3.3 Air Quality and Global Climate Change

3.3.1 Introduction

Section 3.3, Air Quality and Global Climate Change, of the *Burbank to Los Angeles Project Section Environmental Impact Report/Environmental Impact Statement* (EIR/EIS) analyzes the potential impacts of the No Project Alternative and the High-Speed Rail (HSR) Build Alternative and describes impact avoidance and minimization features (IAMF) that would avoid, minimize, or reduce these impacts. Where applicable, mitigation measures are proposed to further reduce, compensate for, or offset impacts of the HSR Build Alternative. Section 3.3 also defines the air quality and global climate change within the region and describes the affected environment in the resource study areas (RSA).

Air Quality and Global Climate Change

Air quality and the earth's climate are important resources that need to be protected to safeguard human health and welfare. Because of this, potentially adverse impacts on air quality and climate resulting from federally funded transportation projects are regulated. These regulations require an evaluation to avoid or minimize adverse impacts on air quality and climate. If impacts are unavoidable, further planning must be completed to try to minimize harm.

The *Burbank to Los Angeles Project Section Draft Air Quality and Global Climate Change Technical Report* (California High-Speed Rail Authority [Authority] 2020) is the basis for the information provided in this section.

Air quality and global climate change are important considerations in analyzing the impacts of the HSR Build Alternative because of their influence on human health and a community's quality of life. Other resource sections in this EIR/EIS that provide additional information related to impacts on air quality and global climate change include:

- **Section 3.2, Transportation**—Construction and operations impacts of the HSR Build Alternative on existing transportation infrastructure and travel patterns
- **Section 3.6, Public Utilities and Energy**—Construction and operations impacts of the HSR Build Alternative on existing utility infrastructure
- **Section 3.10, Hazardous Materials and Waste**—Construction and operations impacts of the HSR Build Alternative on proper disposal of hazardous materials and wastes
- **Section 3.13, Station Planning, Land Use, and Development**—Construction and operations impacts of the HSR Build Alternative on land uses and stations and a description of how growth is addressed in local land use regulations
- **Section 3.18, Regional Growth**—Construction and operations impacts of the HSR Build Alternative that would induce growth related to population and employment
- **Section 3.19, Cumulative Impacts**—Construction and operations impacts of the HSR Build Alternative on cumulatively considerable impacts to air quality and global climate change.

3.3.1.1 Definition of Resources

The following are definitions for air quality and global climate change analyzed in this Draft EIR/EIS.

- **Air Quality** describes the amount of air pollution to which the public is exposed.
- **Air Pollution** refers to one or more chemical substances that degrades the quality of the atmosphere. Air pollutants degrade the atmosphere by reducing visibility, damaging property, and combining to form smog. Air pollutants can result in impacts on humans by reducing human health, by reducing the productivity or vigor (a measure of the increase in plant growth or foliage volume through time after planting) of crops or natural vegetation, by reducing animal health, and by damaging property. Three general classes of air pollutants are of concern: criteria pollutants, toxic air contaminants (TAC), and greenhouse gases (GHG).

- **Criteria Pollutants**—Criteria pollutants are pollutants for which the U.S. 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 to 2.5 microns in diameter), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. The statewide standards established for California also incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.
- **TACs**—The Toxic Air Contaminant Identification and Control Act (Assembly Bill [AB] 1807) created California's program to reduce exposure to air toxics. TACs are airborne substances that are capable of causing chronic (i.e., of long duration) and acute (i.e., severe but of short duration) adverse effects on human health. The USEPA finalized a rule (Control of Hazardous Air Pollutants from Mobile Sources, February 9, 2007) to reduce hazardous air pollutants from mobile sources. The TACs of concern are nine mobile source air toxics (MSAT) identified by the USEPA as having significant contributions from mobile sources: acrolein, benzene, 1,3-butadiene, acetaldehyde, diesel particulate matter (DPM) and diesel exhaust organic gases, ethylbenzene, 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 O_3, water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (e.g., chlorofluorocarbons and hydrochlorofluorocarbons). Long-lived GHGs include CO_2, CH_4, N_2O, and fluorinated gases.

- **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

Federal, state, and local laws, regulations, orders, or plans relevant to air quality and global climate change in the geographic area that is affected by the project are presented below. General National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) requirements for assessment and disclosure of environmental impacts are described in Section 3.1, Introduction, and are therefore not restated in this resource section.

3.3.2.1 Federal

Federal Railroad Administration, Procedures for Considering Environmental Impacts (64 Fed. Reg. 28545)

On May 26, 1999, the Federal Railroad Administration (FRA) released *Procedures for Considering Environmental Impacts* (FRA 1999). These FRA procedures supplement the Council on Environmental Quality Regulations (Code of Federal Regulations [C.F.R.] Title 40, Part 1500 et seq.) and describe the FRA's process for assessing the environmental impacts of actions and legislation proposed by the agency and for the preparation of associated documents (42 U.S. Code 4321 et seq.). The FRA Procedures for Considering Environmental Impacts states that "the EIS should identify any significant changes likely to occur in the natural environment and in the developed environment. The EIS should also discuss the consideration given to design quality, art, and architecture in project planning and development as required by U.S. Department of Transportation Order 5610.4." These FRA procedures state that an EIS should consider possible impacts on air quality.

U.S. Environmental Protection Agency

The USEPA is responsible for establishing the National Ambient Air Quality Standards (NAAQS), enforcing the Clean Air Act (CAA; 42 U.S. Code § 7401), and regulating transportation-related emission sources, such as aircraft, ships, and certain types of locomotives, under the exclusive authority of the federal government. The USEPA also establishes vehicular emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet stricter emission standards established by the California Air Resources Board (CARB).

Clean Air Act (42 U.S. Code § 7401) and Conformity Rule (40 C.F.R Parts 51 and 93)

The CAA defines nonattainment areas as geographic regions designated as not meeting one or more of the NAAQS. It 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 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.

Clean Air Act

The Clean Air Act (CAA) is the comprehensive federal law that regulates air emissions from stationary and mobile sources. This law authorizes the U.S. Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and welfare and to regulate emissions of hazardous air pollutants. California has also implemented state-specific clean air requirements to protect the health and welfare of California citizens.

Pursuant to CAA Section 176(c) requirements, the USEPA promulgated the General Conformity Rule (40 C.F.R. 51, Subpart W, and 40 C.F.R. Part 93, Subpart B) "Determining Conformity of General Federal Actions to State or Federal Implementation Plans" (§ 63214) (November 30, 1993) as amended; 75 *Federal Register* (Fed. Reg.) 17253 (April 5, 2010), and the Transportation Conformity Rule (40 C.F.R. Part 93, Subpart A). The General Conformity Rule applies to all federal actions, including those by the FRA and the U.S. Army Corps of Engineers, except for those federal actions that are excluded from review (e.g., stationary source emissions) or that involve transportation plans, programs, and projects funded by Federal Highway Administration (FHWA) or Federal Transit Administration, which are subject to the Transportation Conformity Rule.

In states that have an approved SIP revision adopting general conformity regulations, 40 C.F.R. Part 51W applies; in states that do not have an approved SIP revision adopting general conformity regulations, 40 C.F.R. Part 93B applies.

The General Conformity Rule is used to determine if federal actions meet the requirements of the CAA and the applicable SIP by ensuring that air emissions related to the action do not:

- Cause or contribute to new violations of a NAAQS
- Increase the frequency or severity of any existing violation of a NAAQS
- Delay timely attainment of a NAAQS or interim emission reduction

A conformity determination under the General Conformity Rule is required if the federal agency determines the following:

- The action will occur in a nonattainment or maintenance area
- One or more specific exemptions do not apply to the action
- The action is not included in the federal agency's "presumed to conform" list
- The emissions from the proposed action are not within the approved emissions budget for an applicable facility

- The total direct and indirect emissions of a pollutant (or its precursors), are at or above the *de minimis* levels[1] established in the general conformity regulations (75 Fed. Reg. 17255)

Conformity regulatory criteria are listed in 40 C.F.R. Part 93.158. An action will be determined to conform to the applicable SIP if, for each pollutant that exceeds the *de minimis* emissions level in 40 C.F.R. Part 93.153(b), or otherwise requires a conformity determination due to the total of direct and indirect emissions from the action, the action meets the requirements of 40 C.F.R. Part 93.158(c).

In addition, federal activities may not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions toward attainment. The proposed project is subject to review under the USEPA General Conformity Rule. However, there may be some smaller highway elements of the project that will be dealt with through the case-by-case modification of the regional transportation plan (RTP) consistent with transportation conformity.

National and State Ambient Air Quality Standards

As required by the CAA, the USEPA has established NAAQS for six major air pollutants known as criteria pollutants. The criteria pollutants are: O_3, $PM_{2.5}$, PM_{10}, CO, NO_2, SO_2, and lead. The California Ambient Air Quality Standards (CAAQS) are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

Table 3.3-1 summarizes state and federal standards (as of May 2016). 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 effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

Mobile Source Air Toxics

In addition to the criteria pollutants for which there are NAAQS, the USEPA regulates MSATs. In February 2007, the USEPA finalized a rule (Control of Hazardous Air Pollutants from Mobile Sources) to reduce hazardous air pollutants from mobile sources. The rule limits the benzene content of gasoline and reduces toxic emissions from passenger vehicles and gas cans. The USEPA estimates that in 2030 this rule would reduce total emissions of MSATs by 330,000 tons and volatile organic compound (VOC) emissions (precursors to O_3 and $PM_{2.5}$) by more than 1 million tons. The latest revision to this rule occurred in October 2008. This revision added specific benzene control technologies that the previous rule did not include. No federal or California ambient standards exist for MSATs. Specifically, the USEPA has not established NAAQS or provided standards for hazardous air pollutants.

On February 3, 2006, the FHWA released *Interim Guidance on Air Toxic Analysis in NEPA Documents* (FHWA 2006). This guidance was superseded on September 30, 2009, by the FHWA's *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents* (FHWA 2009), and was updated on December 6, 2012 (FHWA 2012). The FHWA most recently updated the guidance on October 18, 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 considered interim because MSAT science is still evolving. As the science progresses, the FHWA is expected to update the guidance. The Authority considers the FHWA guidance when evaluating the impacts of projects that have the potential to affect MSAT emissions.

[1] Section 40 C.F.R. 93 Part 153 defines *de minimis* levels as the minimum rates (tons per year) for which a conformity determination must be performed for various criteria pollutants in various areas.

Table 3.3-1 Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone[8] (O_3)	1-Hour	0.09 ppm (180 μg/m³)	Ultraviolet Photometry	–	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.070 ppm (137 μg/m³)		0.070 ppm (137 μg/m³)		
Respirable Particulate Matter (PM_{10})[9]	24-Hour	50 μg/m³	Gravimetric or Beta Attenuation	150 μg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 μg/m³		–		
Fine Particulate Matter ($PM_{2.5}$)[9]	24-Hour	–	–	35 μg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 μg/m³	Gravimetric or Beta Attenuation	12.0 μg/m³	15 μg/m³	
Carbon Monoxide (CO)	1-Hour	20 ppm (23 mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m³)	–	Non-Dispersive Infrared Photometry (NDIR)
	8-Hour	9 ppm (10 mg/m³)		9 ppm (10 mg/m³)	–	
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m³)		–	–	
Nitrogen Dioxide (NO_2)[10]	1-Hour	0.18 ppm (339 μg/m³)	Gas Phase Chemiluminescence	0.100 ppm (188 μg/m³)	–	Gas Phase Chemilumin-escence
	Annual Arithmetic Mean	0.030 ppm (57 μg/m³)		0.053 ppm (100 μg/m³)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1-Hour	0.25 ppm (655 μg/m³)	Ultraviolet Fluorescence	0.075 ppm (196 μg/m³)	–	Ultraviolet Fluorescence; Spectrophotom etry (Pararosaniline Method)
	3-Hour	–		–	0.5 ppm (1300 μg/m³)	
	24-Hour	0.04 ppm (105 μg/m³)		0.14 ppm (for certain areas)[11]	–	
	Annual Arithmetic Mean	–		0.030 ppm (for certain areas)[11]	–	
Lead[12, 13]	30-Day Average	1.5 μg/m³	Atomic Absorption	–	–	High-Volume Sampler and Atomic Absorption
	Calendar Quarter	–		1.5 μg/m³ (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	–		0.15 μg/m³		

Pollutant	Averaging Time	California Standards[1]		Federal 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 Federal Standards		
Sulfates	24-Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24-Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

Source: California Air Resources Board, 2016

[1] California standards for O_3, CO (except 8-hour Lake Tahoe), SO_2 (1- and 24-hour), NO_2, and suspended 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 O_3, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The O_3 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/m³ 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 federal policies.

[3] Concentration 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 procedure which can be shown to the satisfaction of 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 O_3 primary and secondary standards were lowered from 0.075 ppm to 0.070 ppm.

[9] On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m³ to 12.0 µg/m³. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m³, as was the annual secondary standard of 15 µg/m³. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m³ 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 standards are in units of ppb. California standards are in units of ppm. To directly compare the national standards 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 standards 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] 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/m³ 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, CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents. These are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

°C = degrees Celsius
µg/m³ = micrograms per cubic meter
CARB = California Air Resources Board
mg/m³ = milligrams per cubic meter
ppb = parts per billion
ppm = parts per million
USEPA = U.S. Environmental Protection Agency

Greenhouse Gas Regulations

GHG emissions are regulated at the federal and state levels. Laws and regulations, as well as plans and policies, have been adopted to address global climate change issues. Key federal regulations relevant to the project are summarized below.

On September 22, 2009, the USEPA published the Final Rule that requires mandatory reporting of GHG emissions from large sources in the U.S. (USEPA 2010a). The gases covered by the Final Rule are CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases, including nitrogen trifluoride, and hydrofluorinated ethers. Currently, this is not a transportation-related regulation and, therefore, does not apply to this project. However, the methodology developed as part of this regulation is helpful in identifying potential GHG emissions.

On December 7, 2009, the *Final Endangerment and Cause or Contribute Findings for Greenhouse Gases* under Section 202(a) of the CAA was signed by the USEPA administrator. The endangerment finding states that current and projected concentrations of the six key well-mixed GHGs in the atmosphere—CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—threaten the public health and welfare of current and future generations. Furthermore, it states that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare (USEPA 2010b).

Based on the endangerment finding, the USEPA revised vehicle emission standards. The USEPA and the National Highway Traffic Safety Administration updated the Corporate Average Fuel Economy fuel standards on October 15, 2012 (77 Fed. Reg. 62623), requiring substantial improvements in fuel economy for all vehicles sold in the U.S. The new standards apply to new passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2017 through 2025. The USEPA GHG standards require that these vehicles meet an estimated combined average emissions level of 163 grams of CO_2 per mile in model year 2025, which would be equivalent to 54.5 miles per gallon if the automotive industry were to meet this CO_2 level entirely through fuel economy improvements.

On September 15, 2011, the USEPA and the National Highway Traffic Safety Administration issued a final rule of *Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles* (76 Fed. Reg. 7106). This final rule is tailored to each of the three regulatory categories of heavy-duty vehicles—combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles. The USEPA and the National Highway Traffic Safety Administration estimated that the new 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.

In January 2012, CARB approved a vehicle emissions control program for model years 2017 through 2025. This is called the Advanced Clean Cars Program. On August 28, 2012, the USEPA and the National Highway Traffic Safety Administration issued a joint final rulemaking to establish 2017 through 2025 GHG emissions and Corporate Average Fuel Economy (CAFE) standards. 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 on December 31, 2012.

On August 24, 2018, the USEPA and the National Highway Traffic Safety Administration proposed the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks. The SAFE Vehicles Rule, if finalized, would amend certain existing CAFE and tailpipe CO_2 emissions standards for passenger cars and light trucks and establish new standards, all covering model years 2021 through 2026. More specifically, the National Highway Traffic Safety Administration is proposing new CAFE standards for model years 2022 through 2026 and amending its 2021 model year CAFE standards, and the USEPA is proposing to amend its CO_2 emissions standards for model years 2021 through 2025 in addition to establishing new standards for model year 2026. The agencies proposed to retain the model year 2020 standards for both programs through model year 2026, but they also requested comment on a range of other alternatives.

3.3.2.2 State

California Clean Air Act

The California Clean Air Act requires that nonattainment areas achieve and maintain the health-based CAAQS by the earliest practicable date. The California Clean Air Act is administered by CARB at the state level and by local air quality management districts at the regional level. Air districts are required to develop plans and control programs for attaining the state standards.

CARB is responsible for ensuring implementation of the California Clean Air Act, meeting state requirements of the federal CAA, and establishing the CAAQS. CARB is also responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment. CARB also establishes passenger vehicle fuel specifications.

Asbestos Control Measures

CARB has adopted two airborne toxic control measures for controlling naturally occurring asbestos—the Asbestos Airborne Toxic Control Measure for Surfacing Applications (California Code of Regulations, Title 17, Section 93106) and the Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations (California Code of Regulations, Title 17, Section 93105). In addition, the USEPA is responsible for enforcing regulations relating to asbestos renovations and demolitions; however, the USEPA can delegate this authority to state and local agencies. CARB and local air districts have been delegated authority to enforce the Federal National Emission Standards for Hazardous Air Pollutants regulations for asbestos.

Greenhouse Gas Regulations

California has taken proactive steps, briefly described below, to address the issues associated with GHG emissions and climate change.

Assembly Bill 1493

In 2002, with the passage of AB 1493 (Pavley), California launched an innovative and proactive approach to addressing GHG emissions and climate change at the state level. AB 1493 requires CARB to develop and implement regulations to reduce automobile and light-truck GHG emissions. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the model year 2009. Although litigation challenged these regulations and the USEPA initially denied California’s related request for a waiver, the waiver request was granted (USEPA 2010c).

Executive Order S-3-05

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order (EO) S-3-05. EO S-3-05 establishes targets to reduce California’s GHG emissions to year 2000 levels by 2010; 1990 levels by 2020; and 80 percent below the 1990 levels by 2050. EO S-3-05 also calls for the California Environmental Protection Agency (Cal-EPA) to prepare biennial science reports on the potential effect of continued global warming on certain sectors of the California economy. As a result of the scientific analysis presented in these biennial reports, a comprehensive 2009 Climate Adaptation Strategy (California Natural Resources Agency 2009) was released following extensive interagency coordination and stakeholder input. The latest of these reports, *Climate Action Team Biennial Report*, was published December 2010 (Cal-EPA 2010).

Assembly Bill 32

In 2006, the goal of EO S-3-05 was further reinforced with the passage of AB 32 (Pavley; Chapter 488, Statutes of 2006), the Global Warming Solutions Act of 2006. AB 32 sets overall GHG emissions reduction goals and mandates that CARB create a plan that includes market mechanisms and implement rules to achieve *real, quantifiable, cost-effective reductions of GHGs*. EO S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the state's Climate Action Team.

Among AB 32's specific requirements are the following:

- CARB will prepare and approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions from sources or categories of sources of GHGs by 2020 (California Health and Safety Code 38561). The scoping plan, approved by CARB on December 12, 2008, with updates in 2014 and 2017, provides the outline for future actions to reduce GHG emissions in California via regulations, market mechanisms, and other measures. On December 14, 2017, CARB adopted the *2017 Climate Change Scoping Plan Update* (Second Update) (CARB 2017). This 2017 update proposes CARB's strategy for achieving the state's 2030 GHG target as established in Senate Bill (SB) 32 (discussed below).

  The scoping plan includes the implementation of the California HSR System as a GHG reduction measure, estimating a 2020 reduction of 1 MMT of carbon dioxide equivalent (CO_2e) emissions.
- Identify the statewide level of GHG emissions in 1990 to serve as the emissions limit to be achieved by 2020 (California Health and Safety Code 38550). In December 2007, CARB approved the 2020 emissions limit of 427 MMT CO_2e of GHG.
- Adopt a regulation requiring the mandatory reporting of GHG emissions (California Health and Safety Code 38530). In December 2007, CARB adopted a regulation requiring the largest industrial sources to report and verify their GHG emissions. The reporting regulation serves as a solid foundation to determine GHG emissions and track future changes in emission levels.

Executive Order S-01-07

With EO S-01-07, Governor Schwarzenegger set forth the Low Carbon Fuel Standard for California. This EO calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020.

Sustainable Communities and Climate Protection Act of 2008 (Senate Bill 375)

SB 375, the Sustainable Communities and Climate Protection Act of 2008 (Chapter 728, Statutes of 2008), was signed into law by the governor on September 30, 2008, and became effective January 1, 2009. This law requires CARB to develop regional reduction targets for GHG emissions and prompts the creation of regional land use and transportation plans to reduce emissions from passenger vehicle use throughout the state. The targets apply to the regions in the state covered by California's 18 metropolitan planning organizations (MPO). The 18 MPOs have been tasked with creating the regional land use and transportation plans called "sustainable community strategies" (SCS). The MPOs are required to develop the SCS through integrated land use and transportation planning and to demonstrate an ability to attain the proposed reduction targets by 2020 and 2035. This would be accomplished through either the financially constrained SCS as part of its RTP or through an unconstrained alternative planning strategy. If regions develop integrated land use, housing, and transportation plans that meet the SB 375 targets, new projects in these regions can be relieved of certain review requirements of CEQA.

Pursuant to SB 375, CARB appointed a Regional Targets Advisory Committee on January 23, 2009, to provide recommendations on factors to be considered and methodologies to be used in CARB's target-setting process. The Regional Targets Advisory Committee was required to provide its recommendations in a report to CARB by September 30, 2009. The report included relevant issues, such as data needs, modeling techniques, growth forecasts, jobs-housing balance, interregional travel, various land use/transportation issues affecting GHG emissions, and overall issues relating to setting these targets. CARB adopted the final targets on September 23, 2010. CARB must update the regional targets every 8 years (or 4 years if it so chooses), consistent with each MPO update of its RTP.

Executive Order S-13-08

EO S-13-08 (November 2008) is intended to hasten California's response to the impacts of global climate change, particularly sea-level rise. Therefore, the EO directs state agencies to take specified actions to assess and plan for such impacts. The final 2009 *California Climate Adaptation Strategy* report was issued in December 2009 by the California Natural Resources Agency (California Natural Resources Agency 2009), and an update, *Safeguarding California: Reducing Climate Risk*, followed in July 2014 (California Natural Resources Agency 2014). To assess the state's vulnerability, the report summarizes key climate change impacts to the state for the following areas: agriculture, biodiversity and habitat, emergency management, energy, forestry, ocean and coastal ecosystems and resources, public health, transportation, and water.

Executive Order B-30-15 and SB 350

In April 2015, Governor Jerry 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 emissions reduction target of 40 percent below 1990 levels by 2030 is intended to make it possible to reach the state's 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 (Office of the Governor 2015).

100 Percent Clean Energy Act (Senate Bill 100)

SB 100, the 100 Percent Clean Energy Act of 2018, establishes a state goal to acquire 100 percent of California electricity from eligible renewable energy resources and zero-carbon resources by December 31, 2045. SB 100 also requires electric utilities and other service providers to generate 60 percent of their power from renewable sources by 2030 and requires that the remaining 40 percent be generated by zero-carbon sources of electricity by 2045. In addition, 100 percent of electricity procured will serve all state agencies (including the Authority) by 2045.

California Global Warming Solutions Act of 2016 (Senate Bill 32)

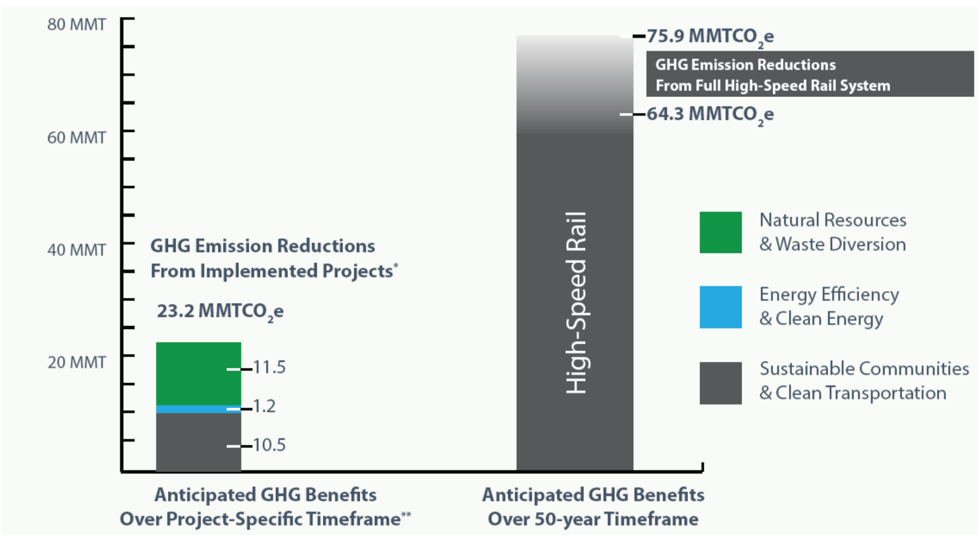
On September 8, 2016, Governor Brown signed into law SB 32, effectively extending California's landmark AB 32 to the year 2030. SB 32 effectively establishes a new GHG reduction goal for statewide emissions of 40 percent below 1990 levels by 2030. This goal is 40 percent more stringent than the current AB 32 mandated goal of 1990 levels by 2020. In terms of metric tons, this means that to meet SB 32 targets, California would need to reduce emissions from 441.5 MMT CO_2e in 2014 to 431 MMT CO_2e by 2020, and would need to reduce emissions to 258.6 MMT CO_2e by 2030.

2017 Climate Change Scoping Plan

On December 14, 2017, CARB adopted the 2017 Climate Change Scoping Plan, the strategy for achieving California's 2030 GHG emissions target, per the Legislature's direction in SB 32. The 2030 midterm target helps to frame the suite of policy measures, regulations, planning efforts, and investments in clean technologies and infrastructure needed to continue driving down emissions. The plan builds on the state's existing policy (namely the previous two scoping plans developed pursuant to AB 32), ties together a number of sector-specific strategies, and solidifies targets within sectors. The plan is intended to drive the state toward more electric vehicles; cleaner electricity to fuel those cars; denser, more walkable communities with more efficient buildings; and less-polluting agriculture. The scoping plan also reinforced legislative direction by confirming the role of the cap-and-trade program to achieve more than one-third of the state's requisite reductions by 2030.

California Climate Investments Program

California Climate Investments is a statewide initiative that puts billions of cap-and-trade dollars to work reducing GHG emissions, strengthening the economy, and improving public health and the environment. The cap-and-trade program also creates a financial incentive for industries to invest in clean technologies and to develop innovative ways to reduce pollution. California Climate Investments projects include affordable housing, sustainable agriculture, environmental restoration, waste diversion and recycling, renewable energy, public transportation, and zero-emission vehicles. According to the California Climate Investments program, the California HSR System will generate an aggregate reduction in statewide GHG emissions over a 50-year period. Figure 3.3-1 illustrates the estimated aggregate reductions in GHG emissions that would result from the HSR system over a 50-year timeframe.



*Estimates for California Climate Investments implemented through 2016 & 2017; does not include benefits from High-Speed Rail Project.
**https://www.arb.ca.gov/cc/capandtrade/auctionproceeds/2018_cci_annual_report.pdf

Source: California High-Speed Rail Authority, 2018

Figure 3.3-1 Aggregate GHG Emissions Reductions That Would Result from the California High-Speed Rail Project

3.3.2.3 Regional and Local

Adopted local and regional plans, policies, and regulations related to air quality and GHG emissions are provided in the sections below.

Local Air Quality Management District Regulations

The Burbank to Los Angeles Project Section is within the cities of Burbank, Glendale, and Los Angeles, which are also within the South Coast Air Quality Management District (SCAQMD). This air district includes all of Orange County, Los Angeles County except for the Antelope Valley, the nondesert portion of western San Bernardino County, and the western and Coachella Valley portions of Riverside County. The SCAQMD is the agency principally responsible for air pollution control in the South Coast Air Basin (Basin) and is tasked with implementing certain programs and regulations required by the CAA and the California Clean Air Act. The SCAQMD prepares plans to attain CAAQS and NAAQS.

The SCAQMD is directly responsible for reducing emissions from stationary (area and point) sources. The SCAQMD develops rules and regulations, establishes permitting requirements, inspects emissions sources, and enforces such measures through educational programs or fines, when necessary. The following sections summarize the SCAQMD rules and regulations that may be applicable to the project.

Regulation IV—Prohibitions

This regulation sets forth the restrictions for visible emissions, odor nuisance, fugitive dust, various air pollutant emissions, fuel contaminants, and startup/shutdown exemptions.

Rule 402—Nuisance
This rule restricts the discharge of any contaminant in quantities that cause, or have a natural ability to cause, injury, damage, nuisance, or annoyance to businesses, property, or the public. The proposed project does not plan to discharge any contaminants in quantities that would cause injury to the public or property.

Rule 403—Fugitive Dust
This rule requires the prevention, reduction, or mitigation of fugitive dust emissions from a project site. Rule 403 restricts visible fugitive dust to a project property line, restricts the net PM_{10} emissions to less than 50 micrograms per cubic meter ($\mu g/m^3$) and restricts the tracking out of bulk materials onto public roads. Additionally, Rule 403 requires an applicant to utilize one or more of the best available control measures (identified in the tables within the rule). Mitigation measures may include adding freeboard to haul vehicles, covering loose material on haul vehicles, using dust suppressants such as watering or chemical soil stabilizers, and/or ceasing all activities.

Regulation XI—Source-Specific Standards

Regulation XI sets emissions standards for different sources.

Rule 1113—Architectural Coatings
This rule limits the amount of VOCs from architectural coatings and solvents, which lowers the emissions of odorous compounds.

Metropolitan Planning Organization

The Southern California Association of Governments (SCAG) is the MPO for Los Angeles, Orange, Riverside, San Bernardino, Imperial, and Ventura Counties. It is a regional planning agency and serves as a forum for regional issues relating to transportation, the economy and community development, and the environment. SCAG is the federally designated MPO for most of the Southern California region and is the largest MPO in the nation. Regarding air quality planning, SCAG prepares the RTP and Federal Transportation Improvement Program, which address regional development and growth forecasts and form the basis for the land use and transportation control portions of the Air Quality Management Plan (AQMP), which in turn are utilized in the preparation of the air quality forecasts and consistency analysis included in the AQMP. The RTP, the Federal Transportation Improvement Program, and the AQMP are based on projections originating within local jurisdictions.

Although SCAG is not an air quality management agency, it is responsible for developing transportation, land use, and energy conservation measures that affect air quality. SCAG's Regional Comprehensive Plan provides growth forecasts that are used in the development of air quality-related land use and transportation control strategies by the SCAQMD. The Regional Comprehensive Plan is a framework for decision-making for local governments, assisting them in meeting federal and state mandates for growth management, mobility, and environmental standards while maintaining consistency with regional goals regarding growth and changes through the year 2016 and beyond. Policies within the Regional Comprehensive Plan include consideration of air quality, land use, transportation, and economic relationships by all levels of government.

On April 7, 2016, SCAG adopted the 2016–2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). Using growth forecasts and economic trends, the RTP provides a vision for transportation throughout the region for the next 20 years. It considers the role of transportation in the broader context of economic, environmental, and quality-of-life goals for the future, and identifies regional transportation strategies to address mobility needs. The SCS is a newly required element of the RTP that integrates land use and transportation strategies to achieve CARB emissions reduction targets. The inclusion of the SCS is required by SB 375. The RTP/SCS would successfully achieve and exceed the GHG emission-reduction targets set by CARB by achieving an 8 percent reduction by 2020, a 19 percent reduction by 2035, and a 21 percent reduction by 2040 compared to the 2005 level on a per-capita basis. This RTP/SCS also meets criteria pollutant emission budgets set by the USEPA.

The 2016–2040 RTP/SCS includes a strong commitment to reducing emissions from transportation sources to comply with SB 375, improve public health, and meet the NAAQS as set forth by the CAA. Even with ongoing aggressive control strategies, ever more stringent national O_3 standards require further nitrogen oxides (NO_X) emission reductions in the SCAG region. In the Basin, for example, it is estimated that NO_X emissions will need to be reduced by approximately 50 percent in 2023 and by an additional 15 percent beyond 2023 levels by 2031. Most sources of NO_X emissions (i.e., cars and factories) are already reduced by over 90 percent from uncontrolled conditions. The level of emission reduction required is so significant that 2030 emissions forecast from just three sources—ships, trains, and aircraft—would lead to O_3 levels reduced to near the federal standard. To accomplish the reduction required to meet O_3 standards, the 2016–2040 RTP/SCS contains a regional commitment for the broad deployment of zero- and near-zero-emission transportation technologies in the 2023–2040 timeframe and clears steps to move toward this objective.

Local Agencies

Table 3.3-2 lists the SCAG RTP/SCS strategic plan and city general plan goals, policies, and ordinances relevant to the air quality and GHG issues within the Burbank to Los Angeles Project Section. Each city's plans are described below.

Table 3.3-2 Regional and Local Plans and Policies

Policy Title	Summary
Southern California Association of Governments 2016–2040 Regional Transportation Plan/Sustainable Community Strategies	
Strategic Plan **Goal 1:** California High Speed Rail	2016 Strategic Plan: The California High-Speed Train will be electrified and will therefore produce no emissions along its operating corridors. Furthermore, the California High-Speed Rail Authority (Authority) has committed to using 100 percent renewable energy to power its trains. Because of the expected reduction in air and automobile travel, the Authority estimates its service will save 2.0 million to 3.2 million barrels of oil annually, beginning in 2030.
Goal 2: Emissions Reduction Targets	The 2016–2040 RTP/SCS includes a strong commitment to reduce emissions from transportation sources to comply with Senate Bill 375, improve public health, and meet the NAAQS as set forth by the Clean Air Act. With the recent CARB updated target-setting activities, the SCAG RTP/SCS is now intended to reduce GHG emissions from passenger vehicles and light-duty trucks by 5 percent per capita by 2020 and 19 percent per capita by 2035 compared to 2005.

Policy Title	Summary
City of Burbank	
City of Burbank 2035 General Plan	
General Plan, Air Quality and Climate Change Element (Adopted in 2013) Goal 1: Reduction of Air Pollution	▪ Policy 1.1: Coordinate air quality planning efforts with local, regional, state, and federal agencies, and evaluate the air quality effects of proposed plans and development projects. ▪ Policy 1.2: Seek to attain or exceed the more stringent of federal or state ambient air quality standards for each criteria air pollutant. ▪ Policy 1.3: Continue to participate in the Cities for Climate Protection Program, South Coast Air Quality Management District's (SCAQMD's) Flag Program, SCAQMD's Transportation Programs (i.e., Rule 2202, Employee Rideshare Program), and applicable state and federal air quality and climate change programs. ▪ Policy 1.5: Require projects that generate potentially significant levels of air pollutants, such as large construction projects, to incorporate best available air quality and greenhouse gas mitigation in project design. ▪ Policy 1.6: Require measures to control air pollutant emissions at construction sites and during soil-disturbing or dust-generating activities (i.e., tilling, landscaping) for projects requiring such activities.
Goal 2: Sensitive Receptors	▪ Policy 2.2 Separate sensitive uses such as residences, schools, parks, and day care facilities from sources of air pollution and toxic chemicals. Provide proper site planning and design features to buffer and protect when physical separation of these uses is not feasible. ▪ Policy 2.3 Require businesses that cause air pollution to provide pollution control measures. ▪ Policy 2.4 Reduce the effects of air pollution, poor ambient air quality, and urban heat island effect with increased tree planting in public and private spaces. ▪ Policy 2.5 Require the use of recommendations from the California Air Resources Board's Air Quality and Land Use Handbook to guide decisions regarding location of sensitive land uses.
Goal 3: Reduction of Greenhouse Gas Emissions	▪ Policy 3.4 Reduce greenhouse gas emissions by promoting development that is pedestrian-friendly and transit-oriented; and promoting energy-efficient building design and site planning.
City of Glendale	
General Plan, Air Quality Element (Adopted in 1994) Goal 1: Air Quality will be healthful for all residents	▪ Policy objective 1: Reduce Glendale's contribution to regional emissions in a manner both efficient and equitable to residents and businesses, since emissions generated within Glendale affect regional air quality. ▪ Policy objective 2: Comply with the AQMP prepared by SCAQMD and the Southern California Association of Governments.
Greener Glendale Sustainability Plan (Adopted in 2012)	One of the goals of the Sustainability Plan is to facilitate the provision of alternative transportation infrastructure for residents and patrons in the Glendale community. ▪ Policy T1-G: Connect Glendale to the regional light rail network and high speed rail, should it be developed.
City of Los Angeles	
General Plan, Land Use Element (Adopted in 1992) Goal 1: Good air quality and mobility	▪ Objective1.3: Reduce particulate air pollutants emanating from construction sites. – Policy 1.3.1: Minimize particulate emission from construction sites.

Policy Title	Summary
Goal 3: Efficient management of transportation facilities and system infrastructure	▪ Objective 3.1: It is the objective to the City to increase the portion of work trips made by transit to levels that are consistent with the goals of the AQMP. – Policy 3.1.1: Implement programs to finance and improve public transit facilities and service. – Policy 3.1.2: Address public safety concerns as part of transit improvement programs to increase transit ridership. – Policy 3.1.2: Cooperate with regional transportation agencies in expediting the development and implementation of regional transit system.
Goal 4: Minimal impact of existing land use patterns and future land use development on air quality	▪ Objective 4.1: It is the objective of the City to include the regional attainment of ambient air quality standards as a primary consideration in land use planning. – Policy 4.1.1: Coordinate with all appropriate regional agencies the implementation of strategies for the integration of land use, transportation, and air quality policies.
Green LA Plan (adopted in 2007)	▪ Transportation Goal: Focus on Mobility for People, Not Cars – Objective: Expand the regional rail network.
Amtrak	
Amtrak Sustainability Policy & Program	▪ Goal: Environmental Compliance – Objective: Comply with the Clean Air Act, and state and local air quality and greenhouse gas emission requirements. ▪ Policy: Implement fuel conservation efforts by encouraging efficient train handling and reducing locomotive idling wherever possible.
Metrolink	
Tier 4 Locomotive Program	▪ Goal: Tier 4 Locomotive Engine Compliance – Objective Achieved: Tier 4 locomotive clean technology was phased into service in fall 2017. Forty locomotives were ordered (Metrolink Tier 4 Fact Sheet [2018]).
Metrolink Fuel Conservation Program	▪ Goal: Environmental Compliance – Objective: Comply with the Clean Air Act, and state and local air quality and greenhouse gas emission requirements. ▪ Policy: Implement fuel conservation efforts by encouraging efficient train handling and reducing locomotive idling wherever possible.
Metrolink Plug-In Program	▪ Goal: Add more plug-in stations – Policy: Implement plug-in stations that supply electric ground power to rail cars during testing and inspection at CMF.

AQMP = air quality management plan
CARB = California Air Resources Board
CMF = Central Maintenance Facility
GHG = greenhouse gas
NAAQS = National Ambient Air Quality Standards
RTP/SCS = Regional Transportation Plan/Sustainable Communities Strategy

City of Burbank

City of Burbank General Plan

The City of Burbank addresses air quality and GHG emissions in the air quality and climate change element of its general plan. The air quality and climate change element includes goals and policies that work to reduce air pollution, reduce the exposure of sensitive receptors to TACs and odors, reduce GHG emissions, and prepare for and adapt to climate change (City of Burbank 2013a).

City of Burbank Sustainability Plan

The City of Burbank also addresses GHG emissions in the *Burbank 2035 Greenhouse Gas Reduction Plan* (City of Burbank 2013b). This plan addresses six main reduction strategies: energy, transportation, water, solid waste, green infrastructure, and city government. The

Burbank 2035 Greenhouse Gas Reduction Plan identifies the following for each reduction strategy: specific measures, actions, and responsible departments for implementation; progress indicators and metrics against which to measure success; and estimated GHG reductions in 2020 and 2035.

City of Glendale

City of Glendale General Plan

The City of Glendale General Plan Air Quality Element recognizes and considers the relationship between land use and air quality in the City of Glendale's planning efforts, identifies ways in which the city can reduce its emissions of air pollutants through various policies and programs, and complies with the region's AQMP. The overall goal of the air quality element is for the City of Glendale to assist other governmental agencies in the attainment of healthful air for Glendale and other Basin residents, including those sensitive to air pollution (City of Glendale 1994).

Greener Glendale Plan

The City of Glendale addresses GHG emissions in its sustainability plan, *Greener Glendale Plan*. The plan assesses what actions the City of Glendale and the community have already taken to be more sustainable and recommends how to build on these efforts. The plan addresses sustainability in Glendale through nine topic areas: cross-cutting approaches, economic development, urban design, waste, energy, urban nature, water, transportation, and environmental health. Each of the nine topics, or focus areas, explores a series of objectives with supporting strategies with quantified GHG reductions in 2020 and 2035 (City of Glendale 2011).

City of Los Angeles

City of Los Angeles General Plan

The City of Los Angeles General Plan Air Quality Element includes goals, objectives, and policies that guide the city in the implementation of air quality improvement programs and strategies. Goals of the air quality element include:

- Good air quality in an environment of continued population growth and healthy economic structure
- Less reliance on single-occupant vehicles with fewer commute and nonwork trips
- Efficient management of transportation facilities and system infrastructure using cost-effective system management and innovative demand-management techniques
- Minimizing the effect of existing land use patterns and future land use development on air quality by addressing the relationship among land use, transportation, and air quality
- Energy efficiency through land use and transportation planning, the use of renewable resources and less-polluting fuels, and the implementation of conservation measures, including passive methods such as site orientation and tree planting
- Citizen awareness of the linkages between personal behavior and air pollution, and participation in efforts to reduce air pollution (City of Los Angeles 1992)

City of Los Angeles Sustainable City Plan

The City of Los Angeles Sustainable City Plan also addresses air quality and GHG emissions. This plan comprises short-term (by 2017) and longer-term (by 2025 and 2035) targets in 14 categories that will advance the city's environment, economy, and equity. These topic areas include: local water, local solar power, energy-efficient buildings, carbon and climate leadership, waste and landfills, housing and development, mobility and transit, prosperity and green jobs, preparedness and resiliency, air quality, environmental justice, urban ecosystem, livable neighborhoods, and lead by example (City of Los Angeles 2015).

Railroads

Table 3.3-2 also lists the policies of public railroad operators relevant to the air quality and GHG issues within the Burbank to Los Angeles Project Section.

Amtrak

In July 2013, Amtrak approved a new sustainability policy, which led to the implementation of a companywide sustainability program. Amtrak's sustainability program focuses on environmental, economic, and social factors within the organization. In addition, the sustainability policy outlines the following commitments:

- Conduct passenger rail business and related businesses and operations in a manner that incorporates the three pillars of sustainability into decision-making and risk management processes for all planning, development, operations, maintenance, and capital improvements and that aligns with and supports the corporate strategic goals, values, and leadership philosophy of the company.
- Set continuous improvement targets by which sustainability performance goals will be set and performance of and adherence to the Sustainability Program will be demonstrated and measured.
- Publicly report on initiatives and accomplishments under the Sustainability Program.
- Use the Environmental Management and Sustainability System as the vehicle to deliver sustainability to the organization (Amtrak 2017).

Metrolink

Metrolink is committed to the goal of cleaner air in Southern California, including within the Burbank to Los Angeles Project Section (Metrolink 2017). By implementing such programs as the Tier 4 Locomotive Engine Program, Fuel Conservation Program, and Plug-in Program, Metrolink has reduced locomotive NO_X and PM emissions by 85 percent, reduced train idling by 35 percent systemwide, and added 55 percent more plug-in stations that supply electric ground power to railcars during testing and inspection. In addition, an electric railcar mover was purchased to perform the testing and inspections. These programs have reduced the fuel use and emissions associated with these operational activities.

3.3.3 Consistency with Plans and Laws

As indicated in Section 3.1, Introduction, CEQA and NEPA regulations[2] require a discussion of inconsistencies or conflicts between a proposed undertaking and federal, state, regional, or local plans and laws.

Several federal and state laws, listed in Section 3.3.2.1, Federal, and Section 3.3.2.2, State, pertain to air quality and global climate change. The Authority, as the CEQA lead agency and also the NEPA lead agency (the Authority is the lead federal agency pursuant to 23 U.S. Code 327 and the terms of the memorandum of understanding between the FRA and the State of California effective July 23, 2019) 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 of the project. Therefore, there would be no inconsistencies between the HSR Build Alternative 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. A total of 11 plans and policies were reviewed. The HSR Build Alternative would be consistent with all policies related to air quality and global climate change.

[2] NEPA regulations refer to the regulations issued by the Council for Environmental Quality at 40 C.F.R. Part 1500.

3.3.4 Methods for Evaluating Impacts

The following sections summarize the RSAs and the methods used for evaluating potential impacts on air quality and global climate change. Additional information related to air quality and global climate change is included in Section 3.2, Transportation; Section 3.6, Public Utilities and Energy; Section 3.10, Hazardous Materials and Wastes; and Section 3.19, Cumulative Impacts.

The methods for evaluating impacts are intended to satisfy the federal and state requirements, including NEPA, CEQA, and general conformity. These laws require consideration of a No Project Alternative (synonymous with the No Action Alternative), which represents the conditions that would occur in the forecast year (in this case, 2040) if the proposed action is not implemented. In addition, in accordance with CEQA requirements, an EIR must include a description of the existing physical environmental conditions near the project. Those conditions, in turn, “will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant” (CEQA Guidelines, Section 15125[a]).

In accordance with these requirements, the HSR Build Alternative’s air quality and global climate change effects are evaluated against existing conditions (2015) and background (i.e., No Project) conditions as they are expected to be in the horizon year of 2040, with consideration of effects in the opening year of HSR operations. This approach complies with CEQA (*Neighbors for Smart Rail v. Exposition Metro Line Construction Authority*, et al. [2013] 57 Cal. 4th 439, 454). Details are presented in Appendix E of the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020).

The analysis estimated the emissions changes due to projected reductions of on-road vehicle miles traveled (VMT) and intrastate air travel, and increases in electrical demand (required to power the HSR Build Alternative).

3.3.4.1 Definition of Resource Study Area

As defined in Section 3.1, Introduction, RSAs are the geographic boundaries in which the Authority conducted environmental investigations specific to each resource topic. The RSA is the area in which all environmental investigations specific to air quality and global climate change are conducted to determine the resource characteristics and potential effects of the Burbank to Los Angeles Project Section. The boundaries of the RSA for air quality and global climate change extend beyond the footprint of the HSR Build Alternative. The local air quality effects analysis focuses on the effects of criteria pollutants, TACs, and GHG emissions from both the construction and operation of the HSR Build Alternative on nearby sensitive receptors. Typical screening distances of 1,000 feet from the project footprint, based on USEPA and CARB modeling guidance and project-specific factors of the HSR Build Alternative, including the location of HSR rail alignment and train stations, were used to determine the RSA. Table 3.3-3 provides a general definition and boundary description for each RSA within the Burbank to Los Angeles Project Section.

Table 3.3-3 Definition of Resource Study Areas

General Definition	Resource Study Area Boundary
Air Quality	
State	State of California
Regional	South Coast Air Basin
Local	Project footprint plus areas within 1,000 feet, and intersections operating at level-of-service E or F
Global Climate Change	
State	State of California

State

The state component of the air quality RSA (for operations) was identified to evaluate potential changes in air quality from large-scale, nonlocalized impacts, such as HSR project electric power requirements, changes in air traffic, and HSR project 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 GHGs. A statewide RSA provides a policy context for California-specific goals within which to view air quality and global climate change issues.

Regional

The regional RSA is situated in Los Angeles County, which is located within the Basin. The Basin covers approximately 6,600 square miles and includes all of Orange County, Los Angeles County except for the Antelope Valley, the nondesert portion of western San Bernardino County, and the western and Coachella Valley portions of Riverside County. The red outline on Figure 3.3-2 presents the boundary of the Basin.

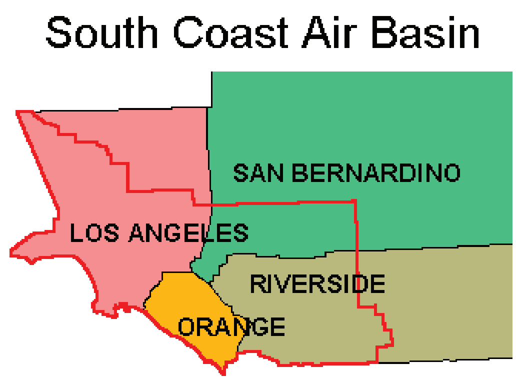


Figure 3.3-2 South Coast Air Basin

Local

The local RSA consists of the project footprint, areas within 1,000 feet of the proposed stations, and intersections operating at level of service (LOS) E or F.

Climate Change

As described above, the RSA for GHG emission analysis is the State of California, based on the properties of GHG pollutants and the statewide nature of the HSR Build Alternative's effect on VMT, aircraft, and energy use.

3.3.4.2 Pollutants for Analysis

Three general classes of pollutants are of concern for this project—criteria pollutants, TACs, and GHGs. Criteria pollutants are those for which the 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. TACs of concern for the Burbank to Los Angeles Project Section are nine MSATs identified by the USEPA as having significant contributions from mobile sources—acrolein, acetaldehyde, benzene,1,3-butadiene, DPM, ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. GHGs are gaseous compounds that limit the transmission of radiated heat from the earth's surface to the atmosphere. GHGs include CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases, including nitrogen trifluoride and hydrofluorinated ethers.

Criteria Pollutants

For these pollutants, both NAAQS and CAAQS have been established to protect public health and welfare. The following sections briefly describe each pollutant.

Ozone

CARB inventories two classes of hydrocarbons—total organic gas (TOG) and reactive organic gases (ROG). ROGs have relatively high photochemical reactivity. The principal nonreactive hydrocarbon is CH_4, which is also a GHG. The major source of ROGs is the incomplete combustion of fossil fuels in internal combustion engines. Other sources of ROGs include the evaporative emissions associated with the use of paints and solvents, the application of asphalt paving, and the use of household consumer products. Adverse impacts on human health are not caused directly by ROGs, but rather by reactions of ROGs that form secondary pollutants. ROGs are also transformed into organic aerosols in the atmosphere, contributing to higher levels of fine PM and lower visibility. CARB uses the term ROGs for air quality analysis, and ROG has the same definition as the federal term VOC. The SCAQMD also uses the term VOC in its CEQA Air Quality Significance Thresholds. For air quality and global climate change analysis, ROG is assumed to be the equivalent to VOC.

> ***Definition of O_3***
>
> O_3 is a colorless, toxic gas found in the earth's upper and lower atmospheric levels. In the upper atmosphere, O_3 is naturally occurring and helps to prevent the sun's harmful ultraviolet rays from reaching the earth. In the lower atmosphere, O_3 is human-made. Although O_3 is not directly emitted, it forms in the lower atmosphere through a chemical reaction between hydrocarbons and oxides of nitrogen (also referred to as VOC and NO_X), which are emitted from industrial sources and automobiles.

Substantial O_3 formations generally require a stable atmosphere with strong sunlight; thus, high levels of O_3 are generally a concern in the summer. O_3 is the main ingredient of smog. O_3 enters the bloodstream through the respiratory system and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. O_3 also damages vegetation by inhibiting its growth. The air quality and global climate change analysis examines the impacts of changes in VOC and NO_X emissions for the HSR Build Alternative on a regional and statewide level.

Particulate Matter

Particulate pollution is composed of solid particles or liquid droplets small enough to remain suspended in the air. In general, particulate pollution can include dust, soot, and smoke. These can be irritating but usually are not toxic. However, particulate pollution can include bits of solid or liquid substances that are highly toxic. Particulate pollutants of concern are PM_{10} and $PM_{2.5}$.

Major sources of PM_{10} include motor vehicles; wood-burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires, brush, and waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. Suspended particulates produce haze and reduce visibility. Data collected through numerous nationwide studies indicate that most of the PM_{10} comes from fugitive dust, wind erosion, and agricultural and forestry sources.

> ***Definition of PM_{10} and $PM_{2.5}$***
>
> PM_{10} refers to PM smaller than or equal to 10 microns in diameter (i.e., about 1/7th the thickness of a human hair). PM pollution consists of small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals.
>
> PM also forms when gases emitted from motor vehicles undergo chemical reactions in the atmosphere.
>
> $PM_{2.5}$ is a subset of PM_{10} and refers to particulates that are 2.5 microns or less in diameter (i.e., roughly 1/28th the diameter of a human hair).

A small portion of PM is the product of fuel combustion processes. In the case of $PM_{2.5}$, the combustion of fossil fuels accounts for a significant portion of this pollutant. The main health impact of airborne PM is on the respiratory system. $PM_{2.5}$ results from fuel combustion (from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, $PM_{2.5}$ can form in the atmosphere from gases such as SO_2, NO_X, and VOC. Like PM_{10}, $PM_{2.5}$ can penetrate the human respiratory system's natural defenses and damage the respiratory tract when inhaled. Whereas PM_{10} tends to collect in the upper portion of the respiratory system, $PM_{2.5}$ can penetrate deeper into the lungs and damage lung tissues. The effects of PM_{10} and $PM_{2.5}$ emissions for the project are examined on a localized (or microscale) basis, a regional basis, and a statewide basis.

Carbon Monoxide

In cities, 85 to 95 percent of all CO emissions may come from motor vehicle exhaust. Prolonged exposure to high levels of CO can cause headaches, drowsiness, loss of equilibrium, or heart disease. CO levels are generally highest in the colder months, when inversion conditions (i.e., when warmer air traps colder air near the ground) are more frequent.

CO concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions. Consequently, CO concentrations must be predicted on a microscale basis.

Definition of CO

CO is a colorless gas that interferes with the transfer of oxygen to the brain. CO emits almost exclusively from the incomplete combustion of fossil fuels.

On-road motor-vehicle exhaust is the primary source of CO.

Nitrogen Dioxide

Nitrogen oxides, also known as nitric oxide (NO) and NO_2 (collectively referred to as NO_X), are major contributors to O_3. NO_2 also contributes to the formation of PM_{10}. At atmospheric concentrations, NO_2 is only potentially irritating. In high concentrations, the result is a brownish-red cast to the atmosphere and reduced visibility. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. In addition, an increase in bronchitis in children 2 to 3 years old has been observed at concentrations below 0.3 parts per million (ppm).

Lead

Lead is a metal that can be suspended in the atmosphere. Lead levels from mobile sources in the urban environment have decreased largely because of the federally mandated switch to lead-free gasoline, and they are expected to continually decrease. An analysis of lead emissions from transportation projects is therefore not warranted.

Sulfur Dioxide

SO_2 can cause acute respiratory symptoms and diminished ventilation in children. SO_2 can also yellow plant leaves and corrode iron and steel. Although diesel-fueled heavy-duty vehicles emit SO_2, transportation sources are not considered by the USEPA (and other regulatory agencies) to be large sources of this pollutant. Therefore, an analysis of the impacts of SO_2 emissions from transportation projects is usually not warranted. However, an analysis of the impacts of SO_2 emissions was conducted for this project.

Toxic Air Contaminants

California law defines a TAC as an air pollutant that "may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health." The USEPA uses the term "hazardous air pollutant" in a similar sense. Controlling air toxic emissions became a national priority with the passage of the CAA, whereby Congress mandated that the USEPA regulate 188 air toxics, also known as hazardous air pollutants. TACs can be emitted from stationary and mobile sources.

Stationary sources of TACs from HSR operations would include use of solvent-based materials (cleaners and coatings) and combustion of fossil fuel in boilers, heaters, and ovens at maintenance facilities. Although the HSR system would not emit TACs, MSATs would be associated with the project chiefly through motor vehicle traffic to and from the HSR stations.

For MSATs, the USEPA has assessed the expansive list of 188 air toxics in its latest rule on the Control of Hazardous Air Pollutants from Mobile Sources and identified 93 compounds emitted from mobile sources that are listed in its Integrated Risk Information System. The USEPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and noncancer hazard contributors from the 2014 National Air Toxics Assessment (USEPA 2018). These nine compounds are 1,3-butadiene, acetaldehyde, acrolein, benzene, DPM, ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. This list, however, is subject to change and may be adjusted in consideration of future USEPA rules.

The following is a brief description of these MSATs.

- **Acetaldehyde** is mainly used as an intermediate in the synthesis of other chemicals. It is ubiquitous in the environment and may be formed in the body from the breakdown of ethanol. Acute (short-term) exposure to acetaldehyde results in effects including irritation of the eyes, skin, and respiratory tract. Symptoms of chronic (long-term) intoxication of acetaldehyde resemble those of alcoholism. Acetaldehyde is considered a probable human carcinogen (Group B2) based on inadequate human cancer studies and animal studies that have shown nasal tumors in rats and laryngeal tumors in hamsters.
- **Acrolein** is a water-white or yellow liquid that burns easily, is readily volatilized, and has a disagreeable odor. It is present as a product of incomplete combustion in the exhausts of stationary equipment (e.g., boilers and heaters) and mobile sources. It is also a secondary pollutant formed through the photochemical reaction of VOCs and NO_X in the atmosphere. Acrolein is considered to have high acute toxicity, and it causes upper respiratory tract irritation and congestion in humans. The major effects from chronic (long-term) inhalation exposure to acrolein in humans consist of general respiratory congestion and eye, nose, and throat irritation. No information is available on the reproductive, developmental, or carcinogenic effects of acrolein in humans. The USEPA considers acrolein data to be inadequate for an assessment of human carcinogenic potential.
- **Benzene** is a volatile, colorless, highly flammable liquid with a sweet odor. Most of the benzene in ambient air is from incomplete combustion of fossil fuels and evaporation from gasoline service stations. Acute inhalation exposure to benzene causes neurological symptoms such as drowsiness, dizziness, headaches, and unconsciousness in humans. Chronic inhalation of certain levels of benzene causes disorders of the blood in humans. Benzene specifically affects bone marrow (the tissues that produce blood cells). Aplastic anemia, excessive bleeding, and damage to the immune system (by changes in blood levels of antibodies and loss of white blood cells) may develop. Available human data on the developmental effects of benzene are inconclusive because of concomitant exposure to other chemicals, inadequate sample size, and lack of quantitative exposure data. The USEPA has classified benzene as a known human carcinogen by inhalation.
- **1,3-Butadiene** is a colorless gas with a mild, gasoline-like odor. Sources of 1,3-butadiene released into the air include motor vehicle exhaust, manufacturing and processing facilities, forest fires or other combustion, and cigarette smoke. Acute exposure to 1,3-butadiene by inhalation in humans results in irritation of the eyes, nasal passages, throat, and lungs. Neurological effects, such as blurred vision, fatigue, headache, and vertigo, have also been reported at very high exposure levels. One epidemiological study reported that chronic exposure to 1,3-butadiene by inhalation resulted in an increase in cardiovascular diseases, such as rheumatic and arteriosclerotic heart diseases. Other human studies have reported effects on blood (Agency for Toxic Substances and Disease Registry 1992). No information is available on the reproductive or developmental effects of 1,3-butadiene in humans. The USEPA has classified 1,3-butadiene as a probable human carcinogen by inhalation.
- **Diesel Particulate Matter/Diesel Exhaust Organic Gases** are a complex mixture of hundreds of constituents in either a gaseous or particle form. Gaseous components of diesel exhaust include CO_2, oxygen, nitrogen, water vapor, CO, nitrogen compounds, sulfur compounds, and numerous low-molecular-weight hydrocarbons. Among the gaseous hydrocarbon components of diesel exhaust that are individually known to be of toxicological relevance are several carbonyls (e.g., formaldehyde, acetaldehyde, and acrolein), benzene, 1,3-butadiene, polycyclic aromatic hydrocarbons (PAH), and nitro-PAHs. DPM is composed

of a center core of elemental carbon and adsorbed organic compounds, as well as small amounts of sulfate, nitrate, metals, and other trace elements. DPM consists primarily of $PM_{2.5}$, including a subgroup with a large number of particles having a diameter of less than 0.1 micrometer. Collectively, these particles have a large surface area, which makes them an excellent medium for adsorbing organic compounds. Also, their small size makes them highly respirable and able to reach deep into lung tissue. Several potentially toxicologically relevant organic compounds—including PAHs, nitro-PAHs, and oxidized PAH derivatives—are on the particles. Diesel exhaust is emitted from on-road mobile sources, such as automobiles and trucks, and from off-road mobile sources (e.g., diesel locomotives, marine vessels, and construction equipment). DPM is directly emitted from diesel-powered engines (primary PM) and can be formed from the gaseous compounds emitted by diesel engines (secondary PM).

Acute or short-term (e.g., episodic) exposure to diesel exhaust can cause acute irritation (e.g., eye, throat and bronchial), neurophysiological symptoms (e.g., lightheadedness and nausea), and respiratory symptoms (e.g., cough and phlegm). Evidence also exists for an exacerbation of allergenic responses to known allergens and asthma-like symptoms. Information from available human studies is inadequate for a definitive evaluation of possible noncancer health effects from chronic exposure to diesel exhaust. However, based on extensive animal evidence, diesel exhaust is judged to pose a chronic respiratory hazard to humans. The USEPA has determined that diesel exhaust is likely to be carcinogenic to humans by inhalation and that this hazard applies to environmental exposures.

- **Ethylbenzene** is mainly used in the manufacture of styrene. Acute (short-term) exposure to ethylbenzene in humans results in respiratory effects, such as throat irritation and chest constriction, irritation of the eyes, and neurological effects such as dizziness. Chronic (long-term) exposure to ethylbenzene by inhalation in humans has shown conflicting results regarding its effects on the blood. Animal studies have reported effects on the blood, liver, and kidneys from chronic inhalation exposure to ethylbenzene. Limited information is available on the carcinogenic effects of ethylbenzene in humans. In a study by the National Toxicology Program, exposure to ethylbenzene by inhalation resulted in an increased incidence of kidney and testicular tumors in rats, and lung and liver tumors in mice. USEPA has classified ethylbenzene as a Group D, not classifiable as to human carcinogenicity.
- **Formaldehyde** is a colorless gas with a pungent, suffocating odor at room temperature. The major emission sources of formaldehyde appear to be power plants, manufacturing facilities, incinerators, and automobile exhaust. However, most of the formaldehyde in ambient air is a result of secondary formation through photochemical reaction of VOCs and NO_X. The major toxic effects caused by acute formaldehyde exposure by inhalation are eye, nose, and throat irritation, and effects on the nasal cavity. Other effects from exposure to high levels of formaldehyde in humans are coughing, wheezing, chest pains, and bronchitis. Chronic exposure to formaldehyde by inhalation in humans has been associated with respiratory symptoms and eye, nose, and throat irritation. The USEPA considers formaldehyde to be a probable human carcinogen.
- **Naphthalene** is used in the production of phthalic anhydride; it is also used in mothballs. Acute (short-term) exposure of humans to naphthalene by inhalation, ingestion, and dermal contact is associated with hemolytic anemia, damage to the liver, and neurological damage. Cataracts have also been reported in workers acutely exposed to naphthalene by inhalation and ingestion. Chronic (long-term) exposure of workers and rodents to naphthalene reportedly causes cataracts and damage to the retina. Hemolytic anemia has been reported in infants born to mothers who sniffed and ingested naphthalene (as mothballs) during pregnancy. Available data are inadequate to establish a causal relationship between exposure to naphthalene and cancer in humans. The USEPA has classified naphthalene as a Group C, possible human carcinogen.
- **Polycyclic Organic Matter** defines a broad class of compounds that includes PAHs, of which benzo[a]pyrene is a member. Polycyclic organic matter compounds are formed primarily by combustion and are present in the atmosphere in particulate form. Sources of

air emissions are diverse and include cigarette smoke, vehicle exhaust, home heating, laying tar, and grilling meat. Cancer is the major concern from exposure to polycyclic organic matter. Epidemiologic studies have reported an increase in lung cancer in humans exposed to coke oven emissions, roofing tar emissions, and cigarette smoke; all of these mixtures contain polycyclic organic matter compounds. Animal studies have reported respiratory tract tumors from inhalation exposure to benzo[a]pyrene and forestomach tumors, leukemia, and lung tumors from oral exposure to benzo[a]pyrene. The USEPA has classified seven PAHs (benzo[a]pyrene, benz[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) as Group B2, probable human carcinogens.

Naturally Occurring Asbestos

Asbestos minerals occur in rocks and soil as the result of natural geologic processes, often in veins near earthquake faults in the Coast Ranges and the foothills of the Sierra Nevada, as well as 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, which 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. It causes cancers of the lung and the lining of internal organs, as well as asbestosis and pleural disease, which inhibit lung function. The USEPA is addressing concerns about potential effects of NOA in several areas in California.

The California Geological Survey identified ultramafic rocks in California to be the source of NOA. In August 2000, the California Department of Conservation, Division of Mines and Geology, published a report titled, *A General Location Guide for Ultramafic Rocks in California Areas More Likely to Contain Naturally Occurring Asbestos* (California Department of Conservation, Division of Mines and Geology 2000). This study was used to determine if NOA would be located within the local RSA.

Greenhouse Gases

GHGs trap heat in the atmosphere, keeping the earth's surface warmer than it otherwise would be. According to National Oceanic and Atmospheric Administration and National Aeronautics and Space Administration data, the earth's average surface temperature has increased by 1.2 to 1.4 degrees Fahrenheit in the last 100 years. Eight of the top 10 warmest years on record have occurred since 1998, with 2012 and 2015 being the 2 warmest years on record. Average global temperatures show a similar trend, and all the top 10 warmest years on record worldwide have occurred since 1998 (USEPA 2016). Most of the warming in recent decades is likely the result of human activities. Other aspects of the climate are also changing, such as rainfall patterns, snow and ice cover, and sea level.

Definition of Greenhouse Gases

GHGs include any gases that absorb infrared radiation in the atmosphere. GHGs include, but are not limited to, water vapor, CO_2, CH_4, N_2O, hydrochlorofluorocarbons, O_3, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. GHGs contribute to the global warming trend, a regional and, ultimately, worldwide concern. What was once a natural phenomenon of climate has been changing because of human activities, resulting in an increase in CO_2.

Some GHGs, such as CO_2, occur naturally and are emitted to the atmosphere through both natural processes and human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. GHGs differ in their ability to trap heat. For example, 1 ton of emissions of CO_2 has a different effect than 1 ton of emissions of CH_4. To compare emissions of different GHGs, inventory compilers use a weighting factor called Global Warming Potential (GWP). To use a GWP, the heat-trapping ability of 1 metric ton (1,000 kilograms) of CO_2 is taken as the standard, and emissions are expressed in terms of CO_2e, although they can also be expressed in terms of carbon equivalents. Therefore, the GWP of CO_2 is 1 and the GWP of CH_4 is 25, whereas the GWP of N_2O is 298.

The principal GHGs that enter the atmosphere because of human activities are described below.

- **CO_2:** CO_2 enters the atmosphere via the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees, and wood products, and as a byproduct of other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- **CH_4:** CH_4 is emitted during the production and transport of coal, natural gas, and oil. CH_4 emissions also result from livestock and other agricultural practices, as well as from the decay of organic waste in municipal solid waste landfills.
- **N_2O:** N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- **Fluorinated Gases:** Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for O_3-depleting substances (e.g., chlorofluorocarbons, hydrochlorofluorocarbons, and halons). These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as high-GWP gases.

Due to the global nature of GHG emissions and the nature of the electrical grid system, GHGs will be examined on a statewide level.

3.3.4.3 Impact Avoidance and Minimization Features

The HSR Build Alternative incorporates standardized HSR features to avoid and minimize impacts. These features are referred to as IAMFs. The Authority would implement IAMFs during project design and construction, and as such, the analysis of impacts of the HSR Build Alternative 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 HSR Build Alternative design. AQ-IAMF#5 requires that all construction equipment engines meet the USEPA emission standards that were applicable for its model year. These standards have become more stringent over time, culminating in the current Tier 4 standards. Consequently, newer-model-year vehicles emit less than older ones, and the newer the average age of the vehicle fleet, the lower the average emissions. This measure would avoid or minimize impacts by reducing exhaust emissions of criteria pollutants and TACs through limiting the average age of heavy-duty construction vehicles subject to this IAMF.

The emissions reductions achieved by these IAMFs were incorporated into the air quality modeling by adjusting the modeled emission rates for the affected emission sources:

- AQ-IAMF#1: Fugitive Dust Emissions: The contractor would employ several control measures to minimize and control fugitive dust emissions and would prepare a fugitive dust control plan for each distinct construction segment.
- AQ-IAMF#2: Selection of Coatings: The contractor would use lower-VOC-content paint than that required by SCAQMD Rule 1113.
- AQ-IAMF#3: Renewable Diesel Fuel: The contractor would use renewable diesel fuel to minimize and control exhaust emissions from all heavy-duty diesel-fueled construction diesel equipment and on-road diesel trucks.
- AQ-IAMF#4: Reduce Criteria Exhaust Emissions from Construction Equipment: All heavy-duty off-road construction diesel equipment used during the construction phase would meet Tier 4 engine requirements.
- AQ-IAMF#5: Reduce Criteria Exhaust Emissions from On-Road Construction Equipment: All on-road trucks would be model year 2010 or newer.
- AQ-IAMF#6: Reduce the Potential Impact of Concrete Batch Plants: The contractor would prepare a technical memorandum documenting the concrete batch plant siting criteria

(including locating the plant at least 1,000 feet from sensitive receptors) and utilization of typical control measures.

3.3.4.4 Methods for NEPA and CEQA Impact Analysis

This section describes the sources and methods the Authority used to analyze the potential impacts on air quality and global climate change from implementing the HSR Build Alternative. These methods apply to both NEPA and CEQA unless otherwise indicated. Refer to Section 3.1.3.3, Methods for Evaluating Impacts, for a description of the general framework for evaluating impacts under NEPA and CEQA. Laws, regulations, and orders (Section 3.3.2, Laws, Regulations, and Orders) that regulate state, regional, and local air quality and climate conditions were also considered in the evaluation of impacts on air quality and global climate change.

This analysis focuses on the direct and indirect impacts of the HSR Build Alternative on air quality and global climate change. Additional supporting information is provided in Section 6, Methods for Evaluating Effects, of the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020).

Construction Phase

Construction-phase emissions were quantitatively estimated for the earthwork and major civil construction activity during construction of the following components of the HSR Build Alternative:

- At-grade rail segments
- Below-grade rail segments
- Roadway and rail bridges
- Retained-fill rail segments
- HSR stations
- Roadways
- Roadway overcrossings and undercrossings

These major construction activities would account for the majority of earthwork, the largest amount of diesel-powered off-road construction equipment, and the majority of material to be hauled along public streets compared with the other minor construction activities of the HSR Build Alternative. Therefore, the regional emissions and localized emissions from these major activities would account for the majority of construction emissions that would be generated by construction of the HSR Build Alternative. Regional and localized emissions from minor construction activities, such as mobilization and demobilization, were quantified and would contribute to fewer emissions than the major construction activities listed above. The estimated construction emissions from these major as well as minor activities were used to evaluate the regional and localized air quality effects during the construction phase. Project-specific information was analyzed when available. Default emission rates for activities, such as architectural coating, were used if project-specific information was not available. The construction analysis groups major construction activities into the following categories:

- Land clearing
- Land clearing haul roads
- Earthmoving
- Tunneling cut-and-cover
- Materials handling
- Laying track at-grade
- System facilities
- Buildings demolition
- Bridge demolition
- Elevated structures—roads
- Elevated structures—rail
- Roadway construction
- Burbank Airport Station construction
- Maintenance facilities
- Los Angeles Union Station (LAUS) platform construction

Project information used for the construction emission estimates and details of the construction emission calculations are provided in the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020).

3.3.4.5 Models Used for Construction Emissions

Criteria pollutant and GHG emissions from regional building demolition and construction of the at-grade rail segments, roadway and rail bridges, retained-fill rail segments, and HSR stations (including parking areas and platform facilities) were calculated using California Emissions Estimator Model (CalEEMod), which uses emission factors from the OFFROAD2011 model. The OFFROAD2011 model provides the latest emission factors for construction off-road equipment and accounts for lower fleet population and growth factors because of the economic recession and updated load factors based on feedback from engine manufacturers. For emission rates not available in OFFROAD2011, rates from OFFROAD2007 were conservatively applied. The use of emission rates from the OFFROAD models reflects the recommendation of CARB to capture the latest off-road construction assumptions. OFFROAD2011 default load factors (the ratio of average equipment horsepower utilized to maximum equipment horsepower) and useful life parameters were used for emission estimates. Mobile-source emission burdens from worker vehicle trips and truck trips were calculated using VMT estimates and appropriate emission factors from Emission Factors 2014 (EMFAC2014). Fugitive dust emissions from dirt and aggregate handling were calculated in CalEEMod, which uses emission factors derived from equations from the USEPA's AP-42 (USEPA 2006).

Construction exhaust emissions from equipment, fugitive dust emissions from earthmoving activities, and emissions from worker vehicle trips, deliveries, and materials hauling were calculated and compiled in a spreadsheet tool specific to the HSR Build Alternative for each year of construction. Project-specific data, including construction equipment lists and the construction schedule, were used for construction associated with the HSR Build Alternative. Construction exhaust emissions were modeled using Tier 4 emission rates (AQ-IAMF#4) from CalEEMod assuming standard diesel fuel. Fugitive dust reductions from earthmoving best management practices were applied in CalEEMod (AQ-IAMF#1).[3] PM exhaust reductions of 30 percent would occur from use of renewable diesel (AQ-IAMF#3) in all off-road diesel-powered engines. This reduction was not applied in the CalEEMod criteria pollutant results tables, but it was accounted for in the dispersion modeling. Renewable diesel would also reduce off-road equipment GHG emissions by 99.1 percent, which was accounted for by applying manual calculations to the CalEEMod results.

Mobile-source emission burdens from worker trips and truck trips were calculated using VMT estimates and appropriate emission factors from EMFAC2014. Model year 2010 or newer on-road engines in heavy-duty, diesel powered truck emissions (AQ-IAMF#5) were modeled using emission rates derived from CalEEMod.

Localized Modeling for Construction Health Risks and Localized Effects

According to the Office of Environmental Health Hazard Assessment (OEHHA) guidance, cancer risk is defined as the predicted risk of cancer (unit less) over a lifetime based on a long-term (70-year) continuous exposure, and is usually expressed as chances per million persons exposed (OEHHA 2015). Construction of the HSR Build Alternative would take place over several years, and sensitive receptors at schools (9-year exposure), child-care centers, health-care facilities, and residences (30-year exposure) could potentially be exposed to cancer risks. A detailed air dispersion modeling analysis and health risk assessment were conducted to determine if these effects would be significant.

An air dispersion modeling analysis using the USEPA's American Meteorological Society/ Environmental Protection Agency Regulatory Model (AERMOD) (Version 19191) was conducted to simulate physical conditions and predict pollutant concentrations at locations near the fence

[3] AQ-IAMF#1 requires watering on all unpaved surfaces, which would achieve additional reductions (up to 61 percent).

line of construction sites. These data are typically processed using AERMET, a pre-processor to AERMOD. AERMET requires surface meteorological data, upper air meteorological data, and surface parameter data. Several meteorological datasets that have been processed using AERMET are available on the SCAQMD and CARB websites. Local meteorological data were used in the air dispersion modeling analysis. The analysis of HSR station construction used the nearest available meteorological data set. Five years of meteorological data for the Burbank area (2012 through 2016) and the Central Los Angeles area (2010 through 2011 and 2014 through 2016) were used. Specific details of the air dispersion modeling and health risk assessment are found in Appendix G of the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020).

Construction sites for the HSR Build Alternative were each evaluated for potential localized air quality effects. For these construction sites, representative construction work areas were modeled, as it is not practical to model the entire length of the alignment or all possible construction alternatives, configurations, and locations for these project components. Pollutant concentrations were estimated near the site boundary and surrounding area. Regulatory default options and the urban dispersion algorithm of AERMOD were used in the analysis. All sources were modeled with urban effects using the population of the county where the project is located (Los Angeles County). The modeled concentrations were compared with the applicable NAAQS, CAAQS, and health-related guidelines to determine the level of effects. TAC concentrations at the maximally exposed individual sensitive receptor location were used to estimate cancer risks and the overall noncancer chronic and acute hazard index associated with construction emissions, using procedures developed by OEHHA (OEHHA 2015). Details of the risk analysis are in the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020). The analysis of these localized effects from construction activities includes both qualitative and quantitative information on potential localized effects from construction emissions to provide the public with additional information about the HSR Build Alternative's potential effects.

Statewide Regional Operational Emission Calculations

The emission burden analysis of a project determines a project's overall effect on air quality levels. The HSR system would affect long-distance, city-to-city travel along freeways and highways throughout the state, as well as long-distance, city-to-city aircraft takeoffs and landings. The HSR system would also affect electrical demand throughout the state. Analysts calculated criteria pollutant and GHG operational emissions based on a medium ridership forecast scenario (46.8 million) and a high ridership forecast scenario (56.8 million) for existing (2015) and Phase 1 of the statewide HSR project build-out (2040) years, as described further in Chapter 2 and Chapter 3, Section 3.1. The tables in the effects analysis therefore present two values for operational emissions for each pollutant, corresponding to the two ridership forecast scenarios.

The ridership forecasts were presented for two scenarios based on probability of occurrence. The "medium" scenario is the forecast with a 50 percent probability of occurring; the "high" scenario is the forecast with a 75 percent probability of occurring. For the year 2040, which corresponds to the horizon year used in the impacts analysis in this document, the forecasts projected 42.8 million passengers under the medium scenario and 56.8 million passengers under the high scenario.

This range of ridership forecasts reflects the development of certain aspects of the HSR system's design and certain portions of the environmental analysis, as described in more detail below. Because the ultimate ridership of the HSR system will depend on many uncertain factors, such as the price of gasoline or population growth, the HSR system described in this document has been designed to accommodate the broad range of ridership assumptions expected over the coming decades. See Chapter 2, Section 2.6, for a comparison of the 2016 Business Plan forecasts used in this environmental analysis with the Authority's 2018 Business Plan and 2020 Business Plan forecasts.

Analysis of Local Operation Emission Sources

Operation of the HSR stations would affect emissions of criteria pollutants and GHGs. The operation of the switching station would not result in appreciable air pollutants as site visits would be infrequent and power usage would be limited. Therefore, emissions from the switching station were not quantified.

The methodology used to estimate operational air emissions from the HSR stations and local mobile sources is discussed below. Project information used for the operation emission estimates is presented in the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020). The analysis was conducted for the following modeling years:

- Existing (Year 2015)
- Horizon Year (Year 2040)

For air quality and global climate change, guidance from federal agencies specifies the following standards/thresholds for determining impacts:

- NAAQS
- General conformity *de minimis* levels

Project emissions of criteria pollutants are compared to the annual general conformity *de minimis* levels on a calendar-year basis for both construction and operational emissions. If annual project-related emissions generated in a nonattainment or maintenance area exceed the annual general conformity *de minimis* levels, a general conformity determination is required. The *de minimis* levels established for each pollutant varies by the severity of nonattainment and sets an emission level, in tons per year, above which further analysis is required to demonstrate that the proposed activities would not cause or contribute to a violation of a NAAQS for a nonattainment pollutant. In addition, the project emissions that were modeled with the USEPA approved dispersion models may not cause new violations or exacerbate an existing violation of NAAQS as shown in Table 3.3-1. Table 3.3-4 presents the annual general conformity *de minimis* levels for the Basin.

Table 3.3-4 General Conformity *De Minimis* Levels

Pollutant	Federal Attainment Status for South Coast Air Basin	Annual General Conformity *De Minimis* Levels (tons/yr)
Ozone (VOC or NO_X)	Extreme nonattainment	10
CO, SO_2, and NO_2	All nonattainment and maintenance	100
$PM_{2.5}$ direct emissions, SO_2, NO_X (unless determined not to be a significant precursor), VOC, or ammonia (if determined to be significant precursors)	All nonattainment and maintenance	70
PM_{10}	Attainment/maintenance	100

Source: U.S. Environmental Protection Agency, 2017
Thresholds from Code of Federal Regulations Title 40, Parts 51 and 93
CO = carbon monoxide
N/A = not applicable
NO_2 = nitrogen dioxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
SO_2 = sulfur dioxide
SO_X = sulfur oxides
tons/yr = tons per year
VOC = volatile organic compound

Pursuant to NEPA, impacts on air quality would occur if the project criteria pollutant emissions would exceed the general conformity *de minimis* levels (dependent on attainment status of each air basin) or if the project would result in the creation or worsening of PM_{10}/$PM_{2.5}$ or CO hot spots. In summary, the annual general conformity *de minimis* levels are 10 tons of VOCs and NO_X, 70 tons of $PM_{2.5}$, and 100 tons of CO and PM_{10}. Currently, it is assumed that general conformity will apply only to construction of the HSR project, as the operations are expected to decrease regional emissions of criteria pollutants.

In cases where there are no defined *de minimis* levels, professional judgment is used when considering the resource context, the intensity and duration of the potential effect, and the implementation of mitigation measures to determine whether the project would result in no effect, a beneficial effect, or an adverse impact on air quality.

3.3.4.6 Method for 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 3.1.3.3, Methods for Evaluating Impacts, for further information). By contrast, under NEPA, significance is used to determine whether an EIS will be required. NEPA requires that an EIS be prepared when the proposed federal action (project) 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 the HSR Build Alternative. The Authority is using the following thresholds to determine if a significant impact on air quality and global climate change would occur because of the HSR Build Alternative. A significant impact is one that would:

- Conflict with or obstruct implementation of the applicable air quality plan
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable NAAQS or CAAQS
- Expose sensitive receptors to substantial pollutant concentrations
- Result in other emissions (such as those leading to odors) adversely 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 reducing the emissions of GHGs

Quantitative emission thresholds that can be used to evaluate the significance level of impacts have been developed by the SCAQMD and are discussed below.

The SCAQMD's *CEQA Air Quality Handbook* (SCAQMD 1993) contains the guidelines and emissions thresholds used to evaluate the significance of a project's emissions regarding air quality standards. Emission thresholds were established based on the attainment status of the Basin regarding air quality standards for specific criteria pollutants. The attainment concentration standards were set at a level that protects public health with an adequate margin of safety. Therefore, the emission thresholds are regarded as conservative in determining an individual project's contribution to health risks.

The air quality impacts analysis follows the guidance and methodologies recommended in the SCAQMD's *CEQA Air Quality Handbook* and the significance thresholds on the SCAQMD's website (SCAQMD 2015). CEQA allows the significance criteria established by the applicable air quality management or air pollution control district to be used to assess the impacts of a project on air quality.

The SCAQMD has adopted regional construction and operational emissions thresholds to determine a project's cumulative impact on air quality in the Basin. Specifically, these thresholds gauge whether a project would significantly contribute to a nonattainment designation based on the mass emissions generated. Table 3.3-5 lists the SCAQMD's regional significance thresholds. In addition, the project emissions that were modeled with the USEPA approved dispersion model may not cause new violations or exacerbate an existing violation of CAAQS as shown in Table 3.3-5.

Table 3.3-5 South Coast Air Quality Management District Thresholds

Pollutant	Construction Phase	Operational Phase
ROCs	75 lbs/day	55 lbs/day
CO	550 lbs/day	550 lbs/day
NO_X	100 lbs/day	55 lbs/day
SO_X	150 lbs/day	150 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day

Source: South Coast Air Quality Management District, 2015a
CO = carbon monoxide
lbs = pounds
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
ROC = reactive organic compound
SO_X = sulfur oxides

3.3.5 Affected Environment

This section describes the affected environment for air quality and global climate change within the Burbank to Los Angeles RSAs, including the local, regional, and global settings. This information provides the context for the environmental analysis and evaluation of impacts.

A summary of stakeholder issues and concerns from public outreach efforts can be found in Chapter 9, Public and Agency Involvement.

3.3.5.1 Local Meteorological Conditions

Air quality is affected by both the rate and location of pollutant emissions, and by meteorological conditions that influence movement and dispersal of pollutants in the atmosphere. 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 affect localized air quality.

The Basin covers 6,745 square miles and includes all of Orange County, Los Angeles County except for the Antelope Valley, the nondesert portion of western San Bernardino County, and the western and Coachella Valley portions of Riverside County.

Low average wind speeds, together with a persistent temperature inversion, limit the vertical dispersion of air pollutants throughout the Basin. Strong, dry, north or northeasterly winds, known as Santa Ana winds, occur during the fall and winter months, dispersing air contaminants. The Santa Ana conditions tend to last for several days at a time.

The combination of stagnant wind conditions and low inversions produces the greatest pollutant concentrations. On days of no inversion or high wind speeds, ambient air pollutant concentrations are the lowest. During periods of low inversions and low wind speeds, air pollutants generated in urbanized areas are transported into Riverside and San Bernardino Counties. In the winter, the greatest pollution problems are CO and NO_X because of extremely low inversions and air stagnation during the night and early morning hours. In the summer, the longer daylight hours and the brighter sunshine combine to cause a reaction between hydrocarbons and NO_X to form photochemical smog.

The annual average temperature varies little throughout the Basin, ranging from the low to middle 60s degrees Fahrenheit. With a more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas. Much of the annual rainfall in the Basin occurs between November and April. Summer rainfall is minimal and is generally limited to scattered thundershowers in coastal regions and slightly heavier showers in the eastern portion of the Basin and along the coastal side of the mountains. Average monthly rainfall during that period varies from 3.80 inches in February to 0.01 inch or less between June and July, with an annual total of 16.35 inches. Patterns in monthly and yearly rainfall totals are unpredictable due to fluctuations in the weather.

The Basin intermittently experiences a temperature inversion (increasing temperature with increasing altitude) because of the Pacific High. This inversion limits the vertical dispersion of air contaminants, holding them relatively near the ground. As the sun warms the ground and the lower air layer, the temperature of the lower air layer approaches the temperature of the base of the inversion (upper) layer until the inversion layer finally breaks, allowing vertical mixing with the lower layer. This phenomenon is observed in mid-afternoon to late afternoon on hot summer days, when the smog appears to clear up suddenly. Winter inversions frequently break by midmorning.

3.3.5.2 Ambient Air Quality

CARB maintains ambient air monitoring stations for criteria pollutants throughout California. The stations nearest to the local RSA are the 1630 N Main Street station in the city of Los Angeles and the 752 Wilson Avenue station in the city of Pasadena. Monitoring data from these stations are shown in Table 3.3-6. The stations monitor CO, O_3, NO_2, PM_{10}, $PM_{2.5}$, and SO_2. Full locations for the monitoring stations are listed in the Air Quality and Global Climate Change Technical Report (Authority 2020). A summary of the monitoring data includes the following:

- Monitored data from 2016 through 2018 do not exceed either the state or federal standards for CO.
- O_3 values for the region exceed the national 8-hour O_3 standards at both stations for every year . O_3 values exceed the state 8-hour O_3 standards at both stations every year from 2016 through 2018. O_3 values for the region also exceed the state 1-hour O_3 standard at both stations for every year from 2016 through 2018.
- The PM_{10} values for the region do not exceed the national 24-hour PM_{10} standard. The state 24-hour PM_{10} standard was exceeded at the Los Angeles station for every year. PM_{10} emissions were not measured at the Pasadena station from 2016 through 2018.
- The 1-hour and annual NO_2 values were not exceeded at any of the two stations between 2016 and 2018.
- The $PM_{2.5}$ values for the region exceed the national 24-hour $PM_{2.5}$ standard for the Los Angeles station for the years 2016, 2017, and 2018. The Los Angeles station exceeded the national 24-hour $PM_{2.5}$ standard between 2016 and 2018.
- SO_2 values were not exceeded at any of the two stations between 2016 and 2018.

Attainment Status of Study Area

The USEPA and CARB designate each county (or portions of counties) within California as attainment, maintenance, nonattainment, or unclassified based on the area's ability to meet ambient air quality standards. The four designations are defined as:

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

Table 3.3-6 Ambient Criterial Pollutant Concentration Data at Air Quality Monitoring Stations Closest to the High-Speed Rail Build Alternative

Air Pollutant	Standard/Exceedance	1630 N Main Street Los Angeles			752 Wilson Avenue Pasadena		
		2016	2017	2018	2016	2017	2018
Carbon Monoxide (CO)[3]	Year Coverage	NM	NM	NM	NM	NM	NM
	Max. 1-hour Concentration (ppm)	1.9	2.0	2.0	1.5	2.2	2.0
	Max. 8-hour Concentration (ppm)	1.4	1.8	1.7	1.0	1.7	1.4
	# Days>Federal 1-hour Standard of >35 ppm	0	0	0	0	0	0
	# Days>Federal 8-hour Standard of >9 ppm	0	0	0	0	0	0
	# Days>California 8-hour Standard of >9 ppm	0	0	0	0	0	0
Ozone (O_3)	Year Coverage[1]	98%	96%	96%	95%	96%	98%
	Max. 1-hour Concentration (ppm)	0.103	0.116	0.098	0.126	0.139	0.112
	Max. 8-hour Concentration (ppm)	0.078	0.086	0.073	0.090	0.100	0.090
	# Days>Federal 8-hour Standard of >0.070 ppm	4	14	4	18	36	19
	# Days>California 1-hour Standard of >0.09 ppm	2	6	2	12	18	8
	# Days>California 8-hour Standard of >0.07 ppm	4	16	4	19	38	20
Nitrogen Dioxide (NO_2)	Year Coverage	97%	95%	97%	96%	94%	95%
	Max. 1-hour Concentration (ppb)	64.7	80.6	70.1	71.9	72.3	68.2
	Annual Average (ppb)	21	21	19	15	15	14
	# Days>Federal 1-hour Standard of >100 ppb	0	0	0	0	0	0
Sulfur Dioxide (SO_2)	Max. 1-hour Concentration (ppm)	13.4	5.7	17.9	NM	NM	NM
	Max. 24-hour Concentration (ppm)	1.3	1.5	1.3	NM	NM	NM
	Annual Average (ppm)	0.30	0.36	0.34	NM	NM	NM
	# Days>California 24-hour Standard of >0.04 ppm	0	0	0	NM	NM	NM

Air Pollutant	Standard/Exceedance	1630 N Main Street Los Angeles			752 Wilson Avenue Pasadena		
		2016	2017	2018	2016	2017	2018
Respirable Particulate Matter (PM_{10})	Year Coverage	98%	94%	90%	NM	NM	NM
	Max. 24-hour Concentration (µg/m³)[2]	74.6	96.2	81.2	NM	NM	NM
	# Days>Federal 24-hour Standard of >150 µg/m³	0	0	0	NM	NM	NM
	# Days>California 24-hour Standard of >50 µg/m³	21	40	31	NM	NM	NM
	Annual Average[2] (µg/m³)	25.8	25.7	30.2	NM	NM	NM
Fine Particulate Matter ($PM_{2.5}$)	Year Coverage	98%	98%	95%	98%	100%	99%
	Max. 24-hour Concentration (µg/m³)	49.4	61.7	65.3	29.2	22.8	32.5
	State Annual Average (µg/m³)	12.0	16.3	16.0	9.5	9.7	10.3
	# Days>Federal 24-hour Standard of >35 µg/m³	2	6	6	0	0	0
	Annual Average[2] (µg/m³)	11.7	12.0	12.8	9.5	9.6	10.2

Source: California Air Resources Board and U.S. Environmental Protection Agency, 2019
[1] Coverage is for the 8-hour standard.
[2] Coverage is for the national standard.
[3] CO data for the 752 Wilson Avenue, Pasadena station monitoring site.
\> = greater than
µg/m³ = micrograms per cubic meter
CARB = California Air Resources Board
Max. = maximum
N/A = not available
NM = not monitored
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
ppb = parts per billion
ppm = parts per million

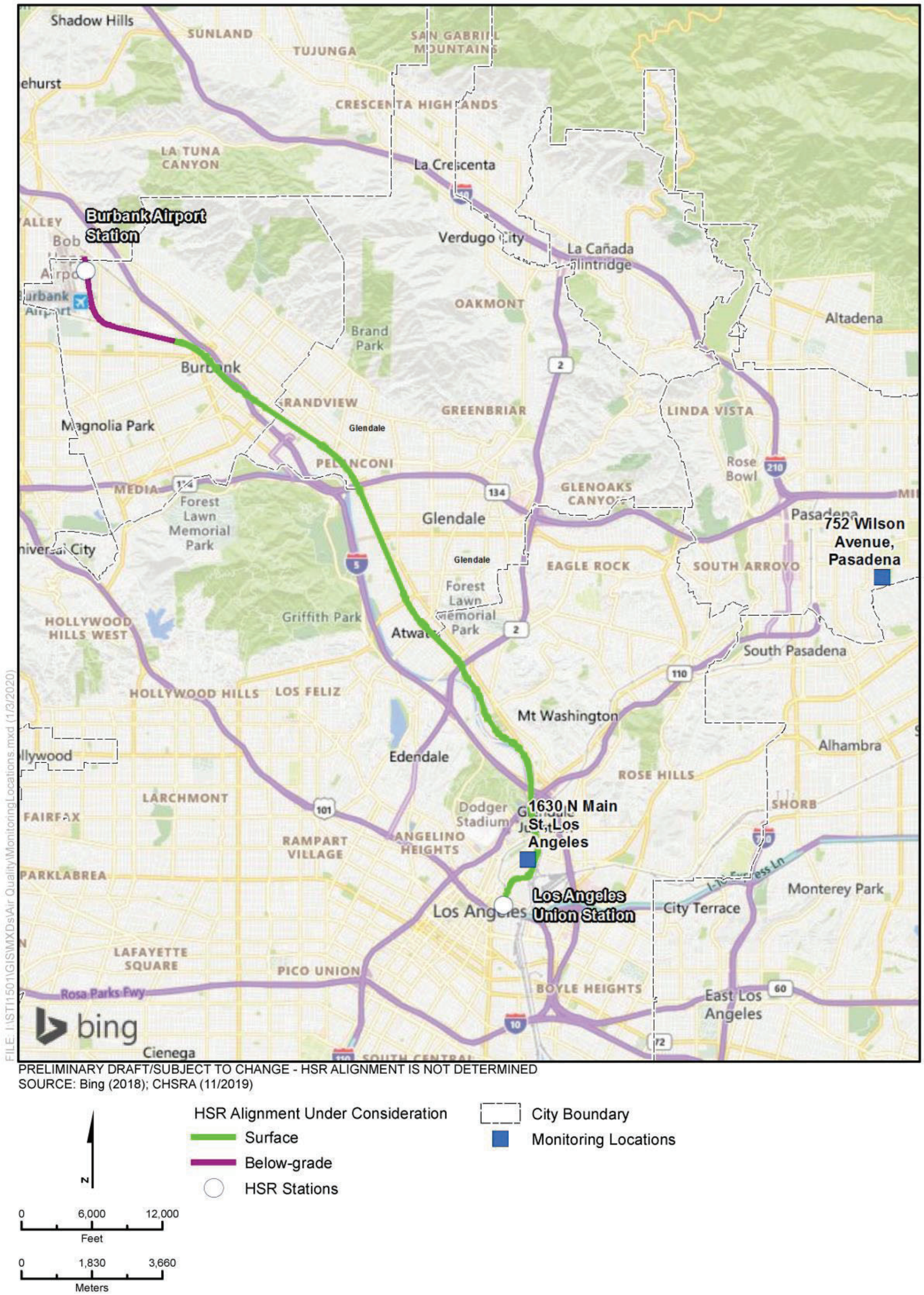


Figure 3.3-3 Air Quality Monitoring Stations Closest to the High-Speed Rail Build Alternative

Table 3.3-7 summarizes the federal (under NAAQS) and state (under CAAQS) attainment status for the Basin.

Table 3.3-7 Federal and State Attainment Status in the South Coast Air Basin

Pollutants	Federal Classification	State Classification
O_3 1-hour	N/A	Nonattainment
O_3 8-hour	Nonattainment	Nonattainment
$PM_{2.5}$	Nonattainment	Nonattainment
PM_{10}	Attainment/Maintenance	Nonattainment
CO	Attainment/Maintenance	Unclassified
NO_2	Unclassified	Attainment
SO_2	Unclassified	Attainment
Lead	Nonattainment	Attainment
All Others	Attainment/Unclassified	Attainment/Unclassified

Source: California Air Resources Board, 2019

CO = carbon monoxide
NO_X = nitrogen oxides
O_3 = ozone
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
SO_2 = sulfur dioxide

Under the federal criteria, the Basin is currently designated as nonattainment for the federal 8-hour O_3, $PM_{2.5}$, and lead standards; unclassified for the federal NO_2 and SO_2 standards; attainment/maintenance for the federal PM_{10} and CO standards; and attainment/unclassified for all other standards. The Basin is considered in nonattainment for the state 1-hour O_3, 8-hour O_3, $PM_{2.5}$, and PM_{10} standards; unclassified for the state CO standards; in attainment for the state NO_2, SO_2, and lead standards; and in attainment/unclassified for all other state standards.

3.3.5.3 Air Quality Plans and Programs

The SCAQMD and CARB develop planning documents for pollutants for which the RSA is classified as a federal nonattainment or maintenance area, and the documents are approved by the USEPA. The SCAQMD is presently guided by the California SIP (CARB 2012) and other planning documents.

The SCAQMD is responsible for demonstrating regional compliance with ambient air quality standards but has limited indirect involvement in reducing emissions from fugitive, mobile, and natural sources. To that end, the SCAQMD works cooperatively with CARB, SCAG, county transportation commissions, local governments, and other federal and state government agencies. It has responded to this requirement by preparing a series of AQMPs to meet the CAAQS and NAAQS. The SCAQMD has adopted the 2016 AQMP (SCAQMD 2016a), which incorporates the latest scientific and technological information and planning assumptions, including the 2016 RTP/SCS, and updated emission inventory methodologies for various emission source categories. The AQMP is the region's Clean Air Plan, which guides the region's air quality planning efforts to attain the CAAQS. The SCAQMD's 2016 AQMP contains districtwide control measures to reduce O_3 precursor emissions (i.e., ROG and NO_X), as well as PM and GHG emissions.

The 2016 AQMP integrated strategies and measures to meet the following NAAQS:

- 2008 8-hour O_3 (75 parts per billion [ppb]) by 2032
- 2012 Annual $PM_{2.5}$ (12 µg/m^3) by 2021–2025
- 1997 8-hour O_3 (80 ppb) by 2024
- 1979 1-hour O_3 (120 ppb) by 2023
- 2006 24-hour $PM_{2.5}$ (35 µg/m^3) by 2019

The 2016 AQMP also considered the 2015 federal 8-hour O_3 standard (70 ppb). The 2016 AQMP is composed of stationary and mobile-source emission reductions from regulatory control measures, incentive-based programs, and co-benefits from climate programs, as well as incorporating energy, climate, transportation, goods movement, infrastructure, and other planning efforts that affect future air quality. The most significant air quality challenge in the Basin is to reduce NO_X emissions sufficiently to meet the upcoming O_3 standard deadlines. Based on preliminary analyses, the approximately 580 tons per day of total Basin NO_X emissions are projected to drop to approximately 300 tons per day and 250 tons per day in the attainment years of 2023 and 2031, respectively, due to continued implementation of already-adopted control measures.

The primary challenge is that mobile sources currently contribute about 88 percent of the region's total NO_X emissions, and the SCAQMD has limited authority to regulate mobile sources. The SCAQMD is working closely with CARB and the USEPA, which have primary authority over mobile sources, in ensuring that mobile sources do their fair share of pollution reduction.

Since NO_X emissions also lead to the formation of $PM_{2.5}$, the NO_X reductions needed to meet the O_3 standards will lead to significant improvements in $PM_{2.5}$ levels. The 2016 AQMP will include $PM_{2.5}$ control strategies as needed to ensure that the $PM_{2.5}$ NAAQS will also be met on time.

2012 State Implementation Plan for Lead

When the USEPA designated the Los Angeles County portion of the Basin as nonattainment for the 2008 lead NAAQS on December 31, 2010, the SCAQMD was required to prepare a SIP for the lead nonattainment area. This designation was based on two source-specific monitors in the city of Vernon and the city of Industry that exceeded the new standard in the 2007 to 2009 period. The remainder of the Basin, outside the Los Angeles County nonattainment area, remains in attainment of the new 2008 lead standard. The 2012 *Lead State Implementation Plan for Los Angeles County* (SCAQMD 2012) outlines the strategies, planning, and pollution control activities that demonstrate attainment of the lead NAAQS. The SIP revision was submitted to the USEPA for approval. Lead concentrations in this nonattainment area have been below the level of the federal standard since December 2011.

2007 Ozone Plan

On January 12, 1999, the USEPA proposed partial approval/disapproval of the 1997 O_3 SIP revisions, citing concerns with the O_3 control strategy provided in the 1997 AQMP. To address these concerns, the SCAQMD's staff prepared the Ozone Plan as an amendment to the SIP.

The 1999 Amendment includes the following key elements:

- New short-term stationary-source control measures
- Revisions of the adoption/implementation schedule for 13 short-term VOC and NO_X stationary-source control measures from the 1997 O_3 SIP Revision
- Provisions for further VOC emission reductions in the near term
- Revisions to the emission-reduction commitments for the long-term control measures in the 1997 O_3 SIP Revision

Clean Communities Plan

The Clean Communities Plan (formerly known as the Air Toxics Control Plan) is designed to examine the overall direction of the SCAQMD's air toxics control program. It includes control strategies aimed at reducing toxic emissions and risk from both mobile and stationary sources (SCAQMD 2010).

Air Quality Monitoring Network Plan

The annual Air Quality Monitoring Network Plan describes the network of ambient air quality monitors located within the SCAQMD's four-county jurisdiction. Federal regulations require that the air quality monitoring network be reviewed annually to identify any need for additions, relocations, or terminations of monitoring sites or instrumentation (SCAQMD 2016b).

Transportation Plans and Programs

The regional transportation planning agency within the Basin and the study area (i.e., SCAG) is responsible for preparing RTPs. The RTP addresses a region's transportation goals, objectives, and policies for the next 20 to 25 years and identifies 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 projects are analyzed for air quality conformity with the SIP as components of the RTPs and the Federal Transportation Improvement Programs. The SCAG adopted its 2016–2040 RTP/SCS in April 2016. This RTP/SCS includes strategies that support the HSR Build Alternative.

3.3.5.4 Emission Inventory

Criteria Pollutants

CARB maintains an annual emission inventory for select counties and air basins in the state. The inventory for the Basin consists of data submitted to CARB by the SCAQMD plus estimates for certain source categories, which are provided by CARB staff. Table 3.3-8 summarizes the 2012 inventory data for the SCAQMD.

Table 3.3-8 Estimated 2012 Annual Average Emissions for the South Coast Air Quality Management District (tons/day)

Source Category	TOG	ROG	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$
Stationary Sources								
Fuel Combustion	42.27	8.78	48.25	44.98	7.08	5.45	5.29	5.17
Waste Disposal	599.43	7.84	1.11	2.15	0.51	1.00	0.56	0.25
Cleaning and Surface Coatings	87.43	38.11	0.47	0.14	0.10	2.10	2.02	1.94
Petroleum Production and Marketing	130.93	41.84	4.55	1.43	2.16	2.57	1.64	1.41
Total Industrial Processes	**12.32**	**10.45**	**1.17**	**0.39**	**0.28**	**19.55**	**11.56**	**5.02**
Total Stationary Sources	**872.39**	**107.02**	**55.55**	**49.09**	**10.14**	**30.68**	**21.06**	**13.78**
Stationary Sources Percentage of Total	***65.1%***	***22.2%***	***2.4%***	***8.6%***	***52.1%***	***12.2%***	***12.1%***	***18.8%***
Areawide Sources								
Solvent Evaporation	129.90	1039.39	–	–	–	0.02	0.02	0.02
Miscellaneous Processes	64.12	17.07	104.76	22.31	0.97	210.00	112.85	34.90
Total Areawide Sources	**194.02**	**126.46**	**104.76**	**22.31**	**0.97**	**210.02**	**112.87**	**34.92**
Areawide Sources Percentage of Total	***14.5%***	***26.2%***	***4.5%***	***3.9%***	***5.0%***	***83.5%***	***65.0%***	***47.5%***
Mobile Sources								
On-Road Motor Vehicles	151.23	138.16	1408.17	328.04	2.12	–	29.28	15.71
Other Mobile Sources	122.45	110.96	780.25	170.73	6.25	10.75	10.40	9.04
Total Mobile Sources	**273.68**	**249.13**	**2,188.42**	**498.77**	**8.37**	**10.75**	**39.68**	**24.75**
Mobile Sources Percentage of Total	***20.4%***	***51.6%***	***93.2%***	***87.5%***	***43.0%***	***4.3%***	***22.9%***	***33.7%***
Grand Total	**1,340.09**	**482.61**	**2,348.74**	**570.16**	**19.48**	**251.44**	**173.62**	**73.45**

Source: California Air Resources Board, 2013
Rounded to the nearest percentage. Category percentages do not sum to 100 percent due to rounding.
CO = carbon monoxide
NO_X = nitrogen oxides
PM = particulate matter
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 gas
SCAQMD = South Coast Air Quality Management District
SO_X = sulfur oxides
TOG = total organic gas

In the SCAQMD, mobile-source emissions account for over 90 and 85 percent of the Basin's CO and NO_X emissions, respectively. Mobile-source emissions also account for over 50 percent of the Basin's ROG emissions. Area-source emissions account for over 80 percent of the Basin's PM, and stationary sources account for over 65 and 50 percent, respectively, of the Basin's VOC and SO_X emissions.

Statewide Greenhouse Gas

As a requirement of AB 32, CARB constructed a GHG emissions inventory to determine the 1990 emissions level and the 2020 limit of 431 MMT CO_2e, using the Intergovernmental Panel on Climate Change's fourth assessment report on GWPs (CARB 2015). GHGs are inventoried on a statewide basis because their effects are not localized or regional due to their rapid dispersion into the global atmosphere. Since climate change is a global rather than regional issue, specific inventories have not been prepared for the individual air basins. The original statewide 2020 limit of 427 MMT CO_2e was approved on December 6, 2007, and was not sector-specific. A revised statewide 2020 limit of 431 MMT CO_2e was approved on May 22, 2014, and was also not sector-specific. Since development of the 1990 emissions inventory, CARB has prepared a statewide inventory for years 2000 through 2015. Table 3.3-9 summarizes the 2015 statewide GHG emissions inventory.

Table 3.3-9 2015 California Statewide Greenhouse Gas Emissions Inventory

Greenhouse Gas Emission Category	2017 (MMT CO_2e)	Percentage of Total
Transportation	170.0	40
Electric Power	62.3	15
Commercial and Residential	41.1	10
Industrial	89.5	21
Recycling and Waste	7.8	1
High-GWP	21.2	5
Agriculture	32.2	8
Total California Emissions	**424.1**	**–**

Source: California Air Resources Board, 2019b
Rounded to the nearest percentage. Category percentages do not sum to 100 percent due to rounding.
GWP = global warming potential MMT CO_2e = million metric tons of carbon dioxide equivalent

3.3.5.5 Sensitive Receptors

Some locations are considered more sensitive to adverse effects from air pollution than others. These locations are termed sensitive receptors and include residences, schools, day-care facilities, elderly-care establishments, medical facilities, active recreational uses, and other areas that are populated with people considered more vulnerable to the effects of poor air quality. Table 3.3-10 shows sensitive receptors within 1,000 feet of the HSR alignment. 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 exposure to air contaminants and decrease asthma symptoms in children (CARB 2005). Figure 3.3-4 (Sheets 1 through 6) shows all the sensitive land uses within 1,000 feet of the HSR Build Alternative alignment.

Table 3.3-10 Sensitive Receptors within 1,000 Feet of the High-Speed Rail Tracks/Stations

Sensitive Receptors	Distance (feet)
Close to Burbank Airport Station	
Single-Family Residential Homes north of San Fernando Road	290
BHC Child Development Center	820
North Ontario Street Apartments	840
Close to Rail Tracks	
Providence Elementary School	710
Monterey High School	315
Little Angels Academy	830
Scholars Preparatory School	977
Thomas Edison Elementary School	480
Glendale Memorial Hospital	1,000
Cerritos Elementary School	1,000
Holy Trinity Elementary School	1,000
Atwater Avenue Elementary School	1,000
Los Feliz Charter School for the Arts	32
Renaissance Arts Academy	440
Glassell Park Elementary School	1,000
Studio Middle School	120
Divine Saviour Elementary School	900
Albion Elementary School	860
PUC Excel Charter Academy	1,000
Ann Street Elementary School	710
Close to Los Angeles Union Station	
Mosaic Apartments	20
Cathay Manor Apartments	880
Chinatown Senior Citizen Services Center[1]	880
Chinatown Teen Post[1]	880
Mixed Use—12 New High Street	714
Mixed Use—618 New High Street	763
Mixed Use—648 N Spring Street	526
Mixed Use—654 N Spring Street	526
Mixed Use—640 N Spring Street	526
Mixed Use—643 N Spring Street	684

All receptor locations are in existing and opening year conditions.
[1] Receptor type: youth, cultural, and educational facility

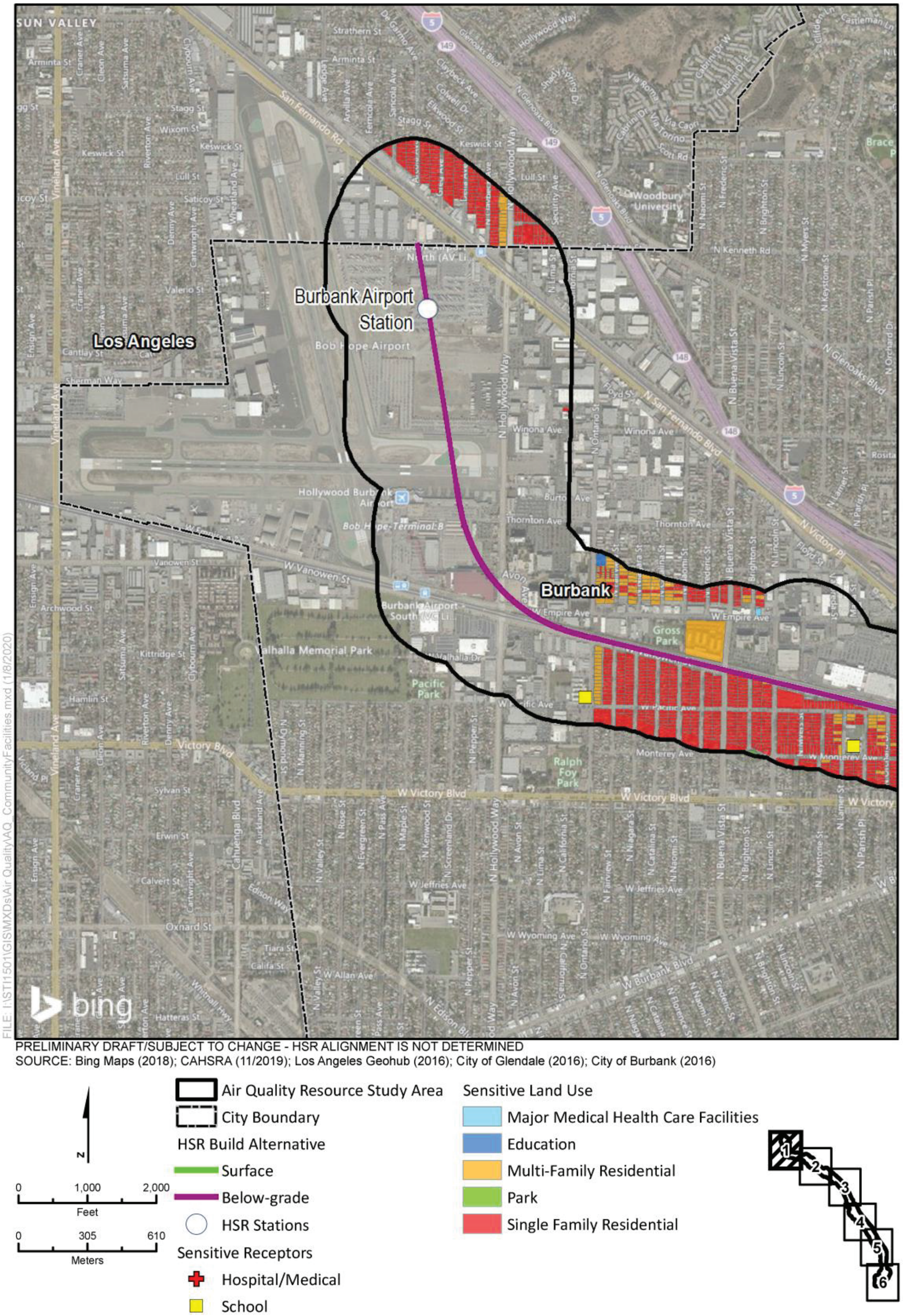


Figure 3.3-4 Sensitive Land Uses within 1,000 Feet of the High-Speed Rail Build Alternative (Sheet 1 of 6)

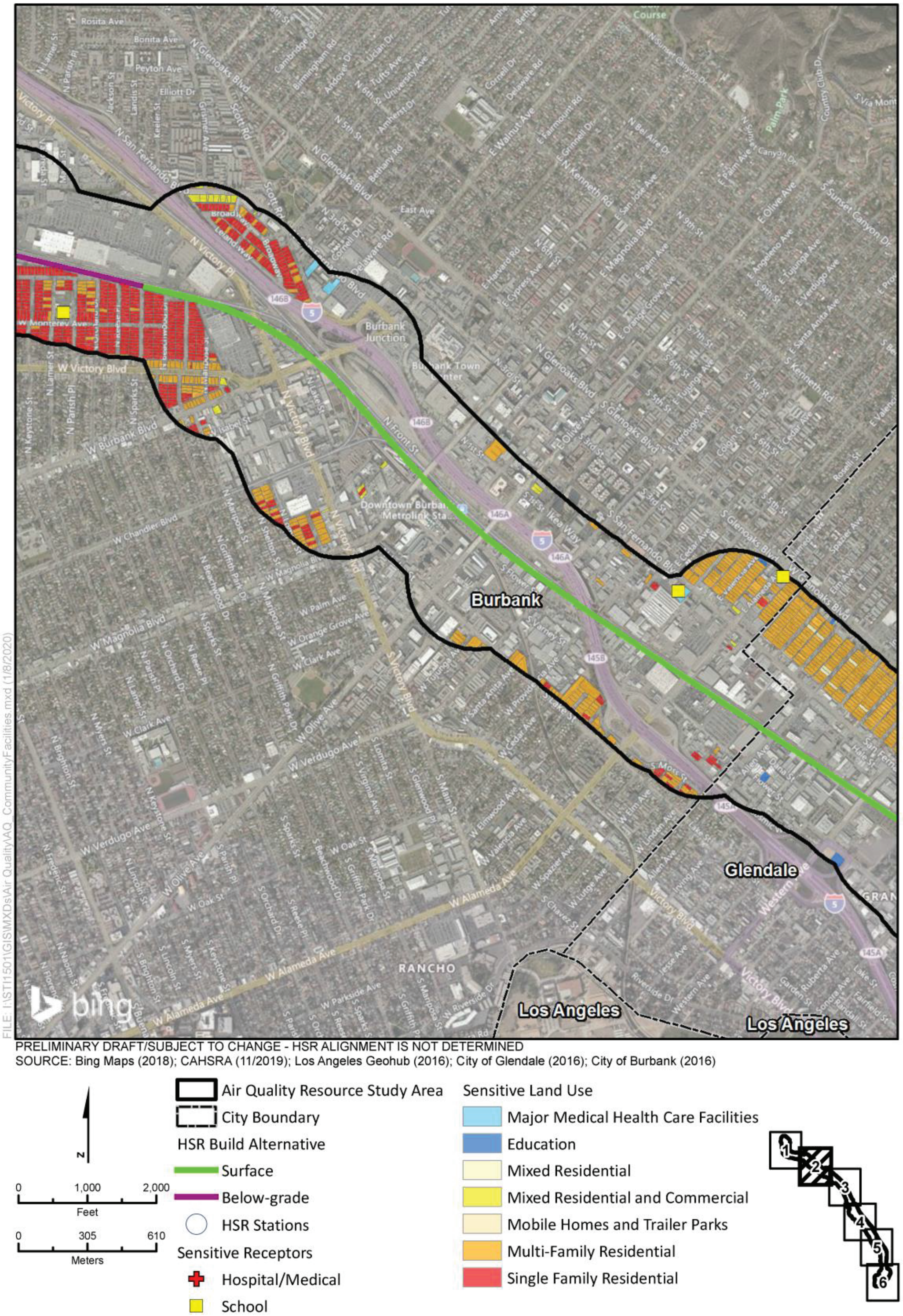


Figure 3.3-4 Sensitive Land Uses within 1,000 Feet of the High-Speed Rail Build Alternative

(Sheet 2 of 6)

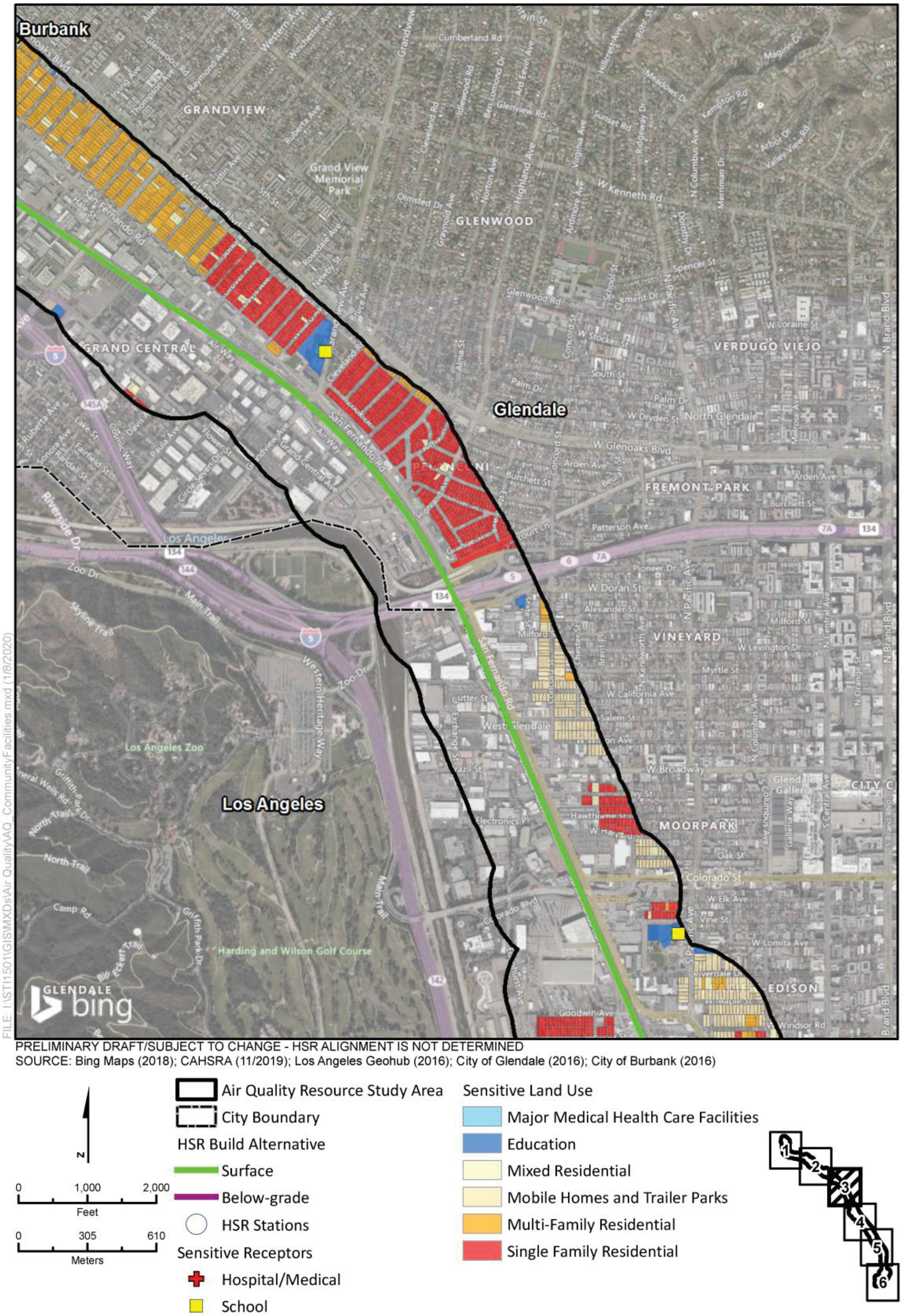


Figure 3.3-4 Sensitive Land Uses within 1,000 Feet of the High-Speed Rail Build Alternative

(Sheet 3 of 6)

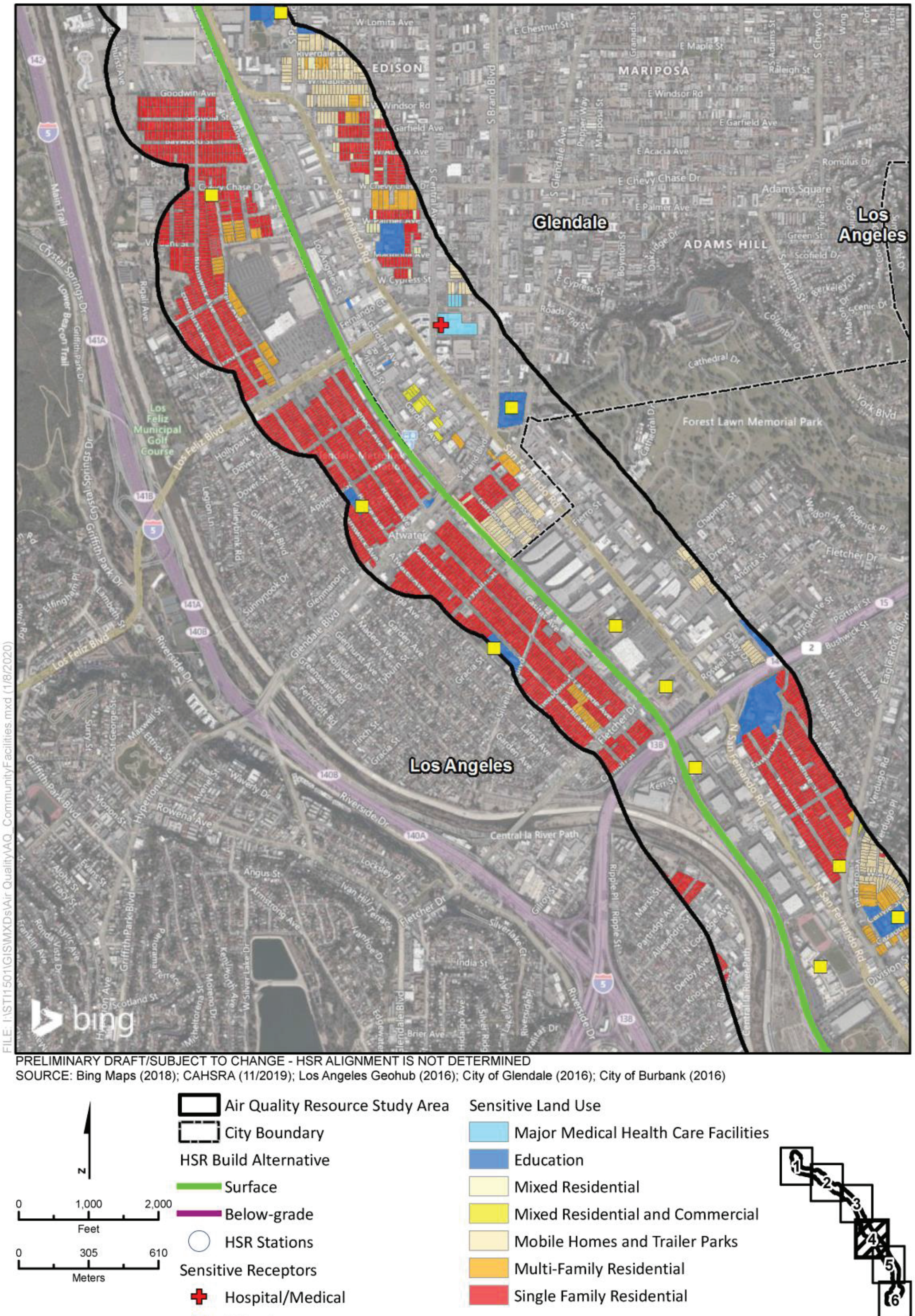


Figure 3.3-4 Sensitive Land Uses within 1,000 Feet of the High-Speed Rail Build Alternative

(Sheet 4 of 6)

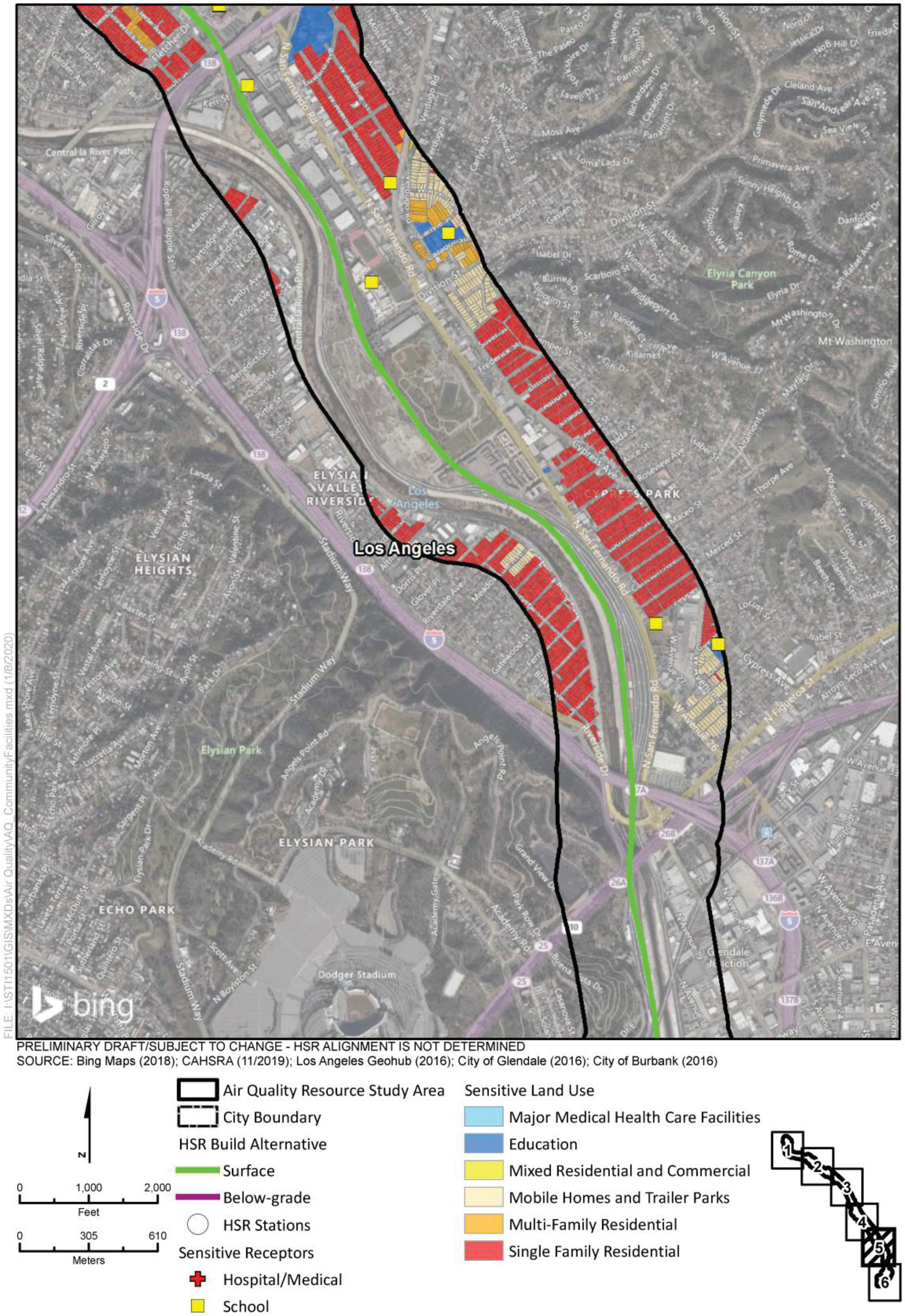


Figure 3.3-4 Sensitive Land Uses within 1,000 Feet of the High-Speed Rail Build Alternative

(Sheet 5 of 6)

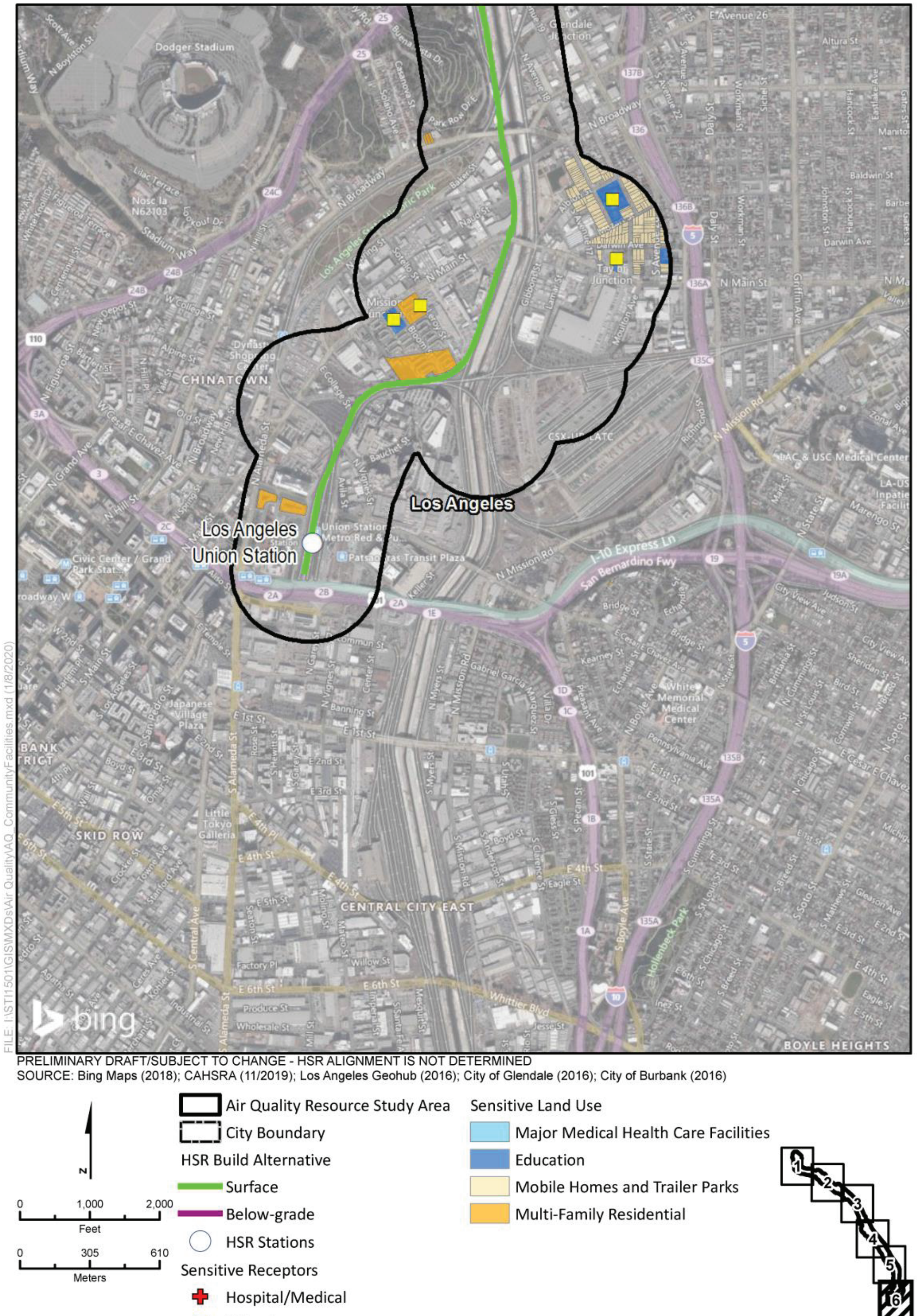


Figure 3.3-4 Sensitive Land Uses within 1,000 Feet of the High-Speed Rail Build Alternative

(Sheet 6 of 6)

3.3.6 Environmental Consequences

3.3.6.1 Overview

This section evaluates how the No Project Alternative and the HSR Build Alternative could affect air quality and global climate change. The impacts of the HSR Build Alternative are described and organized as follows:

- **Construction Impacts**
  - Impact AQ #1—Regional Air Quality Impacts during Construction
  - Impact AQ #2—Compliance with Air Quality Plans
  - Impact AQ #3—Greenhouse Gas Emissions during Construction
  - Impact AQ #4—Asbestos and Lead-Based Paint Exposure during Construction
  - Impact AQ #5—Localized Air Quality Impacts during Construction of Rail Alignment and Train Stations
  - Impact AQ #6—Localized Air Quality Impacts on School Children and Other Sensitive Receptors during Construction
  - Impact AQ#7—Localized Air Quality Impacts from Concrete Batch Plants
- **Operations Impacts**
  - Impact AQ#8—Statewide Operational Emissions
  - Impact AQ #9—Regional Operational Criteria Pollutant Emissions
  - Impact AQ #10—Statewide Greenhouse Gas Emission Analysis during Operation
  - Impact AQ #11—Localized Air Quality Impacts during Train Operations
  - Impact AQ #12—Mobile-Source Air Toxics Analysis
  - Impact AQ #13—Microscale Carbon Monoxide Impact Analysis
  - Impact AQ #14—Localized PM_{10}/$PM_{2.5}$ Hot-Spot Impact Analysis
  - Impact AQ #15—Localized MSAT Impacts to Sensitive Receptors including Schools
  - Impact AQ #16—Odor Impacts from Operations

Mitigation measures would be required as described in Section 3.3.7, Mitigation Measures.

3.3.6.2 No Project Alternative

The No Project Alternative represents future-year 2040 conditions without the HSR Build Alternative. Section 7.5 of the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020) presents several tables summarizing the air quality emissions for the No Project Alternative.

Statewide and regional emissions without the HSR Build Alternative are shown for each of these years in Table 3.3-11 and Table 3.3-12 (2015), and in Table 3.3-13 and Table 3.3-14 (2040). The tables below present results for the No Project assumptions underlying the medium and high ridership scenarios. The medium scenario represents a baseline ridership/revenue forecast that is the most likely scenario and the high scenario represents an optimistic ridership/revenue forecast. The scenario assumptions affect how the no build and existing numbers are generated, which is why Table 3.3-11 and Table 3.3-12 (2015) and Table 3.3-13 (2040) and Table 3.3-14 (2040) show different numbers between the scenarios. High scenario no-build data differs from medium scenario no-build data because the high scenario and the medium scenarios assume different background conditions. These are differences in the conditions surrounding the HSR system and are more extensive than changes in service patterns (e.g. changes in demographics, willingness to travel, air fares, automobile operating costs). For example, an increase in the price of gasoline will lead to higher HSR ridership but will also decrease automobile travel that does not become HSR ridership. The ridership data is based on the Authority's 2016 Business Plan (Authority 2016).

Table 3.3-11 2015 Statewide No Project Emissions (Medium Ridership Scenario)

Project Element	ROG (tons/yr)	TOG (tons/yr)	CO (tons/yr)	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Roadways	7,785	10,506	323,019	33,326	816	22,977	6,238
Planes	338	341	2,888	2,779	299	84	84
Energy (power plants)	1,646	16,458	29,616	15,531	2,303	2,953	2,683
Total[1]	**9,768**	**27,305**	**355,523**	**51,636**	**3,418**	**23,061**	**9,004**

Source: California High-Speed Rail Authority, 2017
[1] The total includes the indirect and direct emissions.
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
tons/yr = tons per year

Table 3.3-12 2015 Statewide No Project Emissions (High Ridership Scenario)

Project Element	ROG (tons/yr)	TOG (tons/yr)	CO (tons/yr)	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Roadways	7,746	10,454	321,414	33,161	812	22,862	6,207
Planes	315	318	2,692	2,589	279	78	78
Energy (power plants)	1,646	16,458	29,616	15,531	2,303	2,953	2,683
Total[1]	**9,707**	**27,229**	**353,722**	**51,281**	**3,394**	**25,894**	**8,968**

Source: California High-Speed Rail Authority, 2017
[1] Totals may not add up exactly due to rounding.
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in size
PM_{10} = particulate matter smaller than or equal to 10 microns in size
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
tons/yr = tons per year

Table 3.3-13 2040 Statewide No Project Emissions (Medium Ridership Scenario)

Project Element	ROG (tons/yr)	TOG (tons/yr)	CO (tons/yr)	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Roadways	996	1,451	86,627	6,312	489	27,540	7,091
Planes	474	479	3,968	3,908	423	118	118
Energy (power plants)	2,205	20,757	45,146	20,858	3,177	3,921	3,564
Total	**3,675**	**22,686**	**35,741**	**31,077**	**4,089**	**31,580**	**10,773**

Source: California High-Speed Rail Authority, 2017
[1] Totals may not add up exactly due to rounding.
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in size
PM_{10} = particulate matter smaller than or equal to 10 microns in size
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
tons/yr = tons per year

Table 3.3-14 2040 Statewide No Project Emissions (High Ridership Scenario)

Project Element	ROG (tons/yr)	TOG (tons/yr)	CO (tons/yr)	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Roadways	1,029	1,498	89,456	6,518	505	28,439	7,323
Planes	520	525	4,348	4,282	464	129	129
Energy (power plants)	2,205	20,757	45,146	20,858	3,177	3,921	3,564
Total[1]	**3,753**	**22,779**	**138,950**	**31,658**	**4,145**	**32,490**	**11,016**

Source: California High-Speed Rail Authority, 2017
[1] Totals may not add up exactly due to rounding.
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in size
PM_{10} = particulate matter smaller than or equal to 10 microns in size
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
tons/yr = tons per year

..

The general plans for the cities of Burbank, Glendale, and Los Angeles indicate continued land development and population growth, which would increase emissions under the No Project Alternative. However, increasingly stringent federal and state emissions control requirements and the replacement of older, higher-polluting vehicles with newer, less-polluting ones would reduce basinwide emissions under the No Project Alternative. Additionally, implementation of the SCAG RTP/SCS would reduce GHG emissions from passenger vehicles and light-duty trucks by 5 percent per capita by 2020 and 19 percent per capita by 2035 compared to 2005. In addition, SCAQMD rules and plans have been established to bring the Basin into compliance with the NAAQS and CAAQS, which would reduce emissions under the No Project Alternative. Continued land development and growth within the region would increase emissions, but these could be mitigated with the State of California initiative plans and local general plan policies under existing conditions and the No Project Alternative. Therefore, air quality is expected to improve in the Basin under the No Project Alternative compared to existing conditions.

3.3.6.3 High-Speed Rail Build Alternative

Construction Impacts

Construction of the project would generate emissions of VOC, NO_X, CO, SO_X, PM_{10}, $PM_{2.5}$, CO_2, CH_4, and N_2O that could result in short-term air quality and GHG effects. Construction of the HSR Build Alternative would involve demolition of existing structures, clearing, and grubbing; reduction of permeable surface area; 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 further described in Chapter 2.

Impact AQ #1: Regional Air Quality Impacts during Construction

Air quality effects would include regional emissions from construction and the potential effects of construction on sensitive receptors in proximity to the HSR Build Alternative. Another common effect of construction in general would be to cause or contribute to a localized exceedance of an ambient air quality standard or to affect compliance with the 2016 AQMP. The HSR Build Alternative emissions were compared to the general conformity *de minimis* levels on a calendar-year basis; consequently, *de minimis* levels can be exceeded for any calendar year in which emissions occur. Table 3.3-15 presents the maximum daily and average annual construction emissions for the HSR Build Alternative for the Burbank to Los Angeles Project Section. The HSR Build Alternative emissions were also calculated on an annual basis with units in tons/year and daily maximum basis expressed in pounds per day, as shown in Table 3.3-15. The emissions for all tables under this impact assume implementation of AQ-IAMF#1, AQ-IAMF#2, AQ-IAMF#4, AQ-IAMF#5, and AQ-IAMF#6. As noted in Section 3.3.4.3, the Authority or its contractors would prepare a 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 greater than 25 miles per hour (AQ-IAMF#1). Contractors would use low-VOC paint that complies with SCAQMD Rule 1113 to limit VOC emissions (AQ-IAMF#2). Contractors would use renewable diesel fuel in equipment and vehicles to reduce exhaust emissions of PM_{10} and $PM_{2.5}$ (AQ-IAMF#3) by 30 percent; however, the analysis did not account for this reduction because the use of renewable diesel fuel is not a fuel option for calculation in the CalEEMod model, which was used for the analysis. Exhaust emissions account for a small fraction of the total PM_{10} and $PM_{2.5}$; therefore, the emission results are conservative. All heavy-duty off-road construction diesel equipment would be required to use Tier 4 engines to reduce exhaust emissions of criteria pollutants and TACs (AQ-IAMF#4). The average age of heavy-duty construction vehicles would be limited to reduce exhaust emissions of criteria pollutants and TACs (AQ-IAMF#5). The reduction of the potential impact of concrete batch plants would also be implemented (AQ-IAMF#6).

Table 3.3-15 High-Speed Rail Build Alternative Construction Emissions

Emission Measurement	Emissions[1]					
	VOCs	CO	NO_X	SO_2	PM_{10}[2]	$PM_{2.5}$[2]
Maximum Daily (lbs/day)	45.99	708.97	482.11	1.69	80.45	28.00
Maximum Annual (tons/year)	3.09	71.92	22.07	0.18	15.93	2.94
Total (tons/construction duration)	**13.18**	**313.51**	**92.64**	**0.76**	**78.13**	**14.26**

Source: California High-Speed Rail Authority, 2018
[1] Emissions include California High-Speed Rail System construction.
[2] The PM_{10} and $PM_{2.5}$ emissions consist of exhaust and fugitive dust emissions.
CO = carbon monoxide
lbs = pounds
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
RTP = Regional Transportation Plan
SO_2 = sulfur dioxide
VOC = volatile organic compound

Table 3.3-16 provides details regarding the construction emissions from the HSR Build Alternative. Emissions presented include emissions from all construction phases of the HSR Build Alternative. The predominant pollutants associated with construction of the HSR Build Alternative would be fugitive dust (PM_{10} and $PM_{2.5}$) from earthmoving and disturbed earth surfaces and combustion pollutants (particularly O_3 precursors [NO_X and VOCs]) from heavy equipment and trucks. AQ-IAMF#1 through AQ-IAMF#6 are included as part of the HSR Build Alternative and would be implemented to avoid or minimize effects. These IAMFs would reduce potential adverse effects resulting from factors related to criteria pollutants during construction. All of the construction-related emissions would be released within the Basin.

Table 3.3-16 High-Speed Rail Build Alternative Programmatic Construction Emissions

Activities	VOC	CO	NO_X	SO_X	PM_{10}[1]	$PM_{2.5}$[1]
SCAQMD annual CEQA significance thresholds (pounds per day) (CEQA)	75	550	100	150	150	55
Annual general conformity *de minimis* levels (tons/yr)[2] (NEPA)	10	100	10	N/A	100	70
Year 2020						
Emissions (lbs/day)	16.28	360.00	**172.93**	0.98	64.23	15.82
Exceeds SCAQMD CEQA thresholds?	No	No	**Yes**	No	No	No
Emissions (tons/yr)	1.21	28.95	**11.88**	0.07	9.56	1.66

Activities	VOC	CO	NO_X	SO_X	PM_{10}[1]	$PM_{2.5}$[1]
Exceeds *de minimis* levels?	No	No	**Yes**	N/A	No	No
Year 2021						
Emissions (lbs/day)	41.42	**644.93**	**482.11**	1.45	80.45	28.00
Exceeds SCAQMD CEQA thresholds?	No	**Yes**	**Yes**	No	No	No
Emissions (tons/yr)	2.55	57.32	**22.07**	0.15	13.01	2.50
Exceeds *de minimis* levels?	No	No	**Yes**	N/A	No	No
Year 2022						
Emissions (lbs/day)	45.99	**552.30**	**171.07**	1.37	65.39	17.14
Exceeds SCAQMD CEQA thresholds?	No	**Yes**	**Yes**	No	No	No
Emissions (tons/yr)	3.09	65.21	**20.88**	0.16	13.65	2.68
Exceeds *de minimis* levels?	No	No	**Yes**	N/A	No	No
Year 2023						
Emissions (lbs/day)	23.29	545.91	**134.54**	1.36	65.29	16.79
Exceeds SCAQMD CEQA thresholds?	No	No	**Yes**	No	No	No
Emissions (tons/yr)	2.57	63.16	**16.49**	0.16	13.51	2.62
Exceeds *de minimis* levels?	No	No	**Yes**	N/A	No	No
Year 2024						
Emissions (lbs/day)	29.23	**708.97**	**180.65**	1.69	75.75	18.67
Exceeds SCAQMD CEQA thresholds?	No	**Yes**	**Yes**	No	No	No
Emissions (tons/yr)	2.87	71.92	**20.45**	0.18	15.93	2.94
Exceeds *de minimis* levels?	No	No	**Yes**	N/A	No	No
Year 2025						
Emissions (lbs/day)	9.08	333.81	39.09	0.73	2.24	1.38
Exceeds SCAQMD CEQA thresholds?	No	No	No	No	No	No
Emissions (tons/yr)	0.05	1.84	0.22	0.00	0.20	0.03
Exceeds *de minimis* levels?	No	No	No	N/A	No	No
Year 2026						
Emissions (lbs/day)	9.08	333.81	39.09	0.73	2.24	1.38
Exceeds SCAQMD CEQA thresholds?	No	No	No	No	No	No
Emissions (tons/yr)	0.05	1.84	0.22	0.00	0.20	0.03
Exceeds *de minimis* levels?	No	No	No	N/A	No	No
Year 2027						
Emissions (lbs/day)	9.08	333.81	39.09	0.73	2.24	1.38
Exceeds SCAQMD CEQA thresholds?	No	No	No	No	No	No
Emissions (tons/yr)	0.05	1.84	0.22	0.00	0.20	0.03
Exceeds *de minimis* levels?	No	No	No	N/A	No	No
Year 2028						
Emissions (lbs/day)	9.08	333.81	39.09	0.73	2.24	1.38
Exceeds SCAQMD CEQA thresholds?	No	No	No	No	No	No

Activities	VOC	CO	NO_X	SO_X	PM_{10}[1]	$PM_{2.5}$[1]
Emissions (tons/yr)	0.05	1.84	0.22	0.00	0.20	0.03
Exceeds *de minimis* levels?	No	No	No	N/A	No	No

Source: California High-Speed Rail Authority, 2019

[1] The PM_{10} and $PM_{2.5}$ emissions consist of exhaust and fugitive dust emissions.

[2] Pursuant to NEPA, effects on air quality would be considered an impact if the HSR Build Alternative criteria pollutant emissions would exceed the general conformity *de minimis* levels in a nonattainment or maintenance area. It is currently assumed that general conformity rule will apply only to construction of the HSR Build Alternative, as operation of the HSR Build Alternative is expected to decrease regional emissions of criteria pollutants.

CEQA = California Environmental Quality Act
CO = carbon monoxide
lbs/day = pounds per day
N/A = not applicable
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
SCAQMD = South Coast Air Quality Management District
SO_X = sulfur oxides
tons/yr = tons per year
VOC = volatile organic compound

Construction emissions have the potential to cause elevated criteria pollutant emissions in the local communities. These elevated emission levels may cause or contribute to exceedances of the general conformity *de minimis* emission levels and/or SCAQMD significance thresholds.

The analysis acknowledges that, without mitigation, exceedances of the SCAQMD's CO and NO_X Air Quality Thresholds of Significance may occur during specific construction periods. Simply exceeding the SCAQMD's numeric regional mass daily emission thresholds does not constitute a particular health impact to an individual nearby. The reason for this is that the mass daily emission thresholds are in lbs/day emitted into the air, whereas health effects are determined based on the concentration of a pollutant in the air at a particular location (e.g., ppm by volume of air or $\mu g/m^3$ of air). CAAQS and NAAQS were developed to protect the most susceptible population groups from adverse health effects and were established in terms of ppm or $\mu g/m^3$ for the applicable emissions.

In contrast to emissions burdens, emission concentrations reflect the quality of the air in terms of the amount of pollution per unit of volume and are used to measure a project's compliance with the NAAQS and CAAQS at a localized level.

Although construction activities would emit ozone precursors, that alone would not cause adverse health effects related to O_3. Ground-level O_3 (smog) is not directly emitted into the air but is formed when precursor pollutants NO_X and VOCs enter the atmosphere and undergo complex chemical reactions in the process of sunlight. Once formed, O_3 can be transported long distances by wind. Because of the complexity of O_3 formation, a specific tonnage amount of NO_X (or VOCs) emitted in a particular area does not translate to a particular concentration of O_3 in that area. The currently available modeling tools are not equipped to provide a meaningful analysis of the correlation between an individual project's air emissions and a specific human health effect. Although health effects are correlated with increases in ambient levels of O_3 in the air (concentration) that an individual person breathes, it would take a substantial amount of additional emissions to result in a modeled increase in ambient O_3 levels over the entire region. It is not currently possible to accurately quantify O_3-related health impacts cause by NOx or VOC emissions at the project level due to photochemistry and regional model limitations. It is therefore not possible to predict whether NO_X or VOC O_3 precursor emissions would result in localized health effects related to O_3.

Although the project would exceed the significance thresholds for CO and NO_X at a regional level, without mitigation, no localized adverse health effects are predicted to occur because the project is not predicted to cause or exacerbate an exceedance of the NAAQS and CAAQS for these pollutants. Moreover, and in any event, emissions of O_3 precursors caused by the project will be offset through an anticipated SCAQMD emission offset program. Therefore, no increases in O_3 levels are expected to occur as a result of the project.

Construction emissions associated with several early action projects (see the description of early action projects in Chapter 2, Alternatives) would occur from the construction equipment and truck activity at four roadway undercrossings (Sonora Avenue, Grandview Avenue, Flower Street, and

Goodwin Avenue/Chevy Chase Drive), one roadway overcrossing (Main Street) and one improvement at a regional passenger rail station (Burbank Metrolink Station). AQ-IAMF#1 through AQ-IAMF#6 are included as part of the HSR Build Alternative and would be implemented to avoid or minimize effects. These IAMFs would reduce potential adverse effects resulting from factors related to criteria pollutants during construction. Table 3.3-17 presents the criteria pollutant emissions during construction of these early action project components.

Table 3.3-17 High-Speed Rail Early Action Project Components Construction Emissions

Activities	VOC	CO	NO_X	SO_X	PM_{10}[1]	$PM_{2.5}$[1]
SCAQMD Daily CEQA significance thresholds (pounds per day)	75	550	100	150	150	55
Annual *de minimis* levels (tons/yr)[2]	10	100	10	N/A	100	70
Burbank Metrolink Station						
Emissions (lbs/day)	0.60	6.25	0.68	0.02	1.58	0.43
Exceeds SCAQMD CEQA thresholds?	No	No	No	No	No	No
Emissions (tons/yr)	0.07	0.83	0.09	0.00	0.20	0.05
Exceeds *de minimis* levels?	No	No	No	N/A	No	No
Sonora Avenue Roadway Undercrossing						
Emissions (lbs/day)	6.64	119.21	28.00	0.29	13.29	3.80
Exceeds SCAQMD CEQA thresholds?	No	No	No	No	No	No
Emissions (tons/yr)	0.40	7.79	1.83	0.02	0.85	0.25
Exceeds *de minimis* levels?	No	No	No	N/A	No	No
Grandview Avenue Roadway Undercrossing						
Emissions (lbs/day)	6.37	119.21	28.00	0.29	13.29	3.80
Exceeds SCAQMD CEQA thresholds?	No	No	No	No	No	No
Emissions (tons/yr)	0.53	10.57	2.44	0.03	1.19	0.34
Exceeds *de minimis* levels?	No	No	No	N/A	No	No
Flower Street Roadway Undercrossing						
Emissions (lbs/day)	5.76	111.89	25.32	0.26	10.87	3.67
Exceeds SCAQMD CEQA thresholds?	No	No	No	No	No	No
Emissions (tons/yr)	0.47	9.95	2.21	0.02	0.98	0.28
Exceeds *de minimis* levels?	No	No	No	N/A	No	No
Goodwin Avenue Roadway Undercrossing						
Emissions (lbs/day)	3.54	92.83	25.58	0.21	7.05	3.67
Exceeds SCAQMD CEQA thresholds?	No	No	No	No	No	No
Emissions (tons/yr)	0.22	6.03	1.67	0.01	0.27	0.09
Exceeds *de minimis* levels?	No	No	No	N/A	No	No
Main Street Roadway Overcrossing						
Emissions (lbs/day)	8.50	134.26	33.78	0.34	18.79	5.28
Exceeds SCAQMD CEQA thresholds?	No	No	No	No	No	No
Emissions (tons/yr)	0.93	16.37	4.08	0.04	2.30	0.65
Exceeds *de minimis* levels?	No	No	No	N/A	No	No

Source: California High-Speed Rail Authority, 2018

[1] The PM_{10} and $PM_{2.5}$ emissions consist of exhaust and fugitive dust emissions.

[2] Pursuant to NEPA, effects on air quality would be considered an adverse effect if the HSR Build Alternative criteria pollutant emissions would exceed the general conformity *de minimis* levels in a nonattainment or maintenance area. It is currently assumed that general conformity rule will apply only to construction of the HSR Build Alternative, as operation of the HSR Build Alternative is expected to decrease regional emissions of criteria pollutants.

CEQA = California Environmental Quality Act
CO = carbon monoxide
HSR = high-speed rail
lbs/day = pounds per day
N/A = not applicable
NEPA = National Environmental Policy Act
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
SCAQMD = South Coast Air Quality Management District
SO_X = sulfur oxides
tons/yr = tons per year
VOC = volatile organic compound

As described above, AQ-IAMF#1, Fugitive Dust Emissions; AQ-IAMF#2, Selection of Coatings; AQ-IAMF#4, Reduce Criteria Exhaust Emissions from Construction Equipment; AQ-IAMF#5, Reduce Criteria Exhaust Emissions from On-Road Construction Equipment; and AQ-IAMF#6, Reduce the Potential Impact of Concrete Batch Plants, are included as part of the HSR Build Alternative and would be implemented to avoid or minimize effects. These IAMFs would reduce potential adverse effects resulting from factors related to criteria pollutants during construction.

Compliance with existing regulatory requirements and implementation of HSR system IAMFs would minimize potential effects associated with construction activities related to air quality. However, direct emissions from the construction phase of the HSR Build Alternative would exceed the general conformity applicability *de minimis* levels for NO_X in certain calendar years in which construction would take place. NO_X emissions that exceed the general conformity *de minimis* levels are therefore considered to have the potential to cause adverse air quality effects. General conformity *de minimis* levels would not be exceeded for any of the other criteria pollutants.

Purchase of emissions offsets through an anticipated SCAQMD emission offset program which will be required under a contractual agreement between the Authority and the SCAQMD (AQ-MM#1), would offset NO_X emissions to below the general conformity applicability *de minimis* levels.

CEQA Conclusion

The construction emissions for the HSR Build Alternative under this impact assume implementation of AQ-IAMF#1, AQ-IAMF#2, AQ-IAMF#4, AQ-IAMF#5, and AQ-IAMF#6. Even after implementation of these measures, construction emissions would exceed the daily emission SCAQMD CEQA thresholds for CO and NO_X during 5 years out of the 9-year construction period; therefore, construction emissions of these pollutants may cause significant air quality impacts related to the release of criteria pollutant emissions for which the project region is in nonattainment. Therefore, CEQA requires mitigation.

One mitigation measure that was considered would extend the construction schedule and limit construction equipment and usage, which would reduce hourly/daily emission concentrations. However, it was determined that this would not be a feasible measure, as increasing the length of the construction schedule would delay the opening year of the Burbank to Los Angeles Project Section and extend the duration of impacts that affect other railroad locomotive operators in the right-of-way, such as Metrolink, Amtrak, and Union Pacific Railroad.

Mitigation measure AQ-MM#1 would require the purchase of emission offsets through an anticipated contractual agreement between the Authority and the SCAQMD. Emission reduction credits are anticipated to be obtained from the SCAQMD to offset emissions associated with the construction of the HSR Build Alternative. Purchase of emission offsets through the anticipated agreement mitigation measure AQ-MM#1), would offset and/or decrease NO_X emissions. There are no available offset programs to reduce CO emissions.

The Authority will participate in the SCAQMD emission offset program to the maximum extent that offsets are available to reduce construction period NO_X emissions. However, until such agreement is in place, this impact is significant and unavoidable.

Impact AQ #2: Compliance with Air Quality Plans

Emissions from construction of the HSR Build Alternative would be limited to the construction duration of up to 5 calendar years. However, depending on the amount of construction to be completed, construction activities would involve heavy-duty construction equipment and would have the potential to cause adverse air quality effects that would conflict with or obstruct implementation of the applicable air quality plan.

The emission calculations for this impact assume implementation of AQ-IAMF#1, AQ-IAMF#2, AQ-IAMF#4, AQ-IAMF#5, and AQ-IAMF#6. As noted in Section 3.3.4.3, the Authority or its contractors would prepare a 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 greater than 25 miles per hour (AQ-IAMF#1). Contractors would use low-VOC paint that complies with SCAQMD Rule 1113 to limit VOC emissions (AQ-IAMF#2). Contractors would also be required to use renewable diesel fuel in equipment and vehicles to reduce exhaust emissions of PM_{10} and $PM_{2.5}$ (AQ-IAMF#3). All heavy-duty off-road construction diesel equipment would be required to use Tier 4 engines to reduce exhaust emissions of criteria pollutants and TACs (AQ-IAMF#4). The average age of heavy-duty construction vehicles would be limited to reduce exhaust emissions of criteria pollutants and TACs (AQ-IAMF#5). An IAMF to reduce the potential impact of concrete batch plants would also be implemented (AQ-IAMF#6).

As discussed above, annual NO_X emissions associated with the HSR Build Alternative would exceed the general conformity applicability levels, whereas annual CO, VOC, PM_{10}, and $PM_{2.5}$ emissions would be below the general conformity applicability levels.

The emission thresholds set by the SCAQMD are also applicable to the plan's compliance under NEPA, as emissions above these thresholds would have the potential to conflict with or obstruct implementation of the SCAQMD's air quality plans, which have been prepared to attain the NAAQS and CAAQS. Construction peak daily CO and NO_X emissions could exceed the daily emission SCAQMD thresholds and impede the implementation of the respective air quality plans, including plans prepared to attain the NAAQS.

With on-site emission reduction measures (i.e., AQ-IAMF#1, AQ-IAMF#2, AQ-IAMF#3, AQ-IAMF#4, AQ-IAMF#5, and AQ-IAMF#6), CO and NO_X effects would be reduced. The purchase of emission offsets through an anticipated contractual agreement between the Authority and SCAQMD (Mitigation Measure AQ-MM#1) for these pollutants, if available, would further reduce effects to air quality.

CEQA Conclusion

As discussed above, CO and NO_X emissions associated with the HSR Build Alternative would exceed the SCAQMD thresholds, while VOC, PM_{10}, and $PM_{2.5}$ emissions would be below the SCAQMD thresholds. Therefore, CO and NO_X emissions would have a significant impact under CEQA.

The emission thresholds set by the SCAQMD are also applicable to the plan's compliance under CEQA, as emissions above these thresholds would have the potential to conflict with or obstruct implementation of the SCAQMD's air quality plans, which have been prepared to attain NAAQS and CAAQS. Construction peak daily CO and NO_X emissions could exceed the daily emissions SCAQMD thresholds and impede the implementation of the respective air quality plans, including plans prepared to attain the NAAQS.

Even with the implementation of AQ-IAMF#1, AQ-IAMF#2, AQ-IAMF#3, AQ-IAMF#4, AQ-IAMF#5 and AQ-IAMF#6, and federal, state, and SCAQMD regulatory requirements, CO and NO_X impacts under CEQA would be significant. Therefore, CEQA requires mitigation. The Authority would offset emissions that exceed general conformity *de minimis* levels by obtaining, through purchase of emission reduction credits or another mechanism approved by SCAQMD, a sufficient quantity of NO_X offsets to demonstrate general conformity. Mitigation measure AQ-MM#1 would require the purchase of construction emission offsets through an anticipated SCAQMD emission offset program. This measure would reduce the regional effect of the increased emissions. However, until the contractual agreement is in place and offsets are secured, this impact is significant and unavoidable under CEQA. The analysis acknowledges that, without mitigation, exceedances of the SCAQMD's CO and NO_X Air Quality Thresholds of Significance may occur during specific construction periods. As noted above, simply exceeding the SCAQMD's numeric regional mass daily emission thresholds does not constitute a particular health impact to an individual nearby. The reason for this is that the mass daily emission thresholds are in lbs/day emitted into the air, whereas health effects are determined based on the concentration of a pollutant in the air at a particular location (e.g., ppm by volume of air or $\mu g/m^3$ of air). CAAQS and NAAQS were developed to protect the most susceptible population groups from adverse health effects and were established in terms of ppm or $\mu g/m^3$ for the applicable emissions.

In contrast to emissions burdens, emission concentrations reflect the quality of the air in terms of the amount of pollution per unit of volume and are used to measure a project's compliance with the NAAQS and CAAQS at a localized level.

Although construction activities would emit ozone precursors, that alone would not cause adverse health effects related to O_3. Ground-level O_3 (smog) is not directly emitted into the air but is formed when precursor pollutants NO_X and VOCs enter the atmosphere and undergo complex chemical reactions in the process of sunlight. Once formed, O_3 can be transported long distances by wind. Because of the complexity of O_3 formation, a specific tonnage amount of NO_X (or VOCs) emitted in a particular area does not translate to a particular concentration of O_3 in that area. The currently available modeling tools are not equipped to provide a meaningful analysis of the correlation between an individual project's air emissions and a specific human health effect. Although health effects are correlated with increases in ambient levels of O_3 in the air (concentration) that an individual person breathes, it would take a substantial amount of additional emissions to result in a modeled increase in ambient O_3 levels over the entire region. It is not currently possible to accurately quantify O_3-related health impacts cause by NO_x or VOC emissions at the project level due to photochemistry and regional model limitations. It is therefore not possible to predict whether NO_X or VOC O_3 precursor emissions would result in localized health effects related to O_3.

Although the project would exceed the significance thresholds for CO and NO_X at a regional level, without mitigation, no localized adverse health effects are predicted to occur because the project is not predicted to cause or exacerbate an exceedance of the NAAQS and CAAQS for these pollutants.

In addition, as described below, a health risk assessment was conducted, and it was determined that the project would not exceed applicable thresholds for cancer risks, or for acute and chronic noncancer health impacts.

Impact AQ #3: Greenhouse Gas Emissions during Construction

GHG emissions generated from construction of the HSR Build Alternative would be short-term. However, because the time that CO_2 remains in the atmosphere cannot be definitively quantified due to the wide range of time scales in which carbon reservoirs exchange CO_2 with the atmosphere, there is no single value for the half-life of CO_2 in the atmosphere (Intergovernmental Panel on Climate Change 1997). Therefore, the duration that CO_2 emissions from a short-term project would remain in the atmosphere is unknown.

The emissions for this impact assume implementation of AQ-IAMF#1, AQ-IAMF#2, AQ-IAMF#3, AQ-IAMF#4, AQ-IAMF#5, and AQ-IAMF#6. The GHG emissions reductions from the use of renewable diesel fuel (AQ-IAMF#3) in all off-road diesel-powered engines was accounted for in the analysis. The GHG construction emissions for the HSR Build Alternative would total 36,102 metric tons of CO_2e. This represents 0.008 percent of the total annual GHG emissions for California, which were 424.1 MMT CO_2e in 2017 (CARB 2019).

Table 3.3-18 shows the amortized GHG emissions during construction of the HSR Build Alternative. The half-life of CO_2 is not defined, and other GHG pollutants such as N_2O can remain in the atmosphere for 120 years (Intergovernmental Panel on Climate Change 1997). According to SCAQMD guidelines, a project's construction emissions should be amortized over the life of the project (defined as 30 years, unless the project is a temporary project that would operate for less than 30 years). The amortized GHG construction emissions for the HSR Build Alternative would be about 37 metric tons of CO_2e per year, as shown in Table 3.3-18. The emissions results assume implementation of AQ-IAMF#1, AQ-IAMF#2, AQ-IAMF#3, AQ IAMF#4, AQ-IAMF#5, and AQ-IAMF#6.

Table 3.3-18 High-Speed Rail Build Alternative Carbon Dioxide Equivalent Construction Emissions (Metric Tons per Year)

Year	CO_2e Emissions (MT/yr)
2020	3,096
2021	6,474
2022	6,846
2023	6,494
2024	6,681
2025	3,994
2026	2,338
2027	132
2028	47
Total	**36,102**
Amortized GHG Emissions (averaged over 30 years)[1]	
CO_2e per year	1,203
Payback of GHG Emissions (days)[2]	
Payback period (Medium Ridership)[3]	13
Payback period (High Ridership)[3]	8

Source: California High-Speed Rail Authority, 2017
Emission factors for CO_2 assume the use of AQ-IAMF#3, Renewable Diesel Fuel.
[1] Project life is assumed to be 30 years according to SCAQMD guidance.
[2] Payback periods were estimated by dividing the GHG emissions during construction years by the annual GHG emissions reduction during HSR Build Alternative operation. Refer to Table 3.3-32 for operational GHG emissions-reduction data. The data range represents the emission changes based on the two ridership scenarios (medium and high) for the HSR Build Alternative's opening year (2029).
[3] The high ridership forecast scenario is 56.8 million. The medium ridership forecast scenario is 46.8 million.
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
HSR = High-Speed Rail
MT/yr = metric tons per year

The increase in GHG emissions generated during construction would be offset by the net GHG reductions from operation of the HSR Build Alternative (because of car and plane trips removed) in less than 14 days.

GHG emissions generated from construction of the early action projects and other project components are also presented in Table 3.3-19. Construction emissions, including those from the early action projects, would be offset in less than 1 day of HSR Build Alternative operation.

Table 3.3-19 Early Action Projects Carbon Dioxide Equivalent Construction Emissions

Early Action Projects	Total CO_2e Emissions (MT) per component at full construction duration
Downtown Burbank Metrolink Station	439
Sonora Avenue Grade Separation	1,533
Grandview Avenue Grade Separation	2,089
Flower Street Grade Separation	1,713
Goodwin Avenue/Chevy Chase Drive Grade Separation	681
Main Street Grade Separation	3,621

Source: California High-Speed Rail Authority, 2019

Emission factors for CO_2 assume the use of AQ-IAMF#3, Renewable Diesel Fuel.

CO_2e = carbon dioxide equivalent MT/yr = metric tons per year

GHG = greenhouse gas SCAQMD = South Coast Air Quality Management District

CEQA Conclusions

The HSR Build Alternative would result in GHG emissions from construction. Per SCAQMD interim guidance for assessing project GHG impacts, construction emissions are amortized over a 30-year period and added to the annual operating emissions to address their contribution to annual emissions over the lifetime of the proposed project. The overall HSR Build Alternative GHG impact would be less than significant because the construction GHG emissions would be offset in less than 13 days of HSR Build Alternative operation as part of the HSR Phase 1 system (because of car and plane trips removed). In addition, GHG emissions reductions would continue and increase over time for decades. The HSR system is also identified in the CARB 2017 Scoping Plan as part of a sustainable statewide transportation system necessary to achieve the state's climate goals, and it is fully consistent with that plan (CARB 2017). Therefore, the construction-related GHG emissions, which would be offset in less than 13 days, would not result in the generation of GHG emissions that may have a significant impact on the environment.

Impact AQ #4: Asbestos and Lead-Based Paint Exposure during Construction

Buildings in the local 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. If encountered during structure demolitions and relocations, lead-based paint and asbestos would be handled and disposed of in accordance with applicable standards. The demolition of asbestos-containing materials is subject to the limitations of the National Emissions Standards for Hazardous Air Pollutants (USEPA 2016a) regulations and would require an asbestos inspection. The SCAQMD's Compliance Division would be consulted before demolition begins. Section 3.10, Hazardous Materials and Wastes, discusses potential issues concerning lead-based paint during construction of the HSR Build Alternative and describes how the HSR Build Alternative would include strict compliance with existing asbestos regulations as part of its design.

Los Angeles County is designated by the California Department of Conservation, Department of Mines and Geology, as an area not likely to contain ultramafic rocks in outcrops. As such, the local RSA is not located in an area with reported NOA based on the *Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California* (U.S. Geological Survey 2011). Therefore, NOA would not likely be disturbed during construction.

CEQA Conclusions

Compliance with the National Emissions Standards for Hazardous Air Pollutants (USEPA 2016a) regulations and the Lead-Based Paint Poisoning Prevention Act of 1971 would prevent sensitive receptors from being exposed to substantial pollutant concentrations from asbestos and lead-based paint exposure. Therefore, this impact would be less than significant under CEQA.

Impact AQ #5: Localized Air Quality Impacts during Construction of Rail Alignment and Train Stations

Rail Alignment

Construction emissions have the potential to cause elevated criteria pollutant concentrations. As previously mentioned under Impact AQ #1, two criteria pollutants, NO_2 and CO, would exceed the CEQA significance thresholds, while NOx would exceed the general conformity *de minimis* levels. These elevated NO_2 and CO concentrations may cause or contribute to exceedances of the NAAQS and the CAAQS. Sensitive receptors (such as schools, residences, and health-care facilities) are located near the construction areas.

Because the HSR Build Alternative is 14 miles long, it would not be practical to analyze the entire construction phase as a whole. Therefore, the six discrete construction modeling areas described below were chosen to represent the worst-case scenarios for construction-related air quality and health risk impacts to the maximum number of sensitive receptors along the Burbank to Los Angeles Project Section alignment. Each selected construction area encompasses a discrete area that includes all elements of the HSR Build Alternative passing through that area, including construction features with their emissions profile, meteorology, topography, and sensitive receptors.

The following construction sites were evaluated for the potential to cause localized air quality effects:

- Construction of the below-grade Burbank Airport Station and track alignment via sequential excavation method (SEM) for the tunnel section under the Hollywood Burbank Airport Runway 8-26, Taxiway D, the proposed extended Taxiway C, and critical airport safety zones and then via cut-and-cover method from south of the runway/taxiways to Victory Place
- Construction of the Burbank Boulevard Grade Separation
- Construction of the rail alignment (a 2-mile segment) between State Route 134 and Los Feliz Boulevard
- Reconfiguration of the Metrolink Central Maintenance Facility
- Construction of the Main Street Grade Separation area
- Construction of the LAUS platforms

The construction emissions are associated with several different phases, such as mobilization, demolition, earthmoving, land clearing, station construction, track construction, and roadway and rail bridge construction.

Table 3.3-20 and Table 3.3-21 show the estimated NO_2 and CO ambient air concentrations, respectively, for each of the construction work areas. The predicted 1-hour NO_2 ambient impacts for the Burbank Airport Station to Alameda Avenue below-grade rail alignment and the Burbank Boulevard Grade Separation would exceed the 1-hour NO_2 NAAQS and CAAQS. The predicted annual NO_2 would exceed the annual NO_2 CAAQS. The predicted 1- and 8-hour CO ambient impacts for all the work areas would be below the NAAQS and CAAQS, and the predicted annual NO_2 would be below the NAAQS.

Health Risk Assessment

During construction, sensitive receptors would be exposed to increased concentrations of TACs (e.g., DPM), which may present cancer risks. This section reports and identifies the health risk from construction-generated emissions.

DPM is the primary TAC released from construction activities. The modeled DPM concentrations were used in determining the total exposure dose and associated health effect. Specific details of the air dispersion modeling and health risk assessment are provided in Appendix G of the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020).

Table 3.3-20 Carbon Monoxide Concentrations from Construction Emissions

Construction Area	Maximum Incremental Off-Site Average CO Concentration (µg/m³) Unmitigated		Background CO Concentration (µg/m)[1]		Total Off-Site CO Concentration (µg/m³)		NAAQS (µg/m³ equivalent)		CAAQS (µg/m³ equivalent)	
	1-Hour	8-Hour	1-Hour[1]	8-Hour[2]	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
Burbank Tunneling Cut-and-Cover 1.8-Mile Segment (between Burbank Airport Station and Victory Place	3,161	1,060	2,514	2,000	5,675	3,060	40,000	10,000	23,000	10,000
Burbank Boulevard Overcrossing Area	3,160	1,060	2,514	2,000	5,674	3,060	40,000	10,000	23,000	10,000
Glendale 2-Mile Segment (between SR 134 and Los Feliz Boulevard)	903	277	2,514	2,000	3,417	2,277	40,000	10,000	23,000	10,000
Metrolink CMF Area	519	144	2,514	2,000	3,033	2,144	40,000	10,000	23,000	10,000
Main Street Grade Separation	2,182	782	2,514	2,000	4,696	2,782	40,000	10,000	23,000	10,000
LAUS Platforms	1,785	603	2,514	2,000	4,299	2,603	40,000	10,000	23,000	10,000

Sources: California High-Speed Rail Authority, 2019; South Coast Air Quality Management District, n.d.

[1] The highest monitored 1-hour value from the Pasadena station or Central Los Angeles station was used as the background concentration.

[2] The highest monitored 8-hour value from the Pasadena station or Central Los Angeles station was used as the background concentration.

µg/m³ = micrograms per cubic meter
CAAQS = California Ambient Air Quality Standards
CMF = Central Maintenance Facility
CO = carbon monoxide
LAUS = Los Angeles Union Station
N/A = not applicable
NAAQS = National Ambient Air Quality Standards
SR = State Route

Table 3.3-21 Nitrogen Dioxide Concentrations from Construction Emissions

Construction Area	Maximum Incremental Off-Site Average NO_2 Concentration ($\mu g/m^3$)		Background Concentration ($\mu g/m^3$)[1]		Total Off-Site 1-Hour NO_2 Concentration ($\mu g/m^3$)		NAAQS		CAAQS	
	1-Hour	Annual	1-Hour	Annual	1-Hour	Annual	1-Hour	Annual	1-Hour	Annual
Burbank Tunneling Cut-and-Cover 1.8-Mile Segment (between Burbank Airport Station and Victory Place	438	20	152	40	**590***	**60***	188	100	339	57
Burbank Boulevard Overcrossing Area	294	2			**446***	42				
Glendale 2-Mile Segment (between SR 134 and Los Feliz Boulevard)	146	11			**298***	51				
Metrolink CMF Area	109	6			**261***	45				
Main Street Grade Separation	491	38			**643***	**77***				
LAUS Platforms	131	10			**283***	50				

Sources: California High-Speed Rail Authority, 2019; South Coast Air Quality Management District, n.d.

[1] The highest monitored 1-hour value from the Pasadena station or Central Los Angeles station was used as the background concentration.

[2] The highest monitored annual value from the Pasadena station or Central Los Angeles station was used as the background concentration.

[3] Exceedances of the air quality standards are shown in **bold with asterisks**.

$\mu g/m^3$ = micrograms per cubic meter
CAAQS = California Ambient Air Quality Standards
CMF = Central Maintenance Facility
LAUS = Los Angeles Union Station
N/A = not applicable
NAAQS = National Ambient Air Quality Standards
NO_2 = nitrogen dioxide
SR = State Route

The six discrete construction areas listed above were designed to represent the conservative approach in terms of construction-related air quality and health risk impacts, typically areas that have a large amount of construction activity with exhaust vented to the air near sensitive receptors along the Palmdale to Burbank alignment. For cancer impacts, a threshold of 10 excess cancers in 1 million is used. For the chronic and acute hazard index, a threshold of 1.0 is used. In all six cases, the maximally exposed individual location is the individual resident receptor immediately adjacent to the perimeter of the facility. Note that specific sensitive receptor locations, such as residential, recreational park, and school land uses, are modeled in all discrete construction work areas.

According to the OEHHA guidance, cancer risk is defined as the predicted risk of cancer (unit less) over a residential lifetime based on a long-term (30-year) continuous exposure, and is usually expressed as chances per million persons exposed (OEHHA 2015). Individual cancer risk is directly proportional to the frequency and duration of exposure to TACs, modified by age sensitivity factors. The age sensitivity factors multiply the risk by 10 for third-trimester fetuses to age 2 (labeled by OEHHA as “0 < 2”); by 3 for children age 2 to 16 (“2 < 16”), and by 1 for persons age 16 and older.

It was necessary to subdivide the exposure durations into smaller time periods (sub-periods) and calculate the health risk separately for each sub-period. These sub-periods correspond to the years when the modeled receptor’s age falls within the ranges defined by the age sensitivity factors (0 < 2, 2 < 16, and ≥ 16). For residential exposures, the >16 range includes the adult.

The cancer risk results for each sub-period were then summed to obtain the cancer risk for the 9-year construction exposure duration. The cancer risks calculated for these three sub-periods were then summed to obtain the total cancer risks for the 9-year construction exposure duration. Specific details of the health risk assessment are found in Appendix G of the *Burbank to Los Angeles Project Section Draft Air Quality and Global Climate Change Technical Report* (Authority 2020).

According to the construction localized effect air dispersion modeling, construction activities along the alignment (including roadway modifications or grade separations) would result in an incremental increase in cancer risk of approximately 2.97 in 1 million. The maximum incremental cancer risk is predicted to be less than the significance threshold for the 30-year residential and 9-year schoolchildren exposure periods. Table 3.3-22 indicates that the incremental residential cancer risk would not exceed the applicable SCAQMD thresholds for all construction areas. None of the construction areas would result in exceedances of applicable thresholds for noncancer chronic hazard indices.

Table 3.3-22 Diesel Particulate Matter Excess Cancer Risk Associated with Construction Emissions

Highest Risk, by Risk Type and Receptor Type	Sensitive Receptor Type		
	Residential [1]	Recreational	School
Burbank Tunneling Cut-and-Cover 1.8-Mile Segment (between Burbank Airport Station and Victory Place			
Cancer Risk (per million)	1.11	0.52	0.56
Noncancer Chronic Hazard Index	0.005	0.001	0.001
Burbank Boulevard Overcrossing Area			
Cancer Risk (per million)	2.64	0.34	0.42
Noncancer Chronic Hazard Index	0.013	0.001	0.001
Glendale 2-Mile Segment (between SR 134 and Los Feliz Boulevard)			
Cancer Risk (per million)	2.97	1.00	0.39
Noncancer Chronic Hazard Index	0.014	0.010	0.001

Highest Risk, by Risk Type and Receptor Type	Sensitive Receptor Type		
	Residential [1]	Recreational	School
Metrolink CMF Area			
Cancer Risk (per million)	1.10	1.42	1.12
Noncancer Chronic Hazard Index	0.005	0.005	0.005
Main Street Grade Separation			
Cancer Risk (per million)	1.09	0.08	1.27
Noncancer Chronic Hazard Index	0.005	0.001	0.005
LAUS Platforms			
Cancer Risk (per million)	2.14	N/A	N/A
Noncancer Chronic Hazard Index	0.010	N/A	N/A

Source: California High-Speed Rail Authority, 2019
[1] The risk was estimated based on the projected ambient air concentrations estimated from air dispersion modeling along with the 9-year construction period, exposure factors, and cancer potency factors.
CMF = Central Maintenance Facility
LAUS = Los Angeles Union Station
N/A = not applicable
SR = State Route

Table 3.3-22 indicates that the incremental residential cancer risk would not exceed the applicable SCAQMD thresholds for all construction areas. None of the construction areas would result in exceedances of applicable thresholds for noncancer chronic hazard indices.

Chronic hazard indices were calculated using the “OEHHA Derived” method, which evaluates inhalation exposure. The maximum chronic hazard index increments are predicted to be less than the significance threshold for all receptor types.

Compliance with existing regulatory requirements and implementation of HSR system IAMFs would minimize potential effects associated with construction activities related to air quality.

Based on the analysis results, health risks would be below the applicable SCAQMD thresholds of 10 in 1 million.

As shown in Table 3.3-21, the predicted combined maximum increases in 1-hour average NO_2 concentration would be 590 micrograms per cubic meter ($\mu g/m^3$) based on the AERMOD dispersion results. This value would exceed the NAAQS 1-hour NO_2 standard of 188 $\mu g/m^3$. The analysis used the highest 1-hour calculated concentration from AERMOD to make this determination, indicating that the maximum 1-hour construction impacts would occur during the full 10-hour off-road equipment activities. The maximum hourly construction emissions would likely be significantly less than estimated annual construction activities. However, it is possible that the construction activity could result in an impact for 1-hour NO_2 concentrations when construction activity peaks. Thus, mitigation measures are required. Mitigation measure AQ-MM#1 would require the purchase of construction emission offsets through an anticipated SCAQMD emission offset program. This measure would reduce the regional effect of the increased emissions; however, localized concentrations of NO_2 would still occur.

The following provides a summary of the impact analysis for the following construction sites.

Burbank Airport Station Sequential Excavation Method Tunnel and Cut-and-Cover Area
Construction activities at the Burbank Airport Station SEM tunneling and cut-and-cover area would exceed the 1-hour NO_2 NAAQS. The maximum 1-hour NO_2 concentration would be 590 $\mu g/m^3$, with an annual NO_2 concentration of 59.9 $\mu g/m^3$. The maximum 1-hour and 8-hour CO concentrations with background ambient CO concentrations would be 5,675 $\mu g/m^3$ and 3,060 $\mu g/m^3$, respectively.

The predicted annual NO_2, and 1- and 8-hour CO ambient concentrations would be below the NAAQS. However, the 1-hour NO_2 concentration from the Burbank Airport Station SEM tunneling and cut-and-cover area plus existing monitored ambient concentrations would exceed the 1-hour NAAQS and CAAQS. Construction activities at the Burbank SEM tunneling and cut-and-cover area would result in an inhalation cancer risk associated with the DPM emissions from construction equipment exhaust that would be 1.11 in 1 million, which is below the 10 in 1 million threshold at the maximum incremental cancer risk residential receptor.

Burbank Boulevard Grade Separation Area

Construction activities at the Burbank Boulevard Grade Separation area would result in an inhalation cancer risk associated with the DPM emissions from construction equipment exhaust that would be 2.64 in 1 million, which is below the 10 in 1 million threshold at the maximum incremental cancer risk residential receptor. The maximum 1-hour NO_2 concentration would be 446 $\mu g/m^3$, with an annual NO_2 concentration of 42.0 $\mu g/m^3$. The maximum 1-hour and 8-hour CO concentrations with background ambient CO concentrations would be 5,674 $\mu g/m^3$ and 3,060 $\mu g/m^3$, respectively.

The predicted annual NO_2, and 1- and 8-hour CO ambient concentrations for the Burbank Boulevard Grade Separation plus existing monitored ambient concentrations would be below the NAAQS. However, the 1-hour NO_2 concentration from the Burbank Boulevard Grade Separation plus existing monitored ambient concentrations would exceed the 1-hour NAAQS and CAAQS.

Glendale 2-Mile Track Segment

Construction activities would result in an inhalation cancer risk associated with the DPM emissions from construction equipment exhaust that would be 2.97 in 1 million, which is below the 10 in 1 million threshold at the maximum incremental cancer risk residential receptor. The maximum 1-hour NO_2 concentration would be 298 $\mu g/m^3$, with an annual NO_2 concentration of 50.5 $\mu g/m^3$. The maximum 1-hour and 8-hour CO concentrations with background ambient CO concentrations would be 3,417 $\mu g/m^3$ and 2,277 $\mu g/m^3$, respectively

The predicted annual NO_2, and 1- and 8-hour CO ambient concentrations would be below the NAAQS. However, the 1-hour NO_2 concentration from the Glendale 2-mile track segment plus existing monitored ambient concentrations would exceed the 1-hour NAAQS.

Metrolink Central Maintenance Facility Reconstruction Area

Construction activities would result in an inhalation cancer risk associated with the DPM emissions from construction equipment exhaust that would be 1.01 in 1 million, which is below the 10 in 1 million threshold at the maximum incremental cancer risk residential receptor. The maximum 1-hour NO_2 concentration would be 261 $\mu g/m^3$, with an annual NO_2 concentration of 45.3 $\mu g/m^3$. The maximum 1-hour and 8-hour CO concentrations with background ambient CO concentrations would be 3,033 $\mu g/m^3$ and 2,144 $\mu g/m^3$, respectively.

The predicted annual NO_2, and 1- and 8-hour CO ambient concentrations would be below the NAAQS. However, the 1-hour NO_2 concentration from the Metrolink CMF Reconstruction Area plus existing monitored ambient concentrations would exceed the 1-hour NAAQS.

Main Street Grade Separation

Construction activities would result in an inhalation cancer risk associated with the DPM emissions from construction equipment exhaust that would be 1.09 in 1 million, which is below the 10 in 1 million threshold at the maximum incremental cancer risk residential receptor. The maximum 1-hour NO_2 concentration would be 643 $\mu g/m^3$, with an annual NO_2 concentration of 77.3 $\mu g/m^3$. The maximum 1-hour and 8-hour CO concentrations with background ambient CO concentrations would be 4,696 $\mu g/m^3$ and 2,782 $\mu g/m^3$, respectively.

The predicted annual NO_2, 1- and 8-hour CO, 1- and 24-hour SO_2, and $PM_{2.5}$ ambient concentrations for the Main Street Grade Separation would be below the NAAQS. However, the 1-hour NO_2 concentration from the Main Street Grade Separation plus existing monitored ambient concentrations would exceed the 1-hour NAAQS.

Los Angeles Union Station

Construction activities would result in an inhalation cancer risk associated with the DPM emissions from construction equipment exhaust that would be 2.14 in 1 million, which is below the 10 in 1 million threshold at the maximum incremental cancer risk residential receptor. The maximum 1-hour NO_2 concentration would be 446 µg/m^3, with an annual NO_2 concentration of 42.1 µg/m^3. The maximum 1-hour and 8-hour CO concentrations with background ambient CO concentrations would be 4,299 µg/m^3 and 2,603 µg/m^3, respectively.

The predicted annual NO_2, and 1- and 8-hour CO ambient concentrations for the LAUS platforms would be below the NAAQS. However, the 1-hour NO_2 concentration from the LAUS platforms plus existing monitored ambient concentrations would exceed the 1-hour NAAQS.

CEQA Conclusion

Based on the analysis results presented above, the air dispersion modeling and health risk assessments indicate that concentration levels (for annual NO_2, and 1- and 8-hour CO) would be below applicable thresholds. Therefore, construction annual NO_2, and 1- and 8-hour CO, emissions associated with the HSR Build Alternative would not contribute a cumulatively considerable net increase in the annual NO_2, and 1- and 8-hour CO concentrations. Health risk results also indicate construction of the HSR Build Alternative would not expose sensitive receptors to substantial pollutant concentrations.

However, even with implementation of AQ-IAMF#1, AQ-IAMF#2, AQ-IAMF#3, AQ-IAMF#4, AQ-IAMF#5, and AQ-IAMF#6, the maximum concentrations associated with construction would still exceed the CAAQS at the localized level for the 1-hour average NO_2 concentrations. The air quality impacts from the 1-hour NO_2 concentration during construction would be significant under CEQA. Details of the health risk analysis and results are provided in the Air Quality and Global Climate Change Technical Report (Authority 2020). AQ-IAMF#1, AQ-IAMF#2, AQ-IAMF#3, AQ-IAMF#4, and AQ-IAMF#5 would implement the lowest-emitting construction equipment technology and adopt best management practices to minimize construction-period emissions. Localized emissions of NO_2 associated with construction of the HSR Build Alternative have the potential to exceed the CAAQS; therefore, this impact would be significant under CEQA. Thus, mitigation measures are required.

One mitigation measure that was considered would extend the construction schedule and limit construction equipment and usage, which would reduce hourly/daily emission concentrations. However, it was determined that this would not be a feasible measure, as increasing the length of the construction schedule would delay the opening year of the Burbank to Los Angeles Project Section and extend the duration of impacts that affect other railroad locomotive operators in the right-of-way, such as Metrolink, Amtrak, and Union Pacific Railroad. Mitigation measure AQ-MM#1 would require the purchase of NO_2 emission offsets through an anticipated contractual agreement between the Authority and SCAQMD. No additional emissions control/mitigation measures exist. Given that all feasible control measures (i.e., renewable diesel, Tier 4-compliant construction equipment, and a 2010 or newer truck fleet) would already be implemented as IAMFs, no additional control measures are available to reduce this impact. Therefore, this impact is significant and unavoidable.

Impact AQ #6: Localized Air Quality Impacts on School Children and Other Sensitive Receptors during Construction

Sensitive receptors for children at schools, residences, and health-care facilities near the multiple construction areas of the HSR Build Alternative could potentially be exposed to health effects from elevated concentrations of criteria pollutants and cancer risks associated with TACs. For each receptor type, the expected age range of children was modeled in the Health Risk Assessment to produce the most conservative (highest) risk result. This assumption maximizes the use of the childhood age sensitivity factors in the cancer risk calculation. Moreover, the calculated cancer risk is increased even further during childhood years by using higher breathing rates per body weight than for adults. Several receptors where children would be present are located near the construction area locations, including residences, schools, and health-care facilities. The NAAQS and CAAQS are established concentrations of criteria pollutants that provide public health protection. As mentioned previously, per OEHHA guidance, cancer risk is defined as the predicted risk of cancer over a lifetime based on long-term continuous exposure and is expressed as chances per million persons exposed (OEHHA 2015).

Health risks for children receptors were estimated using the inhalation exposure pathways for children. The OEHHA policy is to evaluate childhood cancer risk based on a 9-year period of exposure. However, children generally spend more time outdoors than adults. This factor is further modified to account for differences in the breathing rate of children compared to the adult breathing rate. The high-end breathing rate for children is equal to 1,200 liters per kilogram per day (OEHHA 2015). Incremental cancer risk for children from the construction of the proposed HSR Build Alternative was estimated to range between 0.5 and 1.2 in 1 million. These estimates are provided in Appendix G of the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020) and indicate the HSR Build Alternative-related cancer risk for young children would be below the threshold of significance of 10 in 1 million.

Based on the analysis results, the air dispersion modeling and health risk assessments indicate that concentration levels (except for 1-hour NO_2) and health risks would be below applicable thresholds.

CEQA Conclusion

The annual ambient concentrations of NO_2 already exceed the CAAQS. It is anticipated that the HSR Build Alternative would further contribute to this exceedance, even with implementation of AQ-IAMF#1, AQ-IAMF#2, AQ-IAMF#3, AQ-IAMF#4, AQ-IAMF#5, and AQ-IAMF#6, resulting in a significant impact under CEQA. Therefore, CEQA requires mitigation. However, the IAMFs already implement the lowest-emitting construction equipment technology and adopt best management practices to minimize construction-period emissions. One mitigation measure that was considered would extend the construction schedule and limit the construction equipment and usage, which would reduce hourly/daily emission concentrations. However, it was determined that this would not be a feasible measure, as increasing the length of the construction schedule would delay the opening year of the Burbank to Los Angeles Project Section and extend the duration of impacts that affect other railroad locomotive operators in the right-of-way, such as Metrolink, Amtrak, and Union Pacific Railroad. Mitigation measure AQ-MM#1 would require the purchase of emission offsets through an anticipated contractual agreement between the Authority and SCAQMD; however, until such agreement is in place, localized 1-hour NO_X concentrations would remain significant, resulting in the exposure of sensitive receptors to substantial pollutant concentrations and a net increase in emissions for which the region is in nonattainment.

The short-term construction activities of the HSR Build Alternative would have a significant and unavoidable impact on local air quality and sensitive receptors under CEQA.

Impact AQ #7: Localized Air Quality Impacts from Concrete Batch Plants

The HSR Build Alternative is anticipated to require the use of concrete batch plants outside the Burbank Airport Station area. Most of the concrete would be hauled in from existing concrete batch plant facilities that already have their emissions accounted for. Additionally, AQ-IAMF#6 (Reduce the Potential Impact of Concrete Batch Plants) would require the contractor to prepare a technical memorandum documenting the concrete batch plant siting criteria (including locating the plant at least 1,000 feet from sensitive receptors) and utilization of typical emission control measures to reduce any potential localized impacts.

Concrete batch plant activities would be part of the overall construction activities at the Burbank tunneling cut-and-cover area. The resultant construction area source emissions would be the same as presented in the Burbank SEM tunneling and cut-and-cover area section above. For instance, the maximum 1-hour NO_2 concentration would be 590 $\mu g/m^3$, with an annual NO_2 concentration of 59.9 $\mu g/m^3$. The maximum 1-hour and 8-hour CO concentrations with background ambient CO concentrations would be 5,675 $\mu g/m^3$ and 3,060 $\mu g/m^3$, respectively.

The predicted annual NO_2, 1- and 8-hour CO, 1- and 24-hour SO_2, and $PM_{2.5}$ ambient concentrations for the Burbank SEM tunneling and cut-and-cover area would be below the NAAQS. However, PM_{10} emissions from the Burbank SEM tunneling and cut-and-cover area would not exceed the SCAQMD PM_{10} significance threshold. Because the emissions of PM_{10} and $PM_{2.5}$ would be controlled under the SCAQMD's permit conditions, it is anticipated that the HSR Build Alternative would not cause an exceedance of PM_{10} and $PM_{2.5}$ with the use of the concrete batch plant.

CEQA Conclusion

With implementation of AQ-IAMF#6, localized impacts associated with concrete batch plants would not contribute to a cumulative considerable net increase in or expose sensitive receptors to substantial pollutant concentrations. Therefore, concrete batch plants associated with the HSR Build Alternative would have a less than significant impact under CEQA. Therefore, CEQA does not require mitigation.

Operations Impacts

Operation of the HSR Build Alternative would involve emissions associated with on-road vehicles; aircraft flights; power plants; the Burbank and Los Angeles HSR stations; area and stationary sources, including natural gas consumption for space heating and landscaping equipment; indirect power consumption for the HSR stations; traction power; facility lighting; indirect water conveyance and consumption; and indirect solid waste collection and disposal. Operational activities are further described in Chapter 2, Alternatives, of this Draft EIR/EIS.

Impact AQ #8: Statewide Operational Emissions

For comparison purposes, the air quality analysis was conducted for conditions without the HSR Build Alternative for existing conditions (2015) and a future horizon year (2040). Table 3.3-23 and Table 3.3-24 summarize estimated statewide emission burden changes resulting from the HSR Build Alternative in the year 2015. Table 3.3-25 and Table 3.3-26 summarize estimated statewide emission burden changes resulting from the HSR Build Alternative in the year 2040. Results for the medium and high scenarios are presented in the tables below, with the larger reductions in roadway and plane emissions and the larger increases in energy emissions occurring with the high scenario (i.e., when more riders would use the HSR system).

Table 3.3-23 2015 Estimated Statewide Emission Burden Changes Due to the High-Speed Rail Build Alternative vs. No Project (Medium Ridership Scenario)

Project Element	ROG (tons/yr)	TOG (tons/yr)	CO (tons/yr)	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Roadways	-130	-176	-5,406	-558	-14	-385	-104
Planes	-101	-102	-862	-829	-89	-25	-25
Energy (power plants)	12	124	207	105	17	23	21
Total[1]	**-219**	**-153**	**-6,061**	**-1,281**	**-86**	**-387**	**-108**

Source: California High-Speed Rail Authority, 2017
[1] Totals may not add up exactly due to rounding.
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
tons/yr = tons per year

Table 3.3-24 2015 Estimated Statewide Emission Burden Changes Due to the High-Speed Rail Build Alternative vs. No Project (High Ridership Scenario)

Project Element	ROG (tons/yr)	TOG (tons/yr)	CO (tons/yr)	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Roadways	-179	-242	-7,432	-767	-19	-529	-144
Planes	-97	-98	-829	-798	-86	-24	-24
Energy (power plants)	14	137	227	116	19	25	23
Total[1]	**-262**	**-203**	**-8,034**	**-1,448**	**-86**	**-528**	**-145**

Source: California High-Speed Rail Authority, 2017
[1] Totals may not add up exactly due to rounding.
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
tons/yr = tons per year

Table 3.3-25 2040 Estimated Statewide Emission Burden Changes Due to the High-Speed Rail Build Alternative vs. No Project (Medium Ridership Scenario)

Project Element	ROG (tons/yr)	TOG (tons/yr)	CO (tons/yr)	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Roadways	-7	-10	-564	-109	-9	-500	-127
Planes	-139	-140	-1,162	-1,145	-124	-35	-35
Energy (power plants)	12	124	207	105	17	23	21
Total[1]	**-133**	**-25**	**-1,520**	**-1,148**	**-116**	**-512**	**-141**

Source: California High-Speed Rail Authority, 2017
[1] Totals may not add up exactly due to rounding.
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
tons/yr = tons per year

Table 3.3-26 2040 Estimated Statewide Emission Burden Changes Due to the High-Speed Rail Build Alternative vs. No Project (High Ridership)

Project Element	ROG (tons/yr)	TOG (tons/yr)	CO (tons/yr)	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Roadways	-25	-36	-2,174	-158	-12	-691	-178
Planes	-134	-135	-1,118	-1,101	-119	-33	-33
Energy (power plants)	14	137	227	116	19	25	23
Total[1]	**-145**	**-34**	**-3,065**	**-1,144**	**-113**	**-699**	**-188**

Source: California High-Speed Rail Authority, 2017
[1] Totals may not add up exactly due to rounding.
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
tons/yr = tons per year

As shown in the preceding tables, the HSR Build Alternative is predicted to have a beneficial effect on (i.e., reduce) statewide emissions of applicable pollutants in 2040. As explained in more detail in the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020), TOG emissions in the opening year (2029) would increase with the HSR Build Alternative due to increased power requirements, but would decrease by 2040. All other pollutants would be reduced in the opening year of operations (2029). The analysis estimated the emission changes due to projected reductions of on-road VMT and intrastate air travel, and increases in electrical demand (required to power the HSR Build Alternative). As indicated in Table 3.3-23 through Table 3.3-26, all criteria pollutants are less than the general conformity *de minimis* levels.

CEQA Conclusion

Based on the statewide emission reductions discussed above, the statewide operation of the HSR Build Alternative would result in a net reduction of all statewide criteria pollutant emissions.. The net change represents the incremental change in emissions due to the project. As shown in Table 3.3-23 through Table 3.3-26, the project section is predicted to have a beneficial effect on (i.e., reduce) statewide emissions of all pollutants under two ridership scenarios for the existing and future no project (2015 and 2040) baselines. Therefore, operation of the HSR Build Alternative would not contribute to a cumulatively considerable net increase in criteria pollutant emissions. The HSR Build Alternative would have a beneficial impact related to statewide operational emissions under CEQA.

Impact AQ #9: Regional Operational Criteria Pollutant Emissions

Motor vehicle emissions would decrease in the region because of the operation of the HSR Build Alternative. In addition to passenger vehicles, it should also be noted that for one location where Union Pacific Railroad freight rail service would be severed, materials (primarily lumber, as this location is a lumber yard) could feasibly be served by trucks instead of rail. Although there would be an increase in truck emissions due to the trucks required to make those deliveries, there would also be a decrease in freight rail emissions since the spur would no longer be in service. Please refer to Section 2.5.2.8, where track modifications are described in more detail.

Table 3.3-27, Table 3.3-28, Table 3.3-29, and Table 3.3-30 summarize the total emissions changes due to HSR Build Alternative operation for the medium and high ridership scenarios, including the indirect emissions from regional vehicle travel, aircraft, and power plants, and direct project operational emissions from HSR stations and train movements. The HSR Build Alternative would result in a net regional decrease in emissions of criteria pollutants. This decrease would be beneficial to the Basin and would help the Basin meet its attainment goals for O_3 and PM (PM_{10} and $PM_{2.5}$). While lower ridership when the HSR system opens would lead to fewer regional benefits than in 2040, there would be a net benefit in the reduction in emissions when indirect and direct emissions are accounted for in the mobile-source emissions (Authority 2020). As indicated in Table 3.3-27 through Table 3.3-30, all criteria pollutants would be less than the general conformity *de minimis* levels.

Table 3.3-27 2015 Regional Emissions Changes Due to High-Speed Rail Operations (Tons per Year) (Medium Ridership Scenario)

Activities	ROG	TOG	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$
Indirect Emissions							
Changes in VMT Emissions	-39	-53	-1,601	-163	-4	-113	-31
Changes in Airplane Emissions	-43	-44	-371	-357	-38	-11	-11
Changes in Power Plant Emissions	0	1	2	1	0	0	0
Direct Emissions							
HSR Station Operations	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitive Dust from Train Operations	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total[1]	**-83**	**-96**	**-1,971**	**-520**	**-42**	**-124**	**-41**

Source: California High-Speed Rail Authority, 2017
[1] The total includes the indirect and direct emissions.
CO = carbon monoxide
HSR = high-speed rail
N/A = not available
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
VMT = vehicle miles traveled

Table 3.3-28 2015 Regional Emissions Changes Due to High-Speed Rail Operations (Tons per Year) (High Ridership Scenario)

Activities	ROG	TOG	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$
Indirect Emissions							
Changes in VMT Emissions	-55	-74	-2,229	-227	-6	-158	-43
Changes in Airplane Emissions	-41	-41	-350	-337	-36	-10	-10
Changes in Power Plant Emissions	0	1	2	1	0	0	0
Direct Emissions							
HSR Station Operations	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitive Dust from Train Operations	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total[1]	**-96**	**-114**	**-2,577**	**-563**	**-42**	**-167**	**-53**

Source: California High-Speed Rail Authority, 2017
[1] The total includes the indirect and direct emissions.
CO = carbon monoxide
HSR = high-speed rail
N/A = not available
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
VMT = vehicle miles traveled

Table 3.3-29 2040 Regional Emissions Changes Due to High-Speed Rail Operations (Tons per Year) (Medium Ridership Scenario)

Activities	ROG	TOG	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$
Indirect Emissions							
Changes in VMT Emissions	-5	-8	-464	-34	-3	-149	-38
Changes in Airplane Emissions	-60	-60	-501	-493	-53	-15	-15
Changes in Power Plant Emissions	0	1	2	1	0	0	0
Direct Emissions							
HSR Station Operations	1	1	37	4	0	38	10
Fugitive Dust from Train Operations	N/A	N/A	N/A	N/A	N/A	0	0
Total[1]	**-64**	**-66**	**-926**	**-522**	**-56**	**-126**	**-43**

Source: California High-Speed Rail Authority, 2017
[1] The total includes the indirect and direct emissions.
CO = carbon monoxide
HSR = high-speed rail
N/A = not available
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
VMT = vehicle miles traveled

Table 3.3-30 2040 Regional Emissions Changes Due to High-Speed Rail Operations (Tons per Year) (High Ridership Scenario)

Activities	ROG	TOG	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$
Indirect Emissions							
Changes in VMT Emissions	-7	-10	-617	-47	-4	-207	-53
Changes in Airplane Emissions	-56	-57	-472	-465	-50	-14	-14
Changes in Power Plant Emissions	0	1	2	1	0	0	0
Direct Emissions							
HSR Station Operations	1	1	37	4	0	38	10
Fugitive Dust from Train Operations	N/A	N/A	N/A	N/A	N/A	0	0
Total[1]	**-62**	**-65**	**-1,050**	**-507**	**-54**	**-183**	**-57**

Source: California High-Speed Rail Authority, 2017
[1] The total includes the indirect and direct emissions.
CO = carbon monoxide
HSR = high-speed rail
N/A = not available
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
ROG = reactive organic gases
SO_2 = sulfur dioxide
TOG = total organic gas
VMT = vehicle miles traveled

CEQA Conclusion

As indicated in Table 3.3-27 through Table 3.3-30, all criteria pollutants associated with operation of the HSR Build Alternative would result in a net regional decrease in emissions. Therefore, the HSR Build Alternative would not result in a violation of any air quality standard or contribute substantially to an existing or projected air quality violation, and it would have a beneficial impact under CEQA. Therefore, CEQA does not require mitigation.

Impact AQ #10: Statewide Greenhouse Gas Emission Analysis during Operation

The HSR Build Alternative, which is included in the AB 32 Scoping Plan as Measure #T-9, would help the state meet its GHG emissions reduction goals (CARB 2008). As shown in Table 3.3-31 and Table 3.3-32, operation of the HSR Build Alternative would result in a net reduction in GHG emissions.

Table 3.3-31 Estimated Statewide Greenhouse Gas Emissions for the No Project Alternative under the Medium and High Ridership Scenarios

Project Element	CO_2e Emissions Due to HSR (MMT/yr)	
	Medium	High
Year 2015		
Roadways	64	64
Planes	2	2
Energy (power plants)	N/A	N/A
Total	**66**	**66**
Year 2040		
Roadways	42	43
Planes	3	4
Energy (power plants)	N/A	N/A
Total[1]	**45**	**47**

Source: California High-Speed Rail Authority, 2017
[1] Totals may not add up exactly due to rounding.
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
High V2V = Silicon Valley to Central Valley High
HSR = high-speed rail
Med V2V = Silicon Valley to Central Valley Medium
Med V2V Ext = Silicon Valley to Central Valley Medium Extension
MMT/yr = million metric tons per year
N/A = not available

Table 3.3-32 Estimated Statewide Greenhouse Gas Emission Changes Due to the High-Speed Rail Build Alternative under the Medium and High Ridership Scenarios

Project Element	Change in CO_2e Emissions Due to HSR (MMT/yr)	
	Medium	High
Year 2015		
Roadways	-1.1	-1.5
Planes	-0.7	-0.7
Energy (power plants)	0.5	0.5
Total	**-1.3**	**-1.6**
Year 2040		
Roadways	-0.5	-1.1
Planes	-1.0	-0.9
Energy (power plants)	0.5	0.5
Total[1]	**-1.0**	**-1.5**

Source: California High-Speed Rail Authority, 2017
[1] Totals may not add up exactly due to rounding.
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
High V2V = Silicon Valley to Central Valley High
HSR = high-speed rail
Med V2V = Silicon Valley to Central Valley Medium
Med V2V Ext = Silicon Valley to Central Valley Medium Extension
MMT = million metric tons

Table 3.3-31 reports the statewide GHG emissions (expressed in terms of CO_2e) that would result from the No Project Alternative for the medium and high ridership scenarios. The statewide GHG emissions associated with roadways, plane travel, and energy demand for these scenarios are shown for the existing baseline condition (2015) and the horizon year condition (2040).

Despite increases in power plant emissions from the HSR Build Alternative plus all other statewide activity between 2015 and 2040, total statewide GHG emissions in 2040 would be less than the level of GHG emissions in 2015. As shown in Table 3.3-32, the primary factor for the net decrease in emissions is decreases in on-road vehicle emissions due mainly to the advancements in vehicle emissions technology and the mode shift from on-road motor vehicle travel to HSR travel. Aircraft emissions would increase slightly without the HSR Build Alternative because of growth in the state. Therefore, the HSR Build Alternative's effect on GHG emissions would be beneficial with respect to both the 2015 existing baseline and the 2040 future No Project baseline. The effect would also be beneficial in the opening year of HSR operations, as described in more detail in the *Burbank to Los Angeles Project Section: Air Quality and Global Climate Change Technical Report* (Authority 2020).

CEQA Conclusion

As shown in Table 3.3-32, operation of the HSR Build Alternative would result in a reduction of GHG emissions statewide. In addition, GHG emissions reductions would continue and increase over time for decades. The HSR system is identified in the CARB 2017 Scoping Plan as part of a sustainable statewide transportation system necessary to achieve the state's climate goals, and it is fully consistent with that plan (CARB 2017). Therefore, the HSR Build Alternative would not result in the generation of GHG emissions that would have a significant impact on the environment, but it would provide a GHG reduction benefit.

Impact AQ #11: Localized Air Quality Impacts during Train Operations

The HSR system would use electric-multiple-unit trains with power distributed through the overhead contact system. Combustion of fossil fuels and associated emissions from the HSR system would not occur. However, trains traveling at high velocities, such as those associated with the proposed HSR system, create sideways turbulence and rear wake, which would resuspend particulates from the surface around the track, resulting in fugitive dust emissions. A detailed analysis of wind-induced fugitive dust emissions from HSR travel is provided in Appendix D of the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020). For the HSR Build Alternative, the PM_{10} fugitive dust entrainment from wind induced by the high-speed trains would be 0.15 ton per year, and the $PM_{2.5}$ fugitive dust would be 0.02 ton per year (refer to Appendix D of the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* [Authority 2020]). Throughout most of the Burbank to Los Angeles Project Section, the HSR and non-electrified railroad tracks would be within the existing railroad right-of-way, which is typically 70 to 100 feet wide. These emissions represent the total fugitive dust that would be suspended within the HSR impacted zone along the entire length of the alignment. The amount of fugitive dust suspended beyond 5 feet from the HSR and non-electrified railroad tracks would be near zero, which is insignificant due to the low wind speeds generated at this distance from the train. Therefore, project-generated dust-related impacts to receptors would be minimal.

Los Angeles County has high rates of asthma in adults and children. Approximately 9 percent of children in Los Angeles County have asthma (Los Angeles County 2014). Because the HSR system is electrically powered, it is not expected to generate direct combustion emissions along its route that would cause substantial health concerns, such as asthma or other respiratory diseases.

Relocation of Existing Railroad Tracks

The relocation of the non-electrified railroad tracks for passenger and freight trains would be expected to make room for the installation of the HSR tracks. Therefore, the HSR, Amtrak, Metrolink, and Union Pacific Railroad trains would continue to operate in the same rail corridor within the rail corridor right-of-way.

The proposed relocation of non-electrified railroad tracks would not change the effects of the localized DPM emissions on nearby residents throughout most of the Burbank to Los Angeles Project Section after completion of the HSR Build Alternative. It should be noted that additional locomotive emissions reductions would be achieved over time with improved locomotive engine standards for fuel efficiency, such as those associated with USEPA Tier 4 locomotive engine standards.

Locomotives operate differently from other types of mobile sources with respect to how they transmit power from the engine to the wheels. While most mobile sources use a physical coupling (such as a transmission) to transfer power from the engine to the wheels, a locomotive's engine turns a generator or alternator powering an electric motor that, in turn, powers the locomotive's wheels. The physical connection of a typical mobile source means that the engine's speed is dictated by the vehicle's speed through a fixed set of gear ratios, resulting in the highly transient operating conditions (particularly engine speed and load) that characterize mobile-source operations. In contrast, the locomotive's diesel engine and drive system operate more independently, such that the engine can be operated at a specific speed regardless of the speed of the locomotive itself. This allows operation under more steady-state load and speed conditions. Thus, locomotives have been designed to operate in a series of discrete throttle settings called notches, ranging from notch positions one through eight, plus an idle position (Port of Long Beach 2007).

Throughout most of the Burbank to Los Angeles Project Section, the HSR alignment and the relocation of the non-HSR railroad tracks would be located within the existing railroad right-of-way, which is typically 70 to 100 feet wide. For most of the project section, the electrified HSR track centerline and the non-electrified track centerline would have a minimum separation of 23.5 feet. At sections where several sensitive receptors (i.e., residential homes) are adjacent to the railroad right-of-way, the relocation of the existing railroad tracks for the non-electrified passenger and freight trains would move the tracks closer to the sensitive receptors by approximately 15 to 24 feet in distance. All the passenger and freight trains would maintain the same number of locomotives and travel speed through the railroad corridor. The average speed of passenger trains would be 70 miles per hour, and freight trains would be 50 miles per hour (FRA 2018). At the same travel speed, the existing rate of emission exhausts would remain unchanged. The resulting pollutant concentrations and the associated risk attributable to the 24-foot reduction in distance from the locomotive source to sensitive receptor locations are expected to be lower than existing conditions due to the continued declining trend of locomotive DPM emission levels in the South Coast region. Further, as previously stated, additional emissions reductions would be achieved over time as older locomotives are replaced with the newer locomotives with USEPA Tier 4 locomotive engine standards.

Although diesel locomotives would travel through the Burbank to Los Angeles rail line corridor, it should be noted that the release characterizations of locomotive exhaust (such as release height and release momentum) are very different from those of automobile exhaust. Locomotives have higher stack and stronger upward momentum, which generally facilitates air dispersion and would generally disperse rapidly over the nearby sensitive receptors. This rapid dispersion of locomotive emissions and the implementation of Tier 4 locomotive engine standards would result in a lower DPM concentration downwind from the relocated non-electrified railroad tracks.

CEQA Conclusion

Based on the estimated fugitive dust emissions and locomotive DPM emissions described above, the HSR Build Alternative would not expose sensitive receptors to substantial pollutant concentrations, resulting in a less than significant impact under CEQA. No mitigation measures are required.

Impact AQ #12: Mobile-Source Air Toxics Analysis

As described in the *Burbank to Los Angeles Project Section Air Quality and Global Climate Change Technical Report* (Authority 2020), in accordance with the FHWA's *Interim Guidance Update on Air Toxic Analysis in NEPA Documents* (FHWA 2016), a qualitative assessment was derived for the HSR Build Alternative following a study conducted by the FHWA entitled *A*

Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives (FHWA 2012).

The potential MSAT emission sources directly related to HSR Build Alternative operation would be from passenger vehicles traveling to and from the trip destinations. Localized emissions related to the motor vehicle trips would be substantially reduced due to implementation of the USEPA's vehicle and fuel regulations. The HSR Build Alternative would decrease regional MSAT emissions compared with the No Project Alternative.

CEQA Conclusion

Because the HSR Build Alternative would decrease regional MSAT emissions, the HSR Build Alternative would not expose sensitive receptors to substantial pollutant concentrations associated with MSAT emissions. This impact would be less than significant under CEQA. Therefore, CEQA does not require mitigation.

Impact AQ #13: Microscale Carbon Monoxide Impact Analysis

A CO hot-spot analysis was performed for 10 intersections that could potentially cause a localized CO hot spot. The modeled CO concentrations were combined with CO background concentrations and compared with the air quality standards.

The HSR Build Alternative would not worsen traffic conditions at intersections within the local RSA because the alignment and roadways would be grade separated. Therefore, the CO analysis did not consider intersections along the alignment; instead, the operational vehicle CO emission analysis focused on intersection locations near the HSR stations and intersection locations that would experience a change in traffic congestion during roadway construction or detoured traffic conditions under project operations. CO concentrations were modeled at five intersections near the proposed Burbank Airport Station and five intersections near LAUS for existing conditions (2015) and HSR Build Alternative conditions in 2029 and 2040. The intersections were selected based on those projected to have the greatest effect on LOS and/or traffic volumes because of the HSR Build Alternative and thus the worst-case scenario for CO emissions.

The results presented in Table 3.3-33 and Table 3.3-34 summarize the CO hot-spot analysis results at the Burbank Airport Station and LAUS, respectively. The results include the HSR Build Alternative as well as the natural growth in traffic and implementation of other transportation improvement projects in the region. Existing plus project conditions would have a slightly higher CO concentration at a few intersections compared to existing conditions because of additional traffic caused by the stations. Predicted CO concentrations for all modeled intersections are below NAAQS and CAAQS and are not expected to cause violations of CO NAAQS during HSR Build Alternative operation.

Table 3.3-33 Maximum Modeled Carbon Monoxide Concentrations at Intersections near the Burbank Airport Station

	Existing Conditions[2]		Existing plus Project[2]	
Intersection[1]	Max. 1-Hour CO Concentration (ppm)	Max. 8-Hour CO Concentration (ppm)[3]	Max. 1-Hour CO Concentration (ppm)	Max. 8-Hour CO Concentration (ppm)[3]
Year 2015				
Laurel Canyon Blvd / Sherman Way	4.8	4.0	4.8	4.0
Hollywood Way / I-5 SB Ramps	4.7	3.9	4.8	4.0
Buena Vista St / Winona Ave	4.3	3.6	4.3	3.6
I-5 NB Ramps / San Fernando Rd	4.2	3.6	4.2	3.6
SR 170 SB Ramps / Victory Blvd	5.2	4.3	5.2	4.3

Intersection[1]	Existing Conditions[2]		Existing plus Project[2]	
	Max. 1-Hour CO Concentration (ppm)	Max. 8-Hour CO Concentration (ppm)[3]	Max. 1-Hour CO Concentration (ppm)	Max. 8-Hour CO Concentration (ppm)[3]
Year 2040				
Laurel Canyon Blvd / Sherman Way	4.0	3.4	4.0	3.4
Hollywood Way / I-5 SB Ramps	4.0	3.4	4.0	3.4
Buena Vista St / Winona Ave	3.8	3.3	3.8	3.3
I-5 NB Ramps / San Fernando Rd	3.9	3.4	3.9	3.4
SR 170 SB Ramps / Victory Blvd	4.2	3.6	4.2	3.6

Source: California High-Speed Rail Authority, 2017
[1] All proposed grade crossing configurations are pending California Public Utilities Commission approval.
[2] Concentrations include a predicted 1-hour background concentration of 3.4 ppm and an 8-hour background concentration of 3.0 ppm, representing the second-highest measured CO concentrations in years 2014–2016 measured at the 228 N Palm Avenue, Burbank, California, air monitoring station.
[3] A persistence factor of 0.7 was used to estimate the 8-hour CO concentrations based on the generalized persistence factor for urban locations in the CO Protocol (Caltrans 1997).
Caltrans = California Department of Transportation
CO = carbon monoxide
I = Interstate
Max. = maximum
NB = northbound
ppm = parts per million
SB = southbound
SR = State Route

Table 3.3-34 Maximum Modeled Carbon Monoxide Concentrations at Intersections near Los Angeles Union Station

Intersection[1]	Existing Conditions[2]		Existing plus Project[2]	
	Max. 1-Hour CO Concentration (ppm)	Max. 8-Hour CO Concentration (ppm)[3]	Max. 1-Hour CO Concentration (ppm)	Max. 8-Hour CO Concentration (ppm)[3]
Year 2015				
Broadway / E Cesar E. Chavez Ave	3.7	2.8	3.7	2.8
Alameda St / Aliso St – Commercial St	3.4	2.6	3.4	2.6
Garey St–US-101 SB On-/Off-Ramps / Commercial St	3.1	2.4	3.1	2.4
Center St / Commercial St	3.0	2.4	3.0	2.4
Mission Rd / E Cesar E. Chavez Ave	3.5	2.7	3.5	2.7
Year 2040				
Broadway / E Cesar E. Chavez Ave	3.0	2.4	3.1	2.4
Alameda St / Aliso St – Commercial St	2.9	2.3	3.0	2.4
Garey St–US-101 SB On-/Off-Ramps / Commercial St	2.7	2.1	2.7	2.1
Center St / Commercial St	2.7	2.1	2.7	2.1
Mission Rd / E Cesar E. Chavez Ave	3.0	2.4	3.1	2.4

Source: California High-Speed Rail Authority, 2017
[1] All proposed grade crossing configurations are pending California Public Utilities Commission approval.
[2] Concentrations include a predicted 1-hour background concentration of 2.5 ppm and an 8-hour background concentration of 2.0 ppm, representing the second-highest measured CO concentrations in years 2014–2016 measured at the 1630 N Main St, Los Angeles, California, air monitoring station.
[3] A persistence factor of 0.7 was used to estimate the 8-hour CO concentrations based on the generalized persistence factor for urban locations in the CO Protocol (Caltrans 1997).
Caltrans = California Department of Transportation
CO = carbon monoxide
I = Interstate
Max. = maximum
NB = northbound
ppm = parts per million
SB = southbound
SR = State Route

As shown in Table 3.3-33 and Table 3.3-34, the modeled CO concentrations would be below NAAQS for the worst-case intersections.

CEQA Conclusion

Because the modeled CO concentrations would be below CAAQS for the worst-case intersections, implementation of the HSR Build Alternative would not violate CO air quality standards or contribute substantially to an existing or projected CO air quality violation. This impact would be less than significant under CEQA. Therefore, CEQA does not require mitigation.

Impact AQ #14: Localized PM_{10}/$PM_{2.5}$ Hot-Spot Impact Analysis

The HSR Build Alternative would provide regional benefits by reducing the regional VMT compared to the No Project Alternative and existing conditions, which would reduce PM_{10} and $PM_{2.5}$ emissions from regional vehicle travel. A hot-spot analysis was prepared for purposes of identifying and evaluating potential effects under NEPA and CEQA because the local RSA is designated nonattainment for $PM_{2.5}$ and maintenance for PM_{10}, and the HSR Build Alternative is subject to localized PM_{10} and $PM_{2.5}$ hot-spot analysis. In November 2015, the USEPA updated its *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (USEPA 2015b), which was used for this analysis. Although this analysis is normally associated with the transportation conformity rule, the HSR Build Alternative is subject to the general conformity *de minimis* rule. The decision to use this analytical structure notwithstanding, additional analysis or associated activities required to comply with transportation conformity will be carried out only if discrete project elements become subject to those requirements in the future.

The HSR Build Alternative is not a new highway project, nor would it expand an existing highway beyond its current capacity. The HSR vehicles would be electrically powered. While the HSR Build Alternative would affect traffic conditions on roadways near the stations, it should not measurably affect truck volumes on the affected roadways. Most vehicle trips entering and leaving the station locations would be passenger vehicles, which are typically not diesel-powered, except for delivery truck trips to support station activities. Furthermore, the HSR Build Alternative would improve regional traffic conditions by reducing traffic congestion, increasing vehicle speeds, and reducing regional VMT within the regional RSA.

Generally, the HSR Build Alternative would not change the existing traffic mix at signalized intersections. In some cases, the LOS of intersections near the HSR stations would change from LOS D/E under the No Project Alternative to LOS F under the HSR Build Alternative. However, the traffic volume increases at the affected intersections would be primarily from passenger cars and transit buses used for transporting people to or from the stations. Passenger cars would be gasoline-powered and consequently would not add to the number of diesel-fueled vehicles.

BurbankBus is the transit operator in Burbank and currently operates clean-burning natural gas buses (BurbankBus 2009). The Los Angeles Metropolitan Transportation Authority is the transit operator in Los Angeles and currently operates a fleet of all-natural-gas buses (Los Angeles Metropolitan Transportation Authority 2011). The Los Angeles Metropolitan Transportation Authority also operates several bus routes within the greater Los Angeles region, including the cities of Burbank and Glendale. The City of Los Angeles Department of Transportation also provides bus service through DASH and Commuter Express in Los Angeles. The Los Angeles Department of Transportation offers clean air alternatives with new compressed-natural-gas- or propane-powered buses (Los Angeles Department of Transportation n.d.). Therefore, the HSR Build Alternative would not measurably increase the number of diesel vehicles at these intersections used by project-related traffic.

The HSR Build Alternative would not have new or expanded bus or rail terminals or transfer points that significantly increase the number of diesel vehicles congregating at a single location. Although the HSR Build Alternative would include passenger rail terminals, there would not be a significant number of diesel vehicles congregating at a single location. Improved bus service is not part of the HSR Build Alternative. If the local bus service were to be improved to better serve the HSR stations, it would be subject to the local transit authority’s environmental review.

The trains used for the HSR Build Alternative would be electric-multiple-unit trains, which are powered by electricity rather than diesel fuel. Most vehicle trips entering and leaving the station would be passenger vehicles, which are not typically diesel-powered.

CEQA Conclusion
As described above, operation of the HSR Build Alternative would have no effect on localized PM_{10} and $PM_{2.5}$ emissions. Therefore, operation of the HSR Build Alternative would not result in localized pollutant concentrations that would violate air quality standards or contribute substantially to an existing or projected air quality violation. Therefore, the HSR Build Alternative would have a less than significant impact under CEQA, and no mitigation would be required.

Impact AQ #15: Localized MSAT Impacts to Sensitive Receptors including Schools

As described in Impact AQ #12, annual MSAT emissions effects to sensitive receptors, including schools, would be substantially reduced due to current regulatory requirements.

CEQA Conclusion
As described above, operation of the HSR Build Alternative would not result in an increase in localized MSAT emissions. Therefore, the HSR Build Alternative would not expose sensitive receptors to substantial pollutant concentrations and would have a less than significant impact under CEQA for impacts related to localized air quality impacts to sensitive receptors. Therefore, CEQA does not require mitigation.

Impact AQ #16: Odor Impacts from Operations

No potentially odorous emissions would be associated with HSR operations because the trains would be powered from the regional electrical grid. There would be some area-source emissions associated with station operation, such as natural-gas combustion for space and water heating, landscaping equipment emissions, and minor solvent and paint use. The solvent and paint use would have the potential to be odorous sources to sensitive receptors in the immediate vicinity of the Burbank Airport Station and LAUS. However, odors related to paint and solvent use would be limited to the immediate area where the products are being used and would not be expected to result in substantial odors to residential or other areas containing sensitive receptors within the local RSA.

CEQA Conclusion
Implementation of the HSR Build Alternative would not result in the generation of odors affecting a substantial number of people and would therefore have a less than significant odor generation impact under CEQA. Therefore, CEQA does not require mitigation.

Impact AQ #17: Compliance with Air Quality Plans

During operation, the HSR Build Alternative would reduce VMT in the region, which would reduce regional O_3 precursor pollutant emissions. The HSR Build Alternative would also decrease emissions from other modes of travel (i.e., buses, diesel trains, and airports). This reduction in VMT would be consistent with the SCAQMD 2016 AQMP. Therefore, operation of the HSR Build Alternative would not conflict with or obstruct implementation of applicable air quality plans.

CEQA Conclusion
The operation of the HSR Build Alternative would not conflict with or obstruct implementation of the applicable air quality plan and would therefore have no impact under CEQA. Therefore, CEQA does not require mitigation.

3.3.7 Mitigation Measures

The Authority has identified the following mitigation measures for impacts under NEPA and significant impacts under CEQA that cannot be avoided or minimized adequately by IAMFs.

AQ-MM#1: Offset Project Construction Emissions through an SCAQMD Emission Offsets Programs

The project's construction emissions that cannot be reduced by IAMFs and any other mitigation measures will be offset through a South Coast Air Quality Management District (SCAQMD) rule or contractual agreement by funding equivalent emissions reductions that achieve emission reductions in the same years as construction emissions, thus offsetting project-related impacts on air quality in real time. The project will commit to reducing construction emissions for NOx and VOC, thereby satisfying General Conformity.

The SCAQMD and the Authority are participating in ongoing coordination to discuss implementation of the contractual agreement required by this mitigation measure. However, due to the uncertainty of available credits and until such an agreement is in place, the air quality impact would remain significant and unavoidable.

Impacts from Implementing Mitigation Measure AQ-MM#1

Mitigation Measure AQ-MM#1 would require the purchase of offset emissions during project construction through an agreement with the SCAQMD. It is anticipated that fuel and energy consumption, as well as the associated emissions resulting from the offset emission reduction projects, would decrease with implementation of Mitigation Measure AQ-MM#1. This mitigation measure would have no impacts.

3.3.7.1 Early Action Projects

As described in Chapter 2, Section 2.5.2.9, early action projects would be completed in collaboration with local and regional agencies, and they include grade separations and improvements at regional passenger rail stations. These early action projects are analyzed in further detail to allow the agencies to adopt the findings and mitigation measures as needed to construct the projects. The following air quality mitigation measures would be required for the early action projects. Mitigation measure AQ-MM#1 (as shown in Table 3.3-35) would be required for the Main Street Grade Separation early action project. AQ-MM#1 would offset construction-related NO_X emissions within the Basin to below general conformity *de minimis* levels, as appropriate. No other mitigation measures would be required for the other early action projects.

Table 3.3-35 Mitigation Measures Required for Early Action Projects

Early Action Project	Impacts	Mitigation Measure
Downtown Burbank Metrolink Station	No effect	None
Sonora Avenue Grade Separation	No effect	None
Grandview Avenue Grade Separation	No effect	None
Flower Street Grade Separation	No effect	None
Goodwin Avenue/Chevy Chase Drive Grade Separation	No effect	None
Main Street Grade Separation	Impact AQ #5	AQ-MM#1

3.3.8 NEPA Impact Summary

This section summarizes the impacts of the HSR Build Alternative and compares them to the anticipated impacts of the No Project Alternative

Under the No Project Alternative, the HSR system would not be built and, accordingly, there would be no localized impacts on air quality. Existing regional transportation systems would continue to operate, recent development trends within the Burbank to Los Angeles Project Section are anticipated to continue, and the population in the RSA would continue to grow through 2040. In addition, changes to existing highway, airport, and conventional rail systems described in adopted RTPs and municipal general plans would likely be implemented (pending the availability of funding). Further, residential, commercial, industrial, and associated infrastructure development projects (e.g., shopping centers, wastewater conveyance upgrades) would occur. These planned projects and developments would affect regional emissions levels with or without the HSR Build Alternative.

Under the federal criteria, the Basin is currently designated as nonattainment for the federal 8-hour O_3, $PM_{2.5}$, and lead standards; unclassified for the federal NO_2 and SO_2 standards; attainment/maintenance for the federal PM_{10} and CO standards; and attainment/unclassified for all other standards. CO, VOC, PM_{10}, $PM_{2.5}$, and SO_2 emissions would be below the general conformity *de minimis* levels with the application of mitigation measures and control measures for all years. NO_X emissions would exceed general conformity *de minimis* levels for most of the construction phase with or without on-site mitigation. Under the CAA rule, the emission offsets methods can be used to reduce the construction-related CO and NO_X emissions to zero. The use of the emission offset methods as part of the conformity determination process would allow the FRA to affirm that the proposed action would produce no air quality effects under NEPA. Implementation of AQ-MM#1, which would offset construction-phase NO_X emissions through an anticipated SCAQMD emission offset agreement, would minimize the effect under NEPA.

Short-term construction activities are predicted to have a localized impact on regional air quality and sensitive receptors under NEPA because the 1-hour average NO_2 concentrations near sensitive and residential receptors would exceed the NAAQS during alignment construction with on-site mitigation.

Implementation of the HSR Build Alternative would result in a net emission decrease of criteria pollutants and GHG emissions compared to the No Project Alternative, resulting in beneficial effects to regional air quality and global climate change. Additionally, the operation of the HSR Build Alternative would have no effect on localized PM_{10} and $PM_{2.5}$ emissions and no effect on localized air quality for sensitive receptors.

Consistent with 23 U.S.C. 327 and the July 23, 2019 NEPA Assignment Memorandum of Understanding, FRA retains its obligations to make general conformity determinations under the CAA. The Authority and FRA have agreed to collaborate on the development of general conformity determinations. As part of this collaboration, the Authority will develop and provide to FRA a Draft General Conformity Determination and supporting information, as well as the Authority’s proposed approach for achieving general conformity. Because the analysis used for the Draft EIR/EIS will also generate the information necessary for the Draft General Conformity Determination, specific analysis may be incorporated by reference in the General Conformity Determination. FRA will make the ultimate general conformity determination for this project. FRA’s conformity determination would be made prior to Authority issuance (pursuant to NEPA assignment under the MOU) of a ROD for this section.

3.3.9 CEQA Significance Conclusions

Table 3.3-36 provides a summary of the CEQA determination of significance for all construction and operations impacts discussed in Section 3.3.6.3.

Table 3.3-36 Summary of CEQA Significance Conclusions and Mitigation Measures for Air Quality and Global Climate Change

Impact	Impact before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Construction			
Impact AQ #1: Regional Air Quality Impacts during Construction	Significant	AQ-MM#1	Significant and Unavoidable
Impact AQ #2: Compliance with Air Quality Plans	Significant	AQ-MM#1	Significant and Unavoidable
Impact AQ #3: Greenhouse Gas Emissions during Construction	Less than Significant	No mitigation measures are required	Not applicable
Impact AQ #4: Asbestos and Lead-Based Paint Exposure during Construction	Less than Significant	No mitigation measures are required	Not applicable
Impact AQ #5: Localized Air Quality Impacts during Alignment Construction (NO_2 concentrations)	Significant	AQ-MM#1	Significant and Unavoidable
Impact AQ #6: Localized Air Quality Impacts on School Children and Other Sensitive Receptors during Construction	Significant	AQ-MM#1	Significant and Unavoidable
Impact AQ #7: Localized Air Quality Impacts from Concrete Batch Plants	Less than Significant	No mitigation measures are required	Not Applicable
Operations			
Impact AQ #8: Statewide Emissions	No Impact	No mitigation measures are required	No Impact
Impact AQ #9: Regional Criteria Pollutant Emissions	No Impact	No mitigation measures are required	No Impact
Impact AQ #10: Statewide Greenhouse Gas Emission Analysis during Operation	No Impact	No mitigation measures are required	No Impact
Impact AQ #11: Localized Air Quality Impacts during Train Operations	Less than Significant	No mitigation measures are required	Not applicable
Impact AQ #12: Mobile-Source Air Toxics Analysis	Less than Significant	No mitigation measures are required	Not applicable
Impact AQ #13: Microscale Carbon Monoxide Impact Analysis	Less than Significant	No mitigation measures are required	Not applicable
Impact AQ #14: Localized PM_{10}/$PM_{2.5}$ Hot-Spot Impact Analysis	Less than Significant	No mitigation measures are required	Not applicable
Impact AQ #15: Localized MSAT Impacts to Sensitive Receptors including Schools	Less than Significant	No mitigation measures are required	Not applicable
Impact AQ #16: Odor Impacts from Operations	Less than Significant	No mitigation measures are required	Not applicable
Impact AQ #17: Compliance with Air Quality Plans	No Impact	No mitigation measures are required	No Impact

DPM = diesel particulate matter
N/A = not applicable
NO_2 = nitrogen dioxide
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 micrometers in diameter
PM_{10} = particulate matter smaller than or equal to 10 micrometers in diameter

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