3.3 Air Quality

3.3.1 Introduction

This section describes the regulatory and environmental setting for air quality in the vicinity of the Proposed Project and the Atwater Station Alternative. This section also describes the impacts on air quality that would result from implementation of the Proposed Project and the Atwater Station Alternative, and mitigation measures that would reduce significant impacts, where feasible and appropriate. Appendix J, *Air Quality, Greenhouse Gas, and Health Risk Assessment Supporting Documentation*, contains additional technical information for this section.

This section analyzes air quality impacts of the Proposed Project and the Atwater Station Alternative due to the proposed extension of Altamont Corridor Express (ACE) service from Ceres to Merced. Construction would be limited to the geographic area of Ceres to Merced; therefore, construction emissions are only analyzed for the geographic area of Ceres to Merced. Since the Proposed Project and the Atwater Station Alternative include no changes to the number of trains in the rest of the ACE system, the operational analysis in the San Francisco Bay Area (Bay Area) is limited to (1) the increased vehicle shuttle emissions at the Pleasanton and Great America Stations, and (2) the reduction in driving in the Bay Area due to increased ACE ridership from the extended service. In the San Joaquin Valley, the operational analysis considered the net emissions of increased locomotive emissions in conjunction with the emissions reductions from reduced vehicle travel.

Greenhouse gas (GHG) emissions are discussed separately in Section 3.8, *Greenhouse Gas Emissions*. Cumulative impacts on air quality, in combination with planned, approved, and reasonably foreseeable projects, are discussed in Chapter 4, *Other CEQA-Required Analysis*.

3.3.2 Regulatory Setting

Relevant regulatory agencies for criteria pollutant emissions include the U.S. Environmental Protection Agency (USEPA), California Air Resources Board (CARB), Bay Area Air Quality Management District (BAAQMD),[1] and San Joaquin Valley Air Pollution Control District (SJVAPCD). USEPA has established federal air quality standards for which CARB, BAAQMD, and SJVAPCD have primary implementation responsibility. CARB has established state air quality standards and CARB, BAAQMD, and SJVAPCD are responsible for ensuring that state air quality standards are met.

This section summarizes federal, state, regional, and local regulations related to air quality and applicable to the Proposed Project and the Atwater Station Alternative.

[1] The existing ACE route passes through Santa Clara and Alameda Counties, which are located within San Francisco Bay Area Air Basin (SFBAAB) and under the local air quality jurisdiction of the BAAQMD. Although no physical improvements are proposed in the SFBAAB as part of the Proposed Project and Atwater Station Alternative, ACE would continue to operate in the SFBAAB and the added ridership resulting from the extension would have system-wide effects throughout the SFBAAB. As such, BAAQMD regulations are included in this section.

3.3.2.1 Federal

Clean Air Act and Ambient Air Quality Standards

The federal Clean Air Act (CAA), promulgated in 1963 and amended several times thereafter, including the 1990 CAA amendments, establishes the framework for modern air pollution control in the United States. CAA directs USEPA to establish federal air quality standards, known as national ambient air quality standards (NAAQS), and specifies future dates for achieving compliance. USEPA has set NAAQS for six "criteria" pollutants: ozone, carbon monoxide (CO), particulate matter (PM) of 10 microns in diameter and smaller (PM10) and 2.5 microns in diameter and smaller (PM2.5), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and lead (Pb). NAAQS are divided into primary and secondary standards; the former are set to protect human health with an adequate margin of safety, the latter to protect environmental values, such as plant and animal life. Table 3.3-1 summarizes NAAQS currently in effect for each criteria pollutant. The California ambient air quality standards (CAAQS) (discussed in Section 3.3.2.2, *State*) are also provided for reference.

CAA also mandates that the state submit and implement a state implementation plan (SIP) for local areas not meeting those standards. The SIP must include pollution control measures that demonstrate how the standards will be met by the dates specified in CAA.

Corporate Average Fuel Economy Standards

The National Highway Traffic Safety Administration (NHTSA) sets corporate average fuel economy (CAFE) standards for passenger cars and for light trucks (collectively, light-duty vehicles), and separately sets fuel consumption standards for medium- and heavy-duty trucks and engines. The U.S. Department of Transportation (USDOT) and USEPA Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule took effect on June 29, 2020. The SAFE Vehicles Rule amends the existing NHTSA CAFE standards and the existing USEPA tailpipe carbon dioxide emissions standards for passenger cars and light trucks and establish new standards covering model years 2021 through 2026. The final rules retain the model year 2020 standards for both programs through model year 2026. The rule has been legally challenged by the state of California, other states, and other entities. Because the rule would increase on-road vehicle emissions, it has been taken into account in the construction analysis as a worst-case analysis if the rule prevails in court. The rule has not been taken into account in the operations analysis because taking it into account would result in a higher air quality benefit given that on road vehicles would have higher emissions with the new rules compared to the former rule; this is a worst-case analysis if the rule does not prevail in court. In January 2021, The Biden Administration announced plans to propose replacement or revision of the SAFE rule later in 2021.

Locomotive Emissions Standards

In March 2008, USEPA adopted a three-part emissions standard program that will reduce emissions from diesel locomotives. The regulation tightens emission standards for existing, remanufactured locomotives, and sets exhaust emission standards for newly built locomotives of model years 2011–2014 (Tier 3) and 2015 and beyond (Tier 4). The regulation is expected to reduce PM emissions from locomotive engines by as much as 90 percent and nitrogen oxide (NO_X) emissions by as much as 80 percent when fully implemented.

Table 3.3-1. Federal and State Ambient Air Quality Standards

Criteria Pollutant	Averaging Time	California Standards	National Standards[a]	
			Primary	Secondary
Ozone	1-hour	0.09 ppm	None[b]	None[b]
	8-hour	0.070 ppm	0.070 ppm	0.070 ppm
Particulate Matter (PM10)	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
	Annual mean	20 $\mu g/m^3$	None	None
Fine Particulate Matter (PM2.5)	24-hour	None	35 $\mu g/m^3$	35 $\mu g/m^3$
	Annual mean	12 $\mu g/m^3$	12.0 $\mu g/m^3$	15.0 $\mu g/m^3$
Carbon Monoxide	8-hour	9.0 ppm	9 ppm	None
	1-hour	20 ppm	35 ppm	None
	8-hour (Lake Tahoe)	6 ppm	None	None
Nitrogen Dioxide	Annual mean	0.030 ppm	0.053 ppm	0.053 ppm
	1-hour	0.18 ppm	0.100 ppm	None
Sulfur Dioxide	Annual mean	None	0.030 ppm[c]	None
	24-hour	0.04 ppm	0.14 ppm[c]	None
	3-hour	None	None	0.5 ppm
	1-hour	0.25 ppm	0.075 ppm	None
Lead	30-day average	1.5 $\mu g/m^3$	None	None
	Calendar quarter	None	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$
	3-month average	None	0.15 $\mu g/m^3$	0.15 $\mu g/m^3$
Sulfates	24-hour	25 $\mu g/m^3$	None	None
Visibility Reducing Particles	8-hour	–[d]	None	None
Hydrogen Sulfide	1-hour	0.03 ppm	None	None
Vinyl Chloride	24-hour	0.01 ppm	None	None

Source: California Air Resources Board 2016.

$\mu g/m^3$ = micrograms per cubic meter.

ppm = parts per million.

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

[b] The federal 1-hour standard of 12 parts per 100 million was in effect from 1979 through June 15, 2005. The revoked standard is referenced because it was employed for such a long period and is a benchmark for state implementation plans.

[c] The annual and 24-hour National Ambient Air Quality Standards (NAAQS) for sulfur dioxide apply only for 1 year after designation of the new 1-hour standard to those areas that were previously nonattainment for 24-hour and annual NAAQS.

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

3.3.2.2 State

California Clean Air Act and Ambient Air Quality Standards

In 1988, the California Legislature adopted the California CAA, which established a statewide air pollution control program. The California CAA requires all air districts in the state to endeavor to meet CAAQS by the earliest practical date. Unlike the federal CAA, the California CAA does not set precise attainment deadlines. Instead, the California CAA establishes increasingly stringent requirements for areas that will require more time to achieve the standards. CAAQS are generally more stringent than NAAQS and incorporate additional standards for sulfates, hydrogen sulfide, visibility-reducing particles, and vinyl chloride. CAAQS and NAAQS are listed together in Table 3.3-1.

CARB and local air districts bear responsibility for achieving California's air quality standards, which are to be achieved through district-level air quality management plans to be incorporated into the SIP. In California, USEPA has delegated authority to prepare SIPs to CARB, which, in turn, has delegated that authority to individual air districts. CARB traditionally has established state air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving SIPs.

The California CAA substantially adds to the authority and responsibilities of air districts. The California CAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures. The California CAA also emphasizes the control of "indirect and area-wide sources" of air pollutant emissions. An indirect source is a facility or land use that attracts or generates motor vehicle traffic. The California CAA gives local air pollution control districts explicit authority to regulate indirect sources of air pollution and to establish traffic control measures.

State Tailpipe Emission Standards

CARB established a series of increasingly strict emission standards for new off-road diesel equipment, on-road diesel trucks, and harbor craft. Construction equipment used for the Proposed Project and the Atwater Station Alternative, including heavy-duty trucks and off-road construction equipment, will be required to comply with the standards applicable to the model year of manufacture.

CARB has established emissions standards for on-road vehicles as well and is responsible for the certification and production audit of new passenger vehicles and heavy-duty vehicles. Vehicles are not legal for sale in California until CARB-certified. Violation of the requirement for certification can subject the vehicle manufacturers and/or selling dealers to enforcement actions including a fine of up to $37,500 per vehicle.

Carl Moyer Memorial Air Quality Standards Attainment Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program) is a voluntary program that offers grants to owners of heavy-duty vehicles and equipment. The program is a partnership between CARB and the local air districts throughout the state to reduce air pollution emissions from heavy-duty engines. Locally, the air districts administer the Carl Moyer Program.

Toxic Air Contaminant Regulation

California regulates toxic air contaminants (TACs) primarily through the Toxic Air Contaminant Identification and Control Act (Tanner Act) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (Hot Spots Act). In the early 1980s, CARB established a statewide comprehensive air toxics program to reduce exposure to air toxics. The Tanner Act created California's program to reduce exposure to air toxics. The Hot Spots Act supplements the Tanner Act by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.

In August 1998, CARB identified diesel particulate matter (DPM) from diesel-fueled engines as TACs. In September 2000, CARB approved a comprehensive diesel risk reduction plan to reduce emissions from both new and existing diesel-fueled engines and vehicles. The goal of the plan is to reduce DPM (respirable particulate matter) emissions and the associated health risk by 75 percent in 2010 and by 85 percent by 2020. The plan identifies 14 measures that CARB will implement over the next several years.

3.3.2.3 Regional and Local

Bay Area Air Quality Management District

BAAQMD has local air quality jurisdiction in the San Francisco Bay Area Air Basin (SFBAAB), including Santa Clara and Alameda Counties, but does not have land use jurisdiction or jurisdiction over mobile sources. Responsibilities of the air district include overseeing stationary-source emissions, approving permits, maintaining emissions inventories, maintaining air quality monitoring stations, overseeing agricultural burning permits, and reviewing air quality–related sections of environmental documents required by the California Environmental Quality Act (CEQA). BAAQMD is also responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws and for ensuring that NAAQS and CAAQS are met.

BAAQMD has adopted advisory emission thresholds to assist CEQA lead agencies in determining the level of significance of a project's emissions, which are outlined in its *California Environmental Quality Act Air Quality Guidelines* (Bay Area Air Quality Management District 2017a). BAAQMD has also adopted air quality plans to improve air quality, protect public health, and protect the climate. The *Revised San Francisco Bay Area 2001 Ozone Attainment Plan for the 1-Hour National Ozone Standard* was adopted to reduce ozone and achieve the NAAQS ozone standard; and the *2017 Bay Area Clean Air Plan* provides a regional strategy to attain state and federal ambient air quality standards, eliminate health risk disparities among Bay Area communities, and reduce GHG emissions.

San Joaquin Valley Air Pollution Control District

SJVAPCD has local air quality jurisdiction in the San Joaquin Valley Air Basin (SJVAB), including San Joaquin, Stanislaus, and Merced Counties, but does not have land use jurisdiction or jurisdiction over mobile sources. The air district shares the same responsibilities in SJVAB as described above for BAAQMD. SJVAPCD prepared the *Guide for Assessing and Mitigating Air Quality Impacts* (GAMAQI) to assist lead agencies and project applicants in evaluating the potential air quality impacts of projects in SJVAB (San Joaquin Valley Air Pollution Control District 2015). GAMAQI provides SJVAPCD-recommended procedures for evaluating potential air quality impacts during the CEQA environmental review process.

SJVAPCD has adopted several attainment plans in an attempt to achieve state and federal air quality standards. The *2004 Extreme Ozone Attainment Demonstration Plan for 1-Hour Ozone* was adopted on October 8, 2004, and submitted to USEPA on November 15, 2004, and the *Clarifications Regarding the 2004 Extreme Ozone Attainment Demonstration Plan for 1-Hour Ozone* was adopted on August 21, 2008. USEPA proposed approval and partial disapproval of the *2004 Extreme Ozone Attainment Demonstration Plan for 1-Hour Ozone* on June 30, 2009. In September 2013, SJVAPCD adopted the *2013 Plan for the Revoked 1-Hour Ozone Standard*. The *2007 Ozone Plan* for 8-hour ozone was adopted on April 30, 2007. SJVAPCD recently adopted the *2016 Plan for the 2008 8-Hour Ozone Standard* to address the 75 parts per billion (ppb) ozone standard. The *2016 Ozone Plan* contains a comprehensive list of regulatory and incentive-based measures to reduce reactive organic gases (ROG) and nitrogen oxides (NO_X) emissions. In particular, the plan proposes a 60 percent reduction in NO_X by 2031.

The *2007 PM10 Maintenance Plan and Request for Redesignation* was approved by CARB on October 25, 2007, and no PM10 plans are under development. The *2015 Plan for the 1997 PM2.5 Standard* was adopted on April 16, 2015, and the *2016 Moderate Area Plan for the 2012 PM2.5 Standard* was adopted on September 15, 2016. SJVAPCD adopted an updated PM2.5 plan on November 18, 2018. The *2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards* addresses the USEPA federal 1997 annual PM2.5 standard of 15 micrograms per cubic meter ($\mu g/m^3$) and 24-hour PM2.5 standard of 65 $\mu g/m^3$; the 2006 24-hour PM2.5 standard of 35 $\mu g/m^3$; and the 2012 annual PM2.5 standard of 12 $\mu g/m^3$. This plan demonstrates attainment of the federal PM2.5 standards as expeditiously as practicable. The *CO Attainment Plan* was last updated in 2004 by CARB, and it is not planned to be updated in the future unless violations of the CO NAAQS or CAAQS occur.

The Proposed Project and the Atwater Station Alternative may be subject to the following district rules. This list of rules may not be complete as additional SJVAPCD rules may apply as specific components are identified.

- **Rule 2010 (Permits Required)**. This rule requires any person constructing, altering, replacing, or operating any source operation that emits, may emit, or may reduce emissions to obtain an Authority to Construct or a Permit to Operate.
- **Rule 2201 (New and Modified Stationary Source Review).** This rule requires that sources not increase emissions above the specified thresholds.
- **Rule 2280 (Portable Equipment Registration)**. This rule requires portable equipment used at project sites for less than 6 consecutive months be registered with SJVAPCD.
- **Rule 2303 (Mobile Source Emission Reduction Credits)**. This rule encourages joint business ventures and establishes procedures by which emission reduction credits from mobile sources may be certified.
- **Rule 4201 and Rule 4202 (Particulate Matter Concentration and Emission Rates)**. These rules provide PM emission limits for sources operating within the district.
- **Rule 4102 (Nuisance)**. This rule protects the health and safety of the public by prohibiting discharge of air contaminants that cause injury, detriment, nuisance or annoyance to any considerable number of persons.

- Rule 9410 (Employer Based Trip Reduction). This rule outlines requirements for employers in the San Joaquin Valley Air Basin that have at least 100 eligible employees at a worksite for at least 16 consecutive weeks during the first fiscal year of operation. Employers subject to this rule are required to implement an Employer Trip Reduction Implementation Plan. Some trip reduction strategies that can be implemented include hosting a rideshare event, offering guaranteed ride home services, and providing showers and/or lockers on-site. The Merced Layover & Maintenance Facility would have approximately 80-100 employees. As such, the Proposed Project would not be subject to Rule 9410, but it would be possible if the number of employees ends up exceeding 100.
- **Rule 9510 (Indirect Source Review)**. This rule outlines mitigation requirements for construction and operational emissions that exceed certain thresholds. The rule applies to any transportation project in which construction emissions equal or exceed 2 tons of NO_X or PM10 per year.
- **Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations)**. This rule limits VOC emissions by restricting the application and manufacturing of certain types of asphalt for paving and maintenance operations.
- **Regulation VIII (Fugitive PM10 Prohibitions)**. This set of rules outlines requirements for implementation of control measures for fugitive dust emission sources.

Metropolitan Transportation Commission

The Metropolitan Transportation Commission (MTC) serves as both the state-designated regional transportation agency and as the federally designated metropolitan planning organization for the Bay Area. Thus, it is responsible for regularly updating the regional transportation plan (RTP), a comprehensive blueprint for the development of mass transit, highway, airport, seaport, railroad, bicycle and pedestrian elements. The MTC also screens requests from local agencies for state and federal grants for transportation projects to determine their compatibility with the plan.

Association of Bay Area Governments

The Association of Bay Area Governments (ABAG) serves as a regional planning body for the Bay Area. ABAG, MTC, and BAAQMD work closely to develop long-range plans that improve the environment and standard of living through a series of measures that link land use, transportation, and air quality. ABAG is responsible for maintaining the state-mandated sustainable communities strategies (SCS), which link land use, transportation planning, and state funding. ABAG also develops demographic, economic, and project analyses for the region.

Merced County Association of Governments

The Merced County Association of Governments (MCAG) is a joint-powers authority composed of Merced County and the Cities of Atwater, Dos Palos, Merced, Los Banos, Livingston, and Gustine. MCAG responsibilities include solving regional problems, such as those related to transportation, solid waste, and air quality (Merced County Association of Governments no date).

Stanislaus County Council of Governments

Similar to MCAG, the Stanislaus County Council of Governments (StanCOG) is a joint-powers authority that was created to address transportation issues in the region. StanCOG is comprised of the County of Stanislaus and the Cities of Ceres, Hughson, Modesto, Newman, Oakdale, Patterson, Riverbank, Turlock, and Waterford. As a metropolitan planning organization, the primary role of StanCOG is regional transportation planning. The objectives of StanCOG include improving mobility, reducing congestion, and improving air quality (Stanislaus County Council of Governments 2015).

County and City General Plans

The San Joaquin Regional Rail Commission (SJRRC), a state joint powers agency, proposes improvements inside and outside of the Union Pacific Railroad (UPRR) right-of-way (ROW). The Interstate Commerce Commission Termination Act (ICCTA) affords railroads engaged in interstate commerce considerable flexibility in making necessary improvements and modifications to rail infrastructure, subject to the requirements of the Surface Transportation Board.[2] ICCTA broadly preempts state and local regulation of railroads and this preemption extends to the construction and operation of rail lines. As such, activities within the UPRR ROW are clearly exempt from local building and zoning codes and other land use ordinances. However, facilities located outside of the UPRR ROW, including proposed stations, the proposed Merced Layover & Maintenance Facility, and the Atwater Station Alternative would be subject to regional and local plans and regulations. Though ICCTA does broadly preempt state and local regulation of railroads, SJRRC intends to obtain local agency permits for construction of facilities that fall outside of the UPRR ROW even though SJRRC has not determined that such permits are legally necessary or be required.

Appendix G of this environmental impact report (EIR), *Regional Plans and Local General Plans*, provides a list of applicable goals, policies, and objectives from regional and local plans of the jurisdictions in which the Proposed Project and Atwater Station Alternative would be located. Section 15125(d) of the CEQA Guidelines requires an EIR to discuss "any inconsistencies between the proposed project and applicable general plans, specific plans, and regional plans." These plans were considered during the preparation of this analysis and were reviewed to assess whether the Proposed Project and Atwater Station Alternative would be consistent with the plans of relevant jurisdictions.[3]

The Proposed Project traverses and is located in the jurisdiction of two counties and five incorporated cities. The Atwater Station Alternative is located in the City of Atwater. Table 3.3-2 provides a summary of the county and city general plans that have been identified, reviewed, and considered for the preparation of this analysis. Although ACE locomotives would increase emissions in the jurisdictions the alignment traverses, the Proposed Project and the Atwater Station Alternative is expected to result in a transportation mode shift (i.e., attract passengers who otherwise would have driven cars). This shift would reduce travel by highway vehicles, reducing mobile source emissions and congestion. Accordingly, emissions associated with operation of the Proposed Project and the Atwater Station Alternative would not be inconsistent with regional and local air quality plans. Appendix G contains a list of applicable air quality goals, policies, and objectives from the plans listed in Table 3.3-2.

[2] ACE operates within a ROW and on tracks owned by the UPRR, which operates interstate freight rail service in the same ROW and on the same tracks.

[3] An inconsistency with regional or local plans is not necessarily considered a significant impact under CEQA unless it is related to a physical impact on the environment that is significant in its own right.

Table 3.3-2. List of Local Plans Regarding Air Quality

Title	Summary
County General Plans	
Stanislaus County General Plan (County of Stanislaus 2015)	The *Conservation/Open Space Element* of the general plan includes discussion of protecting the county's air quality. Goal Six of the General Plan seeks to improve air quality and includes policies to improve coordination among agencies to develop air quality programs, determine mitigation measures to reduce potential impacts of proposed projects on the local and regional air quality; reducing vehicle trips and vehicles miles traveled; and increasing public awareness of air quality problems and solutions.
2030 Merced County General Plan (County of Merced 2013)	The *Air Quality Element* of the general plan outlines the policies established to achieve the County's vision for air quality. The policies focus on regulating point-source pollution, directing development to existing urban areas, and transportation congestion management.
City General Plans	
Ceres General Plan 2035 (City of Ceres 2018)	The *Agricultural and Natural Resources Element* of the general plan includes Goal 4.G to protect and improve air quality in the Ceres area, and to protect residents from harmful effects of air pollution. Policies 4.G.1 through 4.G.15 support this goal by cooperating with other agencies to meet regional air quality goals; implementing strategies to reduce VMT and roadway dust; and implementing mitigation measure to minimize dust and air emission impacts from construction.
Turlock General Plan (City of Turlock 2012)	The *Air Quality and Greenhouse Gases Element* of the general plan includes policies and implementation measures to reduce air pollutants from mobile sources; develop land use plans that support shorter vehicle trips and alternative modes of transportation; reduce dust particulates; and plant and maintain trees in area parks.
City of Livingston 2025 General Plan (City of Livingston 1999)	The *Open Space, Conservation and Recreation Element* of the general Plan includes policies to reduce potential air quality impacts, such as improving the transportation infrastructure and providing alternate modes of transport; relieve traffic congestion points; adhere to all state, federal, and regional standards and plans; and coordinate among agencies.
City of Atwater General Plan (City of Atwater 2000)	The *Open Space and Conservation Element* of the general plan includes a discussion of current air quality issues and identifies Goal CO-3 reduce air emissions to obtain goals set in local and regional plans. Policies CO-3.1 through CO-3.3 encourage mixed-use and pedestrian-oriented land use development projects; cooperating with the San Joaquin Valley Air Pollution Control District in implementation of the air quality plan; and alternate modes of transportation.
Merced Vision 2030 General Plan (City of Merced 2012)	The *Sustainable Development Element* of the general plan identifies Goal Area SD-1 to minimize particulate content and toxic substances; create or improve transportation infrastructure; and coordinate among agencies. Policies SD-1.1 through SD-1.8 supports this goal by educating the public; coordinating among agencies; and integrate land use and transportation planning.

3.3.3 Environmental Setting

This section describes the environmental setting related to air quality for the Proposed Project and the Atwater Station Alternative. For the purposes of this analysis, the study area includes the SFBAAB and SJVAB;[4] the environmental footprint of the Proposed Project and the Atwater Station Alternative plus 500 feet along the rail line and 1,000 feet around stations; and all affected intersections near the proposed stations.

3.3.3.1 Local Meteorological Conditions

California is divided into 15 air basins based on geographic features that create distinctive regional climates. Ambient air quality in each air basin is affected by these climatological conditions as well as topography and the types and amounts of pollutants emitted. The Proposed Project and the Atwater Station Alternative are located within SJVAB; operational effects would occur throughout the SFBAAB and SJVAB. The following sections discuss climate and meteorological information specific to these air basins.

San Francisco Bay Area Air Basin

Climate in the SFBAAB is primarily affected by marine air flow and the basin's proximity to the San Francisco Bay. The Proposed Project and the Atwater Station Alternative would affect shuttle operations in the SFBAAB; specifically, in the northern part of the Santa Clara Valley portion (the Great America Station) and the Livermore Valley (the Pleasanton Station) of the SFBAAB.

The Santa Clara Valley is bounded by the San Francisco Bay and mountains to the east, south, and west. Temperatures are warm on summer days and cool on summer nights, and winter temperatures are fairly mild. At the northern end of the Santa Clara Valley, mean maximum temperatures are in the low 80s (Fahrenheit [F]) during the summer and the high 50s during the winter, and mean minimum temperatures range from the high 50s in the summer to the low 40s in the winter. Further inland, where the moderating effect of the Bay is not as strong, temperature extremes are greater.

Winds in the Santa Clara Valley are greatly influenced by the terrain, resulting in a prevailing flow that roughly parallels the valley's northwest-southeast axis. A north-northwesterly sea breeze flows through the valley during the afternoon and early evening, and a light south-southeasterly drainage flow occurs during the late evening and early morning.

The air pollution potential of the Santa Clara Valley is high. Warm summer temperatures, stable air and mountains surrounding the valley combine to promote ozone formation. In addition to the many local sources of pollution, ozone precursors from San Francisco, San Mateo, and Alameda Counties are carried by prevailing winds to the Santa Clara Valley. The valley tends to channel pollutants to the southeast. In addition, on summer days with low-level inversions, ozone can be recirculated by southerly wind drainage flows in the late evening and early morning and by the prevailing northwesterlies in the afternoon. A similar recirculation pattern occurs in the winter, affecting levels of CO and PM. This movement of the air up and down the valley increases the impact of the pollutants considerably (Bay Area Air Quality Management District 2017a).

[4] As noted above, added ridership resulting from the Proposed Project and Atwater Station Alternative would have system-wide effects throughout the SFBAAB; specifically, the number of connecting shuttles at the Great America and Pleasanton stations would increase. As such, the SFBAAB is included in the environmental setting.

The Livermore Valley is a sheltered inland valley near the eastern border of SFBAAB. The western side of the valley is bordered by 1,000 to 1,500 foothills with two gaps connecting the valley to the central SFBAAB, the Hayward Pass and Niles Canyon. The eastern side of the valley also is bordered by 1,000 to 1,500 foothills with one major passage to the San Joaquin Valley called the Altamont Pass and several secondary passages. To the north lie the Black Hills and Mount Diablo. A northwest to southeast channel connects the Diablo Valley to the Livermore Valley. The south side of the Livermore Valley is bordered by mountains approximately 3,000 to 3,500 feet high.

During the summer months, when there is a strong inversion with a low ceiling, air movement is weak and pollutants become trapped and concentrated. Maximum summer temperatures in the Livermore Valley range from the high-80s to the low-90s, with extremes in the 100s. At other times in the summer, a strong Pacific high-pressure cell from the west, coupled with hot inland temperatures causes a strong onshore pressure gradient which produces a strong, afternoon wind. With a weak temperature inversion, air moves over the hills with ease, dispersing pollutants.

In the winter, with the exception of an occasional storm moving through the area, air movement is often dictated by local conditions. At night and early morning, especially under clear, calm and cold conditions, gravity drives cold air downward. The cold air drains off the hills and moves into the gaps and passes. On the eastern side of the valley the prevailing winds blow from north, northeast and east out of the Altamont Pass. Winds are light during the late night and early morning hours. Winter daytime winds sometimes flow from the south through the Altamont Pass to the San Joaquin Valley. Average winter maximum temperatures range from the high-50s to the low-60s, while minimum temperatures are from the mid-to-high-30s, with extremes in the high teens and low-20s.

Like the Santa Clara Valley, air pollution potential is high in the Livermore Valley, especially for photochemical pollutants in the summer and fall. High temperatures increase the potential for ozone to build up. The valley not only traps locally generated pollutants but can be the receptor of ozone and ozone precursors from San Francisco, Alameda, Contra Costa and Santa Clara counties. On northeasterly wind flow days, most common in the early fall, ozone maybe carried west from the San Joaquin Valley to the Livermore Valley.

During the winter, the sheltering effect of the valley, its distance from moderating waterbodies, and the presence of a strong high-pressure system contribute to the development of strong, surface-based temperature inversions. Pollutants such as CO and PM, generated by motor vehicles, fireplaces and agricultural burning, can become concentrated. Air pollution problems could intensify because of population growth and increased commuting to and through the subregion (Bay Area Air Quality Management District 2017a).

San Joaquin Valley Air Basin

Approximately 250 miles long and averaging 35 miles wide, SJVAB is the second largest air basin in the state. SJVAB is defined by the Sierra Nevada in the east (8,000–14,000 feet in elevation), the Coast Ranges in the west (averaging 3,000 feet in elevation), and the Tehachapi Mountains in the south (6,000–8,000 feet in elevation). The valley is basically flat with a slight downward gradient to the northwest. The valley opens to the sea at the Carquinez Straits where the San Joaquin–Sacramento Delta empties into San Francisco Bay. The San Joaquin Valley, thus, could be considered a “bowl” open only to the north.

SJVAB has an inland Mediterranean climate averaging more than 260 sunny days per year. The valley floor experiences warm, dry summers and cool, wet winters. Summer high temperatures often exceed 100°F, averaging in the low 90s in the northern valley and high 90s in the south. In the entire SJVAB, high daily temperature readings in summer average 95°F. Over the last 30 years, SJVAB averaged 106 days a year 90°F or hotter, and 40 days a year 100°F or hotter. The daily summer temperature variation can be as much as 30°F.

In winter, as the cyclonic storm track moves southward, the storm systems moving in from the Pacific Ocean have a maritime influence on SJVAB. The high mountains to the east prevent the cold, continental air masses of the interior from influencing the valley. Winters are mild and humid. Temperatures below freezing are unusual. Average high temperatures in the winter are in the 50s, but highs in the 30s and 40s can occur on days with persistent fog and low cloudiness. The average daily low temperature is 45°F.

Although marine air generally flows into the basin from the San Joaquin River Delta, the region's topographic features restrict air movement through and out of the basin. The Coastal Range hinders wind access into SJVAB from the west, the Tehachapi Mountains prevent southerly passage of air flow, and the high Sierra Nevada is a significant barrier to the east. These topographic features result in weak air flow, which becomes blocked vertically by high barometric pressure over SJVAB. As a result, SJVAB is highly susceptible to pollutant accumulation over time. Most of the surrounding mountains are above the normal height of summer inversion layers (i.e., 1,500–3,000 feet) (San Joaquin Valley Air Pollution Control District 2015).

3.3.3.2 Pollutants of Concern

Criteria Air Pollutants

As discussed in Section 3.3.2, *Regulatory Setting*, the federal and state governments have established NAAQS and CAAQS, respectively, for six criteria pollutants. Ozone is considered a regional pollutant because its precursors affect air quality on a regional scale. Pollutants such as CO, NO_2, SO_2, and Pb are considered local pollutants that tend to accumulate in the air locally. PM10 and PM2.5 are both regional and local pollutants.

The primary criteria pollutants of concern in the project are ozone precursors (i.e., NO_X and ROG), CO, and PM.[5,6]

All criteria pollutants can have human health effects at certain concentrations. The ambient air quality standards for these pollutants are set to protect public health and the environment with an adequate margin of safety (Clean Air Act [CAA] Section 109). Epidemiological, controlled human exposure, and toxicology studies evaluate potential health and environmental effects of criteria pollutants, and form the scientific basis for new and revised ambient air quality standards.

Principal characteristics and possible health and environmental effects from exposure to the primary criteria pollutants generated by the Proposed Project and the Atwater Station Alternative are discussed in this section.

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[5] As discussed above, there are also ambient air quality standards for SO_2, lead, sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particulates. However, these pollutants are typically associated with industrial sources, which are not included as part of the project. Accordingly, they are not evaluated further.

[6] Most emissions of NO_x are in the form of nitric oxide (NO). Conversion to NO_2 occurs in the atmosphere as pollutants disperse downwind. Accordingly, NO_2 is not considered a local pollutant of concern for the project and is not evaluated further.

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

Ozone poses a higher risk to those who already suffer from respiratory diseases (e.g., asthma), children, older adults, and people who are active outdoors. Exposure to ozone at certain concentrations can make breathing more difficult, cause shortness of breath and coughing, inflame and damage the airways, aggravate lung diseases, increase the frequency of asthma attacks, and cause chronic obstructive pulmonary disease. Studies show associations between short-term ozone exposure and non-accidental mortality, including deaths from respiratory issues. Studies also suggest long-term exposure to ozone may increase the risk of respiratory-related deaths (U.S. Environmental Protection Agency 2020a). The concentration of ozone at which health effects are observed depends on an individual's sensitivity, level of exertion (i.e., breathing rate), and duration of exposure. Studies show large individual differences in the intensity of symptomatic responses, with one study finding no symptoms to the least responsive individual after a 2-hour exposure to 400 parts per billion of ozone and a 50 percent decrease in forced airway volume in the most responsive individual. Although the results vary, evidence suggests that sensitive populations (e.g., asthmatics) may be affected on days when the 8-hour maximum ozone concentration reaches 80 parts per billion (U.S. Environmental Protection Agency 2016a).

Additionally, ozone has been tied to crop damage, typically in the form of stunted growth and premature death. Ozone can also act as a corrosive, resulting in property damage such as the degradation of rubber products and other materials.

NO_X serve as integral participants in the process of photochemical smog production. The two major forms of NO_X are nitric oxide (NO) and NO_2. NO is a colorless, odorless gas formed from atmospheric nitrogen and oxygen when combustion takes place under high temperature and/or high pressure. NO_2 is a reddish-brown gas formed by the combination of NO and oxygen. NO_X acts as an acute respiratory irritant and increases susceptibility to respiratory pathogens.

CO is a colorless, odorless, toxic gas produced by incomplete combustion of carbon substances, such as gasoline or diesel fuel. In the air quality study area, high CO levels are of greatest concern during the winter, when periods of light winds combine with the formation of ground-level temperature inversions from evening through early morning. These conditions trap pollutants near the ground, reducing the dispersion of vehicle emissions. Moreover, motor vehicles exhibit increased CO emission rates at low air temperatures. The primary negative health effect associated with CO is interference with normal oxygen transfer to the blood, which may result in tissue oxygen deprivation. Exposure to CO at high concentrations can also cause fatigue, headaches, confusion, dizziness, and chest pain. There are no ecological or environmental effects of CO at or near existing background CO levels (California Air Resources Board 2020a).

PM consists of finely divided solids or liquids such as soot, dust, aerosols, fumes, and mists. Two forms of fine particulates are now recognized—inhalable coarse particles, or PM10, and inhalable fine particles, or PM2.5. Particulate discharge into the atmosphere results primarily from industrial, agricultural, construction, and transportation activities. However, wind on arid landscapes also contributes substantially to local particulate loading. Both PM10 and PM2.5 may negatively affect the human respiratory system, especially in those people who are naturally sensitive or susceptible to breathing problems.

Particulate pollution can be transported over long distances and may adversely affect humans, especially for people who are naturally sensitive or susceptible to breathing problems. Numerous studies have linked PM exposure to premature death in people with preexisting heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms. Studies show that long-term exposure to PM2.5 was associated with increased risk of mortality, ranging from 6 to 13 percent increased risk per 10 $\mu g/m^3$ of PM2.5 (California Air Resources Board 2010). For every 1 $\mu g/m^3$ reduction in PM2.5 results in a 1 percent reduction in mortality rate for individuals over 30 years old (Bay Area Air Quality Management District 2017b). Studies also show an approximate 0.5 percent increase in overall mortality for every 10 mg/m^3 increase in PM10 measured the day before death (U.S. Environmental Protection Agency 2005). PM10 levels have been greatly reduced since 1990. Peak concentrations have declined by 60 percent and annual average values have declined by 50 percent (Bay Area Air Quality Management District 2017b). Depending on its composition, both PM10 and PM2.5 can also affect water quality and acidity, deplete soil nutrients, damage sensitive forests and crops, affect ecosystem diversity, and contribute to acid rain (U.S. Environmental Protection Agency 2020b).

Toxic Air Contaminants

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

Air toxics are generated by a number of sources, including *stationary sources*, such as dry cleaners, gas stations, auto body shops, and combustion sources; *mobile sources*, such as motor vehicles, diesel trucks, ships, and trains; and *area sources*, such as farms, landfills, and construction sites. Negative health effects of TACs can be carcinogenic (cancer-causing), short-term (acute) noncarcinogenic, and long-term (chronic) noncarcinogenic. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to the brain and nervous system, and respiratory disorders.

The primary TACs of concern associated with the Proposed Project are PM2.5 and DPM, asbestos, and Valley Fever. Principal characteristics surrounding these pollutants are discussed in this section.

DPM is generated by diesel-fueled equipment and vehicles. Short-term exposure to DPM 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). The USEPA has determined that diesel exhaust is "likely to be carcinogenic to humans by inhalation." (U.S. Environmental Protection Agency 2003)

Asbestos is the name given to a number of naturally occurring fibrous silicate minerals. Asbestos has been mined for applications requiring thermal insulation, chemical and thermal stability, and high tensile strength. Asbestos is also found in its natural state in rock or soil (known as naturally occurring asbestos [NOA]). Mapping published by the U.S. Geological Survey and California Geological Survey indicates that the Proposed Project and the Atwater Station Alternative are not located within an area known to contain NOA (U.S. Geological Survey 2011). The inhalation of asbestos fibers into the lungs can result in a variety of adverse health effects, including inflammation of the lungs, respiratory ailments (e.g., asbestosis, which is scarring of lung tissue that results in constricted breathing), and cancer (e.g., lung cancer and mesothelioma, which is cancer of the linings of the lungs and abdomen).

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

Odors

Offensive odors can be unpleasant and lead to citizen complaints to local governments and air districts. According to CARB's *Air Quality and Land Use Handbook*, land uses associated with odor complaints typically include sewage treatment plants, landfills, recycling facilities, manufacturing, and agricultural activities. CARB provides recommended screening distances for siting new receptors near existing odor sources (California Air Resources Board 2005).

3.3.3.3 Existing Air Quality Conditions

Local Monitoring Data

A number of ambient air quality monitoring stations are located in SFBAAB and SJVAB to monitor progress toward air quality standards attainment of NAAQS and CAAQS (see Table 3.3-1). BAAQMD and SJVAPCD maintain these stations. Tables 3.3-3 and 3.3-4 summarize the values measured at monitoring stations near the Proposed Project and Atwater Station Alternative, and near existing ACE stations in the Bay Area that will be affected by increased ridership. The tables also comparisons to NAAQS and CAAQS.

Attainment Status

Local monitoring data (Tables 3.3-3 and 3.3-4) are used to designate areas as nonattainment, maintenance, attainment, or unclassified for NAAQS and CAAQS. The four designations are further defined as:

- **Nonattainment—**Areas where monitored pollutant concentrations violate the standard in question.

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

Table 3.3-5 summarizes the attainment status for Santa Clara, Alameda, San Joaquin, Stanislaus, and Merced Counties with regard to NAAQS and CAAQS.

Sensitive Receptors

BAAQMD and SJVAPCD generally define a *sensitive receptor* as a facility or land use that houses or attracts members of the population who are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples of sensitive receptors include residential areas, schools, and hospitals. The Proposed Project and the Atwater Station Alternative are surrounded by a mix of industrial, commercial, residential, and recreational land uses. The closest sensitive receptors (residences) are located immediately adjacent to the ROW, with various other receptor locations near the Proposed Project.

Table 3.3-3. Ambient Criteria Pollutant Concentrations at Air Quality Monitoring Stations Closest to Existing Affected ACE Stations (2017–2019)

	BAAQMD			BAAQMD			BAAQMD		
	San Jose Jackson Street			Livermore Rincon			Pleasanton Owens Court		
Pollutant and Standards	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Ozone (O_3)									
Maximum 1-hour concentration (ppm)	0.121	0.078	0.095	0.109	0.099	0.105	NA	NA	NA
Maximum 8-hour concentration (ppm)	0.099	0.061	0.082	0.086	0.078	0.078	NA	NA	NA
Number of days standard exceeded[a]									
CAAQS 1-hour (>0.09 ppm)	3	0	1	5	2	4	NA	NA	NA
CAAQS 8-hour (>0.070 ppm)	4	0	2	6	3	7	NA	NA	NA
NAAQS 8-hour (>0.070 ppm)	4	0	2	6	3	7	NA	NA	NA
Carbon Monoxide (CO)									
Maximum 8-hour concentration (ppm)	1.8	2.1	1.3	NA	NA	NA	NA	2.0	1.0
Maximum 1-hour concentration (ppm)	2.1	2.5	1.7	NA	NA	NA	NA	2.3	1.3
Number of days standard exceeded[a]									
NAAQS 8-hour (≥9 ppm)	0	0	0	NA	NA	NA	NA	0	0
CAAQS 8-hour (≥9.0 ppm)	0	0	0	NA	NA	NA	NA	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0	NA	NA	NA	NA	0	0
CAAQS 1-hour (≥20 ppm)	0	0	0	NA	NA	NA	NA	0	0
Nitrogen Dioxide (NO_2)									
State maximum 1-hour concentration (ppm)	67	86	59	45	56	47	NA	64	63
State second-highest 1-hour concentration (ppm)	64	82	59	45	55	46	NA	59	53
Annual average concentration (ppm)	NA	12	10	8	8	7	NA	NA	13
Number of days standard exceeded[a]									
CAAQS 1-hour (0.18 ppm)	0	0	0	0	0	0	0	0	0
Particulate Matter (PM10)[b]									
National[c] maximum 24-hour concentration (μg/m³)	69.4	115.4	75.4	NA	NA	NA	NA	NA	NA
National[c] second-highest 24-hour concentration (μg/m³)	67.3	111.6	53.6	NA	NA	NA	NA	NA	NA
State[d] maximum 24-hour concentration (μg/m³)	69.8	121.8	77.1	NA	NA	NA	NA	NA	NA
State[d] second-highest 24-hour concentration (μg/m³)	67.6	118.5	56.0	NA	NA	NA	NA	NA	NA
National annual average concentration (μg/m³)	20.7	20.9	18.4	NA	NA	NA	NA	NA	NA
State annual average concentration (μg/m³)[e]	21.3	23.1	19.1	NA	NA	NA	NA	NA	NA

Pollutant and Standards	BAAQMD San Jose Jackson Street 2017	2018	2019	BAAQMD Livermore Rincon 2017	2018	2019	BAAQMD Pleasanton Owens Court 2017	2018	2019
Number of days standard exceeded[a]									
NAAQS 24-hour (>150 $\mu g/m^3$)[f]	0.0	0.0	0.0	NA	NA	NA	NA	NA	NA
CAAQS 24-hour (>50 $\mu g/m^3$)[f]	19.2	12.2	11.8	NA	NA	NA	NA	NA	NA
Particulate Matter (PM2.5)									
National[c] maximum 24-hour concentration ($\mu g/m^3$)	49.7	133.9	27.6	41.5	172.6	28.8	NA	164.7	29.1
National[c] second-highest 24-hour concentration ($\mu g/m^3$)	46.5	130.5	27.4	37.6	136.2	23.1	NA	137.3	23.3
State[d] maximum 24-hour concentration ($\mu g/m^3$)	49.7	133.9	34.4	41.5	172.6	28.8	NA	164.7	29.1
State[d] second-highest 24-hour concentration ($\mu g/m^3$)	46.5	130.5	29.9	37.6	136.2	23.1	NA	137.3	23.3
National annual average concentration ($\mu g/m^3$)	9.5	12.7	9.0	8.4	11.2	6.3	NA	NA	6.2
State annual average concentration ($\mu g/m^3$)[e]	NA	12.9	9.1	8.4	11.3	6.4	NA	NA	6.3
Number of days standard exceeded[a]									
NAAQS 24-hour (>35 $\mu g/m^3$)	6.0	15.5	0.0	2.0	14.6	0.0	0	13	0
Sulfur Dioxide (SO_2) - No data available									

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

BAAQMD = Bay Area Air Quality Management District.
SJVAPCD = San Joaquin Valley Air Pollution Control District.
ppm = parts per million.
NAAQS = national ambient air quality standards.
CAAQS = California Ambient Air Quality Standards.
$\mu g/m^3$ = micrograms per cubic meter.
> = greater than.
≥ = greater than or equal to.
NA = not applicable or there was insufficient or no data available to determine the value.

[a] An exceedance is not necessarily a violation.
[b] National statistics are based on standard conditions data. In addition, national statistics are based on samplers using federal reference or equivalent methods.
[c] State statistics are based on local conditions data, except in the South Coast Air Basin, for which statistics are based on standard conditions data. In addition, state statistics are based on California-approved samplers.
[d] Measurements usually are collected every 6 days.
[e] State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.
[f] Mathematical estimate of how many days' concentrations would have been measured as higher than the level of the standard had each day been monitored. Values have been rounded.

Table 3.3-4. Ambient Criteria Pollutant Concentrations at Air Quality Monitoring Stations Closest to the Proposed Project and the Atwater Station Alternative (2017–2019)

	SJVAPCD			SJVAPCD			SJVAPCD			SJVAPCD		
	Modesto 14th Street			Turlock			Merced M Street			Merced Coffee Avenue		
Pollutant and Standards	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Ozone (O_3)												
Maximum 1-hour concentration (ppm)	0.111	0.103	0.102	0.114	0.108	0.090	NA	NA	NA	0.093	0.104	0.087
Maximum 8-hour concentration (ppm)	0.098	0.091	0.083	0.099	0.095	0.082	NA	NA	NA	0.085	0.084	0.077
Number of days standard exceeded[a]												
CAAQS 1-hour (>0.09 ppm)	3	2	1	3	7	0	NA	NA	NA	0	4	0
CAAQS 8-hour (>0.070 ppm)	23	14	9	31	28	13	NA	NA	NA	17	23	6
NAAQS 8-hour (>0.070 ppm)	21	13	8	31	26	13	NA	NA	NA	16	21	6
Carbon Monoxide (CO)												
Maximum 8-hour concentration (ppm)	1.6	2.1	1.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
Maximum 1-hour concentration (ppm)	2.0	2.7	1.8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Number of days standard exceeded[a]												
NAAQS 8-hour (≥9 ppm)	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
CAAQS 8-hour (≥9.0 ppm)	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
NAAQS 1-hour (≥35 ppm)	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
CAAQS 1-hour (≥20 ppm)	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen Dioxide (NO_2)												
State maximum 1-hour concentration (ppm)	NA	NA	NA	58	67	59	NA	NA	NA	38	45	38
State second-highest 1-hour concentration (ppm)	NA	NA	NA	56	57	56	NA	NA	NA	38	44	38
Annual average concentration (ppm)	NA	NA	NA	9	9	8	NA	NA	NA	7	7	6
Number of days standard exceeded[a]												
CAAQS 1-hour (0.18 ppm)	NA	NA	NA	0	0	0	NA	NA	NA	0	0	0
Particulate Matter (PM10)[b]												
National[c] maximum 24-hour concentration (μg/m³)	129.3	224.9	309.1	111.7	238.7	95.9	146.6	137.0	96.1	NA	NA	NA
National[c] second-highest 24-hour concentration (μg/m³)	112.4	184.8	105.0	107.1	110.7	93.9	94.1	80.1	80.6	NA	NA	NA
State[d] maximum 24-hour concentration (μg/m³)	128.9	236.4	315.6	109.4	250.4	98.4	144.0	142.7	99.1	NA	NA	NA
State[d] second-highest 24-hour concentration (μg/m³)	114.6	193.8	107.7	108.4	116.2	95.5	98.5	83.5	84.4	NA	NA	NA
National annual average concentration (μg/m³)	31.4	32.1	27.8	36.4	36.8	30.1	35.4	34.1	29.2	NA	NA	NA
State annual average concentration (μg/m³)[e]	31.1	NA	NA	36.9	37.5	30.6	35.8	34.6	29.8	NA	NA	NA

Pollutant and Standards	SJVAPCD			SJVAPCD			SJVAPCD			SJVAPCD		
	Modesto 14th Street			Turlock			Merced M Street			Merced Coffee Avenue		
	2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019
Number of days standard exceeded[a]												
NAAQS 24-hour (>150 µg/m^3)[f]	0.0	4.3	1.1	0.0	6.1	0.0	0.0	0.0	0.0	NA	NA	NA
CAAQS 24-hour (>50 µg/m^3)[f]	57	44	41	91.8	79.6	60.5	76.6	59.6	54.4	NA	NA	NA
Particulate Matter (PM2.5)												
National[c] maximum 24-hour concentration (µg/m^3)	74.5	189.8	34.4	72.3	187.3	40.7	66.7	94.7	41.6	69.3	88.2	35.5
National[c] second-highest 24-hour concentration (µg/m^3)	69.5	146.1	32.9	58.7	144.7	40.6	63.9	73.8	30.6	60.6	81.7	29.5
State[d] maximum 24-hour concentration (µg/m^3)	74.5	189.8	34.4	72.3	187.3	40.7	66.7	94.7	41.6	69.3	88.2	35.5
State[d] second-highest 24-hour concentration (µg/m^3)	69.5	146.1	32.9	58.7	144.7	40.6	63.9	73.8	30.6	60.6	81.7	29.5
National annual average concentration (µg/m^3)	12.8	15.2	7.7	12.7	17.2	10.6	12.6	14.2	9.6	13.2	15.1	9.1
State annual average concentration (µg/m^3)[e]	12.9	15.2	7.7	12.7	17.2	10.6	NA	14.2	9.6	13.2	15.1	9.1
Number of days standard exceeded[a]												
NAAQS 24-hour (>35 µg/m^3)	25.1	21.5	0.0	29.2	25.7	8.3	20.4	29.7	3.0	18.7	21.2	1.0
Sulfur Dioxide (SO_2) - No data available												

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

BAAQMD = Bay Area Air Quality Management District.
SJVAPCD = San Joaquin Valley Air Pollution Control District.
ppm = parts per million.
NAAQS = national ambient air quality standards.
CAAQS = California Ambient Air Quality Standards.
µg/m^3 = micrograms per cubic meter.
> = greater than.
$\geq$ = greater than or equal to.
NA = not applicable or there was insufficient or no data available to determine the value.

[a] An exceedance is not necessarily a violation.
[b] National statistics are based on standard conditions data. In addition, national statistics are based on samplers using federal reference or equivalent methods.
[c] State statistics are based on local conditions data, except in the South Coast Air Basin, for which statistics are based on standard conditions data. In addition, state statistics are based on California-approved samplers.
[d] Measurements usually are collected every 6 days.
[e] State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.
[f] Mathematical estimate of how many days' concentrations would have been measured as higher than the level of the standard had each day been monitored. Values have been rounded.

Table 3.3-5. Federal and State Attainment Status

Pollutant	Santa Clara County		Alameda County		Stanislaus County		Merced County	
	Federal	State	Federal	State	Federal	State	Federal	State
Ozone	N	N	N	N	N	N	N	N
CO	A	A	A	A	A/U	A	A/U	U
PM10	A/U	N	A/U	N	A	N	A	N
PM2.5	A/U	N	A/U	N	N	N	N	N
SO_2	A	A	A	A	A/U	A	A/U	A
NO_2	A	A	A	A	A/U	A	A/U	A
Lead	A	A	A	A	A	A	A	A

Sources: California Air Resources Board 2019; U.S. Environmental Protection Agency 2020d.

(P) Applies only to a portion of the county.

A/U = Attainment/Unclassified.

CO = carbon monoxide.

M = Maintenance.

N = Nonattainment.

NO_2 = nitrogen dioxide.

PM10 = particulate matter that is 10 microns in diameter and smaller.

PM2.5 = particulate matter that is 2.5 microns in diameter and smaller.

SO_2 = sulfur dioxide.

3.3.4 Impact Analysis

This section describes the environmental impacts of the Proposed Project and the Atwater Station Alternative on air quality. It describes the methods used to evaluate the impacts and the thresholds used to determine whether an impact would be significant. Measures to mitigate significant impacts are provided, where appropriate.

3.3.4.1 Methods for Analysis

Air quality impacts associated with construction and operation of the Proposed Project and the Atwater Station Alternative were evaluated and quantified using standard and accepted software tools, techniques, and emission factors. A summary of the methodology is provided in this section and a full list of assumptions is provided in Appendix J, *Air Quality, Greenhouse Gas, and Health Risk Assessment Supporting Documentation*.

The construction air quality analysis is limited to the corridor between Ceres and Merced, as physical improvements are only proposed along this route. Operationally, the analysis also focuses on the Ceres to Merced corridor, because the existing and planned ACE system will be unchanged by the proposed extended service between Ceres and Merced. Thus, the operations analysis includes the emissions changes from increased train service along the corridor as well as reduced vehicle emissions due to increased ridership. In the BAAQMD area, the operational analysis also includes the change in emissions due to increased ACE shuttles at the Pleasanton and Great America stations as well as the reduced vehicle emissions in the Bay Area due to increased ridership. This approach ensures that air quality impacts associated with the Proposed Project are comprehensively assessed, in accordance with air district guidance and thresholds.

Mass Emissions Modeling

Construction

Construction activities for the Proposed Project and the Atwater Station Alternative would occur solely within and under the jurisdiction of the SJVAPCD. Construction activities in the SJVAPCD would generate emissions of criteria pollutants (ROG, NO_X, CO, PM10, PM2.5, and sulfur oxide [SO_X]) that would result in short-term effects on ambient air quality in the study area. Emissions would originate from off-road equipment exhaust, employee and haul truck vehicle exhaust (on-road vehicles), locomotive exhaust, site grading and earth movement, and paving. These emissions would be temporary (i.e., limited to the construction period) and would cease when construction activities are complete.

Emissions estimates for construction of the Proposed Project and the Atwater Station Alternative were based on a combination of engineering inputs and model defaults. Total emissions from construction of the Proposed Project and the Atwater Station Alternative are presented at the average daily and annual time scales and compared with SJVAPCD construction thresholds.

- **Off-Road Equipment**: Emission factors for off-road construction equipment (e.g., loaders, graders, bulldozers) were obtained from the *CalEEMod (version 2016.3.2) User's Guide* appendix, which provides values per unit of activity (in grams per horsepower-hour) by calendar year (Trinity Consultants 2017). Criteria pollutants were estimated by multiplying the CalEEMod emission factors by the equipment inventory provided by the project engineer (AECOM 2020a).
- **On-Road Vehicles**: On-road vehicles (e.g., pickup trucks, flatbed trucks) would be required for material and equipment hauling, onsite crew and material movement, and employee

commuting. Exhaust emissions from on-road vehicles were estimated using the EMFAC2017 emissions model and activity data provided by the project engineer (AECOM 2020a). Emission factors for haul trucks are based on aggregated-speed emission rates for EMFAC's "T7 Single" vehicle category. Factors for on-site water, and concrete trucks were based on 5 miles per hour (mph) emission rates for the "T6 Heavy" category, and factors for on-site pickup trucks and sport utility vehicles are based on 5 mph emission rates for the light-duty truck (LDT) and medium-duty vehicle categories, respectively. Factors for employee commute vehicles are based on a weighted average for all vehicle speeds for EMFAC's light-duty auto/LDT vehicle categories. Fugitive re-entrained road dust emissions were estimated using USEPA's *Compilation of Air Pollutant Emission Factors* (AP-42), Sections 13.2.1 and 13.2.2 (U.S. Environmental Protection Agency 2006, 2011).

- **Locomotives**: Emissions from diesel-powered locomotives used to transport rail materials were quantified using the USEPA's locomotive engine emission standards (U.S. Environmental Protection Agency 2009) and activity data provided by the project engineer (AECOM 2020a). All locomotives were assumed to utilize a 1,500 horsepower, Tier 0 engine.
- **Site Grading and Earth Movement**: Fugitive dust emissions from earth movement (i.e., site grading, bulldozing, and truck loading) were quantified using emission factors from CalEEMod and USEPA's AP-42 (U.S. Environmental Protection Agency 1998a and 2006). Data on the total graded acreage and quantity of cut-and-fill material were provided by the project engineer (AECOM 2020a).
- **Paving**: Fugitive ROG emissions associated with paving were calculated using data (e.g., square feet paved) provided by the project engineer and the CalEEMod default emission factor of 2.62 pounds of ROG per acre paved (AECOM 2020a; Trinity Consultants 2017).

Operations

Operation of the Proposed Project and the Atwater Station Alternative would increase passenger train activities (including locomotive movement, locomotive idling[7], and connecting shuttle service), as well as attract additional motor vehicles to existing and new ACE stations. The Proposed Project and the Atwater Station Alternative operations would expand existing ACE service, which would also remove some single-occupancy vehicles from the transportation network and reduce mobile source emissions. Emissions calculations consider both direct and indirect emissions generated by these sources. Emissions were modeled for existing (2019)[8], full operations (2030)[9], and horizon year (2040) conditions to capture changes in Proposed Project and the Atwater Station Alternative

[7] For locomotive idling, the worst-case year would be full operations (2030) because there would be about twice as much idling at the Merced Station and about four times as much idling at the Merced Layover & Maintenance Facility, compared to the idling at these two locations for initial operations of one train in 2025. This analysis evaluates the full operational scenario in 2030.

[8] 2019 was used as the baseline condition because full year data was not available for 2020 during EIR preparation and because 2020 is an anomalous year for transportation emissions due to the substantial disruptions due to the COVID-19 health emergency.

[9] As discussed in Chapter 2, Project Description, operations could start by 2025 with one round trip per day between Ceres and Merced, increasing to four round trips per day in 2030. The year 2030 was selected for the air quality analysis over 2025 since the Project would first reach its full level of operation in 2030 including its full level of train operations. In addition, given the progressive improvement in passenger vehicle efficiency, the benefits of diverting passenger vehicle use through increase train use would be lower in 2030 than in 2025 on a per vehicle-mile travelled (VMT) diverted basis and thus the analysis for 2030 would be conservative compared to 2025.

activity. In addition, emissions were modeled using regional emission factors to represent vehicles in both the BAAQMD and SJVAPCD.

Chapter 2, *Project Description*, provides additional information on the ridership estimate for the Proposed Project and the Atwater Station Alternative.

ACE Operations

Expanded passenger rail service would result in increased diesel fuel combustion and associated criteria pollutant emissions from increased locomotive activity. Table 3.3-6 summarizes the daily operating hours. As noted in the table, all locomotives would operate with Tier 4 engines (Leavitt pers. comm.). The locomotives for the Project would use renewable diesel fuel. Because the locomotives were modeled with Tier 4 engines, the use of renewable diesel would not result in any further direct criteria pollutant emissions reductions from the locomotive exhaust stacks.

Table 3.3-6. Daily Locomotive Operating Hours by Engine Tier in the Ceres to Merced Corridor

Condition	Tier 4 Daily Operating Hours[a]
Existing (2019)[b]	-
2030 No Project Conditions[b]	-
2030 Project and Atwater Station Alternative	4.8[c]
2040 No Project Conditions[b]	-
2040 Project and Atwater Station Alternative	4.8[c]

[a] The assumption that all locomotives would have tier 4 engines is from Leavitt pers. comm.
[b] For the existing and no project conditions, it is assumed that there would be no increase in locomotive operating hours. There would be operating hours associated with the existing ACE system, but no additional locomotive operating hours would occur in the Ceres to Merced corridor.
[c] Based on the prototypical schedule, the operating duration for one train would be 34 or 40 minutes, depending on the route direction. The total duration for the eight daily trains between Ceres and Merced would be four hours and 50 minutes, or approximately 4.8 hours.

Diesel locomotive engine power is controlled by "notched" throttles. Idling, braking, and moving the locomotive is conducted by placing the throttle in one of several available "notch" settings. A locomotive's *duty cycle* is a description of how much, on average, the locomotive spends in each notch setting while operating. ROG, NO_X, CO, and PM emissions generated by ACE operations were estimated using USEPA's (U.S. Environmental Protection Agency 2009) locomotive emissions standards and default assumptions for an average locomotive duty cycle (U.S. Environmental Protection Agency 1998b). The emission standards are defined per unit of activity (in grams per horsepower-hour) by engine tier (e.g., Tier 4). SO_X emissions were calculated based on a diesel fuel density of 3,200 grams per gallon (U.S. Environmental Protection Agency 2009) and a sulfur content of 15 parts per million sulfur, consistent with CARB and USEPA requirements (U.S. Environmental Protection Agency 2016b). Daily criteria pollutant emissions were annualized assuming 254 operating days per year, because ACE service operates only on weekdays.

ACE locomotives idle while loading passengers at stations, when at the end of the line, and while warming up after receiving routine maintenance. The locomotives traveling between Ceres and Merced would receive maintenance at the proposed Merced Layover & Maintenance Facility. Idling emissions at the stations (during passenger loading and end-of-line time) and at the Merced Layover & Maintenance Facility were quantified using USEPA's locomotive emissions standards (U.S.

Environmental Protection Agency 2009). Daily idling hours were provided by the engineering team (AECOM 2020a). In the future, ACE locomotives may be even lower-emitting than Tier 4 because hybrid-electric equipment may be used. The analysis presented here is conservative, however, because the modeling and analysis assumed that locomotives, while Tier 4, would be fully diesel-powered and not hybrid-electric.

Facility Operation

The Merced Layover & Maintenance Facility would consume natural gas and occasionally use a diesel-powered emergency generator, both of which generate criteria pollutant emissions. Natural gas consumption at the Merced Layover & Maintenance Facility was estimated in CalEEMod based on the default consumption rates for light industrial uses and the facility's square footage. Criteria pollutant emissions from the emergency generator were quantified based on the operating characteristics of the emergency generator at the ACE Rail Maintenance Facility in Stockton (generator model, operating time) and emission factors from CalEEMod (AECOM 2020d).

Expanded Shuttle Service

ACE provides shuttle connections at the Great America and Pleasanton Stations, which are used by nearly half of ACE riders (Altamont Corridor Express 2015). Changes in ACE ridership, therefore, will have corresponding effects on shuttle demand and vehicle miles traveled (VMT). Criteria pollutant emissions associated with changes in Great America Station and Pleasanton Station shuttle service were estimated using VMT data provided by AECOM and emission factors obtained from EMFAC2017 for the relevant years of analysis (i.e., operational emissions from the shuttles in 2030 were estimated using a 2030 emission factor, etc.) (AECOM 2020b). Re-entrained road dust was calculated using the same methodology as for construction trips (refer to discussion above of *On-Road Vehicles* under *Construction*). Because all shuttle trips would occur in the Bay Area, all emissions were assigned to BAAQMD. The shuttle emissions are a conservative estimate because the shuttles may be fully electric in 2030 and/or 2040. Shuttles would still generate tire, brake, and road dust, but there would not be any exhaust-related emissions.

Under the No Project Conditions, there would be a bus bridge[10] service between Ceres and Merced instead of the locomotive service. Thus, the No Project Conditions includes emissions associated with the electric bus trips between Ceres and Merced. Because electric buses would be utilized for this service, the vehicles would not generate any exhaust criteria pollutant emissions. Re-entrained road dust was calculated using the same methodology as described for construction trips (refer to discussion above of *On-Road Vehicles* under *Construction*). Because all trips would occur in the San Joaquin Valley, all road dust emissions were assigned to SJVAPCD. With buildout of the Proposed Project, the bus bridge would no longer be provided.

Displaced Vehicles Miles

Operation of the Proposed Project and the Atwater Station Alternative would expand passenger rail service between Ceres and Merced that would result in reductions in passenger vehicle usage. AECOM provided displaced VMT by year and scenario (Proposed Project in 2030, Atwater Station Alternative in 2030, etc.). The VMT was apportioned into 5-mph speed bins based on overall speed profiles from CARB's EMFAC2017 model. Criteria pollutant reductions achieved by displaced VMT were estimated using emission factors from EMFAC2017. Re-entrained road dust was calculated

[10] This would be an electric bus bridge.

using the same methodology as for construction trips (refer to discussion of *On-Road Vehicles* under *Construction*, above).

Emission reductions from displaced VMT were apportioned to the two air districts based on the expected distribution of miles, as analyzed in the programmatic analysis of the Ceres to Merced extension from the *ACE Extension Lathrop to Ceres/Merced EIR* (Prior EIR). In that analysis, emission reductions from displaced VMT between the Stockton and Ceres Stations were allocated to SJVAPCD, for example. Emissions reductions for VMT that span both SJVAPCD and BAAQMD were apportioned to each air district based on the roadway miles between each station.

The No Project Conditions would involve the use of a bus bridge between Ceres and Merced instead of train service. This bus bridge would result in VMT reductions (compared to the existing conditions without the bus bridge) because passengers would use the bus bridge and then ACE train service instead of driving. The passenger ridership quantities and VMT reductions associated with the bus bridge are considered to be part of the system-wide No Projection Conditions. The Proposed Project's displaced quantity of VMT is relative to No Project Conditions and, thus, represents the Proposed Project's incremental reduction in VMT relative to system-wide ACE operation, including operation of the bus bridge.

Net Operational Emissions

The impact analysis evaluates total operational emissions inclusive of the four emission components (*ACE Operations*, *Locomotive Idling*, *Expanded Shuttle Service*, and *Displaced Vehicles Miles*) discussed in this section. Expansion of ACE and connecting shuttle services, as well as operation of the three additional stations, are emissions sources that would result in an increase in daily criteria pollutants relative to existing conditions and No Project Conditions. Displaced VMT would result in a decrease in daily emissions relative to existing conditions and No Project Conditions. The difference between emissions generated by operation of the ACE locomotives and shuttles, and reductions achieved by displaced VMT represents the total net operational impact.

Health Risk Analysis

Construction

Construction of the Proposed Project would generate DPM from diesel-powered off-road equipment, locomotives, and haul trucks. Exposure to construction-related DPM was assessed by predicting the health risks in terms of excess cancer and non-cancer hazard impacts. USEPA's AERMOD dispersion model was used to predict DPM hourly concentrations at sensitive land uses based on the maximum daily PM10 exhaust emissions, with exhaust emissions of PM10 used as a surrogate for DPM based on SJVAPCD guidance. Project-level cancer risk and non-cancer hazard index (HI) were estimated based on annual concentrations from AERMOD using CARB's Hot Spots Analysis and Reporting Program Version 2 (HARP 2). HARP 2 incorporates OEHHA's recent guidance update, which includes age-specific factors to account for the increased sensitivity to carcinogens during early-in-life exposure.

Health risks from construction emissions were assessed for worst-case scenarios for the Proposed Project and the Atwater Station Alternative. The analysis evaluates health risks from construction of the stations under a worst-case scenario. The worst-case scenario was modeled at the Atwater Station Alternative because this station was determined to have the highest DPM emissions density per area and has sensitive receptors that are immediately adjacent to the station footprint. Health risks for Atwater Station construction were modeled based on the estimated construction duration of the station (12 months). Consequently, the station construction analysis represents the worst-case health risks associated with construction of any of the stations.

The new Ceres to Merced Extension Alignment was modeled as a line source because the environmental footprint is long and narrow. To evaluate a worst-case scenario, receptors were placed at the mid-point of a 2-kilometer segment representing the alignment construction, and the receptors were oriented perpendicular to the rail alignment on both sides of the rail line. The closest receptor was placed at 30 feet from the centerline of the railway, then at 50, 75, 100, 150, 200, 250, 300, 350, 400, 450, and 500 feet. Construction of the alignment for the representative two kilometer segment was assumed to occur for 12 months, which is a conservative assumption. It is likely that any given receptor would be exposed to construction emissions for less than 12 months, because construction will progress linearly along the alignment.

Operations

Proposed Project operations would increase DPM emissions along the extension alignment corridor from new ACE train service, and could also affect existing freight rail emissions. Health risks from DPM emissions from locomotive emissions (from ACE operation and idling and freight relocation) were modeled. Health risks from ACE operations were modeled for one condition, because there is not expected to be notable differences in ACE operations from Ceres to Merced between full operations in 2030 and the horizon year of 2040. The ACE locomotives are expected to have Tier 4 engines in both years. The health risk is determined primarily as a function of the operational emissions, local meteorology, and proximity to the rail line. The health risk analysis is based on the number of train trips because the intensity of the emissions is dependent on train trips. The analysis presented here is conservative because ACE locomotives may be even lower-emitting than Tier 4 in the future. Hybrid-electric equipment may be used, but this analysis assumes that locomotives, while Tier 4, will be fully diesel-powered and not hybrid-electric.

ACE Operations

Expanded passenger rail service would result in increased diesel fuel combustion and increased health risk from exposure to diesel exhaust from increased locomotive activity. Using the operating characteristics and locomotive fleet characteristics in Table 3.3-6, above, DPM emissions were determined for Proposed Project operations from the additional locomotive DPM emissions. Health risks were assessed based on a combination of Project engineering input and defaults, as described in the following list.

- **Air Dispersion Model**: USEPA's AERMOD (version 19191) model is a steady-state Gaussian dispersion model that determines air dispersion based on planetary boundary layer turbulence using similarity theory, and includes treatment for both surface and elevated releases. It is USEPA's preferred air dispersion model for near-field air quality impact assessment. The model was used to assess the DPM that occur as result of operational activities associated with the Proposed Project and the Atwater Station Alternative.
- **Track Layout:** To model the alignment, the general orientation of the rail line was determined based on reviewing engineering diagrams and Google Earth maps of the rail alignment. The alignment was represented by a 2-kilometer segment to characterize the spatial allocation of emissions over the rail line.

- **Meteorology:** For each segment, 5 years of representative meteorological data was acquired from the SJVAPCD for use in the air dispersion model. The meteorological data was provided by SJVAPCD. The Merced Airport meteorological dataset was used for each modeling analysis.
- **Exposure Assessment**: The exposure assessment was conducted using HARP 2. This software was originally developed to assist with the programmatic requirements of California's Air Toxics "Hot Spots" Program (Assembly Bill 2588) and has been extended for use in conducting health risk assessments (HRA) under CEQA. For this study, only the risk assessment standalone tool was used, which calculates cancer risk from the AERMOD modeled concentrations using the 2015 OEHHA HRA guidance.
- **Receptor Locations:** Receptors were placed at the mid-point of a 2-kilometer segment representing the alignment to minimize end effects, and the receptors were oriented perpendicular to the rail alignment on both sides of the rail line. The closest receptor was placed at 30 feet from the centerline of the railway, then at 50, 75, 100, 150, 200, 250, 300, 350, 400, 450, and 500 feet.
- **Source Characterization:** The 2-kilometer segment was divided into 15 area sources, each 133.4 meters long and 14 meters wide. The width was based on a doubletrack width of 8 meters (as measured based on the Proposed Project engineering drawings) plus 3 meters on either side to include turbulent wake mixing effects. Locomotive release height and initial vertical dispersion were conservatively modeled for a daytime period. The locomotive modeling approach and assumptions were first developed by CARB in their Roseville Railyard Study (California Air Resources Board 2004) and further developed in the *Air Dispersion Modeling Assessment of Air Toxic Emissions from the BNSF Richmond Railyard* (Richmond Railyard Study) (Environ 2006). The train was conservatively assumed to have maximum exposure when traveling at a slow speed (notch setting one) resulting in having a daytime release parameter for the plume height and initial vertical dimension of 5.87 and 1.37 meters, respectively. These calculations are based on a 4.52-meter stack height for the locomotive. Further source details are shown in Table 3.3-7.
- **Land-Use Characterization:** Most locations along the Proposed Project route where the vast majority of population exposure occurs have urban land uses. Thus, the urban dispersion modeling algorithm was used in the assessment. This algorithm accounts for the increased dispersion that occurs in nighttime conditions in urban areas due to the urban heat island effect. Population data is used in defining the strength of the urban heat island effect, and the population for Merced County was used in the modeling (California Employment Development Department n.d.).

Table 3.3-7. Modeled Area, Track Orientation, and Representative Meteorology

Modeled Area	Track Orientation (degrees)	Representative Meteorology
Ceres to Merced	110/290	Merced (2013–2017)

Additional locomotive idling will occur at the new stations. The largest increase in idle emissions will occur at the new Merced station where baseline emissions are currently zero and where trains will idle for up to 15 minutes during end-of-line start-up and shut-down. Thus, the station idling analysis focuses on the Merced Station, which has the greatest potential to expose receptors to health risks. Table 3.3-8 identifies the facility/station analyzed, number of daily train visits, distance to the nearest residential receptor, and the representative meteorological data used in the dispersion modeling. Health risks were based on a similar approach to the train operations, but with the following changes.

- **Receptor Locations:** Receptors were placed at the nearest potential receptor locations near the train station or layover facility.
- **Source Characterization:** During idle periods the trains behave as a point source of emissions. Thus, the locomotive emissions were modeled as a point source using the stack parameters for line-haul engines as used in Richmond Railyard Study (Environ 2006). The locomotive stack height was set at 4.52 meters, with a stack temperature of 389.1 Kelvin, exit velocity of 5.1 meters per second, and stack diameter of 0.55 meter.

Table 3.3-8. Number of New ACE Train Visits per Day, Distance to Nearest Resident, and Representative Meteorology for the Proposed Project

Name of New Station/Facility	Distance to Nearest Residential Receptor (meters) and Direction (degrees)	Maximum Train Visits Per Day	Representative Meteorology
Merced Station	7 meters, 20°	8	Merced (2013–2017)
Merced Layover & Maintenance Facility	50 meters, 90°	4	Merced (2013–2017)

Source: Compilation by ICF from project plans.

Freight Relocation

Because the Proposed Project would result in the construction of an additional track that may be used by freight trains, the existing distance between the train tracks and sensitive receptors could decrease with new track construction. It is expected that up to half of the existing freight rail traffic could use the new track, while the remaining half of freight traffic would use the existing track. Thus, the incremental change in DPM emissions between the No Project Conditions (freight rail on existing tracks) and the Proposed Project scenarios (half of freight on existing track, half on new track) was modeled to determine the Proposed Project's incremental contribution to health risks as a result of the freight relocation.

The freight relocation analysis was modeled using the same methods as the methods described above (i.e., a 2 kilometer segment, with receptors placed at the midpoint starting at 30 feet from the centerline). For the freight evaluation, a single track was modeled for the 2030 and 2040 No Project Conditions, with a track width of 3.1 meters and plus 3 meters on either side to include turbulent wake mixing effects. For the Proposed Project, a double track area with a width of 8 meters was modeled, with 3 meters on either side. Emissions from diesel-powered freight locomotives used were quantified using the USEPA's locomotive engine emission standards and fuel economy data from Union Pacific (U.S. Environmental Protection Agency 2009; Union Pacific 2019). Estimated freight train numbers were taken from the California State Rail Plan (California Department of Transportation 2018a).

Carbon Monoxide Hot Spot Analysis

Implementation of the Proposed Project and the Atwater Station Alternative would attract additional motor vehicles to existing and new ACE stations. Vehicles may also experience additional delay at railway crossings as a result of increased transit service. SJVAPCD has adopted screening criteria that provide a conservative indication of whether a project's-generated traffic would cause a potential CO hot spot. If an intersection exceeds level of service standards in a congestion management program (CMP), the added traffic associated with the project could exacerbate that exceedance.

To evaluate potential impacts, a microscale CO hot-spot analysis at the intersection of West 16th Street and R Street in Merced in the SJVAPCD was conducted to verify that Project traffic would not cause or contribute to a violation of the CO CAAQS. Although a project-specific traffic study did not identify intersection traffic volumes, existing intersection data was obtained to develop a worst-case scenario. Out of the proposed stations and the Atwater Station Alternative, parking demand and thus vehicle volumes at the Merced Station would be the largest. Thus, the potential intersections to study for CO impacts were narrowed to those in Merced, particularly those near the proposed station in downtown Merced. To obtain existing traffic data for intersections in Merced, the City's 2030 General Plan EIR was reviewed (City of Merced 2010). Existing peak hour counts for over 40 intersections are included in the transportation appendices of the Draft General Plan EIR. The intersection with the highest traffic volumes and near the Merced Station is the intersection of 16th Street and R Street. Traffic volumes at this intersection, from 2008, were used and scaled to the Proposed Project's operational years of 2030 and 2040 using CARB's EMFAC database.

To calculate the approximate change in vehicle volumes between 2008 and 2030/2040, vehicle population data in each of these years were obtained from EMFAC, and the percentage change values between 2008 and 2030/2040 were calculated. Between 2008 and 2030, the vehicle population in Merced County is anticipated to increase by 32 percent, while the increase between 2008 and 2040 is anticipated to be 55 percent (California Air Resources Board 2020c). These percentage values were then applied to the 2008 intersection data from the Merced General Plan EIR to approximate the vehicle volumes in 2030 and 2040 at 16th Street and R Street in downtown Merced.

Finally, to account for the Project-specific volumes that the new Merced Station would add, the daily parking demand at Merced station was added to the intersection volumes at 16th Street and R Street (AECOM 2020c).

With the traffic volumes at the worst-case intersection determined, the potential for CO hot spots was then evaluated using the California Department of Transportation (Caltrans) Institute of Transportation Studies *Transportation Project-Level Carbon Monoxide Protocol* (CO Protocol) (Garza et al. 1997). The CO Protocol details a step-by-step procedure to determine whether project-related CO concentrations have the potential to generate new air quality violations, worsen existing violations, or delay attainment of CAAQS or NAAQS for CO. This section provides details of the modeling.

Vehicle emission rates were determined using the EMFAC emission rate program. Free flow traffic speeds were adjusted to a speed of 5.0 mph for vehicles entering and exiting intersection segments to represent a worst-case scenario because 5.0 mph is the lowest speed EMFAC allows. EMFAC modeling procedures followed the guidelines recommended by Caltrans (Garza et al. 1997). The program assumed Merced County regional traffic data, averaged for each subarea, operating during the winter months.

CO concentrations were estimated at four receptor locations at the modelled intersection. The receptors were placed at the edge of the mixing zone from the corner of the modelled intersection, accounting for the intersection dimensions as determined by the number of lanes in each direction. The mixing zone is defined by a 3-meter buffer from the outer edge of a roadway. Receptors were modeled at the edge of the mixing zone to represent a worst-case scenario as the nearest location in which a receptor could potentially be located adjacent to a travelled roadway. The modeled receptors are not representative of the actual sensitive receptors and represent receptors located at the nearest possible location at the intersection of the modeled mixing zones.[11] Receptors were chosen based on the CO Protocol (Garza et al. 1997). Receptor heights were set at 5.9 feet.

Meteorological inputs to the CALINE4 model were determined using methodology recommended in Appendix B of the CO Protocol (Garza et al. 1997). The meteorological conditions used in the modeling represent a calm winter period. Worst-case wind angles were modeled to determine a worst-case concentration for each receptor. The meteorological inputs included: 0.5 meters per second wind speed, ground-level temperature inversion (atmospheric stability class G), wind direction standard deviation equal to 15 degrees, and a mixing height of 1,000 meters.

Background concentration data for 1- and 8-hour CO values were obtained from USEPA and added to the project-level values to account for sources of CO not included in the modeling (Table 3.3-3). Eight-hour modeled values were calculated from the 1-hour values using a persistence factor of 0.7. Background concentrations for the first full year of operations (2030) and the horizon (2040) year conditions were assumed to be the same as those for the current year. Actual 1- and 8-hour background concentrations in future years would likely be lower than those used in the CO modeling analysis, because the trend in CO emissions and concentrations is decreasing as a result of continuing improvements in engine technology and the retirement of older, higher-emitting vehicles. Appendix J, *Air Quality, Greenhouse Gas, and Health Risk Assessment Supporting Documentation,* presents CALINE4 model output files.

3.3.4.2 Thresholds of Significance

CEQA Guidelines Appendix G (14 California Code of Regulations 15000 et seq.) has identified significance criteria to be considered for determining whether a project could have significant impacts on air quality.

An impact would be considered significant is construction or operation of the Proposed Project and the Atwater Station Alternative would have any of the following consequences.

- Conflict with or obstruct implementation of the applicable air quality plan.
    - For this analysis, "conflict with or obstruct implementation" is defined as circumstances in which the project would worsen existing air quality violations or exceed the growth assumptions utilized by MTC, SJCOG, or the StanCOG.

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[11] The *mixing zone* represents the region directly over the highway as a zone of uniform emissions and turbulence. This area is the region over the traveled way (traffic lanes, not including shoulders) plus 3 meters on either side. The additional 3-meter width accounts for the initial horizontal dispersion of pollutants by the vehicle wake. Within the mixing zone, the mechanical turbulence created by moving vehicles and the thermal turbulence created by hot vehicle exhaust are assumed to be the dominant dispersive mechanisms (Benson 1989).

- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is designated a nonattainment area under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors).
    - For this analysis, a "cumulatively considerable net increase" is defined as circumstances in which construction or operational emissions exceed the pertinent air quality thresholds of significance, as described below under *Supplemental Thresholds* and shown in Table 3.3-9.
- Expose sensitive receptors to substantial pollutant concentrations.
    - For this analysis, schools, day care facilities, medical facilities, parks, and residences are considered sensitive receptor locations. A "substantial pollutant concentration" is defined as levels in excess of the applicable air district thresholds described under *Supplemental Thresholds*.
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.
    - For this analysis, construction of an odor-producing facility, as defined by the study area air quality management districts, would result in an "objectionable odor" capable of affecting a substantial number of people. Odor-producing facilities include landfills, wastewater treatment plants, food processing facilities, and certain agricultural activities.

The CEQA Guidelines Section 15125 indicate that existing conditions at the time a notice of preparation is released or when environmental review begins "normally" constitute the baseline for environmental analysis. In 2010, the California Supreme Court issued an opinion that while lead agencies have some flexibility in determining what constitutes the baseline, relying on "hypothetical allowable conditions" when those conditions are not a realistic description of the conditions without the Proposed Project, would be an illusory basis for a finding of no significant impact from the Proposed Project and, therefore, a violation of CEQA (*Communities for a Better Environment v. South Coast Air Quality Management District* (2010) 48 Cal. 4th 310).

On August 5, 2013, the California Supreme Court decided *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (57 Cal. 4th 439). This latest decision has clarified that, under certain circumstances, a baseline may reflect future, rather than existing, conditions. The rule specifies that factual circumstances can justify an agency using a future baseline in the following circumstances when such reasons are supported by substantial evidence:

- When necessary to prevent misinforming or misleading the public and decision makers.
- When the use of future conditions in place of existing conditions is justified by unusual aspects of the project or surrounding conditions.

With respect to the Proposed Project and the Atwater Station Alternative, using existing conditions to evaluate criteria pollutant impacts would misrepresent and mislead the public and decision makers with respect to potential air quality impacts, for the following reasons: (1) changes in on-road emission factors, and (2) net Proposed Project VMT reductions.

1. On-road vehicle emissions rates are anticipated to lessen in the future due to continuing engine advancements and more stringent air quality regulations. Applying the complete ridership increase under existing conditions (2019) and quantifying emissions utilizing 2019 vehicle

emissions rates would not only represent a fictitious scenario but would also overestimate emissions reductions and potential air quality benefits achieved by the Proposed Project.

2. Using the relatively higher "existing conditions" emissions factors to quantify emissions reduction benefits assorted with Project-related VMT reductions in the years 2030 and 2040 would overstate the Proposed Project's emissions reduction benefits.

These facts represent substantial evidence in support of using a future conditions analysis, rather than existing conditions, to evaluate air quality impacts. Accordingly, for this analysis, the CEQA assessment evaluates the Proposed Project and the Atwater Station Alternative emissions under the full operations (2030) and horizon (2040) year conditions, compared to the future No Project Conditions. This approach reflects appropriate vehicle fleet characteristics and emission factors. Using future year conditions as the basis for the CEQA analysis avoids misinforming and misleading the public and decision makers with respect to air quality impacts, consistent with current CEQA case law.

For the purposes of full disclosure, the comparison of the Proposed Project's operational emissions is presented relative to both existing and No Project Conditions; however, significance determinations are only made with respect to No Project Conditions based on the rationale explained above.

Supplemental Thresholds

The following section summarizes relevant thresholds and presents substantial evidence regarding the basis upon which they were developed. This section also describes how the thresholds are used to determine whether construction and operation of the Proposed Project and the Atwater Station Alternative would result in a significant impact within the context of (1) interfering with or impeding attainment of CAAQS or NAAQS, or (2) causing or contributing to increased risk to human health.

Regional Thresholds for Air Basin Attainment of State and Federal Ambient Air Quality Standards

BAAQMD and SJVAPCD have established different thresholds for criteria pollutants. The criteria pollutant thresholds identified in Table 3.3-9 were adopted by BAAQMD and SJVAPCD to assist lead agencies in determining the significance of environmental effects with regard to local attainment of state and federal ambient air quality standards.

BAAQMD and SJVAPCD's ROG, NOx, and PM thresholds are based on emissions levels identified under the New Source Review (NSR) program. The NSR program is a permitting program that was established by Congress as part of the CAA Amendments to ensure that air quality is not significantly degraded by new sources of emissions. The NSR program requires stationary sources receive permits before starting construction or use of the equipment. By permitting large stationary sources, the NSR program ensures that new emissions would not slow regional progress toward attaining NAAQS. BAAQMD and SJVPACD have concluded that pollutants generated by land use and other projects not subject to the NSR (like this Project) are equally significant to the stationary pollutants described under the NSR program. BAAQMD's and SJVAPCD's thresholds identified in Table 3.3-9 were set as the total emission thresholds associated within the NSR program to help attain NAAQS (Bay Area Air Quality Management District 2017a; San Joaquin Valley Air Pollution Control District 2015).

Accordingly, emissions in excess of BAAQMD or SJVAPCD thresholds (Table 3.3-9) would be expected to have a significant impact on air quality because an exceedance of the thresholds is anticipated to contribute to CAAQS and NAAQS violations. Further, by its very nature, regional air pollution is a cumulative impact. Emissions from past, present, and future projects contribute to unfavorable air quality on a cumulative basis. No single project by itself would be sufficient in size to result in regional nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulative negative air quality impacts. Both BAAQMD and SJVAPCD have identified project-level mass emission thresholds to evaluate impacts on air quality. The thresholds have been adopted to prevent further deterioration of ambient air quality, which is influenced by emissions generated by projects within a specific air basin. The project-level thresholds, therefore, consider relevant past, present, and reasonably foreseeable future projects within SFBAAB and SJVAB. For example, as noted in BAAQMD's CEQA Guidelines,

> In developing thresholds of significance for air pollutants, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions. Therefore, additional analysis to assess cumulative impacts is unnecessary (Bay Area Air Quality Management District 2017a).

And in SJVAPCD's GAMAQI,

> If project specific emissions exceed the thresholds of significance for criteria pollutants the project would be expected to result in a cumulatively considerable net increase of any criteria pollutant for which [SJVAPCD] is in non-attainment under applicable federal or state ambient air quality standards (San Joaquin Valley Air Pollution Control District 2015).

The mass emissions thresholds in Table 3.3-9, therefore, represent the maximum emissions a project may generate before contributing to a cumulative impact on regional air quality.

Table 3.3-9. Bay Area Air Quality Management District and San Joaquin Valley Air Pollution Control District Mass Emission Thresholds

Analysis	BAAQMD	SJVAPCD
Construction	Not Applicable [a]	ROG: 10 tons/year or 100 lbs/day[b] NO_X: 10 tons/year or 100 lbs/day[b] PM10: 15 tons/year or 100 lbs/day[b] PM2.5: 15 tons/year or 100 lbs/day[b] CO: 100 tons/year or 100 lbs/day[b] SO_X: 27 tons/year or 100 lbs/day[b]
Operations	ROG: 54 lbs/day or 10 tons/year NO_X: 54 lbs/day or 10 tons/year PM10: 82 lbs/day or 15 tons/year PM2.5: 54 lbs/day or 10 tons/year	Same as construction

Sources: Bay Area Air Quality Management District 2017a; San Joaquin Valley Air Pollution Control District 2015.

ROG = reactive organic gases.
lbs = pounds.
NO_X = nitrogen oxide.
PM10 = particulate matter that is 10 microns in diameter and smaller.
PM2.5 = particulate matter that is 2.5 microns in diameter and smaller.
CO = carbon monoxide.

SO_X	=	sulfur oxide.
CAAQS	=	California ambient air quality standards.
NAAQS	=	national ambient air quality standards.

[a] Thresholds not applicable to the Proposed Project because there would be no construction in BAAQMD.

[b] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a proposed project will cause or contribute to a violation of CAAQS or NAAQS. Projects with emissions below the threshold will not be in violation of CAAQS or NAAQS. Projects with emissions above the threshold would require an Ambient Air Quality Analysis to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015).

Health-Based Thresholds for Project-Generated Pollutants of Human Health Concern

In December 2018, the California Supreme Court issued its decision in *Sierra Club v. County of Fresno* (226 Cal.App.4th 704) (hereafter referred to as the "Friant Ranch" decision). The case reviewed the long-term, regional air quality analysis contained in the EIR for the proposed Friant Ranch development. The Friant Ranch project is a 942-acre master-plan development in unincorporated Fresno County within the San Joaquin Valley Air Basin, an air basin currently in nonattainment for the ozone and PM2.5 NAAQS and CAAQS. The Court found that the air quality analysis was inadequate because it failed to provide enough detail "for the public to translate the bare [criteria pollutant emissions] numbers provided into adverse health impacts or to understand why such a translation is not possible at this time." The Court's decision clarifies that environmental documents must connect a project's air quality impacts to specific health effects or explain why it is not technically feasible to perform such an analysis.

As discussed in Section 3.3.3.2, *Pollutants of Concern*, all criteria pollutants that would be generated by the Proposed Project and the Atwater Station Alternative are associated with some form of health risk (e.g., asthma). Criteria pollutants can be classified as either regional or localized pollutants. Regional pollutants can be transported over long distances and affect ambient air quality far from the emissions source. Localized pollutants affect ambient air quality near the emissions source. Ozone is considered a regional criteria pollutant, whereas CO, NO2, SO2, and Pb are localized pollutants. PM can be both a local and a regional pollutant, depending on its composition. As discussed above, the primary criteria pollutants of concern generated by the project are ozone precursors (ROG and NOX), CO, and PM (including DPM).

Because localized pollutants generated by a project can directly affect adjacent sensitive receptors, the analysis of project-related impacts on human health focuses on those localized pollutants with the greatest potential to result in a significant, material impact on human health. Potential health effects associated with project-generated ozone precursors are only discussed within the regional and cumulative context. This approach is consistent with the current state of practice and published guidance by BAAQMD, SJVAPCD, California Air Pollution Control Officers Association, OEHHA, and CARB (Bay Area Air Quality Management District 2017a; San Joaquin Valley Air Pollution Control District 2015; California Air Pollution Control Officers Association 2009; Office of Environmental Health Hazard Assessment 2015; California Air Resources Board 2000). The local pollutants of concern are (1) localized CO, (2) DPM, (3) localized PM, (4) asbestos, and (5) *C. immitis* (Valley Fever). Adopted thresholds of significance for each local pollutant are identified in the following subsections.

Localized Carbon Monoxide Concentrations

BAAQMD and SJVAPCD consider localized CO emissions to result in significant impacts if concentrations exceed CAAQS (Table 3.3-1).

Diesel Particulate Matter and Localized Particulate Matter

BAAQMD and SJVAPCD have adopted separate thresholds to evaluate receptor exposure to DPM emissions. The substantial DPM threshold defined by BAAQMD is the probability of contracting cancer for the maximum exposed individual (MEI) exceeding 10 in 1 million, or the ground-level concentrations of non-carcinogenic TACs resulting in an HI greater than 1 for the MEI. SJVAPCD's HI is also greater than 1 for the MEI, but its cancer risk threshold is 20 in 1 million.

BAAQMD has adopted an incremental concentration-based significance threshold to evaluate receptor exposure to localized PM2.5, where a substantial contribution is defined as PM2.5 exhaust (diesel and gasoline) concentrations exceeding 0.3 μg/m^3. SJVAPCD also requires dust control measures to reduce fugitive PM2.5 and PM10 during construction activities.

BAAQMD's cumulative cancer risk threshold is 100 cases per million and its non-cancer thresholds are an HI greater than 10.0 and a PM2.5 concentration greater than 0.8 μg/m^3. SJVAPCD has not adopted separate cumulative health risk thresholds.

Table 3.3-10 summarizes the cancer and non-cancer health risk thresholds used in the analysis.

Table 3.3-10. Bay Area Air Quality Management District and San Joaquin Valley Air Pollution Control District Cancer and Non-Cancer Health Risk Thresholds

Air District	Cancer Risk	Hazard Index	PM2.5 Concentration (μg/m^3)
BAAQMD	10 per million (project) 100 per million (cumulative)	1.0 (project) 10.0 (cumulative)	0.3 (project) 0.8 (cumulative)
SJVAPCD	20 per million (project and cumulative)	1.0 (project and cumulative)	-

Sources: Bay Area Air Quality Management District 2017a; San Joaquin Valley Air Pollution Control District 2015.
DPM = diesel particulate matter.
PM2.5 = particulate matter that is 2.5 microns in diameter and smaller.
μg/m^3 = micrograms per cubic meter.
\- = no threshold.
BAAQMD = Bay Area Air Quality Management District.
SJVACPD = San Joaquin Valley Air Pollution Control District.

Asbestos

There are no quantitative thresholds related to receptor exposure to asbestos. However, SJVAPCD requires the demolition or renovation of asbestos containing building materials to comply with the limitations of the National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations as listed in the Code of Federal Regulations where all construction activities will occur.

Valley Fever

There are no quantitative thresholds related to receptor exposure to *C. immitis.* The potential for the Proposed Project and the Atwater Stational Alternative to expose receptors to Valley Fever is highest in areas known to contain *C. immitis* and during earthmoving activities that generate fugitive dust. Accordingly, uncontrolled construction dust emissions in endemic regions of *C. immitis* could result in increased health impacts from exposure of receptors to *C. immitis* spores.

3.3.4.3 Impacts and Mitigation Measures

Impact AQ-1	Construction of the Proposed Project could conflict with or obstruct implementation of the applicable air quality plan. Operation of the Proposed Project would not conflict with or obstruct implementation of the applicable air quality plan.
Level of Impact	**Potentially significant impact**
Mitigation Measures	AQ-2.1: Implement advanced emissions controls for off-road equipment
Level of Impact after Mitigation	**Less than significant impact**

Impact Characterization

A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds estimates used to develop applicable air quality plans. Projects that propose development consistent with the growth anticipated by the relevant land use plans would be consistent with the current BAAQMD or SJVAPCD air quality plans. Likewise, projects that propose development less dense than anticipated within a general plan (or other governing land use document) would be consistent with the air quality plans because emissions would be less than estimated for the region. If a project proposes development that is greater than the anticipated growth projections, the project would be in conflict with BAAQMD or SJVAPCD air quality plans and might have a potentially significant impact on air quality because emissions would exceed those estimated for the region. This situation would warrant further analysis to determine if a project and surrounding projects would exceed the growth projections used in BAAQMD or SJVAPCD air quality plans for a specific subregional area.

Proposed Project

As discussed in Section 3.11, *Land Use and Planning*, the Proposed Project would not result in significant environmental impacts with respect to consistency with local general plans and policies. Likewise, as noted in Section 3.13, *Population and Housing,* the Proposed Project would not result in substantial or unplanned population or housing growth. The growth that would occur as a result of the Proposed Project, as noted in Section 3.13, would be supportive of local development plans. The Proposed Project would increase service and ridership on the ACE system; however, this increased service would not materially increase the overall growth pressure in the communities served by ACE, because the stations are located in urbanized and developed areas. The Proposed Project would not provide new access to undeveloped areas. Accordingly, the Proposed Project would not induce growth and would be consistent with recent growth projections for the region.

The Proposed Project is listed and/or mentioned in MTC's *San Francisco Bay Area Regional Rail Plan*, the California High-Speed Rail Authority's *Draft 2020 Business Plan*, and *2018 CA State Rail Plan* (Metropolitan Transportation Commission 2007; California High-Speed Rail Authority 2020; California Department of Transportation 2018b). The Proposed Project is also discussed in the RTP/SCS documents adopted by StanCOG, MCAG, and SJCOG (Stanislaus Council of Governments 2018; Merced Council of Governments 2018; San Joaquin Council of Governments 2018).[12] The

[12] Although no components of the Proposed Project are located in San Joaquin County, the ACE system serves San Joaquin County and thus the benefits from implementing the Proposed Project would also affect this county. The

Proposed Project would expand alternative transportation, alleviate traffic congestion, and reduce VMT throughout Northern California. In addition, the Proposed Project would support transit oriented development, which would also help in the reduction of VMT.

Additionally, the Proposed Project would result in a number of benefits, including reduced VMT and traffic congestion that are consistent with the objectives and policies of BAAQMD's and SJVAPCD's air quality plans. The ultimate goal of the air quality plans, however, is to reduce criteria pollutants for which SFBAAB and SJVAB are currently considered nonattainment in order to achieve NAAQS and CAAQS by the earliest practicable date. Both SJVAPCD and BAAQMD have established project-level thresholds to identify projects that may contribute to violations of the ambient air quality standards (Table 3.3-9). Accordingly, projects that result in construction or operational emissions in excess of district mass emission thresholds would conflict with the primary goal of the air quality plans, which is to achieve the regional attainment of NAAQS and CAAQS.

Operation of the Proposed Project would exceed neither BAAQMD's nor SJVAPCD's recommended analysis thresholds. However, construction emissions would exceed SJVAPCD's annual NO_X threshold. SJVAPCD's thresholds were established to help prevent emissions from new projects in the SJVAB from contributing to regional violations of the ambient air quality standards. Because NO_X emissions exceed SJVAPCD's threshold, construction of the Proposed Project may conflict with the *8-hour SJVAPCD 2007 Ozone Plan* and the *2004 Extreme Ozone 1-hour Attainment Demonstration Plan*. This is a potentially significant impact.

Atwater Station Alternative

Like the Proposed Project, the Atwater Station Alternative would not result in significant environmental impacts with respect to consistency with local general plans and policies, would not result in substantial or unplanned population or housing growth, and would not provide new access to undeveloped areas. The Atwater Station Alternative, like the Proposed Project, would also be supportive of local development plans and increase ridership but not materially increase the overall growth pressure in the communities served by ACE. Compared to the proposed Livingston Station, the Atwater Station Alternative would result in slightly higher ridership. Accordingly, the Atwater Station Alternative would not induce growth and would be consistent with recent growth projections for the region. As noted above, the Proposed Project is listed and/or mentioned in the relevant regional rail plans and RTP/SCS documents. Operations of the Atwater Station Alternative would not exceed any air district thresholds; however, construction emissions would exceed SJVAPCD's annual NO_X threshold, and this is a potentially significant impact.

Nonetheless, there would be no difference in impact between the Atwater Station Alternative and the proposed Livingston Station (both would result in a potentially significant impact that would be reduced to a less-than-significant level with mitigation).

Mitigation Measures

Mitigation Measure AQ-2.1 would apply to the Proposed Project and Atwater Station Alternative for potential impacts on air quality. Descriptions of this measure is provided in Impact AQ-2a.

Proposed Project would also support the applicable sustainable communities strategy (SCS), San Joaquin Council of Government's *Regional Transportation Plan* (RTP)/SCS.

Mitigation Measure AQ-2.1: Implement advanced emissions controls for off-road equipment.

Refer to measure description in Impact AQ-2a.

Significance with Application of Mitigation

Mitigation Measure AQ-2.1 (discussed under Impact AQ-2a) would reduce construction-related NO_X emissions from the Proposed Project below SJVAPCD's annual threshold. Accordingly, construction of the Proposed Project would not conflict with applicable air quality plans with implementation of mitigation, and the impact would be less than significant.

For the same reasons as the Proposed Project, implementation of Mitigation Measure AQ-2.1 would ensure that the Atwater Station Alternative would not conflict with applicable air quality plans, and the impact would be less than significant.

Impact AQ-2a	Construction of the Proposed Project could result in a cumulatively considerable net increase of a criteria pollutant for which the Project region is designated a nonattainment area under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors).
Level of Impact	**Potentially significant impact**
Mitigation Measures	AQ-2.1: Implement advanced emissions controls for off-road equipment AQ-2.2: Implement advanced emissions controls for locomotives used for construction
Level of Impact after Mitigation	**Less than significant impact**

Impact Characterization

Proposed Project

Construction of the Proposed Project has the potential to create air quality impacts through the use of heavy-duty construction equipment, worker vehicle trips, truck hauling trips, and locomotive trips. In addition, fugitive emissions would result from site grading and asphalt paving. Criteria pollutant emissions generated by these sources were quantified using emission factors from CalEEMod, EMFAC2014, AP-42, and other sources, as described in Section 3.3.4.1, *Methods for Analysis*.

The total amount, duration, and intensity of construction activity could have a substantial effect on the amount of construction emissions, their concentrations, and the resulting impacts occurring at any one time. Consequently, the emission forecasts provided in this analysis reflect a specific set of conservative assumptions based on the expected construction scenario wherein a relatively large amount of construction takes place in a relatively intensive and overlapped schedule. Because of this conservative assumption, actual emissions could be less than those forecasted. If construction is delayed or occurs over a longer period, emissions could be reduced because of (1) a more modern and cleaner-burning construction equipment fleet mix, and/or (2) a less intensive and overlapping buildout schedule (i.e., fewer daily emissions occurring over a longer period).

Table 3.3-11 summarizes estimated unmitigated construction-related emissions in SJVAPCD in pounds per day and tons per year. While emissions are summarized in different units (pounds and tons), the amounts of emissions are identical (i.e., 2,000 pounds is identical to 1 ton). Summarizing emissions in both pounds per day and tons per year is necessary to evaluate effects against the appropriate air district thresholds, which are given in both pounds and tons. As discussed in Section 3.3.4.2, *Thresholds of Significance*, SJVAPCD has identified project-level mass emission thresholds to evaluate impacts on air quality that are inclusive of past, present, and future projects. The mass emissions thresholds, therefore, represent the maximum emissions the Proposed Project may generate before contributing to a cumulative impact on regional air quality.

Table 3.3-11. Estimated Unmitigated Construction Criteria Pollutant Emissions from Proposed Project Construction and Atwater Station Alternative Construction in the San Joaquin Valley Air Pollution Control District

	Average Pounds per Day						Tons per year					
Construction Year	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**SO_2**	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**SO_2**
Proposed Project												
2023	5	56	30	16	8	< 1	1	7	4	2	1	< 1
2024	10	104	55	18	10	< 1	1	12	6	2	2	< 1
Threshold[a]	100	100	100	100	100	100	10	10	100	15	15	27
Atwater Station Alternative												
2023	5	56	30	16	8	< 1	1	7	4	2	1	< 1
2024	10	104	55	18	10	< 1	1	12	6	2	2	< 1
Threshold[a]	100	100	100	100	100	100	10	10	100	15	15	27

Exceedances of air district thresholds are shown in underline.

[a] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a proposed project will cause or contribute to a violation of California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS). Projects with emissions below the threshold will not be in violation of CAAQS or NAAQS. Projects with emissions above the threshold would require an ambient air quality analysis to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015).

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

As shown in Table 3.3-11, unmitigated construction emissions would exceed SJVAPCD's annual NO_X threshold, as shown above in Table 3.3-11, by 4 pounds per day (and 2 tons per year). No other pollutant emissions would exceed the SJVAPCD thresholds. Due to the exceedance of NOx shown in Table 3.3-11 above, emissions may contribute to a cumulatively considerable net increase of a criteria pollutant within SJVAB for which the region is designated a nonattainment area. This is a potentially significant impact.

Atwater Station Alternative

Like the Proposed Project, construction of the Atwater Station Alternative also has the potential to create air pollutant impacts through the use of heavy-duty construction equipment, construction worker vehicle trips, truck hauling trips, and locomotive trips. Table 3.3-11 summarizes unmitigated estimated construction-related criteria pollutant emissions in the SJVAPCD for the Atwater Station Alternative. Because of the identical methodologies, the Atwater Station Alternative would result in the same amount of emissions as the Proposed Project. The same conclusions would apply to the Atwater Station Alternative because the construction NOx emissions would exceed the SJVAPCD's threshold by the same amount as the Proposed Project. Construction of the Atwater Station Alternative would result in a potentially significant impact.

There would be no difference in impact between the Atwater Station Alternative and the proposed Livingston Station (both would result in a potentially significant impact that would be reduced to a less-than-significant level with mitigation).

Mitigation Measures

Mitigation Measures AQ-2.1 and AQ-2.2 would apply to the construction of the Proposed Project and the Atwater Station Alternative for potential impacts on air quality in the SJVAPCD.

Mitigation Measure AQ-2.1: Implement advanced emissions controls for off-road equipment

SJRRC will require all off-road equipment greater than 25 horsepower and operating for more than 20 total hours over the entire duration of construction activities have engines that meet or exceed either USEPA or CARB Tier 4 final off-road emission standards.

Mitigation Measure AQ-2.2: Implement advanced emissions controls for locomotives used for construction

SJRRC will require all diesel-powered locomotives used for construction to have engines that meet or exceed either USEPA or CARB Tier 4 locomotive emission standards.

Significance with Application of Mitigation

Mitigation is required to reduce NO_X emissions. Mitigation Measure AQ-2.1 reduces emissions from off-road equipment and requires engines greater than 25 horsepower to meet Tier 4 emission standards. Mitigation Measure AQ-2.2 is not required to mitigate this impact, but the emissions analysis in this impact includes this measure, which is required for a subsequent impact (see Impact AQ-3b). The modeling also accounts for compliance with SJVAPCD Regulation VIII, which is required to control fugitive dust emissions. Table 3.13-12 shows the mitigated emissions in the SJVAPCD with the implementation of Mitigation Measures AQ-2.1 and AQ-2.2.

Additionally, as shown in Table 3.3-12, mitigated emissions of NOx would exceed 2 tons per year, which means that the Proposed Project is subject to SJVAPCD Rule 9510. Although total PM10 emissions would exceed two tons per year, the amount of PM10 from exhaust would be less than two tons per year.

Per Rule 9510, emissions from construction equipment greater than 50 horsepower must be reduced by at least 20 percent relative to the statewide average for NOx. Relative to the unmitigated emissions shown in Table 3.3-11, the mitigated NOx emissions in Table 3.3-12 are reduced by more than 80 percent. The unmitigated emissions represent the fleet average equipment in the years of construction, so the use of Tier 4 equipment per Mitigation Measures AQ-2.1 and AQ-2.2 would result in a reduction greater than the 20 percent required for Rule 9510. Although PM10 exhaust emissions are less than two tons per year, PM10 exhaust emissions would also be reduced more than the required amount (45 percent) relative the fleet average equipment.

As shown in Tables 3.3-11 and 3.3-12, with mitigation, NOx emissions from the Proposed Project and Atwater Station Alternative would be reduced. The reduction in NOx emissions is greater than 80 percent, which satisfies the 20 percent mitigation requirement of Rule 9510.

Table 3.3-12. Estimated Mitigated Construction Criteria Pollutant Emissions from Proposed Project Construction and Atwater Station Alternative Construction in the San Joaquin Valley Air Pollution Control District

Construction Year	Average Pounds per Day						Tons per year					
	ROG	NO_X	CO	PM10	PM2.5	SO_2	ROG	NO_X	CO	PM10	PM2.5	SO_2
Proposed Project												
2023	1	11	29	14	7	< 1	< 1	1	4	2	1	< 1
2024	2	19	52	15	7	< 1	< 1	2	6	2	1	< 1
Threshold[a]	100	100	100	100	100	100	10	10	100	15	15	27
Atwater Station Alternative												
2023	1	11	29	14	7	< 1	< 1	1	4	2	1	< 1
2024	2	19	52	15	7	< 1	< 1	2	6	2	1	< 1
Threshold[a]	100	100	100	100	100	100	10	10	100	15	15	27

Exceedances of air district thresholds are shown in underline. Emissions include implementation of Mitigation Measures AQ-2.1 and AQ-2.2 compliance with San Joaquin Valley Air Pollution Control District Regulation VIII.

[a] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a proposed project will cause or contribute to a violation of California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS). Projects with emissions below the threshold will not be in violation of CAAQS or NAAQS. Projects with emissions above the threshold would require an ambient air quality analysis to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015).

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

As shown in Table 3.3-12, Mitigation Measures AQ-2.1 and AQ-2.2 would reduce construction-related NOx emissions in SJVAPCD below the applicable significance threshold. Thus, mitigation would reduce NO_X emissions to below the annual significance threshold, which is based on the NSR program and attainment of the NAAQS, and consider relevant past, present, and reasonably foreseeable future projects within the air basin. Because Proposed Project-generated NO_X emissions are below the relevant threshold with mitigation, the Proposed Project would not incrementally contribute to a significant ozone or associated human heath impact. This impact from construction of the Proposed Project would be less than significant with mitigation.

For the same reasons as the Proposed Project, implementation of Measures AQ-2.1 and AQ-2.2 would reduce construction-related NOx emissions due to the Atwater Station Alternative in SJVAPCD below the applicable significance threshold, and the impact would be less than significant with mitigation.

The Atwater Station Alternative would also be subject to SJVAPCD Rule 9510 for the same reason as the Proposed Project. Mitigated NOx emissions would be greater than two tons per year and a 20 percent reduction is required, but Mitigation Measures AQ-2.1 and AQ-2.2 would satisfy the reduction requirement.

Impact AQ-2b	Operations of the Proposed Project would not result in a cumulatively considerable net increase of a criteria pollutant for which the Project region is designated a nonattainment area under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors).
Level of Impact	**Less than significant impact (beneficial)** BAAQMD: all pollutants SJVAPCD: CO, PM2.5, PM10, and SOx **Less than significant impact** SJVAPCD: ROG and NOx

Impact Characterization

Proposed Project

Proposed Project operations have the potential to create air quality impacts through extended ACE rail service and increased shuttle activity. However, Proposed Project operations would also improve existing passenger rail opportunities, which would reduce single-occupancy VMT in the transportation network. Criteria pollutant emissions and reductions generated by these sources were quantified for existing (2019), full operations (2030), and horizon year (2040) conditions to capture changes in regional emission as a result of the Proposed Project.

Tables 3.3-13 and 3.3-14 summarize operations emissions in BAAQMD and SJVAPCD, respectively. The estimates reflect the difference between emissions generated by operation of the ACE locomotives and shuttles and reductions achieved by displaced VMT, where negative values represent a net reduction in emissions under the operating scenario. Refer to Appendix J, *Air Quality, Greenhouse Gas, and Health Risk Assessment Supporting Documentation,* for a detailed summary of emissions and reductions by source (e.g., ACE operations). The table also compares emissions to existing and No Project Conditions for informational purposes. The difference in operations emissions between the Proposed Project and the existing ACE service represents the change in emissions over existing conditions with the Proposed Project, but this comparison is not used to make significance determinations, based on the reasoning described in Section 3.3.4.2, *Thresholds of Significance*. The comparison to the No Project Conditions represents the net impact of Proposed Project operation, and this is the comparison that is used to determine impact significance. As noted in Section 3.3.4.1, *Methods for Analysis,* the No Project Conditions would result in reductions of VMT from the use of the bus bridge. Emissions reductions from those VMT reductions are not included in the No Project Conditions row in Tables 3.3-13 and 3.3-14 because the Proposed Project's emissions are relative to the entire ACE system, including the bus bridge. In other words, for VMT accounting purposes the No Project Conditions are assumed to be zero. Thus, emissions from the No Project Conditions shown in Tables 3.3-13 and 3.3-14 only include direct emissions that are not accounted for elsewhere (i.e. road dust from the electric bus bridge service, emissions from locomotive idling at the maintenance facility and end-of-line station).

Table 3.3-13. Estimated Operational Criteria Pollutant Emissions from Proposed Project and Atwater Station Alternative Operation in the Bay Area Air Quality Management District

	Net Pounds per Day[a]						Net Tons per Year[a]					
Scenario	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**SO_X**	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**SO_X**
Existing (2019)	-	-	-	-	-	-	-	-	-	-	-	-
2030 No Project Conditions	-	-	-	-	-	-	-	-	-	-	-	-
2030 Proposed Project	< 1	-2	-31	-59	-15	< 1	< 1	< 1	-4	-8	-2	< 1
2030 Atwater Station Alternative	< 1	-2	-31	-60	-15	< 1	< 1	< 1	-4	-8	-2	< 1
2040 No Project Conditions	-	-	-	-	-	-	-	-	-	-	-	-
2040 Proposed Project	< 1	-2	-23	-76	-19	< 1	< 1	< 1	-3	-10	-2	< 1
2040 Atwater Station Alternative	< 1	-2	-24	-77	-20	< 1	< 1	< 1	-3	-10	-2	< 1
Comparison to Existing (2019)[b]												
2030 Proposed Project	< 1	-2	-31	-59	-15	< 1	< 1	< 1	-4	-8	-2	< 1
2030 Atwater Station Alternative	< 1	-2	-31	-60	-15	< 1	< 1	< 1	-4	-8	-2	< 1
2040 Proposed Project	< 1	-2	-23	-76	-19	< 1	< 1	< 1	-3	-10	-2	< 1
2040 Atwater Station Alternative	< 1	-2	-24	-77	-20	< 1	< 1	< 1	-3	-10	-2	< 1
Comparison to No Project Conditions												
2030 Proposed Project	< 1	-2	-31	-59	-15	< 1	< 1	< 1	-4	-8	-2	< 1
2030 Atwater Station Alternative	< 1	-2	-31	-60	-15	< 1	< 1	< 1	-4	-8	-2	< 1
2040 Proposed Project	< 1	-2	-23	-76	-19	< 1	< 1	< 1	-3	-10	-2	< 1
2040 Atwater Station Alternative	< 1	-2	-24	-77	-20	< 1	< 1	< 1	-3	-10	-2	< 1
BAAQMD Thresholds	**54**	**54**	**-**	**82**	**54**	**-**	**10**	**10**	**-**	**15**	**10**	**-**

[a] The emissions estimates reflect the difference between emissions generated by operation of the Altamont Corridor Express (ACE) locomotives and shuttles and reductions achieved by displaced vehicle miles traveled, where negative values represent a net reduction in emissions under the operating scenario. Refer to Appendix J, *Air Quality, Greenhouse Gas, and Health Risk Assessment Supporting Documentation,* for a detailed summary of emission and reductions by source (e.g., ACE operation).

[b] Comparison provided for informational purposes only. Impact determination based on the net change in emissions relative to the No Project Conditions. Refer to Section 3.3.4.2, *Thresholds of Significance*, for additional information.

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

Table 3.3-14. Estimated Operational Criteria Pollutant Emissions from Proposed Project and Atwater Station Alternative Operation in the San Joaquin Valley Air Pollution Control District

	Net Pounds per Day[a]						Net Tons per Year[a]					
Scenario	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**SO_X**	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**SO_X**
Existing (2019)	-	-	-	-	-	-	-	-	-	-	-	-
2030 No Project Conditions	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
2030 Proposed Project	1	21	-30	-42	-11	< 1	< 1	3	-4	-5	-1	< 1
2030 Atwater Station Alternative	1	21	-31	-43	-11	< 1	< 1	3	-4	-5	-1	< 1
2040 No Project Conditions	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
2040 Proposed Project	1	21	-32	-54	-14	< 1	< 1	3	-4	-7	-2	< 1
2040 Atwater Station Alternative	1	21	-33	-55	-14	< 1	< 1	3	-4	-7	-2	< 1
Comparison to Existing (2019)[b]												
2030 Proposed Project	1	21	-30	-42	-11	< 1	< 1	3	-4	-5	-1	< 1
2030 Atwater Station Alternative	1	21	-31	-43	-11	< 1	< 1	3	-4	-5	-1	< 1
2040 Proposed Project	1	21	-32	-54	-14	< 1	< 1	3	-4	-7	-2	< 1
2040 Atwater Station Alternative	1	21	-33	-55	-14	< 1	< 1	3	-4	-7	-2	< 1
Comparison to No Project Conditions												
2030 Proposed Project	1	21	-30	-43	-11	< 1	< 1	2	-4	-5	-1	< 1
2030 Atwater Station Alternative	1	21	-31	-43	-11	< 1	< 1	2	-4	-5	-1	< 1
2040 Proposed Project	1	21	-32	-55	-14	< 1	< 1	3	-4	-7	-2	< 1
2040 Atwater Station Alternative	1	21	-33	-55	-14	< 1	< 1	3	-4	-7	-2	< 1
SJVAPCD Thresholds[c]	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**10**	**100**	**15**	**15**	**27**

[a] The emissions estimates reflect the difference between emissions generated by operation of the Altamont Corridor Express (ACE) locomotives and shuttles and reductions achieved by displaced vehicle miles traveled, where negative values represent a net reduction in emissions under the operating scenario. Refer to Appendix J, *Air Quality, Greenhouse Gas, and Health Risk Assessment Supporting Documentation,* for a detailed summary of emission and reductions by source (e.g., ACE operation).

[b] Comparison provided for informational purposes only. Impact determination based on the net change in emissions relative to the No Project Conditions. Refer to Section 3.3.4.2, *Thresholds of Significance*, for additional information.

[c] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a proposed project will cause or contribute to a violation of California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS). Projects with emissions below the threshold will not be in violation of CAAQS or NAAQS. Projects with emissions above the threshold would require an ambient air quality analysis to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015).

ROG = reactive organic gases.
NO_X = nitrogen oxide.
CO = carbon monoxide.
PM10 = particulate matter that is 10 microns in diameter and smaller.
PM2.5 = particulate matter that is 2.5 microns in diameter and smaller.
< = less than.
SO_X = sulfur oxide.

As shown in Table 3.3-13, operation of the Proposed Project would result in emissions reductions for all pollutants in the BAAQMD, relative to No Project Conditions. This result is expected, because the operations emissions associated with ACE locomotives would only occur in the SJVAPCD, while VMT-related emissions reductions would affect the BAAQMD. The Proposed Project would result in emissions from shuttle trips in the BAAQMD, but these emissions are minor relative to the VMT reductions, as reflected in Table 3.3-13. Thus, there would be a regional air quality benefit in BAAQMD.

As shown in Table 3.3-14, operation of the Proposed Project would not generate emissions in excess of SJVAPCD's thresholds for ROG or NOx. Several pollutants (CO, PM10, PM2.5, and SO_2) would be reduced relative to No Project Conditions. For the pollutants that would increase (but be below the SJVAPCD thresholds), emissions from operations of the ACE locomotives would exceed the amount of emissions reduced from VMT reductions in SJVAPCD. For those pollutants that would be reduced, this would be a regional air quality benefit.

Since project emissions would not exceed BAAQMD nor SJVAPCD significance thresholds and the Proposed Project would result in net reductions of criteria pollutant emissions for some pollutants in both SJVAPCD and BAAQMD, there would be no significant impact associated with Proposed Project operations. Thus, the Proposed Project would not result in a cumulatively considerable net increase of a criteria pollutant for which the Project region is designated a nonattainment area. Impacts from operation of the Proposed Project would be less than significant.

Atwater Station Alternative

The operational emissions from the Atwater Station Alternative are also shown in Tables 3.3-13 and 3.3-14 above and are relatively close in magnitude to the Proposed Project. As with the Proposed Project, the Atwater Station Alternative would not generate emissions in excess of BAAQMD or SJVAPCD's thresholds, and the same overall trends are reflected. That is, there would be pollutant decreases in BAAQMD, increases for ROG and NOx in SJVAPCD, but no threshold exceedances in SJVAPCD. Since emissions would not exceed BAAQMD nor SJVAPCD significance thresholds, and the Atwater Station Alternative would result in net reductions of criteria pollutant emissions for some pollutants in both SJVAPCD and BAAQMD, there would be no significant impact associated with project operational criteria pollutants. Impacts from operations of the Atwater Station Alternative would be less than significant.

Compared to the proposed Livingston Station, the Atwater Station Alternative would result in a slightly greater reduction of pollutants (see Tables 3.3-13 and 3.13-14). This is because the Atwater Station Alternative is expected to result in a slightly greater VMT reduction than the proposed Livingston Station, due to a slightly higher ridership.

Impact AQ-3a	Operation of the Proposed Project would not expose sensitive receptors to substantial carbon monoxide concentrations from increased passenger rail traffic.
Level of Impact	**Less than significant impact**

Impact Characterization

Proposed Project

Continuous engine exhaust may elevate localized CO concentrations. People at receptors exposed to these CO hot spots may have a greater likelihood of developing negative health effects (as described in Section 3.3.3, *Environmental Setting*). CO hot spots are typically observed at heavily congested roadway intersections where a substantial number of gasoline-powered vehicles idle for prolonged durations throughout the day. Construction sites are less likely to result in localized CO hot spots due to the nature of construction activities, which normally utilize diesel-powered equipment for intermittent or short durations. The Proposed Project locomotives are diesel-fueled and are unlikely to contribute to a CO hot spot. Accordingly, this analysis focuses on potential CO hot spots associated with additional motor vehicles at the new stations that would be constructed for the Proposed Project.

Full operations (2030) and horizon year (2040) conditions were modeled to evaluate CO concentrations relative to the NAAQS and CAAQS. As previously discussed, CO concentrations were estimated at 16th Street and R Street in Merced in the SJVAPCD, which is a reasonable estimate for the highest volume intersection in the Proposed Project are. Table 3.3-15 summarizes the results of the intersection CO modeling.

As described in Chapter 2, *Project Description,* the additional shuttles at the Great America and Pleasanton would result in approximately 11 additional daily trips at Great America and 3 additional daily trips at Pleasanton. Given these small volumes, the Proposed Project is not expected to change traffic conditions around these stations. Accordingly, CO concentrations were not modeled for these locations.

Table 3.3-15 indicates that CO concentrations are not anticipated to exceed the 1- or 8- hour NAAQS and CAAQS. Accordingly, implementation of the Proposed Project would not contribute to CO hot spots or expose receptors to substantial CO concentrations. This impact would be less than significant.

Table 3.3-15. Carbon Monoxide Modeling Concentration Results (parts per million)

		2030 Full Operations		2040 Horizon	
Intersection	**Receptor[a]**	**1-hr**	**8-hr**	**1-hr**	**8-hr**
16th Street and R Street, Merced (Proposed Project)	1	3.4	2.5	3.4	2.5
	2	3.4	2.5	3.4	2.5
	3	3.3	2.4	3.4	2.5
	4	3.4	2.5	3.4	2.5
16th Street and R Street, Merced (Atwater Station Alternative)	1	3.4	2.5	3.4	2.5
	2	3.4	2.5	3.4	2.5
	3	3.3	2.4	3.3	2.4
	4	3.4	2.5	3.4	2.5
Threshold (CAAQS and NAAQS)		20 & 35	9.0 & 9	20 & 35	9.0 & 9
Threshold Exceedance?		No	No	No	No

Notes:

[a] Consistent with Caltrans CO Protocol, receptors are located 3 meters from the intersection, at each of the four corners to represent the nearest location in which a receptor could potentially be located adjacent to a travelled roadway. The modeled receptors indicated are not representative of the actual sensitive receptors.

CO = carbon monoxide.
CAAQS = California Ambient Air Quality Standards.
NAAQS = National Ambient Air Quality Standards.

Atwater Station Alternative

As noted in Section 3.3.4.1, *Methods for Analysis, Carbon Monoxide Hot Spot Analysis*, the CO analysis represents a worst-case scenario, because it evaluates traffic volumes at the Merced Station, where parking demand and vehicle volumes would be the greatest. Parking demand at the Merced Station would be lower if the Atwater Station Alternative were implemented instead of the proposed Livingston Station. Table 3.3-15 summarizes the results of the intersection CO modeling at the Merced Station if the Atwater Station Alternative were implemented and it shows that concentrations would be well below the applicable NAAQS and CAAQS. Because CO concentrations are substantially below the NAAQS and CAAQS for the worst-case scenario, this impact would be less than significant.

Implementation of the Atwater Station Alternative would have a slightly reduced impact than implementation of the proposed Livingston Station. Nonetheless, both would result in a less-than-significant impact.

Impact AQ-3b	Construction of the Proposed Project could expose sensitive receptors to substantial diesel particulate matter or localized particulate matter concentrations.
Level of Impact	**Potentially significant impact**
Mitigation Measures	AQ-2.1: Implement advanced emissions controls for off-road equipment AQ-2.2: Implement advanced emissions controls for locomotives used for construction
Level of Impact after Mitigation	**Less than significant impact**

Impact Characterization

Proposed Project

Construction of the Proposed Project would have the potential to create inhalation health risks, which may exceed local significance thresholds for increased cancer and non-cancer health risk at receptor locations adjacent to the track, stations, and/or maintenance facility. As noted in Section 3.3.3.2, *Pollutants of Concern*, the cancer risk from exposure to diesel exhaust is much higher than the risk associated with any other air toxic from construction of the Proposed Project. Accordingly, both the construction and operational HRAs (Impacts AQ-3b through AQ-3e) focus on DPM emissions, as recommended by SJVAPCD, BAAQMD, OEHHA, and CARB.

The local topography and meteorology can have a substantial effect on DPM air concentrations and the resulting exposure. Consequently, DPM concentrations were estimated using conservative air quality modeling options and representative local meteorological conditions. Modeling results are reported based on the annual average concentration collected from 5 years of modeling. Because of these conservative assumptions, actual health risks could be less than the projected exposures.

Table 3.3-16 summarizes estimated unmitigated and mitigated maximum individual cancer risk and chronic health hazard from construction of the Proposed Project in the SJVAPCD.

Table 3.3-16. Estimated Maximum Inhalation Cancer Risk and Chronic and Acute Hazard Index from Construction in the San Joaquin Valley Air Pollution Control District

Segment/Scenario	Cancer Risk (per million) [unmitigated/mitigated]	Chronic HI
Atwater Station Alternative (worst-case station)	49.3/4.4	0.07/0.01
Merced Layover & Maintenance Facility	11.4/1.2	0.03/<0.01
Ceres to Merced Extension Alignment	31.9/2.2	0.04/<0.01
SJVAPCD Threshold	20.0	1.0

Note: Modeling assumes implementation of Mitigation Measures AQ-2.1 and AQ-2.2.
Exceedances of air district thresholds are shown in underline.
HI = hazard index.
μg/m3 = micrograms per cubic meter.
< = less than.
SJVAPCD = San Joaquin Valley Air Pollution Control District.

Without mitigation, the values in Table 3.3-16 would exceed the thresholds. Cancer risks could be as high as 49 per million, which is above the threshold of 20 per million. Hazard index values would be below the threshold. Because of the cancer risk threshold exceedance, this is a potentially significant impact.

Atwater Station Alternative

The Atwater Station Alternative would not result in meaningful differences in DPM exposure, because the analysis conducted above for the Proposed Project represents a worst-case scenario. Construction activities of the Merced Layover & Maintenance Facility and Ceres to Merced Extension Alignment would be the same for both the Proposed Project and the Atwater Station Alternative. With respect to station construction, the Atwater Station Alternative construction activities were determined to be a worst-case scenario, because, as noted above, that station would have the highest DPM emissions density per area and has sensitive receptors that are immediately adjacent to the station footprint. Therefore, the results in Table 3.3-16 are representative of both the Proposed Project and the Atwater Station Alternative, and there would be no meaningful difference in impact between the Proposed Project and the Atwater Station Alternative (both would result in a less-than-significant impact with mitigation).

Mitigation Measures

Mitigation Measures AQ-2.1 through AQ-2.2 would apply to the Proposed Project and Atwater Station Alternative for potential impacts on air quality.

Mitigation Measure AQ-2.1: Implement advanced emissions controls for off-road equipment

Refer to measure description in Impact AQ-2a.

Mitigation Measure AQ-2.2: Implement advanced emissions controls for locomotives used for construction

Refer to measure description in Impact AQ-2a.

Significance with Application of Mitigation

As noted for Impact AQ-2a, Mitigation Measure AQ-2.1 is separately required to reduce NOx emissions. Even with Mitigation Measure AQ-2.1, cancer risks could exceed the SJVAPCD threshold of 20. As such, additional mitigation is required with respect to the locomotives to be used during construction, which, in the absence of further mitigation, would be the primary contributor of DPM during construction. Mitigation Measure AQ-2.2 would require advanced emissions controls for locomotives, which would reduce DPM emissions. As shown in Table 3.3-16, construction of the Proposed Project would not result in increased cancer or chronic health hazards in excess of SJVAPCD thresholds with Mitigation Measures AQ-2.1 and AQ-2.2. Mitigation is thus required to reduce health-related impacts, and this impact would be less than significant with mitigation.

For the same reasons as the Proposed Project, Mitigation Measures AQ-2.1 and AQ-2.2 would reduce health related impacts from construction of the Atwater Station Alternative to a less-than-significant level.

Impact AQ-3c	Operations of the Proposed Project would not expose sensitive receptors to health risks from increased exposure to diesel particulate matter and PM2.5 concentrations.
Level of Impact	**Less than significant impact**

Impact Characterization

Proposed Project

Operation of the Proposed Project locomotive engines and the minor shift in freight train traffic would have the potential to create inhalation health risks. DPM concentrations were estimated using conservative air quality modeling options and representative local meteorological conditions. Modeling results are reported based on the highest annual average concentration collected from 5 years of meteorological data. Because of these conservative assumptions, actual health risks could be less than the projected exposures. Table 3.3-17 summarizes estimated maximum cancer risk and chronic health hazard.[13] Table 3.3-17 also reports the incremental increase in health risks that would result between the Proposed Project and No Project Conditions from the minor shift in freight train traffic that would occur. For freight relocation, the comparison between the No Project Conditions and Proposed Project scenarios represent the net impact of the Proposed Project, and that net effect is compared to SJVAPCD thresholds. That net effect from freight rail is added to the Proposed Project's effect from ACE locomotive operation to determine the total effect from the Proposed Project.

Table 3.3-17. Estimated Maximum Inhalation Cancer Risk and Chronic Hazard Index from Operation of ACE Locomotives and Freight Relocation in the San Joaquin Valley Air Pollution Control District

Segment/Scenario	Cancer Risk (per million)	Chronic HI
ACE Operation		
2030 and 2040	1.3	<0.1

[13] Because the locomotives are exclusively diesel powered, there would be no acute risk.

Segment/Scenario	Cancer Risk (per million)	Chronic HI
Freight Rail – No Project Conditions		
2030	22.8	<0.1
2040	11.6	<0.1
Freight Rail – With Project		
2030	23.7	<0.1
2040	12.1	<0.1
Freight Rail - Project Increment		
2030	0.9	<0.1
2040	0.5	<0.1
ACE Operation + Increment		
2030	2.1	<0.1
2040	1.7	<0.1

ACE = Altamont Corridor Express.
HI = hazard index.
< = less than.

As shown in Table 3.3-17, expansion of ACE service, including the minor shift in freight rail traffic, would not result in increased cancer or chronic health hazards in excess of the SJVAPCD thresholds of 20 cancers per million or hazard index of 1.0. This impact would be less than significant.

Atwater Station Alternative

The Atwater Station Alternative would not result in meaningful differences in DPM exposure because the analysis conducted above for the Proposed Project represents a worst-case scenario. ACE operations on a typical segment of track would result in the same approximate exposure of DPM regardless of whether the Livingston Station or Atwater Station Alternative is implemented. Therefore, the results in Table 3.3-17 are representative of both the Proposed Project and the Atwater Station Alternative, and there would be no meaningful difference in impact between the Proposed Project and the Atwater Station Alternative (both would result in a less-than-significant impact).

Impact AQ-3d	Operations of the Proposed Project could expose sensitive receptors adjacent to ACE stations and maintenance facilities to health risks from increased exposure to diesel particulate matter.
Level of Impact	**Potentially significant impact**
Mitigation Measures	AQ-3.1: Locate emergency generator for the Merced Layover & Maintenance Facility more than 1,000 feet from residences
Level of Impact	**Less than significant impact**

Impact Characterization

Proposed Project

The expanded ACE service from Ceres to Merced would increase locomotive idling at the new stations and the Merced Layover & Maintenance Facility. Receptors adjacent to the Proposed Project stations and the Merced Layover & Maintenance Facility may be exposed to increased cancer and non-cancer health risks, similar to receptors adjacent to the extension alignment (analyzed under Impact AQ-3c).

DPM concentrations from idling at the Merced Station and the Merced Layover & Maintenance Facility were estimated using conservative air quality modeling options and representative local meteorological conditions. Modeling results are reported based on the highest annual average concentration collected from 5 years of meteorological data. Because of these conservative assumptions, actual health risks could be less than the projected exposures. The Merced Station represents the worst-case scenario out of all the proposed stations, because each train could idle for up to 15 minutes at Merced Station during power-up and power-down, whereas idle time at the non-end-of-line stations would be approximately 1.5 minutes per train. At the Merced Layover & Maintenance Facility, each train could idle up to one hour per day (AECOM 2020a). When locomotives are at the Merced Layover & Maintenance Facility, they would idle for the one hour time period but would be connected to electric power otherwise with engines off.

Table 3.3-18 summarizes the estimated maximum cancer risk and chronic health hazards at the Merced Station and Merced Layover & Maintenance Facility. Both the Merced Station and Merced Layover & Maintenance Facility would be located in SJVAPCD.

Table 3.3-18. Estimated Maximum Inhalation Cancer Risk and Chronic Hazard Index from Increased ACE Locomotive Idling

Location	Cancer Risk (per million)	Chronic HI
Merced Layover & Maintenance Facility	<1	<0.1
Merced Station (worst-case)	<1	<0.1
SJVAPCD Threshold	20	1.0

[a] Receptors adjacent to new stations may also be exposed to running exhaust diesel particulate matter from trains as they exit the station. Refer to Impact AQ-3f for a discussion of overlapping risk from project sources.

ACE = Altamont Corridor Express.
HI = hazard index.
< = less than.
SJVAPCD = San Joaquin Valley Air Pollution Control District.
PM2.5 = particulate matter that is 2.5 microns in diameter and smaller.

As shown in Table 3.3-18, idling at the Merced Station and Merced Layover & Maintenance Facility would not result in increased cancer or chronic health hazards in excess of SJVAPCD thresholds under a worst-case scenario. This impact would be less than significant.

In addition, operations of the Proposed Project would require the operation of a diesel-powered emergency generator at the Merced Layover & Maintenance Facility. There are residences located within 1,000 feet of the eastern part of the Merced Layover & Maintenance Facility (i.e., the part closer to SR 59). These residences are located east of SR 59. If the diesel-powered emergency generator were located within 1,000 feet of these residences, then there is a potential that diesel particulate matter from the emergency generator could result in health risks to nearby residences. A health risk assessment has not been conducted, so this is considered a potentially significant impact.

Atwater Station Alternative

The Atwater Station Alternative would not result in meaningful differences in diesel particulate matter exposure because the analysis conducted above for the Proposed Project represents a worst-case scenario. Moreover, that worst-case scenario applies to both the Proposed Project and the Atwater Station Alternative, because both would result in trains idling for approximately the same time at the Merced Station and at the Merced Layover & Maintenance Facility. Thus, there would be no meaningful difference in impact between the proposed Livingston Station and the Atwater Station Alternative related to locomotive idling (both would result in a less-than-significant impact).

The Atwater Station Alternative would not change the potentially significant impact at the Merced Layover & Maintenance Facility.

Mitigation Measures

Mitigation Measure AQ-3.1 would apply to the Merced Layover & Maintenance Facility.

Mitigation Measure AQ-3.1: Locate emergency generator for the Merced Layover & Maintenance Facility more than 1,000 feet from residences.

SJRRC or its contractor(s) would locate the emergency generator at the Merced Layover & Maintenance Facility at least 1,000 feet from any sensitive residential receptors east of SR 59. Prior to construction, SJRRC would verify that the emergency generator would be more than 1,000 feet from sensitive receptors through its approval of the final design of the Project.

Significance with Application of Mitigation

Mitigation Measure AQ-3.1 would require that the diesel-powered emergency generator at the Merced Layover & Maintenance Facility be located at least 1,000 feet from any sensitive receptors. Given that the source-receptor distance for the generator would be more than 1,000 feet after implementation of Mitigation Measure AQ-3.1, diesel emissions from the generator would be substantially reduced at the nearest sensitive receptors. Consequently, the impacts on health risks from the Proposed Project (and the Atwater Station Alternative) would be less than significant after the implementation of Mitigation Measure AQ-3.1.

Impact AQ-3e	Operations of the Proposed Project would not expose sensitive receptors adjacent to shuttle routes to health risks from increased exposure to diesel particulate matter and PM2.5 concentrations from expanded shuttle service.
Level of Impact	**Less than significant impact**

Impact Characterization

Proposed Project

The increase in ACE ridership associated with the Proposed Project is anticipated to have a corresponding increase in daily shuttle trips at the Great America and Pleasanton stations. Additional vehicle exhaust can result in higher potential health risks from exposure to DPM and PM2.5. Receptors adjacent to shuttle routes could therefore be exposed to increased cancer and non-cancer health risks.

Based on the anticipated ridership data for the Proposed Project, there would be an increase of 4 shuttle trips in 2030 relative to the No Project Conditions (a 2 percent increase), and an increase in 11 shuttle trips in 2040 relative to the No Project Conditions (a 5 percent increase). At the Great America station, there are nine shuttle routes, and there would be a maximum of 2 additional shuttle trips for any of the routes. At the Pleasanton station, there would be an increase of 1 trip per day on only one of the routes. As such, although there would be 4 and 11 additional shuttle trips per day in 2030 and 2040, respectively, the increases in trips would be dispersed among the different shuttle routes. After leaving the station areas, the exhaust emissions from all 11 trips would thus not be concentrated on any one route.

The health effects associated with additional shuttle trips were analyzed at both the Great America and Pleasanton stations in the Prior EIR. For that project, there was determined to be a net increase in shuttle trips at the Great America station of 18 in 2020 and 22 in 2040, beyond the number of shuttle trips that would be offered without that project. At the Pleasanton station, the additional trips would be 4 in 2020 and 6 in 2040, beyond the number of shuttle trips offered without that project.

The health risk assessment results for the additional shuttle trips analyzed in the Prior EIR were found to be substantially less than the BAAQMD's thresholds and thus less than significant. At both stations, the increase in cancer risk was found to be less than 1 per million, and the significance threshold is 10 per million. For the hazard indices, the results at both stations were found to be less than 0.1, and the threshold is 1.0. For PM2.5 concentration results, the findings for both stations were less than 0.1, and the threshold is 0.3 $\mu g/m^3$.

Compared to the 18 to 22 additional trips at Great America and 4 to 6 additional trips at Pleasanton analyzed in the Prior EIR, the Proposed Project would add a relatively moderate additional number of trips (a maximum of 11 at Great America, and one at Pleasanton). Consequently, it is reasonable to assume that the analysis results from the Prior EIR demonstrate that an increase of up to 22 trips at Great America and 6 trips at Pleasanton would not result in health risks or PM2.5 concentrations that exceed the BAAQMD's thresholds. As shown in the Prior EIR (Section 4.3, Tables 4.3-21 and 4.3-22), the net change in health risks and PM2.5 concentrations are well below the applicable thresholds. Thus, the Proposed Project's contribution of a maximum of 11 additional daily trips would result in even lower health risks and PM2.5 concentrations than presented in the Prior EIR. This result is to be expected, given the low number of additional shuttle trips that would be added for the Proposed Project. Additionally, the shuttles may be electric in 2030 and/or 2040, which would further reduce the health risks and PM2.5 concentrations. Electric shuttles would not generate any exhaust-related emissions but would still generate tire, brake, and road dust. This analysis is conservative, because it assumes that the shuttles will be internal combustion vehicles in 2030 and 2040.

Given that the Prior EIR demonstrated less than significant effects from a larger number of daily shuttle trips, the Proposed Project would result in a less than significant cancer risk and hazard index impact from the increase in daily shuttle trips at the Great America and Pleasanton stations.

Atwater Station Alternative

Because the expected passenger ridership quantities for Proposed Project and the Atwater Stational Alternative are anticipated to be similar, the additional shuttle trips at the Great America and Pleasanton stations would apply to the Atwater Station Alternative as well. In other words, the difference in ridership numbers between the Proposed Project and Atwater Station Alternative is not likely large enough to cause differences in the required number of additional shuttle trips. Consequently, the analysis above for the Proposed Project also applies to the Atwater Station Alternative. Both would result in a less than significant impact and there would be no difference in impacts between the proposed Livingston Station and the Atwater Station Alternative.

Impact AQ-3f	Construction and operations of the Proposed Project would not expose sensitive receptors to health risks from increased exposure to diesel particulate matter and PM2.5 concentrations from multiple emission sources.
Level of Impact	**Less than significant impact**

Impact Characterization

Proposed Project

Impacts AQ-3b through AQ-3e evaluate risks from receptor exposure to DPM from construction and individual operational emission sources (e.g., ACE operation, station idling, etc.). At some locations, receptors may be exposed to DPM emissions from multiple sources. Combined exposure may occur from new ACE train operations adjacent to a new ACE station. To evaluate the potential overlap of different sources, a worst-case analysis has been quantified in Table 3.3-19. The Atwater Station Alternative was chosen as the worst-case station, because, as noted above that station would have the highest DPM emissions density per area and has sensitive receptors that are immediately adjacent to the station footprint. Although the Atwater Station Alternative would not be a part of the Proposed Project, the worst-case analysis with the Atwater Station Alternative would apply for the Proposed Project.

Table 3.3-19. Estimated Maximum Incremental Change in Inhalation Cancer Risk and Chronic from Combined Proposed Project Emission Sources[a]

Source	Cancer Risk (per million)	Chronic HI
Atwater Station Alternative Construction (mitigated)	4.4	<0.1
Ceres to Merced Extension Alignment Construction (mitigated)	2.2	<0.1
ACE Operation + Freight Shift (2030)	2.1	<0.1
Total	**8.8**	**<0.1**
SJVAPCD Threshold	**20**	**1.0**

[a] Table presents the net change in risk, relative to No Project Conditions.

ACE = Altamont Corridor Express
HI = hazard index
< = less than
SJVAPCD = San Joaquin Valley Air Pollution Control District

The results in Table 3.3-19 do not represent an actual receptor. This is because the same worst-case receptor during construction of the Atwater Station Alternative would not be the same worst-case receptor during construction of the Ceres to Merced Extension Alignment. Furthermore, the worst-case receptors during ACE operation would not likely be the same as those worst-case receptors during construction. However, the results in Table 3.3-19 are shown because they demonstrate that even in a hypothetical situation where several Proposed Project components overlap at the same receptor, the total cancer risk and hazard index would not exceed the SJVAPCD thresholds. Thus, as shown in Table 3.3-19, the cancer risk increase associated with combined risks from Proposed Project construction and operations would not exceed SJVAPCD's health risk thresholds. This impact would be less than significant.

Atwater Station Alternative

The analysis conducted above for the Proposed Project represents a worst-case scenario. The Atwater Station Alternative was chosen as the worst-case station. As such, for the same reasons as the Proposed Project, the cancer risk increase associated with combined risks from construction and operations of the Atwater Station Alternative would not exceed SJVAPCD's health risk thresholds. This impact would be less than significant. There would be no meaningful difference in impact between the proposed Livingston Station and the Atwater Station Alternative (both would result in a less-than-significant impact).

Impact AQ-3g	Construction and operations of the Proposed Project would not expose sensitive receptors to cumulative health risks from increased exposure to diesel particulate matter and PM2.5 concentrations.
Level of Impact	**Less than significant impact**

Impact Characterization and Significance Conclusion

Proposed Project

Multiple existing sources of cumulative DPM emissions and sensitive receptors are located within 1,000 feet of the Ceres to Merced Extension Alignment. When combined with DPM emissions from Proposed Project construction and operations, receptors may be exposed to cumulative health risks in excess of air district thresholds. BAAQMD has established cumulative risk thresholds. Current SJVAPCD guidance for cumulative impacts is to evaluate the potential risks associated from all project-related emission sources. Emission sources outside the project boundaries should not be included in the assessment. If the project-level assessment demonstrates that potential project related health impacts are less than significant, one could conclude that the project would have a less than cumulatively significant impact (Siong pers. comm.). This cumulative health risk discussion is limited to construction within the SJVAPCD and operations in the BAAQMD and SJVAPCD.

As discussed in Impacts AQ-3b through AQ-3d and Impact AQ-3f, neither mitigated construction activities nor operation of the Proposed Project would result in health risks to sensitive receptors in excess of SJVAPCD's thresholds of significance. SJVAPCD considers risks in excess of project-level thresholds to result in a cumulatively considerable impact. Accordingly, since the Proposed Project would not exceed SJVAPCD's project-level thresholds, cumulative health risks within the SJVAPCD would be less than significant.

Similarly, changes in ACE shuttle service within the BAAQMD would not contribute to cumulative health hazards because predicted health risks are anticipated to be well below the applicable threshold (e.g., less than 1 excess cancer case per million relative to a threshold of 10), relative to existing conditions (see Impact AQ-3e above). Unlike the project-level analysis, which relies on a comparison to No Project Conditions to evaluate the incremental effect of the Proposed Project on air quality impacts, cumulative health risks are discussed relative to existing conditions as the baseline. This is because health risks depend on the duration receptors are exposed to the emission source. Individuals currently residing near ACE shuttle routes are exposed to a certain amount of pollution (representative of existing conditions). If the Proposed Project-induced increase in shuttle trips does not occur, the receptors would continue to be exposed to the existing pollution levels from the current number of ACE shuttles and ambient sources.

In addition, regional emissions from motor vehicles including heavy diesel trucks will decline over time due to natural fleet turnover, as older, higher-emitting vehicles are retired and replaced by newer, lower-emitting vehicles. Similarly, existing risks due to stationary sources near receptors may decline as older equipment is retired and replaced. This turnover will reduce existing ambient risk levels independent of Proposed Project operations.

As discussed in Impact AQ-3e above, health risks would decrease or remain virtually unchanged with the additional shuttles from the Proposed Project, and as such, the Proposed Project would not exceed BAAQMD's cumulative risk thresholds or cumulatively contribute to existing risks. Accordingly, this impact would be less than significant.

Atwater Station Alternative

Similar to the Proposed Project, the Atwater Station Alternative would increase emissions from locomotives but reduce automotive emissions and in the future with the Atwater Station Alternative, regional emissions from motor vehicles would be expected to decline over time. For the Atwater Station Alternative, mitigated construction activities and operations would not result in health risks to sensitive receptors in excess of SJVAPCD's thresholds of significance, as discussed in Impacts AQ-3b through AQ-3e. The Atwater Station Alternative's cumulative health risks within the SJVAPCD would be less than significant.

As noted in Impact AQ-3e above, the numbers of additional shuttle trips at the Great America and Pleasanton stations are anticipated to be the same for both the Proposed Project and the Atwater Station Alternative. As a result, health risks would remain virtually unchanged with the additional shuttles, and the Atwater Station Alternative would not exceed BAAQMD's cumulative risk thresholds or cumulatively contribute to existing risks. Accordingly, this impact would be less than significant.

There would be no difference in impacts between the proposed Livingston Station and the Atwater Station Alternative (both would result in a less-than-significant impact).

Impact AQ-3h	Construction of the Proposed Project would not expose sensitive receptors to increased risk of contracting Valley Fever or exposure to asbestos-containing material.
Level of Impact	**Less than significant impact**

Impact Characterization and Significance Conclusion

Proposed Project

Valley Fever

Disturbance of soil containing *C. immitis* could expose the receptors adjacent to the construction site to spores known to cause Valley Fever. Areas endemic to *C. immitis* are generally arid to semiarid with low annual rainfall, and as such, soil containing the fungus is commonly found in Southern California and throughout the Central Valley. Based on Valley Fever hospitalization rates from the California Department of Public Health, over 75 percent of Valley Fever cases have been in people who live in the San Joaquin Valley (California Department of Public Health 2016). Within the Proposed Project study area, Merced County has the highest incidence rate of Valley Fever and is the seventh most affected county in the state (California Department of Public Health 2018).

The presence of *C. immitis* in the Proposed Project area does not guarantee that construction activities would result in increased incidence of Valley Fever. Propagation of *C. immitis* is dependent on climatic conditions, with the potential for growth and surface exposure highest following early seasonal rains and long dry spells. *C. immitis* spores can be released when filaments are disturbed by earthmoving activities, although receptors must be exposed to and inhale the spores to be at increased risk of developing Valley Fever. Moreover, exposure to *C. immitis* does not guarantee that an individual will become ill—approximately 60 percent of people exposed to the fungal spores are asymptomatic and show no signs of an infection (U.S. Geological Survey 2000).

All Proposed Project construction activities are located within Stanislaus and Merced Counties. *C. immitis* is endemic to the Central Valley, in particular San Joaquin County and has been found in Stanislaus County. Earthmoving activities for the Proposed Project may release *C. immitis* spores if filaments are present and other soil chemistry and climatic conditions are conducive to spore development. Receptors adjacent to the construction area, therefore, may be exposed to increase risk of inhaling *C. immitis* spores and subsequent development of Valley Fever. However, the presence of *C. immitis* in the Proposed Project area does not guarantee that construction activities would result in increased incidence of Valley Fever.

Dust control measures are the primary defense against Valley Fever infection (U.S. Geological Survey 2000). Fugitive dust controls required by compliance with SJVAPCD Regulation VIII would avoid dusty conditions and reduce the risk of contracting Valley Fever through routine watering and other controls. Therefore, the impact of exposure of sensitive receptors to increased Valley Fever risk during construction would be less than significant.

Asbestos-Containing Materials

Demolition of existing structures results in fugitive dust and other particulates that may disperse to adjacent sensitive receptor locations. Asbestos-containing materials (ACM) were commonly used as fireproofing and insulating agents prior to the 1970s. The U.S. Consumer Product Safety Commission banned use of most ACM in 1977 due to their link to mesothelioma. However, buildings constructed prior to 1977 that would be demolished by the Proposed Project may have used ACM and could expose receptors to asbestos, which may become airborne with other particulates during demolition.

The Proposed Project would require a small amount of demolition. If ACM were present in the existing structures that would be demolished, demolition activities could expose adjacent receptors to increased risk from airborne asbestos. The asbestos NESHAP regulations for demolition and renovation are outlined in SJVAPCD Regulation III and Regulation VIII. Compliance with the asbestos NESHAP regulations would be mandatory in the event ACM is found in any of the existing structures. Therefore, the impact of exposure of sensitive receptors to increased asbestos during construction would be less than significant.

Atwater Station Alternative

The Atwater Station Alternative is also located in the Central Valley, where *C. immitis* is endemic. However, the presence of *C. immitis* in the area does not guarantee that construction activities would result in increased incidence of Valley Fever. The Atwater Station Alternative would also implement fugitive dust controls required by SJVAPCD Regulation VIII, which would avoid dusty conditions and reduce the risk of contracting Valley Fever through routine watering and other controls. The impact of exposure of sensitive receptors to increased Valley Fever risk during construction would be less than significant. Consequently, there is no substantial difference between the impacts of the Atwater Station Alternative and the proposed Livingston Station (both would result in a less-than-significant impact).

For asbestos, a small amount of demolition would be required for the Atwater Station Alternative and could expose adjacent receptors to increased risk from airborne asbestos if ACM were present in the existing structures. As with the Proposed Project, compliance with the asbestos NESHAP regulations would be mandatory in the event ACM is found in any of the existing structures. Therefore, the impact of exposure of sensitive receptors to increased asbestos during construction would be less than significant.

The Atwater Station Alternative would require the demolition of more buildings than the proposed Livingston Station. Thus, there is a slightly greater potential that the Atwater Station Alternative could result in impacts related to airborne asbestos. Nonetheless, construction of both the proposed and Livingston Station would require the implementation of the same regulations and would both result in a less-than-significant impact.

Impact AQ-4	Construction and operations of the Proposed Project would not create objectionable odors affecting a substantial number of people.
Level of Impact	**Less than significant impact**

Impact Characterization and Significance Conclusion

Proposed Project

The generation and severity of odors is dependent on a number of factors, including the nature, frequency, and intensity of the source; wind direction; and the location of the receptor(s). Odors rarely cause physical harm, but can cause discomfort, leading to complaints to regulatory agencies. Land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting facilities, refineries, landfills, dairies, and fiberglass molding facilities (California Air Resources Board 2005).

Sources of odor during construction include diesel exhaust from construction equipment and asphalt paving. All odors would be localized, generally confined to the immediate area surrounding the construction site, and would cease once construction activities have been completed. Construction of the Proposed Project would utilize typical construction techniques. The equipment odors would be typical of most construction sites, temporary in nature, and localized to the vicinity of the construction work area. The construction odors would cease once construction activities have been completed. SJVAPCD has adopted rules that limit the amount of ROG emissions from cutback asphalt (see Section 3.3.3, *Environmental Setting*). Accordingly, potential odors generated during asphalt paving would be addressed through mandatory compliance with air district rules. This impact would be less than significant, and no mitigation is required.

The operations associated with the Proposed Project would not include any uses identified by the CARB as being associated with odors. However, expanded passenger rail operation may increase the potential for odors resulting from diesel fuel combustion. The new stations themselves would not represent substantial sources of odor emissions. However, expanded passenger rail operation on the tracks that access the stations may increase odors from train operation. Similarly, odors from increased diesel-powered shuttles that service the stations would slightly increase. These odors would be intermittent, occurring only as trains pass by receptors, and would be consistent with existing land uses and passenger rail operation. Odors resulting from diesel fuel combustion between Ceres and Merced or at existing or new stations would be short-term, occurring as trains or shuttles pass by, and are not considered a significant odor-generating source (California Air Resources Board 2005). Moreover, odors associated with the expanded passenger rail service would be consistent with existing land uses in the project area, which already includes freight activity. This impact would be less than significant.

Atwater Station Alternative

The operations associated with the Atwater Station Alternative would also not include any uses identified by the CARB as being associated with odors. In general, the potential for odor generation would not differ appreciably for the Proposed Project and Atwater Station Alternative. Short-term and intermittent odors could also occur from construction and operation of the Atwater Station Alternative. Consequently, there is no substantial difference between the odor impacts of the Atwater Station Alternative and the proposed Livingston Station. Both impacts would be less than significant.

3.3.4.4 Overall Comparison of the Proposed Livingston Station and Atwater Station Alternative

Because the Atwater Station Alternative would have slightly higher ridership and associated VMT reductions than the proposed Livingston Station, the Atwater Station Alternative would have slightly greater benefits related to reduction of pollutants, compared to the proposed Livingston Station. Overall, both the Atwater Station Alternative and the proposed Livingston Station would result in benefits from the reduction of pollutants. However, overall, the Atwater Station Alternative would result in greater benefits due to higher ridership and higher VMT reductions.