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 (including all track variants, technology variants, and the Greenville and Mountain House initial operating segments [IOS]) and the alternatives analyzed at an equal level of detail (Southfront Road Station Alternative, Stone Cut Alignment Alternative, West Tracy Operation and Maintenance Facility [OMF] Alternative, Mountain House Station Alternative, and Downtown Tracy Station Parking Alternatives 1 and 2). This section also describes the impacts on air quality and mitigation measures that would reduce significant impacts, where feasible and appropriate for the Proposed Project and the alternatives analyzed at an equal level of detail. Appendix L, *Air Quality, Energy, Greenhouse Gas Emissions, and Health Risk Assessment Supporting Documentation*, contains additional technical information for this section.

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*.

This section describes the construction and operational air quality impacts of the Proposed Project and the alternatives analyzed at an equal level of detail. For construction, air quality impacts are analyzed for the Proposed Project and the alternatives analyzed at an equal level of detail. For operation, air quality impacts are analyzed for the Proposed Project including the four technology variants: diesel multiple unit (DMU), hybrid battery multiple unit (HBMU), battery-electric multiple unit (BEMU), and diesel locomotive haul (DLH), as well as for the Southfront Road Station Alternative and the Stone Cut Alignment Alternative. The Mountain House Station Alternative and the Downtown Tracy Station Parking Alternatives 1 and 2 would have the same level of train service and ridership as the Proposed Project, so their operational air quality impacts would be the same as the Proposed Project and these alternatives are not analyzed separately below for operational impacts. The West Tracy OMF Alternative would have the same operational emissions as the proposed Tracy OMF and this alternative is not analyzed separately below for operational impacts.

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), 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, as well as the alternatives analyzed at an equal level of detail.

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.

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 μg/m[c]	150 μg/m[c]	150 μg/m[c]
	Annual mean	20 μg/m[c]	None	None
Fine Particulate Matter (PM2.5)	24-hour	None	35 μg/m[3]	35 μg/m[c]
	Annual mean	12 μg/m[c]	12.0 μg/m[c]	15.0 μg/m[c]
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 μg/m[c]	None	None
	Calendar quarter	None	1.5 μg/m[c]	1.5 μg/m[c]
	3-month average	None	0.15 μg/m[c]	0.15 μg/m[c]
Sulfates	24-hour	25 μg/m[c]	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.

[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 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] CAAQS for visibility-reducing particles is defined by an extinction coefficient of 0.23 per kilometer – visibility of 10 miles or more due to particles when relative humidity is less than 70%.
$\mu g/m^3$ = micrograms per cubic meter
ppm = parts per million

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 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 operational 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.

Train Emissions Standards

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

3.3.2.2 State

California Clean Air Act and Ambient Air Quality Standards

In 1988, the state 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, 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 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 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 Alameda County, 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 (2017) has published 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*. 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 Clean Air Plan: Spare the Air, Cool the Climate* provides a regional strategy to attain NAAQS and CAAQS, eliminate health risk disparities among San Francisco Bay Area (Bay Area) communities, and reduce GHG emissions.

The Proposed Project may be subject to the following district rules. This list of rules may not be complete as additional BAAQMD rules may apply to the Proposed Project as specific components are further refined.

- Regulation 2, Rule 2 (New Source Review). This regulation contains requirements for Best Available Control Technology and emission offsets.
- Regulation 2, Rule 5 (New Source Review of Toxic Air Contaminates). This regulation outlines guidance for evaluating TAC emissions and their potential health risks.
- Regulation 6, Rule 1 (Particulate Matter). This regulation restricts emissions of PM darker than No. 1 on the Ringelmann Chart to less than 3 minutes in any 1 hour.
- Regulation 7 (Odorous Substances). This regulation establishes general odor limitations on odorous substances and specific emission limitations on certain odorous compounds.
- Regulation 8, Rule 3 (Architectural Coatings). This regulation limits the quantity of reactive organic gases (ROG) in architectural coatings.
- Regulation 9, Rule 8 (Stationary Internal Combustion Engines). This regulation limits emissions of NO_X and CO from stationary internal combustion engines of more than 50 horsepower.
- Regulation 11, Rule 2 (Asbestos Demolition, Renovation, and Manufacturing). This rule controls emissions of asbestos to the atmosphere during demolition, renovation, milling and manufacturing and establish appropriate waste disposal procedures.

San Joaquin Valley Air Pollution Control District

SJVAPCD has local air quality jurisdiction in the San Joaquin Valley Air Basin (SJVAB), including San Joaquin County, 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 (2015) 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. GAMAQI provides SJVAPCD-recommended procedures for evaluating potential air quality impacts during the CEQA environmental review process.

SJVAPCD has adopted several attainment plans 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, 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. The *2016 Plan for the 2008 8-Hour Ozone Standard* addresses the 75 parts per billion (ppb) ozone standard and was adopted on June 16, 2016. The *2016 Ozone Plan* contains a comprehensive list of regulatory and incentive-based measures to reduce ROG and 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. 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 Standar*d 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 Proposed Project 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 which 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 4601 (Architectural Coatings). This rule limits volatile organic compound (VOC) emissions from architectural coatings.
- Rule 8011 (General Requirements—Fugitive Dust Emission Sources). This rule outlines requirements for implementation of control measures for fugitive dust emission sources.

- 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.

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 region. 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 region. 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.

San Joaquin Council of Governments

The San Joaquin Council of Governments (SJCOG) is a joint-powers authority composed of the County of San Joaquin and the Cities of Stockton, Lodi, Manteca, Tracy, Ripon, Escalon, and Lathrop. SJCOG serves as the regional transportation planning agency, which provides a forum for regional decision-making on issues such as growth, transportation, environmental management, housing, open space, air quality, fiscal management, and economic development. SJCOG also analyzes population statistics, airport land use, habitat and open space planning, and other regional issues.

County and City General Plans

Appendix I, *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 the alternatives analyzed at an equal level of detail are proposed. Section 15125(d) of the CEQA Guidelines requires an environmental impact report (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 the alternatives analyzed at an equal level of detail would be consistent[1] with the plans of relevant jurisdictions. The Proposed Project and the alternatives analyzed at an equal level of detail would be generally consistent with the applicable goals, policies, and objectives related to air quality identified in Appendix I.

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. For a list of applicable air quality goals, policies, and objectives from these county and city general plans, please see Appendix I.

[1] 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.

Table 3.3-2. Local General Plans Regarding Air Quality

Title	Summary
County	
Alameda County	
Alameda County General Plan (1994)	The General Plan contains seven elements (land use, circulation, housing, open space, conservation, safety, and noise) and is subdivided into three area plans to focus on land use elements for their specific geographic areas.
San Joaquin County	
San Joaquin County General Plan 2035 (2016)	The General Plan includes an Air Quality section in the Public Health and Safety Element, which outlines existing air quality conditions, local air quality planning, as well as federal and state ambient air quality standards which the County must comply with. The Plan includes policies to protect human health such as meeting all state and federal standards; minimizing motor vehicle emissions through land use and transportation strategies; coordinating with the SJVAPCD and supporting its efforts; and minimizing hazards from toxic air contaminants.
City	
Dublin	
City of Dublin General Plan (2017)	The City of Dublin General Plan is a comprehensive policy document that expresses the community's long-term vision and provides a framework for future decision making. The General Plan contains 12 elements that address many aspects of the community including, including Air Quality, General Plan policy requires that an air quality analysis be prepared for new development projects that could generate significant air pollutant emissions on a project and cumulative level, and that the air quality analysis include specific feasible measures to reduce anticipated air quality emissions to a less-than-significant level under CEQA.
Lathrop	
General Plan (1991)	The General Plan includes air quality policies to mitigate air quality impacts resulting from transportation projects; developing a regional rail transit service; adopting standards to require an industrial process analysis to ensure compliance with air quality standards; requiring positive control of dust particulates; future land uses to consider benefits of open space and vegetation; and stating the need to protect and preserve air resources within the planning area.
Livermore	
2003–2025 General Plan (2004)	The General Plan includes a Climate Change Element and the Open Space and Conservation Element contain a section on Air Quality. The Air Quality Section goal is to protect and improve Livermore's air quality and includes seven policies. The policies state that the City shall monitor the air quality and consider implementing a population cap if it declines; support and encourage alternative modes of transportation; and reduce commuting rates.
Pleasanton	
Pleasanton General Plan 2005–2025 (2009)	The General Plan includes an Air Quality Element which outlines current and future air quality conditions. The Element includes goals and policies to reduce building-related emissions, reduce vehicle trips, adhere to federal and state standards; and review future projects for potential impacts on air quality conditions.

Title	Summary
Tracy	
2025 General Plan (2011)	The General Plan includes several air quality objectives, such as improving air quality through land use decisions; promoting development to minimize emissions; providing a diverse and efficient transportation systems; and supporting local and regional air quality improvement efforts.

Although the Proposed Project would increase emissions from DMUs in the jurisdictions the alignment traverses, it 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 would not be inconsistent with regional and local air quality plans.

3.3.3 Environmental Setting

This section describes the environmental setting related to air quality. The study area includes SFBAAB and SJVAB; the footprint of the Proposed Project and the alternatives analyzed at an equal level of detail, plus 500 feet along the rail line and 1,000 feet around the stations (and station alternatives); and all affected intersections projected to operate at level of service (LOS) E and F.

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 is located within SFBAAB and SJVAB. The following sections discuss climate and meteorological information specific to these air basins.

San Francisco Bay Area Air Basin

Climate in SFBAAB is primarily affected by marine air flow and the basin's proximity to the San Francisco Bay. The Proposed Project would be in the Livermore Valley portion of SFBAAB. Temperatures are warm on summer days and cool on summer nights, and winter temperatures are mild. Mean maximum temperatures are in the high 80s to low 90s (Fahrenheit [F]) during the summer and the high 50s to low 60s during the winter.

Winds in the Livermore Valley are greatly influenced by the terrain. On the eastern side of the valley, which includes the Proposed Project area, 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.

The air pollution potential of the Livermore Valley is high, 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, Contra Costa, and Santa Clara Counties. On northeasterly wind flow days, most common in the early fall, ozone may be 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 can become

concentrated. Air pollution problems could intensify because of population growth and increased commuting to and through the valley (Bay Area Air Quality Management District 2017).

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 mountains in the east (8,000 to 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 to 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 Strait 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 bring a maritime influence to 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 range 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 (1,500 to 3,000 feet) (San Joaquin Valley Air Pollution Control District 2015).

3.3.3.2 Pollutants of Concern

Criteria Air Pollutants

As discussed above, the federal and state governments have established NAAQS and CAAQS, respectively, for six criteria pollutants. Ozone and NO_2 are considered regional pollutants because they (or their precursors) affect air quality on a regional scale. Pollutants such as CO, 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 Proposed Project area are ozone (including NO_X and ROG), CO, and PM[2],[3].

All criteria pollutants can have human health and environmental effects at certain concentrations. The ambient air quality standards for these pollutants (Table 3.3-1) are set to public health and the environment within an adequate margin of safety (CAA § 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 are discussed below.

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 usage 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 formed from atmospheric nitrogen and oxygen when combustion takes place under high temperature and/or high pressure. NO_2 is a reddish-brown irritating gas formed by the combination of NO and oxygen. In addition to serving as an integral participant in ozone formation, NO_X also directly acts as an acute respiratory irritant and increases susceptibility to respiratory pathogens.

Ozone poses a higher risk to those who already suffer from respiratory diseases (e.g., asthma), children, older adults, and people who are active outdoor. Exposure to ozone at certain concentrations can make breathing more difficult, cause shortness of breath and coughing, inflame and damage the airways, aggregate 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 2019a). 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 ppb of ozone and a 50 percent decrement in forced airway volume in the most responsive individual. Although the results vary, evidence suggest that sensitive populations (e.g., asthmatics) may be affected on days when the 8-hour maximum ozone concentration reaches 80 ppb (U.S. Environmental Protection Agency 2019b).

In addition to human health effect, ozone has been tied to crop damage, typically in the form of stunted growth, leaf discoloration, cell damage, and premature death. Ozone can also act as a corrosive and oxidant, resulting in property damage such as the degradation of rubber products and other materials.

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

[3] Most emission of NO_X are in the form of nitric oxide (Reşitoğlu 2018). 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 Proposed Project and is not evaluated further.

Reactive Organic Gases are compounds made up primarily of hydrogen and carbon atoms. Internal combustion associated with motor vehicle usage is the major source of hydrocarbons. Other sources of 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. Negative effects on human health are not caused directly by ROG, but rather by reactions of ROG to form secondary pollutants such as ozone.

Nitrogen Oxides serve as integral participants in the process of photochemical smog production. The two major forms of NO_X are 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.

Carbon Monoxide is a colorless, odorless, toxic gas produced by incomplete combustion of carbon substances, such as gasoline or diesel fuel. 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 to ambient CO (California Air Resources Board 2019).

Particulate Matter 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.

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. In 2008, CARB estimated that annual PM2.5 emissions for the entire Sacramento Metropolitan Area causes 90 premature deaths, 20 hospital admissions, 1,200 asthma and lower respiratory symptom cases, 110 acute bronchitis cases, 7,900 lost work days, and 42,000 minor restricted activity days (Sacramento Metropolitan Air Quality Management District 2013). 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 2019c).

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).

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 the fungus spores that cause Valley Fever. Principal characteristics surrounding these pollutants are discussed below.

Fine particulate matter (PM2.5) and **diesel particulate matter** exposure is strongly associated with mortality, respiratory diseases, and lung development in children, and other endpoints such as hospitalization for cardiopulmonary disease. CARB identified DPM as a TAC based on evidence demonstrating cancer effects in humans. The estimated cancer risk from exposure to diesel exhaust is much higher than the risk associated with any other TAC routinely measured in the Proposed Project area.

Asbestos is the name given to several 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 is not located within an area known to contain NOA. However, asbestos may have been used during construction of the existing structures that will be demolished by the Proposed Project.

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. While *C. immitis* is not typically found in SFBAAB, the fungus is endemic to SJVAB (U.S. Geological Survey 2000).

3.3.3.3 Existing Air Quality Conditions

Local Monitoring Data

Several ambient air quality monitoring stations are in SFBAAB and SJVAB to monitor progress toward attainment of NAAQS and CAAQS (Table 3.3-1). BAAQMD, SJVAPCD, and CARB maintain these stations. Table 3.3-3 summarizes the values measured at monitoring stations on or near the Proposed Project alignment and provides 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—Assigned to areas where monitored pollutant concentrations violate the standard in question.

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

Table 3.3-4 summarizes the attainment status for Alameda and San Joaquin Counties regarding 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 alignment is 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 scattered along the corridor.

Table 3.3-3. Ambient Criteria Pollutant Concentrations at Air Quality Monitoring Stations Closest to the Proposed Project Alignment (2015–2017)

	Tri-Valley (BAAQMD)			Altamont Pass (BAAQMD)			Tracy to Lathrop (SJVAPCD)		
	Livermore (793 Rincon Ave)			Livermore (13224 Patterson Pass Rd)			Tracy Airport		
Pollutant and Standards	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**
Ozone (O_3) [a]									
Maximum 1-hour concentration (ppm)	0.105	0.102	0.109	0.099	0.109	0.057	0.107	0.109	0.093
Maximum 8-hour concentration (ppm)	0.081	0.085	0.086	0.082	0.087	0.051	0.091	0.092	0.082
Number of days standard exceeded[1]									
CAAQS 1-hour (>0.09 ppm)	1	2	5	4	5	0	4	4	0
NAAQS 8-hour (>0.070 ppm)	7	4	6	5	15	0	19	19	5
CAAQS 8-hour (>0.070 ppm)	7	6	6	3	8	0	21	19	7
Carbon Monoxide (CO) [b]									
Maximum 8-hour concentration (ppm)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Maximum 1-hour concentration (ppm)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Number of days standard exceeded[1]									
NAAQS 8-hour (≥9 ppm)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CAAQS 8-hour (≥9.0 ppm)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NAAQS 1-hour (≥35 ppm)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CAAQS 1-hour (≥20 ppm)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nitrogen Dioxide (NO_2) [a]									
National maximum 1-hour concentration (ppm)	49.6	41.3	45.4	18.9	23.9	12.9	35.0	28.0	40.5
State maximum 1-hour concentration (ppm)	49	41	45	18	23	12	35	28	40
State annual average concentration (ppm)	10	8	8	n/a	n/a	n/a	6	4	4
Number of days standard exceeded									
NAAQS 1-hour (98th Percentile>0.100 ppm)	0	0	0	0	0	0	0	0	0
CAAQS 1-hour (0.18 ppm)	0	0	0	0	0	0	0	0	0
Annual standard exceeded?									
NAAQS Annual (>0.053 ppm)	No	No	No	No	No	No	No	No	No
CAAQS Annual (>0.030 ppm)	No	No	No	No	No	No	No	No	No

	Tri-Valley (BAAQMD)			Altamont Pass (BAAQMD)			Tracy to Lathrop (SJVAPCD)		
	Livermore (793 Rincon Ave)			Livermore (13224 Patterson Pass Rd)			Tracy Airport		
Pollutant and Standards	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**
Particulate Matter (PM10)[2, a]									
National[3] maximum 24-hour concentration (µg/m³)	n/a	n/a	n/a	n/a	n/a	n/a	58.3	53.0	152.0
National[3] second-highest 24-hour concentration (µg/m³)	n/a	n/a	n/a	n/a	n/a	n/a	57.1	45.7	85.4
State[4] maximum 24-hour concentration (µg/m³)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
State[4] second-highest 24-hour concentration (µg/m³)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
National annual average concentration (µg/m³)	n/a	n/a	n/a	n/a	n/a	n/a	20.9	18.6	22.6
State annual average concentration (µg/m³)[5]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Number of days standard exceeded[1]									
NAAQS 24-hour (>150 µg/m³)[6]	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0
CAAQS 24-hour (>50 µg/m³)[6]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Annual standard exceeded?									
CAAQS Annual (>20 µg/m³)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Particulate Matter (PM2.5) [a]									
National[3] maximum 24-hour concentration (µg/m³)	31.1	22.3	41.5	n/a	n/a	n/a	n/a	n/a	n/a
National[3] second-highest 24-hour concentration (µg/m³)	31.0	19.6	37.6	n/a	n/a	n/a	n/a	n/a	n/a
State[4] maximum 24-hour concentration (µg/m³)	31.1	22.3	41.5	n/a	n/a	n/a	39.0	28.5	47.9
State[4] second-highest 24-hour concentration (µg/m³)	31.0	19.6	37.6	n/a	n/a	n/a	36.6	26.7	42.8
National annual average concentration (µg/m³)	8.7	7.4	8.4	n/a	n/a	n/a	n/a	n/a	n/a
State annual average concentration (µg/m³)[5]	8.8	7.5	8.4	n/a	n/a	n/a	n/a	n/a	n/a
Number of days standard exceeded[1]									
NAAQS 24-hour (>35 µg/m³)	0	0	2	n/a	n/a	n/a	n/a	n/a	n/a
Annual standard exceeded?									
NAAQS Annual (>12.0 µg/m³)	Yes	Yes	Yes	n/a	n/a	n/a	n/a	n/a	n/a
CAAQS Annual (>12 µg/m³)	Yes	Yes	Yes	n/a	n/a	n/a	n/a	n/a	n/a
Sulfur Dioxide (SO_2)									
No data available	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Sources: [a] California Air Resources Board 2018a; [b] U.S. Environmental Protection Agency 2018a.
[1] An exceedance of a standard is not necessarily a violation because of the regulatory definition of a violation.

[2] National statistics are based on standard conditions data. In addition, national statistics are based on samplers using federal reference or equivalent methods.
[3] State statistics are based on local conditions data.
[4] Measurements usually are collected every 6 days.
[5] State criteria for data sufficiently complete for calculating valid annual averages are more stringent than the national criteria.
[6] 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.

CAAQS = California Ambient Air Quality Standards
NAAQS = National Ambient Air Quality Standards
ppm = parts per million
µg/m^3 = micrograms per cubic meter
SO_2 = sulfur dioxide
O_3 = ozone
CO = carbon monoxide
NO_2 = nitrogen dioxide
PM2.5 = particulate matter 2.5 microns or less in diameter
PM10 = particulate matter 10 microns or less in diameter
n/a = not available

Table 3.3-4. Federal and State Attainment Status

	SFBAAB		SJVAB	
Pollutant	**Federal**	**State**	**Federal**	**State**
Ozone (O_3)	Nonattainment (marginal)	Nonattainment	Nonattainment (extreme)	Nonattainment
Particulate Matter (PM10)	Attainment/ Unclassified	Nonattainment	Maintenance (serious)	Nonattainment
Particulate Matter (PM2.5)	Nonattainment (moderate)	Nonattainment	Nonattainment (serious/moderate)	Nonattainment
Carbon Monoxide (CO)	Attainment	Attainment	Attainment	Unclassified
Nitrogen Dioxide (NO_2)	Attainment/ Unclassified	Attainment	Attainment/ Unclassified	Attainment
Sulfur Dioxide (SO_2)	Attainment/ Unclassified	Attainment	Attainment/ Unclassified	Attainment

Sources: California Air Resources Board 2018b; U.S. Environmental Protection Agency 2019.
SO_2 = sulfur dioxide
O_3 = ozone
CO = carbon monoxide
NO_2 = nitrogen dioxide
PM2.5 = particulate matter 2.5 microns or less in diameter
PM10 = particulate matter 10 microns or less in diameter
SFBAAB = San Francisco Bay Area Air Basin
SJVAB = San Joaquin Valley Air Basin

3.3.4 Impact Analysis

3.3.4.1 Methods for Analysis

The methodology used to evaluate air quality impacts for the Proposed Project and the alternatives analyzed at an equal level of detail is described in this section. A full list of assumptions is provided in Appendix L, *Air Quality, Energy, Greenhouse Gas Emissions, and Health Risk Assessment Supporting Documentation*.

Since the Proposed Project would introduce new rail service between the existing Dublin/Pleasanton Bay Area Rapid Transit (BART) Station and the proposed North Lathrop Station, several impact determinations are based on the criteria pollutant emissions across the entire corridor and consider emissions generated by the Proposed Project. This approach ensures total emissions and air quality impacts associated with the Proposed Project are accurately assessed in accordance with air district guidance and thresholds. A summary of the methodology is provided below.

Mass Emissions Modeling

Construction of Proposed Project

The Proposed Project falls under the jurisdiction of two air districts—BAAQMD and SJVAPCD. Construction activities in the BAAQMD and 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), train exhaust, site grading and earth movement, demolition, 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 each element in each air district were based on a combination of engineering input and model defaults.

- **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 2016). Criteria pollutants were estimated by multiplying the CalEEMod emission factors by the equipment inventory provided by the project engineer (Lo pers. comm.).
- **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 project engineer (Lo pers. comm. A). Emission factors for haul trucks, flatbed trucks, and flatbed tractors are based on aggregated-speed emission rates for EMFAC's T7 Single vehicle category. Factors for onsite dump, water, and concrete trucks were based on 5 miles per hour (mph) emission rates for the T6 Heavy category, and factors for onsite pickups and SUVs are based on 5 mph emission rates for the light-duty auto/light-duty truck (LDA-LDT) and medium-duty vehicle (MDV) categories, respectively. Factors for employee commute vehicles are based on a weighted average for all vehicle speeds

for EMFAC's LDA/LDT vehicle categories. Fugitive re-entrained road dust emissions were estimated using USEPA's (2006; 2011) *Compilation of Air Pollutant Emission Factors* (AP-42), Sections 13.2.1 and 13.2.2.

- **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 (1998, 2006) AP-42. Data on the total graded acreage and quantity of cut-and-fill material were provided by project engineer (Lo pers. comm.).
- **Demolition**: Fugitive dust emissions from building demolition are based on data (e.g., square feet demolished) provided by the project engineer and calculation methodologies from the CalEEMod User's Guide (Lo pers. comm.; Trinity Consultants 2016).
- **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 (Lo pers. comm.; Trinity Consultants 2016).

Emissions by Segment

Emissions from each of the above sources are presented at the daily and annual time scales and compared with the air district construction thresholds discussed below. As described in Chapter 2, *Project Description*, each segment includes multiple facilities. For example, the Altamont segment includes upgrades for the Altamont Alignment, construction of a train station, and construction of an OMF. Construction of each individual facility would include one to three phases, including site work, rail work, and structure work. It was conservatively assumed that the construction phases for each element could have overlapping activity in any given day throughout a year. Similarly, segments that contain multiple facilities (such as Altamont Pass) were assumed to have concurrent construction, where daily emissions for each segment were estimated by summing emissions for all covered facilities. The highest daily emissions in each construction year were selected as the peak day for impact analysis purposes. This approach is meant to convey a worst-case scenario based on available information, and, therefore, is not necessarily representative of actual emissions that would be incurred daily throughout the construction period.

Emissions by Air District

The Proposed Project falls under the jurisdiction of two air districts—BAAQMD and SJVAPCD—both of which have adopted their own distinct local thresholds of significance. To compare emissions to the federal and state thresholds (see below), construction activities occurring within each air district were quantified and analyzed separately.[4]

Proposed Project facilities within each air district were identified based on the location of construction activities. Emissions generated by construction of facilities that would occur exclusively within one air district (e.g., Tri-Valley segment) were wholly assigned to that air district. Emissions estimates for segments that span both SJVAPCD and BAAQMD were apportioned to each air district based on the location of construction activity. For example, construction of the Altamont

[4] CARB acknowledges that air basins, including SJVAB, are both contributors and receptors of pollutant transport throughout the state. While technical documents have been published analyzing the transport relationship among California air basins, quantifying the effects of pollutant transport as a result of project implementation would require detailed projections of future climatic and meteorological conditions. Air districts in the Project area have adopted thresholds and mitigation requirements that commensurate with expected criteria air pollutant contributions from downwind air basins.

segment would occur in both BAAQMD and SJVAPCD. Accordingly, the emissions estimates associated with track construction were apportioned to BAAQMD and SJVAPCD based on the number of rail miles constructed within each air district. Appendix L, *Air Quality, Energy, Greenhouse Gas Emissions, and Health Risk Assessment Supporting Documentation*, summarizes the location of each proposed alignment, proposed or alternative stations, and proposed or alternative OMF by geographic segment and the air district scaling factors used in the analysis, as appropriate.

Proposed Project Emissions Estimates

Daily and annual criteria pollutant emissions generated by construction of the Proposed Project were quantified using the methods described above. Table 3.3-5 summarizes the facilities in the Proposed Project used to derive the construction emissions estimate.

Table 3.3-5. Proposed Project Facilities for Construction Emissions Estimates

Segment	Facilities used for Construction Emission Estimate[a]
Tri-Valley	Tri-Valley Alignment with Dublin/Pleasanton Station, Isabel Station, and Greenville Station
Altamont	Altamont Alignment (with Owens-Illinois Industrial Lead Variant 2, Double Track) with Mountain House Station and Tracy OMF
Tracy to Lathrop	Tracy to Lathrop Alignment Variant 2, Double Track with Downtown Tracy Station, River Islands Station, and North Lathrop Station

[a] The combination of Proposed Project facilities results in the highest total emissions estimates across the entire corridor. Refer to Chapter 2, *Project Description*, for more information.

Proposed Project Operation

Operation of the Proposed Project would increase passenger train activities (including train movement and idling), as well as attract additional motor vehicles to the new Valley Link transit stations and new OMFs. Proposed Project operations would provide new service, which would reduce 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 opening (2025) and design year (2040) conditions to capture changes associated with the Proposed Project and regional emission factors.

Valley Link Train Operation

The proposed new passenger rail service would result in diesel fuel combustion and associated criteria pollutant emissions (or electricity consumption and associated electricity generation emissions for the BEMU technology variants) from train activity. Table 3.3-6 summarizes the weekday train trip counts anticipated to occur under Proposed Project operation. DMU, DLH and two battery-related technology variants (HBMU and BEMU) are being considered. If one of the DMU, HBMU, or DLH technology variants are chosen, train engines would meet Tier 4 emissions standards (Lo pers. comm.). The BEMU technology variant would not have direct train emissions but would have indirect emissions due to electricity use.

ROG, NO_X, CO, and PM emissions generated by Valley Link operation were estimated using USEPA's (2009) train emissions standards and fuel consumption estimates from industry references and/or provided by the project engineering team (Bombardier 2018, Lo pers. comm.). Daily criteria pollutant emissions were annualized assuming 253 operating days per year. Emissions were apportioned to BAAQMD and SJVAPCD based on the number of track miles within each air district.

Table 3.3-6. Valley Link Weekday Train Trips (1-way)

	Evaluation Year and Build Condition		
Segment	**2025 Interim**	**2025 Full Build**	**2040 Full Build**
Tri-Valley	106	106	144
Altamont	106	106	144
Tracy to Lathrop	--	54	100

Source: Lo pers. comm.

Valley Link trains would idle at stations while loading and unloading passengers. Idle time was assumed to be 2 minutes per station stop.

OMF Operations

The Proposed Project proposes to construct an OMF that would service and maintain the Valley Link rail transit cars. OMF worker vehicles would generate air pollutant emissions during home-work trips; and the OMF buildings would use electricity during train maintenance and repair activities that would lead to offsite air pollutant emissions related to electricity production. In addition, OMF building would consume electricity and natural gas for temperature control, which would also lead to offsite air pollutant emissions related to energy production.

Displaced Vehicle Miles

The Valley Link service would cause some commuters to mode-shift from automobile use to transit use. This would cause a reduction in vehicle miles traveled (VMT) associated with weekday commuter travel. AECOM provided displaced VMT by analysis year (e.g., 2025, 2040) (Lo pers. comm.). The CT-EMFAC2017 default speed-bin distribution profile was applied to the above-mentioned VMT reduction estimates to estimate passenger vehicle emissions reductions for Alameda and San Joaquin Counties. Emissions reduction estimates were then apportioned to the SJVAPCD and BAAQMD air districts based on the Proposed Project alignment length within each air district.

Net Operational Emissions

The impact analysis evaluates total operational emissions inclusive of the three emission components (Valley Link Train Operation, OMF Operations, and Displaced Vehicle Miles) discussed above. Emissions related to train movements and idling, station platform activity, and OMF operations would result in an increase in daily criteria pollutants, relative to no build condition (also referred to as No Project Alternative). Displaced VMT would result in a decrease in daily emissions, relative to the No Project Alternative. Proposed Project–related emissions increases and decreases are netted to disclose net Proposed Project operational emissions.

Health Risk Analysis

Construction

Construction of the Project would generate DPM from diesel-powered off-road equipment, trains, and haul trucks. Exposure to construction-related DPM was assessed for three alignment segments: Tri-Valley, Altamont, and Tracy to Lathrop. The analysis also evaluates health risks from construction of proposed stations (Dublin/Pleasanton, Isabel, Greenville, Mountain House,

Downtown Tracy, River Islands, and North Lathrop), OMFs (Interim OMF, Tracy OMF), station alternatives (Southfront Road Station Alternative, Mountain House Station Alternative, Downtown Tracy Station Parking Alternatives 1 and 2), and the West Tracy OMF Alternative.

Health risks were predicted in terms of excess cancer, non-cancer hazard impacts, and elevated PM2.5 concentrations. USEPA's AERMOD dispersion model was used to estimate DPM annual concentrations at sensitive land uses based on the maximum daily exhaust emissions, with exhaust emissions of PM2.5 and PM10 as surrogate for DPM based on BAAQMD and SJVAPCD guidance, respectively. Project-level cancer risk and non-cancer hazard impacts were estimated based on annual DPM concentrations from AERMOD using CARB's Hotspots Analysis and Reporting Program Version 2 (HARP 2). HARP 2 incorporates OEHHA's recent guidance update, which includes age-specific factors to take into account the increased sensitivity to carcinogens during early-in-life exposure.

The Tri-Valley, Altamont and Tracy to Lathrop segments were modeled as area sources to depict the environmental footprint which includes the construction areas of rail segments, bridges, and roads. All of the residential areas within the 1,000 feet of the three alignments are identified and receptors are placed at the locations surrounding the alignments: three segments for the Tri-Valley Alignment (Doherty Road to Fallon Road, Dublin for Section 1, Isabel Ave to North Livermore Ave, Livermore for Section 2 and First Street to Lawrence Drive, Livermore for Section 3), one segment for the Altamont Alignment and two segments for the Tracy to Lathrop Alignment (South Lammers Road to West Grand Line Road, Tracy for Section 1 and Steward Road to Brookfield Ave, Lathrop for Section 2). The length of the segments ranges from 2 to 7 miles. Only residential receptors were considered since these typically incur the highest health risks due to prolonged exposure durations.

All the stations and proposed OMF locations were modeled as area sources. Individual residences could reasonably be identified and were therefore modeled at each location.

Operation

The introduction of new rail service would increase DPM emissions along the proposed alignment corridors and at the proposed OMF location. Health risks from DPM emissions from train emissions (train movement and idling) were modeled, as described further below in this section. Health risks were modeled for opening year (2025) and design year (2040) conditions.

Proposed Project-related health risk would be based on the intensity of DPM emissions, local meteorology conditions, and sensitive receptor proximity to the emissions source (i.e., rail line and station stops). For each segment of the alignment, 2025 interim (for the Tri-Valley Alignment only), opening (2025) and design (2040) scenario analyses were performed to determine the maximum potential health risk impacts.

DPM emissions were estimated using the operating characteristics described earlier in Table 3.3-6. Health risks for each geographic segment were based on a combination of project engineering input and defaults.

- **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 and is USEPA's preferred air dispersion model for near-field air quality impact assessment. The model was used to assess the DPM and PM2.5 concentrations (BAAQMD only) that occur as result of operational activities associated with the project.

- **Track Layout and Receptor Locations:** The track alignments were modeled as a line source representing a rail segment. All of the residential areas within the 1,000 feet of the three alignments are identified and receptors are placed at three segments for the Tri-Valley Alignment (Doherty Road to Fallon Road, Dublin for Section 1, Isabel Ave to North Livermore Ave, Livermore for Section 2 and First Street to Lawrence Drive, Livermore for Section 3), one segment for the Altamont Alignment and two segments for the Tracy to Lathrop Alignment (South Lammers Road to West Grand Line Road, Tracy for Section 1 and Steward Road to Brookfield Ave, Lathrop for Section 2). The length of the segments ranges from 2 to 7 miles.
- **Meteorology:** For each segment, 5 years of representative meteorological data was acquired from the air district (BAAQMD or SJVAPCD) for use in the air dispersion model. For SJVAPCD locations, the meteorological data prepared by SJVAPCD using the non-default option of "adjusted friction velocity (u*) in AERMET was used in the analysis. Table 3.3-7 shows the representative meteorological data for each geographic segment.
- **Exposure Assessment**: The exposure assessment was conducted using HARP 2. This software originally developed to assist with the programmatic requirements of California's Air Toxics "Hot Spots" Program (Assembly Bill 2588) and has been extend for use in conducting health risk assessments (HRAs) under CEQA. For this study, only the exposure module was used which calculates cancer risk from the AERMOD modeled concentrations using the 2015 OEHHA HRA guidance.
- **Source Characterization:** The length of the modeled segments ranges from 2 to 7 miles, and they are 9.1 meters wide. The width was based on a track width of 3.1 meters plus 3 meters on either side to include turbulent wake mixing effects. The operational train emissions were based on the DLH technology variant because it is the worst case of the diesel technology variants (DMU, HBMU, and DLH). Train release height and initial vertical dispersion were separated into day and night periods to include changes in plume rise from the trains. The approach was first developed by CARB in their Roseville Railyard Study (California Air Resources Board 2004a) and further developed in the 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, and a nighttime plume height and initial vertical dimension of 10.98 and 2.55 meters, respectively. These calculations are based on a 4.52-meter stack height for the train.
- **Land-Use Characterization:** Most locations within the Valley Link rail alignment where most of the population exposure occurs are within urban land-use environment. Thus, the urban dispersion modeling algorithm was used in the assessment. This 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. USEPA guidance was followed to define the population used in the model based on published census data.

Table 3.3-7. Modeled Area and Representative Meteorology by Geographic Segment

Segment	Modeled Area	Representative Meteorology
Tri-Valley	Section 1	Pleasanton, CA (2010, 2011, 2012, 2014, 2015)[a]
Tri-Valley	Section 2	Livermore Airport (2009–2013)
Tri-Valley	Section 3	Livermore Airport (2009–2013)
Altamont		Livermore Airport (2009–2013)

Segment	Modeled Area	Representative Meteorology
Tracy to Lathrop	Segment 1	Tracy (2004–2008)[b]
Tracy to Lathrop	Segment 2	Modesto (2012–2016)

[a] The meteorological data for Pleasanton do not meet the 90% data capture by discrete quarter check and is missing just over 10% of the wind directions in the fourth quarter.
[b] Derived from MM5 data assimilation weather model.

Train Idling

The idling HRAs were performed for Tri-Valley (proposed Dublin/Pleasanton, Isabel, Greenville Stations, and the Southfront Road Station Alternative), Altamont (proposed Mountain House Station and Mountain House Station Alternative) and Tracy to Lathrop (proposed Downtown Tracy, River Islands and North Lathrop stations, and the Downtown Tracy Station Alternative 1). The idling HRAs were based on the DLH technology variant.

Table 3.3-8 provides the meteorological data used in the dispersion modeling for the train idling at the stations. Health risks were based on a similar approach to the train operation with the receptors placed at the residential areas within 1,000 feet surrounding the stations identified based on Google Maps, and the following changes to the source characterization.

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

Table 3.3-8. Meteorological Data Used for the Tri-Valley, Altamont, and Tracy to Lathrop Stations

Station	Meteorological Data
Tri-Valley Stations	
Dublin/Pleasanton Station	Pleasanton
Greenville Station	Livermore
Isabel Station	Livermore
Southfront Road Station Alternative	Livermore
Altamont Stations	
Mountain House Station	Tracy
Mountain House Station Alternative	Tracy
Tracy to Lathrop Stations	
Downtown Tracy Station	Tracy
Downtown Tracy Station Parking Alternative 1 and 2	Tracy
River Islands Station	Modesto
North Lathrop Station	Modesto

I-580 Realignment

The project would include realignment of Interstate (I-) 580 between Greenville Road and the BART Dublin/Pleasanton Station in order to accommodate the new tracks and stations. In some cases, the westbound lanes would be realigned; in some cases, the eastbound lands would be realigned. AN

HRA was conducted to examine the effect of realigning I-580 in the areas where I-580 travel lanes would be located closer to sensitive receptors (primarily residences) with the realignment.

Eight locations were selected where travel lanes on I-580 would be shifted closer to existing receptors (in some of these locations the project would move some travel lanes closer and others further away; these countervailing effects were taken into account in the analysis).

The BAAQMD maintains an inventory of health risks associated with roadway sources in the SFBAAB (Winkel 2018). The inventory was used to characterize the net effect of health risks associated with moving vehicle emissions on I-580 closer to or further away from the existing sensitive receptors identified in Table 3.3-9. BAAQMD's inventory is based on vehicle volumes and emission factors in 2015. There were approximately 77 million annual trips between El Charro Road and Hopyard Road on I-580 in 2015, and regional vehicle volumes are anticipated to grow by about 1 percent per annum (California Department of Transportation 2020; Metropolitan Transportation Commission 2017). Conversely, vehicle emission factors are anticipated to decrease as a function of time because of natural fleet turnover. CARB's EMFAC model predicts that Alameda County average vehicle emissions of diesel PM2.5 are expected to decline by 91 percent between 2015 and 2040 and total PM2.5 emissions are expected to decline by 35 percent. Analysts used the annual growth in vehicle trips and decrease in PM2.5 emissions to adjust the 2015 risks from BAAQMD's inventory to be representative of conditions in 2040. BAAQMD's inventory was also adjusted to 2018 conditions to more accurately inform the CEQA baseline condition.

Repositioning existing travel lanes on I-580 would increase TAC concentrations at certain receptor locations and would result in corresponding decreases at other locations. Because diesel-related exhaust, specifically DPM, is considered a carcinogenic TAC by CARB, an HRA was conducted to assess the risk (i.e., cancer risks and chronic acute risks) associated with shifting I-580 travel lanes. The HRA also analyzed potential changes in PM2.5 concentrations at receptor locations, consistent with guidance from the BAAQMD (2017). Table 3.3-9 identifies the receptors within the vicinity of I-580 that would experience the largest shift in distance to or from existing I-580 travel lanes. At each receptor location, the table summarizes the distances to the receptor under existing conditions and with the travel lane relocation under the project.

Table 3.3-9. Primary Receptors Affected by I-580 Realignment

#	Receptor	Affected Lanes	I-580 Distance to Receptor (feet)		
			Existing	Repositioned	Difference
1	N. of BART Dublin/Pleasanton Station mixed use	Westbound	273	241	-32
2	Collier Canyon Road residence	Westbound	165	143	-22
3A	Univ. of Phoenix	Westbound	200	195	-5
3B	Univ. of Phoenix	Eastbound	295	309	+14
4A	Shea Sage Residential	Westbound	297	293	-4
4B	Shea Sage Residential	Eastbound	381	398	+17
5A	Saddleback Residential	Eastbound	368	355	-13
5B	Saddleback Residential	Westbound	460	471	+11
6	E. of Las Colinas Road residential	Westbound	225	206	-19
7A	W. of Vasco Road residential	Westbound	103	98	-5
7B	W. of Vasco Road residential	Eastbound	190	219	+29

#	Receptor	Affected Lanes	I-580 Distance to Receptor (feet)		
			Existing	Repositioned	Difference
8	E. of Laughlin Road residential	Westbound	169	161	-8

Cumulative Health Risk Analysis

Multiple sources of cumulative (existing sources and future planned) DPM emissions are located within 1,000 feet of the Valley Link alignment and sensitive receptors, including the following:

- Existing sources: Multiple stationary, rail, and roadway sources located within 1,000 feet of the alignment generate DPM.
- Planned land use development: Land use development in the region surrounding the alignment would increase traffic levels and would result in increased vehicle-related emissions along roadways, although, over time, state and federal regulations would reduce the allowed emission rates for new vehicles. Planned development may also generate additional DPM from emergency generators and truck loading bays, as well as DPM during construction of the Proposed Project.

A quantitative HRA has not been conducted to estimate future DPM-related health risks to nearby sensitive receptors due to cumulative land use development since construction and operational details are not available and those projects would be responsible to analyze their contributions. The cumulative HRA, therefore, focuses on ambient concentrations from stationary, rail, and roadway sources.

BAAQMD has developed Google Earth files that identify source-specific health risks throughout SFBAAB. These files were used to screen the alignment and select one area per geographic segment to analyze cumulative health risks. The selected areas were chosen based on their proximity to residential receptors and the alignment, as well as overall density of existing sources. Where appropriate, BAAQMD's distance multipliers were used to adjust risks from existing generators and gasoline dispensing facilities. Total cumulative health risks at the representative locations in each geographic segment were calculated by adding the background health risks sources to the health risk and hazard impacts for the Proposed Project.

Note that the cumulative HRA was only performed for portions of the Proposed Project area located within BAAQMD, consistent with local air district requirements. Current SJVAPCD guidance 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.).

Carbon Monoxide Hot Spot Analysis

The introduction of new commuter rail service would attract motor vehicles to new transit stations. Analysis of potential CO emissions was conducted by screening potential traffic volumes near one of the Valley Link stations and on I-580 in the Tri-Valley, which are the locations with the highest potential traffic volumes. Traffic volumes were compared to the BAAQMD traffic volume screening values for CO analysis. As explained below, since volumes were below the screening value, no quantitative analysis was conducted.

3.3.4.2 Thresholds of Significance

Appendix G of the CEQA Guidelines (14 Cal. Code Regs. § 15000 et seq.) identify significance criteria to be considered for determining whether a project could have significant impacts on existing air quality.

A project impact would be considered significant if construction or operation of the project would cause any of the following:

1. Conflict with or obstruct implementation of the applicable air quality plan.
    - For the purposes of this analysis, "conflict with or obstruct implementation of" is defined as circumstances in which a project would worsen existing air quality violations or exceed the growth assumptions utilized by MTC and SJCOG.
2. 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 the purposes of this analysis, a "cumulatively considerable net increase" is defined as circumstances in which total direct emissions exceed the pertinent air quality thresholds of significance, as presented below in Table 3.3-10.
3. Expose sensitive receptors to substantial pollutant concentrations.
    - For this analysis, schools, daycare facilities, places of assembly, medical facilities, parks, and residences are considered sensitive receptor locations. A "substantial pollutant concentration" is defined as levels more than the applicable air district thresholds as described below under *Supplemental Thresholds.*
4. 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.

Table 3.3-10. BAAQMD and SJVAPCD Mass Emission Thresholds

Analysis	BAAQMD	SJVAPCD
Regional Criteria Pollutants (Construction)	ROG: 54 lbs/day NO_X: 54 lbs/day PM10: 82 lbs/day (exhaust only) PM2.5: 54 lbs/day (exhaust only)	ROG: 10 tons/year or 100 lbs/day[a] NO_X: 10 tons/year or 100 lbs/day[a] PM10: 15 tons/year or 100 lbs/day[a] PM2.5: 15 tons/year or 100 lbs/day[a] CO: 100 tons/year or 100 lbs/day[a] SO_X: 27 tons/year or 100 lbs/day[a]
Regional Criteria Pollutants (Operation)	ROG: Same as construction NO_X: Same as construction PM10: 82 lbs/day PM2.5: 54 lbs/day	Same as construction

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

ROG = reactive organic gases
lbs = pounds
NO_X = nitrogen oxide
PM10 = particulate matter 10 microns in diameter and smaller
PM2.5 = particulate matter 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

CEQA Guidelines Section 15125 indicates 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 holding 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 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 departing from that norm 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, 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 experience reductions in the future due to (a) continuing engine advancements, (b) more stringent air quality regulations, and (c) the retirement of older, more-polluting vehicles from the service population fleet. Quantifying emissions utilizing current vehicle emissions rates would not only represent a fictitious scenario but would also overestimate emissions reductions and potential air quality benefits achieved by the project.
2. Using the relatively higher "existing conditions" emissions factors to quantify emissions reduction benefits assorted with Project-related VMT reductions in the years 2025 and 2040 would overstate the 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 the purposes of this analysis, the CEQA assessment evaluates Proposed Project emissions under opening (2025) and design (2040) year conditions, compared to the future No Project Alternative. 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.

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 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, as shown in Table 3.3-10, for criteria pollutants. The criteria pollutant thresholds identified in Table 3.3-10 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, NO_X, and PM thresholds, and SJVAPCD's CO and SO_X 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 assures that new emissions would not slow regional progress toward attaining NAAQS. BAAQMD and SJVAPCD have concluded that the stationary pollutants described under the NSR program are equally significant to those pollutants generated with land use projects. BAAQMD's and SJVAPCD's thresholds identified in Table 3.3-10 were set as the total emission thresholds associated within the NSR program to help attain NAAQS (Bay Area Air Quality Management District 2011; San Joaquin Valley Air Pollution Control District 2015a).

Accordingly, emissions more than BAAQMD or SJVAPCD thresholds, shown in Table 3.3-10, 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.

Health-Based Thresholds for Proposed 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 SJVAB, 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, *Environmental Setting*, all criteria pollutants that would be generated by the Proposed Project 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, NO_2, SO_2, 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 NO_X), 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 only on those localized pollutants with the greatest potential to result in a significant, material impact on human health. This analysis is consistent with the current state-of-practice and published guidance by SJVAPCD (2015), BAAQMD (2017), California Air Pollution Control Officers Association (2009), OEHHA (2015), and CARB (2000). The pollutants of concern include (1) localized CO, (2) DPM[5] and localized PM, (3) asbestos, and (4) *C. immitis* (Valley Fever). Locally adopted thresholds of significance for each pollutant are identified below.

Regional Project-Generated Criteria Pollutants (Ozone Precursors and Regional PM)

Adverse health effects induced by regional criteria pollutant emissions generated by the Proposed Project (ozone precursors and PM) are highly dependent on a multitude of interconnected variables (e.g., cumulative concentrations, local meteorology and atmospheric conditions, the number and character of exposed individuals [e.g., age, gender]). For these reasons, ozone precursors (ROG and NO_X) contribute to the formation of ground-borne ozone on a regional scale, where emissions of ROG and NO_X generated in one area may not equate to a specific ozone concentration in that same area. Similarly, some types of particulate pollutant may be transported over long distances or formed through atmospheric reactions. As such, the magnitude and locations of specific health

[5] DPM is the primary TAC of concern for mobile sources; of all controlled TACs, emissions of DPM are estimated to be responsible for approximately 70 percent of the total ambient TAC risk (California Air Resources Board 2000). Given the risks associated with DPM, tools and factors for evaluating human health impacts from Project-generated DPM have been developed and are readily available. Conversely, tools and techniques for assessing Project-specific health outcomes because of exposure to other TACs (e.g., benzene) remain limited. These limitations impede the ability to evaluate and precisely quantify potential public health risks posed by TAC exposure.

effects from exposure to increased ozone or regional PM concentrations are the product of emissions generated by numerous sources throughout a region, as opposed to a single individual project.

Models and tools have been developed to correlate regional criteria pollutant emissions to potential community health impacts. Appendix L, *Air Quality, Energy, Greenhouse Gas Emissions, and Health Risk Assessment Supporting Documentation*, summarizes many of these tools, identifies the analyzed pollutants, describes their intended application and resolution, and analyzes whether they could be used to reasonably correlate project-level emissions to specific health consequences. As described in Appendix L, while there are models capable of quantifying ozone and secondary PM formation and associated health effects, these tools were developed to support regional planning and policy analysis and have limited sensitivity to small changes in criteria pollutant concentrations induced by individual projects. Therefore, translating project-generated criteria pollutants to the locations where specific health effects could occur or the resultant number of additional days of nonattainment cannot be estimated with a high degree of accuracy for relatively small projects (relative to the regional air basin).

Technical limitations of existing models to correlate project-level regional emissions to specific health consequences are recognized by air quality management districts throughout the state, including the SJVAPCD and South Coast Air Quality Management District (SCAQMD), who provided amici curiae briefs for the Friant Ranch legal proceedings. In its brief, SJVAPCD (2015) acknowledges that while HRAs for localized air toxics, such as DPM, are commonly prepared, "it is not feasible to conduct a similar analysis for criteria air pollutants because currently available computer modeling tools are not equipped for this task." The air district further notes that emissions solely from the Friant Ranch project (which equate to less than one-tenth of one percent of the total NO_X and VOC in the Valley) is not likely to yield valid information," and that any such information should not be "accurate when applied at the local level." SCAQMD (2015) presents similar information in their brief, stating that "it takes a large amount of additional precursor emissions to cause a modeled increase in ambient ozone levels".[6]

As discussed above, air districts develop region-specific CEQA thresholds of significance in consideration of existing air quality concentrations and attainment or nonattainment designations under the NAAQS and CAAQS. The NAAQS and CAAQS are informed by a wide range of scientific evidence that demonstrates there are known safe concentrations of criteria pollutants. While recognizing that air quality is cumulative problem, air districts typically consider projects that generate criteria pollutant and ozone precursor emissions below these thresholds to be minor in nature and would not adversely affect air quality such that the NAAQS or CAAQS would be exceeded. Emissions generated by the project could increase photochemical reactions and the formation of tropospheric ozone and secondary PM, which at certain concentrations, could lead to increased incidence of specific health consequences. Although these health effects are associated with ozone and particulate pollution, the effects are a result of cumulative and regional emissions. As such, a project's incremental contribution cannot be traced to specific health outcomes on a regional scale, and a specific quantitative correlation of project-generated regional criteria pollutant emissions to specific human health impacts is not included in this analysis. While there is no available tool to

[6] For example, SCAQMD's analysis of their 2012 Air Quality Attainment Plan showed that modeled NO_X and ROG reductions of 432 and 187 tons per day, respectively, only reduced ozone levels by 9 ppb. Analysis of SCAQMD's Rule 1315 showed that emissions of NO_X and ROG of 6,620 and 89,180 pounds per day, respectively, contributed to 20 premature deaths per year and 89,947 school absences (South Coast Air Quality Management District 2015).

individually model project-level NO_2 or PM health effects, USEPA (2018b) has developed an approach for estimating the average human health impacts related to emissions of direct PM2.5 and PM2.5 precursors (NO_X and SO_2) and this approach is used to disclose potential average general health outcomes due to project emissions in the analysis in this section. It is foreseeable that unmitigated construction- and operation-generated emissions of ozone precursors and PM more than air district thresholds could contribute to cumulative and regional health impacts. In such cases, all feasible mitigation is applied, and emissions are reduced to the extent possible. Please refer to Impact AQ-2 for a discussion of Project-generated emissions, cumulative impacts, and a description of feasible mitigation.

Localized Project-Generated Criteria Pollutants (PM and CO) and Air Toxics (DPM)

Localized pollutants generated by a project are deposited and potentially affect population near the emissions source. Because these pollutants dissipate with distance, emissions from individual projects can result in direct and material health impacts to adjacent sensitive receptors. Models and thresholds are readily available to quantify these potential health effects and evaluate their significance (CAPCOA 2009; OEHHA 2015; BAAQMD 2012; CARB 2000). Locally adopted thresholds and analysis procedures for the localized pollutants of concern associated with the proposed plan (DPM, CO, NOA, and Valley Fever)[7] are identified below.

Localized Carbon Monoxide Concentrations

BAAQMD and SJVAPCD consider localized CO emissions to result in significant impacts if concentrations exceed CAAQS (Table 3.3-1). Both air districts have adopted screening criteria that provide a conservative indication of whether a project-generated traffic will cause a potential CO hot spot. The air districts establish that if the screening criteria are not met, a quantitative analysis through site-specific dispersion modeling of project-related CO concentrations would not be necessary and the project would not cause localized exceedances of CO CAAQS. Projects that do not generate CO concentrations in excess of the health based CAAQS would not contribute a significant level of CO such that localized air quality and human health would be substantially degraded.

Screening criteria adopted by SJVAPCD focus on whether a project would reduce the LOS at affected intersections to LOS E or F, whereas screening criteria adopted by BAAQMD include quantitative criteria based on the number of additional vehicles added to affected intersections. These quantitative metrics were established based on local modeling and provide a conservative estimate for the maximum number of vehicles that can be added to intersection without an exceedance of the CO CAAQS. BAAQMD CO screening criteria are summarized below.

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

[7] Although SO_2, NO_2, and Pb may also concentrate locally, the project does not represent a significant source of these pollutants at the local level. Accordingly, they are not discussed or evaluated further.

3. Project is consistent with an applicable congestion management plan established by the county congestion management agency for designated roads or highways, RTP, and local congestion management agency plans.

Given that BAAQMD's screening criteria are based on the number of vehicles that could be added to an intersection before contributing to a CO violation, BAAQMD's screening criteria are conservatively used to evaluate whether traffic generated by the Project in both BAAQMD and SJVAPCD would result in a CO hot spot and violation of the CO CAAQS.

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 a hazard index (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. PM10 from earthmoving activities is expected to be significant without application of dust control measures. 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 of greater than 10.0 and a PM2.5 concentration of greater than 0.8 µg/m^3. SJVAPCD has not adopted cumulative health risk thresholds.

Table 3.3-11 summarizes the cancer and non-cancer health risk thresholds used in the analysis.

Table 3.3-11. BAAQMD and SJVAPCD 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 2017; San Joaquin Valley Air Pollution Control District 2015a.
DPM = diesel particulate matter
PM2.5 = particulate matter 2.5 microns in diameter and smaller
µg/m^3 = micrograms per cubic meter
- = no threshold
BAAQMD = Bay Area Air Quality Management District
SJVAPCD = San Joaquin Valley Air Pollution Control District

Asbestos

There are no quantitative thresholds related to receptor exposure to asbestos. However, SJVAPCD and BAAQMD both require 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.

Valley Fever Exposure

Valley Fever can develop after receptor exposure to *C. immitis.* While flu-like symptoms develop in less than 40 percent of individuals exposed to the fungal spores, those presenting symptoms may experience fatigue, cough, chest pain, fever, rash, headache, and joint aches. Neither the state nor the Project area air districts have adopted thresholds to evaluate receptor exposure to increased Valley Fever risk. The potential for the Proposed Project 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 plans. Operation of the Project would not conflict with or obstruct implementation of the applicable air quality plans.

Level of Impact Prior to Mitigation	**Potentially significant (mitigation required)**
Mitigation Measures	AQ-2.1: Implement advanced emissions controls for off-road equipment during construction AQ-2.2: Implement off-road equipment engine maintenance and idling restrictions during construction AQ-2.3: Implement advanced emissions controls for trains during construction AQ-2.4: Utilize modern fleet for on-road material delivery and haul trucks during construction AQ-2.5: Implement fugitive dust controls during construction AQ-2.6: Offset Project Construction Emissions in the SFBAAB AQ-2.7: Offset Project Construction Emissions in the SJVAB
Level of Impact after Mitigation	**Less than significant**

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 that is 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 that is 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 proposed project and surrounding projects would exceed the growth projections used in BAAQMD or SJVAPCD air quality plans for a specific subregional area.

As discussed in Section 3.11, *Land Use and Planning*, the Proposed Project would 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 could directly result in unplanned population/housing growth in and near those project features in communities that have urban growth boundaries or other restrictive land use policies in place. While the Proposed Project would introduce new commuter rail service and associated ridership, the service is primarily intended to serve existing populations as well as populations associated with approved but not yet built growth (see Table 3.13-5 in Section 3.13, *Population and Housing*). Consequently, new passenger rail service is not expected to materially increase the overall growth pressure in the communities served by Valley Link substantially beyond planned growth levels.

Rail connections across the Altamont Pass are consistent with the *2018 CA State Rail Plan* and the SJCOG's RTP/SCS. The Proposed Project would expand rail service, alleviate traffic congestion, and reduce VMT throughout northern California.

Impact Detail and Conclusions

Proposed Project

The Proposed Project would be implemented between Dublin/Pleasanton and Lathrop. The potential for growth and changes in Valley Link service would occur along the entire alignment. While distinct operational characteristics will lead to differences in operational emissions within the Tri-Valley, Altamont, and Tracy to Lathrop segments (discussed further under Impact AQ-2b), these are relatively minor and do not affect consistency with applicable air quality plans. Accordingly, the impact determination is based on the criteria pollutant emissions across the entire Proposed Project corridor.

The Proposed Project would result in several benefits, including reduced VMT and traffic congestion relief that are consistent with the objectives and policies of BAAQMD's and SJVAPCD's air quality plans. The 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. Accordingly, projects that result in construction or operational emissions more than district thresholds would conflict with the primary goal of the air quality plans, which is to achieve the regional attainment of NAAQS and CAAQS.

As discussed under Impact AQ-2a, construction emissions would exceed BAAQMD's ROG and NO_X thresholds, SJVAPCD's annual NO_X and PM10 thresholds, and the NO_X, CO, PM10, and PM2.5 ambient air quality analysis (AAQA) triggers. This is a potentially significant impact because of construction-period emissions, which would exceed thresholds for both BAAQMD and SJVAPCD.

Operation of all ridership scenarios would reduce most criteria pollutant emissions under 2025 and 2040 conditions with the Proposed Project, and net operational emissions in BAAQMD and SJVAPCD would not exceed any air district thresholds. Accordingly, operation of the Proposed Project would be consistent with applicable air quality plans in BAAQMD and SJVAPCD and would have no impact for the Proposed Project and a less-than-significant impact for the Interim Build (e.g., IOS).

As discussed in Section 3.3.3, *Environmental Setting*, all criteria pollutants are associated with some form of health risk (e.g., asthma, asphyxiation). Negative health effects associated with criteria

pollutant emissions are highly dependent on a multitude of interconnected variables (e.g., cumulative concentrations, local meteorology and atmospheric conditions, the number and character of exposed individuals [e.g., age, gender]). Moreover, ozone precursors (ROG and NO_X) affect air quality on a regional scale. Health effects related to ozone, therefore, are the product of emissions generated by numerous sources throughout a region. Existing models have limited sensitivity to small changes in criteria pollutant concentrations, and as such, translating project-generated criteria pollutants to specific health effects would produce meaningless results. In other words, minor increases in regional air pollution from project-generated ROG and NO_X would have nominal or negligible impacts on human health.[8]

As such, an analysis of impacts on human health associated with project-generated regional emissions is not included in the project-level analysis. Increased emissions of ozone precursors (ROG and NO_X) generated by the Proposed Project could increase photochemical reactions and the formation of tropospheric ozone, which at certain concentrations, could lead to respiratory symptoms (e.g., coughing), decreased lung function, and inflammation of airways. Although these health effects are associated with ozone, the impacts are a result of cumulative and regional ROG and NO_X emissions, and the incremental contribution of the Proposed Project to specific health outcomes from criteria pollutant emissions would be limited and cannot be solely traced to the Proposed Project.

Alternatives Analyzed at an Equal Level of Detail

Distinct operational characteristics will lead to differences in operational emissions for the alternatives analyzed at an equal level of detail (Southfront Road Station Alternative, Stone Cut Alignment Alternative, West Tracy OMF Alternative, Mountain House Station Alternative, and Downtown Tracy Station Parking Alternatives 1 and 2). However, these differences in operational emissions are relatively minor and do not affect consistency with applicable air quality plans. Like the Proposed Project, the alternatives analyzed at an equal level of detail would have a potentially significant impact.

Mitigation Measures

Mitigation Measures AQ-2.1 through AQ-2.7 would apply to all proposed alignments, stations, and OMFs of the Proposed Project (and the alternatives analyzed at an equal level of detail) for potential impacts on air quality.

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

Refer to measure description under Impact AQ-2a.

Mitigation Measure AQ-2.2: Implement off-road equipment engine maintenance and idling restrictions during construction

Refer to measure description under Impact AQ-2a.

[8] As an example, the BAAQMD Multi-Pollutant Evaluation Method requires a 3 to 5 percent increase in regional ozone precursors to produce a material change in modeled human health impacts. Based on 2008 ROG and NO_X emissions in the Bay Area, a 3 to 5 percent increases equates to over 20,000 pounds per day or ROG and NO_X.

Mitigation Measure AQ-2.3: Implement advanced emissions controls for trains during construction

Refer to measure description under Impact AQ-2a.

Mitigation Measure AQ-2.4: Utilize modern fleet for on-road material delivery and haul trucks during construction

Refer to measure description under Impact AQ-2a.

Mitigation Measure AQ-2.5: Implement fugitive dust controls during construction

Refer to measure description under Impact AQ-2a.

Mitigation Measure AQ-2.6: Offset Project Construction Emissions in the SFBAAB

Refer to measure description under Impact AQ-2a.

Mitigation Measure AQ-2.7: Offset Project Construction Emissions in the SJVAB

Refer to measure description under Impact AQ-2a.

Significance with Application of Mitigation

Mitigation Measures AQ-2.1 through AQ-2.4 (discussed in detail under Impact AQ-2a) will reduce construction-related ROG emissions below BAAQMD's daily threshold and construction-related NO_X emissions below SJVAPCD's annual threshold. However, construction-related NO_X emissions would remain above BAAQMD's daily threshold and construction-related PM10 emissions would remain above SJVAPCD's annual threshold. Also, construction-related CO and PM10 emissions would remain above SJVAPCD's daily thresholds. Dispersion modeling confirms that PM10 emissions more than SJVAPCD's AAQA trigger would contribute to violations of CAAQS (refer to Impact AQ-2a). However, dispersion modeling confirms that CO emissions more than SJVAPCD's AAQA trigger would not contribute to violations of CAAQS. Because of the exceedances of BAAQMD's daily threshold and SJVAPCD's annual thresholds and the contribution of PM10 emissions within SJVAPCD to violations of CAAQS, Mitigation Measures AQ-2.6 and AQ-2.7 are required to reduce criteria pollutant emissions through purchase of emissions offsets in the SFBAAB and the SJVAB to reduce emissions below threshold levels. Construction of the Proposed Project would not conflict with applicable air quality plans with implementation of mitigation.

For the same reasons listed above, construction of the Southfront Road Station Alternative, Stone Cut Alignment Alternative, West Tracy OMF Alternative, Mountain House Station Alternative, and Downtown Tracy Station Parking Alternatives 1 and 2 would not conflict with applicable air quality plans with implementation of mitigation.

Comparison of Alternatives

While emissions associated with the Southfront Road Station Alternative, Stone Cut Alignment Alternative, West Tracy OMF Alternative, Mountain House Station Alternative, and Downtown Tracy Station Parking Alternatives 1 and 2 would differ in minor aspects related to the Proposed Project, construction of any of these alternatives would not conflict with applicable air quality plans with implementation of mitigation. Operationally, implementation of any of these alternatives would help

to reduce criteria pollutant emissions, which would also be consistent with applicable air quality plans.

Impact AQ-2a: Construction of the Proposed Project could 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).

Level of Impact Prior to Mitigation	**Potentially significant (mitigation required)**
Mitigation Measures	AQ-2.1: Implement advanced emissions controls for off-road equipment during construction AQ-2.2: Implement off-road equipment engine maintenance and idling restrictions during construction AQ-2.3: Implement advanced emissions controls for trains during construction AQ-2.4: Utilize modern fleet for on-road material delivery and haul trucks during construction AQ-2.5: Implement fugitive dust controls during construction AQ-2.6: Offset Project Construction Emissions in the SFBAAB AQ-2.7: Offset Project Construction Emissions in the SJVAB
Level of Impact after Mitigation	**Less than significant** Proposed and Alternative Facilities within BAAQMD jurisdiction **Significant and Unavoidable** Proposed and Alternative Facilities within SJVAPCD jurisdiction

Impact Characterization

Construction of the Proposed Project has the potential to create air quality impacts due to emissions from heavy-duty construction equipment, worker vehicle trips, truck hauling trips, and train trips. In addition, fugitive emissions would result from site grading, asphalt paving, and demolition. Criteria pollutant emissions generated by these sources were quantified using emission factors from CalEEMod, EMFAC2017, 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 herein reflect a specific set of conservative assumptions, 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).

Impact Detail and Conclusions

Proposed Project

Tables 3.3-11 and 3.3-12 summarize estimated unmitigated construction-related emissions in BAAQMD and SJVAPCD, respectively, in pounds per day and tons per year. Only emissions for those Proposed Project facilities or alternative facilities within each air district are presented (e.g., facilities within the Tracy to Lathrop segment are not listed in Table 3.3-12 because they would occur exclusively within SJVAPCD). Note that 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 Proposed Project (or alternative) emissions against the appropriate air district thresholds, which are given in both pounds and tons (Table 3.3-10).

Table 3.3-12. Estimated Unmitigated Construction Criteria Pollutant Emissions in the Bay Area Air Quality Management District

	Peak pounds per day[a]										Tons per year									
				PM10			PM2.5							PM10			PM2.5			
Element	ROG	NO_X	CO	Dust	Exh	Tot	Dust	Exh	Tot	SO_2	ROG	NO_X	CO	Dust	Exh	Tot	Dust	Exh	Tot	SO_2
Proposed Project																				
Tri-Valley – Alignment																				
Alignment	44	466	409	184	19	203	47	17	64	1	4	46	37	20	2	22	5	2	7	<1
Tri-Valley – Stations																				
Dublin/Pleasanton Station	4	32	73	96	1	97	25	1	26	<1	<1	2	4	5	<1	5	1	<1	1	<1
Isabel Station – for 2025	4	32	73	87	1	89	23	1	25	<1	<1	2	3	3	<1	3	1	<1	1	<1
Isabel Station – for 2040	4	15	50	88	<1	88	24	<1	24	<1	<1	1	2	3	<1	3	1	<1	1	<1
Greenville Station for 2035	6	32	73	101	1	103	26	1	27	<1	<1	2	2	4	<1	4	1	<1	1	<1
Greenville Station for 2040	2	7	12	22	<1	22	7	<1	7	<1	<1	<1	1	1	<1	1	<1	<1	<1	<1
Altamont Pass – Alignment																				
Double Track	30	314	262	259	11	271	68	11	79	1	4	38	31	31	1	32	8	1	10	<1
Altamont Pass – OMF																				
Interim OMF	4	33	27	7	1	8	2	1	3	<1	<1	4	3	1	<1	1	<1	<1	<1	<1
Yearly Emissions Estimates																				
2022	77	812	698	450	32	482	117	29	146	2	7	77	64	52	3	55	14	3	16	<1
2023	88	873	885	734	34	768	191	31	222	3	7	79	64	45	3	48	12	3	15	<1
2024	41	348	445	247	15	262	61	13	73	1	2	13	17	7	1	7	2	<1	2	<1
2037	6	22	62	111	<1	111	31	<1	31	<1	<1	1	2	4	<1	4	1	<1	1	<1
2038	3	7	37	65	<1	65	16	<1	16	<1	<1	<1	1	2	<1	2	<1	<1	<1	<1
BAAQMD Threshold	*54*	*54*	-	*BMPs*	*82*	-	*BMPs*	*54*	-	-	-	-	-	-	-	-	-	-	-	-
Alternatives																				
Southfront Rd. St. (for 2025)	9	32	73	157	1	159	34	1	35	<1	<1	2	3	9	<1	9	2	<1	2	<1
Southfront Rd. St. (for 2040)	2	7	12	22	<1	22	7	<1	7	<1	<1	<1	1	1	<1	1	<1	<1	<1	<1
Stone Cut Alignment Alt.[b]	30	316	264	262	12	274	69	11	80	1	4	38	32	31	1	33	8	1	10	<1

Exceedances of air district thresholds are shown in underline.

[a] Represents the daily emissions that would occur in any one year throughout the entire construction period (2022–2024 or 2037 - 2038).

[b] Construction emissions shown are for the entire Altamont Alignment with the Stone Cut Alignment Alternative so they can be compared to the proposed alignment.

ROG=reactive organic gases; NO_X = nitrogen oxide; CO =carbon monoxide; PM10/2.5 = particulate matter 10 or 2.5 microns in diameter and smaller; Exh= exhaust; SO_2=sulfur dioxide; BMP=best management practice; BAAQMD= Bay Area Air Quality Management District

Table 3.3-13. Estimated Unmitigated Construction Criteria Pollutant Emissions in the San Joaquin Valley Air Pollution Control District

	Average pounds per day[a]										Tons per year									
				PM10			PM2.5							PM10			PM2.5			
Facilities	**ROG**	**NO_X**	**CO**	**Dust**	**Exh**	**Tot**	**Dust**	**Exh**	**Tot**	**SO_2**	**ROG**	**NO_X**	**CO**	**Dust**	**Exh**	**Tot**	**Dust**	**Exh**	**Tot**	**SO_2**
Proposed Project																				
Altamont– Alignment																				
Double Track	6	60	50	50	2	52	13	2	15	<1	1	7	6	6	<1	6	2	<1	2	<1
Altamont– OMF																				
Tracy OMF	8	93	45	25	2	27	7	2	9	<1	1	11	5	3	<1	3	1	<1	1	<1
Altamont– Stations																				
Mountain House Station for 2025	6	33	78	88	1	89	23	1	25	<1	<1	2	3	3	<1	3	1	<1	1	<1
Mountain House Station for 2040	2	7	12	22	<1	22	7	<1	7	<1	<1	<1	1	1	<1	1	<1	<1	<1	<1
Tracy to Lathrop – Alignment																				
Double Track	36	376	331	309	14	322	81	13	95	1	4	45	40	37	2	39	10	2	11	<1
Tracy to Lathrop – Stations																				
Downtown Tracy Station for 2025	3	13	55	64	<1	65	16	<1	16	<1	<1	1	3	6	<1	6	1	<1	1	<1
Downtown Tracy Station for 2040	4	14	51	88	<1	88	24	<1	24	<1	<1	1	2	3	<1	3	<1	<1	<1	<1
River Islands Station for 2025	3	13	33	38	<1	39	9	<1	10	<1	<1	2	3	3	<1	3	1	<1	1	<1
River Islands Station for 2040	2	8	13	22	<1	22	7	<1	7	<1	<1	<1	1	1	<1	1	<1	<1	<1	<1
North Lathrop Station for 2025	3	13	55	64	<1	65	16	<1	16	<1	<1	1	3	4	<1	4	1	<1	1	<1
North Lathrop Station for 2040	5	8	6	8	<1	8	4	<1	4	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Emissions Estimates																				
2022	48	529	426	384	18	401	101	17	118	2	6	63	51	46	2	48	12	2	14	<1
2023	49	466	452	473	17	490	124	16	139	2	5	54	47	49	2	51	13	2	15	<1
2024	21	76	235	258	3	260	64	3	67	1	1	4	10	10	<1	10	2	<1	3	<1
2037	12	37	82	141	1	142	42	1	43	<1	1	2	3	6	<1	6	2	<1	2	<1
2038	3	7	38	65	<1	65	16	<1	16	<1	<1	<1	1	2	<1	2	<1	<1	<1	<1
SJVAPCD Threshold	100	100	100	BMP	-	100	BMP	-	100	100	10	10	100	BMP	-	15	BMP	-	15	27
Alternatives																				

	Average pounds per day[a]									Tons per year									
				PM10			PM2.5							PM10			PM2.5			
Facilities	**ROG**	**NO_X**	**CO**	**Dust**	**Exh**	**Tot**	**Dust**	**Exh**	**Tot**	**SO_2**	**ROG**	**NO_X**	**CO**	**Dust**	**Exh**	**Tot**	**Dust**	**Exh**	**Tot**	**SO_2**
West Tracy OMF Alternative	6	106	41	22	2	24	6	2	8	<1	1	13	5	3	<1	3	1	<1	1	<1
Mountain House St. Alt. for 2025	5	33	78	87	1	89	23	1	25	<1	<1	2	4	4	<1	5	1	<1	1	<1
Mountain House St. Alt. for 2040	2	8	13	22	<1	22	7	<1	7	<1	<1	<1	1	1	<1	1	<1	<1	<1	<1
Downtown Tracy Station Alts. 1, 2 (for 2025)	2	15	37	59	1	60	13	1	13	<1	<1	2	3	7	<1	7	2	<1	2	<1

Exceedances of air district thresholds are shown in underline.
[a] Represents the average daily emissions estimated over the course of construction (2022–2024) for the construction for opening in 2025 and over the course of construction (2037 – 2038) for the additional parking in 2040.
Acronyms: See Table 3.3-12.

Bay Area Air Quality Management District

The Tri-Valley Alignment would occur exclusively within BAAQMD. The alignment would result in construction-related ROG and NO_X emissions greater than BAAQMD's thresholds of significance. None of the station options would individually result in construction emissions greater than BAAQMD's thresholds of significance.

Construction of the Altamont Alignment located within BAAQMD would result in NO_X emissions that would exceed the air district's threshold. Construction of the Interim OMF option would occur in BAAQMD. The Interim OMF would not individually result in construction emissions greater than BAAQMD's thresholds of significance.

As shown in Table 3.3-12, construction emissions overall would exceed BAAQMD's ROG and NO_X thresholds. Construction emissions would exceed BAAQMD's ROG and NO_X thresholds. This is a potentially significant impact.

San Joaquin Valley Air Quality Management District

Construction of the Altamont Alignment located within SJVAPCD would not individually result in emissions that would exceed SJVAPCD's thresholds of significance or AAQA trigger levels. None of the station options would individually result in construction emissions more than SJVAPCD's thresholds of significance or AAQA triggers. None of the OMF options would individually result in construction emissions more than SJVAPCD's thresholds of significance or AAQA triggers.

The Tracy to Lathrop Alignment would occur exclusively within SJVAPCD. The alignment would result in construction-related emissions more than SJVAPCD's annual NO_X and PM10 thresholds and the NO_X, CO, and PM10 AAQA triggers. None of the station options would individually result in construction emissions more than SJVAPCD's thresholds of significance or AAQA triggers.

As shown in Table 3.3-13, construction emissions would exceed SJVAPCD's annual NO_X and PM10 thresholds. Emissions would also exceed the NO_X, CO, PM10, and PM2.5 AAQA triggers, indicating that emissions may contribute to violations of CAAQS within SJVAB. This is a potentially significant impact.

Alternatives Analyzed at an Equal Level of Detail

While some of the alternatives analyzed at an equal level of detail would not have emissions that exceed the BAAQMD or SJVAPCD thresholds when considered in isolation (e.g., the Southfront Road Station Alternative construction would not exceed BAAQMD thresholds), as these alternatives only have partial differences with the Proposed Project and require construction of the rest of the Project alignments or stations, overall these alternatives would still result in significant impacts in both BAAQMD and SJVAPCD, prior to mitigation.

As shown in Table 3.3-12 and 3.3-13 above:

- The Southfront Road Station Alternative would result in similar construction emissions as the proposed Greenville Station. Construction of the Southfront Road Station would not have emissions that exceed BAAQMD thresholds on its own but would contribute to exceedance of emissions thresholds in combination with the rest of construction in BAAQMD.
- The Stone Cut Alignment Alternative would result in similar, but slightly higher, construction emissions as the proposed Altamont Alignment. This alternative would have emissions that

exceed BAAQMD thresholds on its own and in combination with the rest of construction in BAAQMD.

- The West Tracy OMF Alternative would result in similar construction emissions as the proposed Tracy OMF. Construction of the West Tracy OMF would not have emissions that exceed SJVAPCD thresholds on its own but would contribute to exceedance of emissions thresholds in combination with the rest of construction in SJVAPCD.
- The Mountain House Station Alternative would result in similar construction emissions as the proposed Mountain House Station. Construction of the Mountain House Station Alternative would not have emissions that exceed SJVAPCD thresholds on its own but would contribute to exceedance of emissions thresholds in combination with the rest of construction in SJVAPCD.
- The Downtown Tracy Station Parking Alternative 1 and Downtown Tracy Station Parking Alternative 2 would result in slightly lower construction emissions than the proposed Downtown Tracy Station for the 2022 to 2024 construction period Construction of either of these station alternatives would not have emissions that exceed SJVAPCD thresholds on its own but would contribute to exceedance of emissions thresholds in combination with the rest of construction in SJVAPCD. These alternatives do not include an expansion of parking to support 2040 ridership; however, if they did they would likely have similar construction emissions for 2037–2038 as the proposed Downtown Tracy Station.
- The combination of the Mountain House Station and the West Tracy OMF Alternative would result in higher localized CO and PM10 emissions than the proposed Mountain House Station and Tracy OMF, which would be a significant impact.

Mitigation Measures

The following mitigation measures would apply to the construction of the Proposed Project (and the alternatives analyzed at an equal level of detail) for potential impacts on air quality.

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

The Tri-Valley–San Joaquin Valley Regional Rail Authority (Authority) shall require the following construction equipment exhaust emissions requirements to be included in construction contract specifications:

- All off-road equipment greater than 25 horsepower and operating for more than 20 total hours over the entire duration of construction activities shall have engines that meet or exceed either USEPA or CARB Tier 4 Final off-road emission standards, if commercially available. Lesser-tier engines shall be allowed on a case-by-case basis when the contractor has documented that no engine equipment or emissions equivalent retrofit equipment is available for a particular equipment type that must be used to complete construction. Documentation shall consist of signed written statements from at least two construction equipment rental firms or equivalent.
- A copy of each unit's certified tier specification and any required CARB or air pollution control district operating permit shall be collected by the contractor at the time of mobilization of each piece of equipment and included in monthly reporting to the Authority.

Mitigation Measure AQ-2.2: Implement off-road equipment engine maintenance and idling restrictions during construction

The Authority shall require the following construction equipment exhaust emissions requirements to be included in construction contract specifications:

- The construction contractor shall minimize off-road equipment idling times either by shutting equipment off when not in use or reducing the maximum idling time to 2 minutes. Clear signage will be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer‘s specifications.
- All equipment shall be checked by a certified visible emissions evaluator.

Mitigation Measure AQ-2.3: Implement advanced emissions controls for trains during construction

The Authority shall require the following construction equipment exhaust emissions requirements to be included in construction contract specifications:

- The construction contractor shall require that all diesel-powered trains used during Project construction have engines that meet or exceed either USEPA or CARB Tier 4 train emission standards.
- A copy of each unit’s certified tier specification and any required CARB or air pollution control district operating permit shall be collected by the contractor at the time of mobilization of each piece of equipment and included in monthly reporting to the Authority.

Mitigation Measure AQ-2.4: Utilize modern fleet for on-road material delivery and haul trucks during construction

The Authority shall require the following material-hauling truck fleet mix requirements to be included in construction contract specifications:

- The construction contractor shall ensure that all on-road heavy-duty diesel trucks with a gross vehicle weight rating of 19,500 pounds or greater used at the project site will comply with USEPA 2007 on-road emission standards for PM10 (0.01 grams per brake horsepower-hour) where commercially available. These PM10 standards were phased in through the 2007 and 2010 model years on a percent of sales basis (50 percent of sales in 2007 to 2009 and 100 percent of sales in 2010). This measure assumes that all on-road heavy-duty diesel trucks will be model year 2010 and newer, with all trucks compliant with USEPA 2007 on-road emission standards. While impacts are associated with PM2.5 concentrations and the USEPA 2007 on-road emission standards address PM10 emission, the newer engine technologies that are required to meet the PM10 emission standards will also reduce PM2.5 concentrations.
- For specialty delivery or hauling vehicles, lesser-tier engines shall be allowed on a case-by-case basis when the contractor has documented that no engine equipment or emissions equivalent retrofit equipment is available for a particular delivery or hauling vehicles that must be used to complete construction. Documentation shall consist of signed written statements from at least two truck rental or supplier firms or equivalent.

- Copies of truck fleet compliance with this requirement shall be collected and included in monthly reporting to the Authority.

Mitigation Measure AQ-2.5: Implement fugitive dust controls during construction

The Authority shall require the following fugitive dust control requirements to be included in construction contract specifications.

The construction contractor shall implement basic and enhanced control measures at all construction and staging areas to reduce construction-related fugitive dust. The following measures are based on BAAQMD's CEQA guidelines and are in conformance with SJVAPCD fugitive dust control requirements (Regulation VIII).

Basic Fugitive Dust Control Measures

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) will be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material offsite will be covered.
- All visible mud or dirt track-out onto adjacent public roads will be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All roadways, driveways, and sidewalks to be paved will be completed as soon as possible. Building pads will be laid as soon as possible after grading unless seeding or soil binders are used.
- Post a publicly visible sign with the telephone number and the name of the person to contact at the lead agency regarding dust complaints. This person will respond and take corrective action within 48 hours. The phone number of the district will also be visible to ensure compliance.

Enhanced Fugitive Dust Control Measures for Land Disturbance

- All exposed surfaces will be watered at a frequency adequate to maintain minimum soil moisture of 12 percent. Moisture content can be verified by lab samples or moisture probe.
- All excavation, grading, and/or demolition activities will be suspended when average wind speeds exceed 20 mph.
- Wind breaks (e.g., trees, fences) will be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.
- Vegetative ground cover (e.g., fast-germinating native grass seed) will be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established.
- The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time will be limited. Activities will be phased to reduce the amount of disturbed surfaces at any one time.

Measures for Entrained Road Dust

- All trucks and equipment, including their tires, will be washed off prior to leaving the site.

- Site accesses to 100 feet from the paved road will be treated with a 6- to 12-inch compacted layer of wood chips, mulch, or gravel.
- Sandbags or other erosion control measures will be installed to prevent silt runoff to public roadways from sites with a slope greater than one percent.
- All vehicle speeds on unpaved roads will be limited to 15 mph.
- All unpaved roads will be watered twice daily.

Mitigation Measure AQ-2.6: Offset Project Construction Emissions in the SFBAAB

The Authority shall require the following fugitive dust control requirements to be included in contract specifications.

Prior to construction, the Authority or its contractor will enter into a memorandum of understanding (MOU) with the Bay Area Clean Air Foundation (Foundation), a public non-profit and supporting organization for the BAAQMD, to reduce VOC and NO_X to below the appropriate CEQA threshold levels.

The mitigation offset fee amount will be determined at the time of mitigation to fund one or more emissions reduction projects within the SFBAAB. The Foundation will require an additional administrative fee of no less than 5 percent. The mitigation offset fee will be determined by the Authority or its contractor and the Foundation based on the type of projects available at the time of mitigation. When the CEQA threshold is exceeded, these funds may be spent to reduce either VOC or NO_X emissions (ozone precursors). This fee is intended to fund emissions reduction projects to achieve reductions, with the estimated tonnage of emissions offsets required starting in the first year of construction. Documentation of payment will be provided to the Authority or its designated representative.

The MOU will include details regarding the annual calculation of required offsets the Authority must achieve, funds to be paid, administrative fee, and the timing of the emissions reduction projects. Acceptance of this fee by the Foundation will serve as an acknowledgment and commitment by the Foundation to: (1) implement an emissions reduction project(s) within a timeframe to be determined based on the type of project(s) selected after receipt of the mitigation fee designed to achieve the emission reduction objectives; and (2) provide documentation to the Authority or its contractor describing the project(s) funded by the mitigation fee, including the amount of emissions reduced (tons per year) in the SFBAAB from the emissions reduction project(s). To qualify under this mitigation measure, the specific emissions reduction project(s) must result in emission reductions in the SFBAAB that are real, surplus, quantifiable, enforceable, and will not otherwise be achieved through compliance with existing regulatory requirements or any other legal requirement. Funding will need to be received prior to contracting with participants and should allow enough time to receive and process applications to fund and implement off-site reduction projects prior to commencement of project activities being reduced. This will roughly equate to 1 year prior to the required mitigation; additional lead time may be necessary depending on the level of offsite emission reductions required for a specific year.

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

addition to VOC and NO_X, the implementation of emission-reduction projects could result in reductions of other criteria pollutants and/or GHGs. However, this would be a secondary effect of this mitigation measure and is not a required outcome to mitigate any impacts of the project.

Mitigation Measure AQ-2.7: Offset Project Construction Emissions in the SJVAB

The Authority shall require the following fugitive dust control requirements to be included in construction contract specifications.

The Authority or its contractor will enter into a Voluntary Emissions Reduction Agreement (VERA) with the SJVAPCD that will establish the framework for fully mitigating construction emissions of NO_X, VOC, PM10, and PM2.5 below the SJVAPCD thresholds in the SJVAB. The project-level VERA must be executed prior to commencement of construction and the mitigation fees and offsets delivered and achieved according to the requirements of the VERA.

The implementation of this mitigation measure would not be expected to affect air quality in the SJVAPCD because purchasing emissions offsets would not result in any physical change to the environment, and therefore would not result in other secondary environmental impacts. In addition to NO_X and PM10, the implementation of emissions reduction projects could result in reductions of other criteria pollutants, GHGs, or both. However, this would be a secondary effect of this mitigation measure and is not a required outcome to mitigate any impacts of the project.

Significance with Application of Mitigation

Proposed Project

Mitigation is required to reduce ROG, NO_X, CO, PM10, and PM2.5 emissions. Mitigation Measures AQ-2.1 and AQ-2.2 target emissions from off-road equipment and require engines greater than 25 horsepower to meet Tier 4 emission standards. Equipment idling times will also be reduced to 2 minutes and all engines properly tuned according to manufacturer specifications. Mitigation Measure AQ-2.3 requires trains used during rail work to meet Tier 4 emission standards, whereas Mitigation Measure AQ-2.4 requires all on-road vehicles with a gross vehicle weight rating of 19,500 pounds or greater to comply with USEPA 2007 on-road emission standards. Mitigation Measure AQ-2.5 outlines air district-recommended measures to control fugitive dust.

Tables 3.3-14 and 3.3-15 show the mitigated emissions in the BAAQMD and SJVAPCD with the implementation of Mitigation Measures AQ-2.1 through AQ-2.4.

As shown in Table 3.3-14, Mitigation Measures AQ-2.1 through AQ-2.4 would reduce construction-related ROG emissions in BAAQMD below the applicable significance threshold but NO_X emissions in BAAQMD would still exceed 54 pounds per day, even after implementation of all feasible onsite mitigation. Consequently, Mitigation Measure AQ-2.6 will be required to reduce NO_X emissions within BAAQMD to below threshold levels. With implementation of Mitigation Measures AQ-2.1 through AQ-2.4 and AQ-2.6, impacts in the BAAQMD would be less than significant.

Table 3.3-14. Estimated Mitigated Construction Criteria Pollutant Emissions in the BAAQMD with Onsite Mitigation

	Peak pounds per day[a]										Tons per year									
				PM10			PM2.5							PM10			PM2.5			
Element	ROG	NO_X	CO	Dust	Exh	Tot	Dust	Exh	Tot	SO_2	ROG	NO_X	CO	Dust	Exh	Tot	Dust	Exh	Tot	SO_2
Proposed Project																				
Tri-Valley Alignment																				
Alignment	31	215	478	181	9	190	47	7	54	1	3	22	44	19	1	20	5	1	6	<1
Tri-Valley – Stations																				
Dublin/Pleasanton Station	2	10	75	94	<1	94	25	<1	25	<1	<1	1	4	5	<1	5	1	<1	1	<1
Isabel Station for 2025	2	10	75	85	<1	86	23	<1	23	<1	<1	<1	3	3	<1	3	1	<1	1	<1
Isabel Station for 2040	3	8	54	87	<1	87	23	<1	23	<1	<1	<1	2	3	<1	3	1	<1	1	<1
Greenville Station for 2025	4	10	75	100	<1	100	25	<1	26	<1	<1	<1	2	4	<1	4	1	<1	1	<1
Greenville Station for 2040	1	5	14	22	<1	22	7	<1	7	<1	<1	<1	1	1	<1	1	<1	<1	<1	<1
Altamont– Alignment																				
Double Track	24	256	270	254	8	262	68	8	76	1	3	31	32	30	1	31	8	1	9	<1
Altamont OMF																				
Interim OMF	3	8	27	7	<1	7	2	<1	2	<1	<1	1	3	1	<1	1	<1	<1	<1	<1
Emission Estimates																				
2022	56	479	775	441	17	459	117	16	132	2	5	52	68	51	2	52	14	2	15	<1
2023	63	500	971	720	18	738	189	16	205	3	6	46	72	44	2	46	12	2	13	<1
2024	27	86	520	243	4	248	60	3	63	1	1	3	19	6	<1	7	2	<1	2	<1
2037	4	13	68	108	<1	108	31	<1	31	<1	<1	1	3	4	<1	4	1	<1	1	<1
2038	3	4	39	64	<1	64	16	<1	16	<1	<1	<1	1	<1	<1	2	<1	<1	<1	<1
BAAQMD Threshold	*54*	*54*	-	*BMPs*	*82*	-	*BMPs*	*54*	-	-	-	-	-	-	-	-	-	-	-	-
Alternatives																				
Southfront Rd. St. for 2025	7	10	75	155	<1	156	34	<1	34	<1	<1	<1	3	9	<1	9	2	<1	2	<1
Southfront Rd. St. for 2040	1	5	14	22	<1	22	7	<1	7	<1	<1	<1	1	1	<1	1	<1	<1	<1	<1
Stone Cut Alignment Alt.[b]	24	257	266	257	8	265	68	8	77	1	3	31	32	31	1	32	8	1	9	<1

Exceedances of air district thresholds are shown in underline.

[a] Represents maximum daily emissions in any one year throughout the entire construction period (2022–2024). Daily emissions results for each year of construction are summarized at the bottom of the table.

[b] Construction emissions shown are for the entire Altamont Alignment with the Stone Cut Alignment Alternative so they can be compared to the proposed alignment.

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

Exh = exhaust
BMP = best management practice
SO_2 = sulfur dioxide
BAAQMD = Bay Area Air Quality Management District

Table 3.3-15. Estimated Mitigated Construction Criteria Pollutant Emissions in the SJVAPCD with Onsite Mitigation

	Average pounds per day[a]										Tons per year									
				PM10			PM2.5							PM10			PM2.5			
Facilities	**ROG**	**NO_X**	**CO**	**Dust**	**Exh**	**Tot**	**Dust**	**Exh**	**Tot**	**SO_2**	**ROG**	**NO_X**	**CO**	**Dust**	**Exh**	**Tot**	**Dust**	**Exh**	**Tot**	**SO_2**
Proposed Project																				
Altamont – Alignment																				
Double Track	5	49	52	49	2	50	13	2	15	<1	1	6	6	6	<1	6	2	<1	2	<1
Altamont – OMF																				
Tracy OMF	7	50	42	25	<1	26	7	<1	7	<1	1	6	5	3	<1	3	1	<1	1	<1
Altamont – Stations																				
Mountain House Station for 2025	4	10	80	86	<1	86	23	<1	23	<1	<1	<1	3	3	<1	3	1	<1	1	<1
Mountain House Station for 2040	1	5	14	22	<1	22	7	<1	7	<1	<1	<1	1	1	<1	1	<1	<1	<1	<1
Tracy to Lathrop – Alignment																				
Double Track	29	306	333	302	10	312	81	10	91	1	3	37	40	36	1	37	10	1	11	<1
Tracy to Lathrop – Stations																				
Downtown Tracy Station for 2025	2	4	38	59	<1	59	13	<1	13	<1	<1	1	3	7	<1	7	2	<1	2	<1
Downtown Tracy Station for 2040	2	8	55	86	<1	86	23	<1	23	<1	<1	<1	1	2	<1	2	<1	<1	<1	<1
River Islands Station for 2025	2	4	34	38	<1	38	9	<1	10	<1	<1	<1	3	3	<1	3	1	<1	1	<1
River Islands Station for 2040	1	5	15	22	<1	22	7	<1	7	<1	<1	<1	1	1	<1	1	<1	<1	<1	<1
North Lathrop Station for 2025	2	5	57	63	<1	64	16	<1	16	<1	<1	<1	3	4	<1	4	1	<1	1	<1
North Lathrop Station for 2040	4	5	8	7	<1	7	4	<1	4	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Proposed Project Emissions Estimate[a]																				
2022	36	405	426	376	12	388	101	12	112	2	4	49	51	45	1	47	12	1	13	<1
2023	39	361	458	472	11	484	124	11	135	2	4	43	48	49	1	51	13	1	14	<1
2024	16	29	224	232	1	233	59	1	59	1	1	2	9	9	<1	9	2	<1	2	<1
2037	9	22	92	136	<1	136	41	<1	41	<1	<1	1	4	5	<1	5	2	<1	2	<1
2038	2	4	40	64	<1	64	16	<1	16	<1	<1	<1	1	2	<1	2	<1	<1	<1	<1
SJVAPCD Threshold	100	100	100	BMP	-	100	BMP	-	100	100	10	10	100	BMP	-	15	BMP	-	15	27
Alternatives																				
West Tracy OMF Alternative	4	58	38	22	<1	22	6	0	6	<1	<1	7	5	3	<1	3	1	<1	1	<1

	Average pounds per day[a]									Tons per year									
				PM10			PM2.5							PM10			PM2.5			
Facilities	**ROG**	**NO_X**	**CO**	**Dust**	**Exh**	**Tot**	**Dust**	**Exh**	**Tot**	**SO_2**	**ROG**	**NO_X**	**CO**	**Dust**	**Exh**	**Tot**	**Dust**	**Exh**	**Tot**	**SO_2**
Mountain House St. Alt. for 2025	3	10	80	85	<1	86	23	0	23	<1	<1	1	4	4	<1	4	1	<1	1	<1
Mountain House St. Alt. for 2040	1	5	14	22	<1	22	7	<1	7	<1	<1	<1	1	1	<1	1	<1	<1	<1	<1
Downtown Tracy Station Alt. 1, 2	2	4	38	59	<1	59	13	0	13	<1	<1	1	3	7	<1	7	2	<1	2	<1

Exceedances of air district thresholds are shown in underline.

[a] Represents the average daily emissions estimated over the course of construction (2022–2024). Daily emissions results for each year of construction are summarized at the bottom of the table.

ROG = reactive organic gases
CO = carbon monoxide
Exh = exhaust
BMP = best management practice
NO_X = nitrogen oxide
PM10/PM2.5 = particulate matter 10 or 2.5 microns in diameter and smaller
SO_2 = sulfur dioxide
BAAQMD = Bay Area Air Quality Management District

As shown in Table 3.3-15, Mitigation Measures AQ-2.1 though AQ-2.4 would reduce NO_X emissions in SJVAPCD below the applicable significance threshold, and NO_X and PM2.5 emissions below the AAQA triggers.

However, CO and PM10 emissions would exceed the AAQA triggers, even with implementation of all feasible onsite mitigation. Pursuant to SJVAPCD's GAMAQI, a dispersion analysis was performed to evaluate if CO and PM10 concentrations would exceed the CAAQS. Modeled CO and PM10 concentrations are summarized in Tables 3.3-16 and 3.3-17.

Table 3.3-16. Modeled CO Concentrations for Construction in the SJVAPCD

Highest CO Emissions (one per geographic segment)	CO Concentration (µg/m³)	
	1-hour	8-hour
Altamont[a]	219	28
Tracy to Lathrop[b]	78	25
Background CO Concentration		
Altamont	3,092	2,405
Tracy to Lathrop	3,092	2,405
Total Off-Site CO Concentrations		
Altamont[a]	3,311	2,433
Tracy to Lathrop[b]	3,170	2,405
CAAQS	*23,000[c]*	*10,000[d]*

[a] Includes construction of the rail line, the Mountain House Station and the West Tracy OMF alternative as a worst-case location for 2025. Concentrations would be lower with the Tracy OMF since it is not located near the Mountain House Station.
[b] Includes construction of the rail line and stations.
[c] Converted from 9.0 ppm.
[d] Converted from 0.070 ppm.
CO = carbon monoxide
AAQA = ambient air quality analysis
CAAQS = California Ambient Air Quality Standards

Table 3.3-17. Modeled PM10 Concentrations for Construction in the SJVAPCD

Highest PM10 Emissions (one per geographic segment)	PM10 Concentration (µg/m³)	
	24-hour	Annual
Altamont[a]	185	16
Tracy to Lathrop[b]	83	28
Background PM10 Concentration		
Altamont	88	21
Tracy to Lathrop	88	21
Total Off-Site PM10 Concentrations		
Altamont[a]	273	37
Tracy to Lathrop[b]	171	49
CAAQS	*50[c]*	*20[d]*

[a] Includes construction of the rail line, the Mountain House Station and the West Tracy OMF alternative as a worst-case location for 2025. Concentrations would be lower with the Tracy OMF since it is not located near the Mountain House Station.

[b] Includes construction of the rail line and stations.
[c] Converted from 9.0 ppm.
[d] Converted from 0.070 ppm.
AAQA = ambient air quality analysis
CAAQS = California Ambient Air Quality Standards

As shown in Table 3.3-16, dispersion modeling confirms that CO concentrations from construction activity would not violate CAAQS (see Table 3.3-19) and construction of the Proposed Project would not violate a CO standard or contribute substantially to an existing or projected CO violation However, as shown in Table 3.3-17, dispersion modeling confirms that PM10 emissions from construction activity would contribute to violations of the 24-hour PM10 CAAQS.

Due to the exceedance of the annual SJVAPCD PM threshold and the 24-hour PM10 CAAQS after implementation of all feasible onsite mitigation, the Proposed Project's PM10 concentration increment is compared to the SJVAPCD's significance impact level (SIL) thresholds for significance determination. The PM10 concentration SILs for the 24-hour and annual averaging periods is 1 $\mu g/m^3$ and 5 $\mu g/m^3$, respectively. As shown in Table 3.3-17, Project increment PM10 concentrations would exceed these SIL levels. Given that impact analysis already accounts for implementation of feasible mitigation measures (i.e., Tier 4-compliant construction equipment, fugitive dust control measures), this impact would be significant and unavoidable.

Health Consequences of Project Construction Emissions

Proposed Project NO_X and PM10 emissions (after application of onsite mitigation but before application of offsite mitigation) would still exceed BAAQMD and SJVAPCD thresholds which were developed by the air districts in consideration of achieving attainment status under the CAAQS for ozone and PM. As a result, construction NO_X and PM10 emissions from the Proposed Project would contribute to localized air pollution within Alameda and San Joaquin Counties even though with offsite mitigation the project would not contribute to regional air pollution. Alameda and San Joaquin Counties do not currently attain the ozone CAAQS and NAAQS, the PM2.5 CAAQS and NAAQS, or the PM10 CAAQS (see Table 3.3-4).

As discussed in Section 3.3.3, *Environmental Setting*, all criteria pollutants are associated with some form of health risk (e.g., asthma, asphyxiation). Negative health effects associated with criteria pollutant emissions are highly dependent on a multitude of interconnected variables (e.g., cumulative concentrations, local meteorology and atmospheric conditions, the number and character of exposed individuals [e.g., age, gender]). Moreover, ozone precursors (ROG and NO_X) affect air quality on a regional scale. Health effects related to ozone, therefore, are the product of emissions generated by numerous sources throughout a region.

Increased emissions of ozone precursors (ROG and NO_X) generated by the Proposed Project could increase photochemical reactions and the formation of tropospheric ozone, which at certain concentrations could lead to respiratory symptoms (e.g., coughing), decreased lung function, and inflammation of airways.

The NAAQS and CAAQS are set to protect public health and the environment within an adequate margin of safety. Some individuals exposed to pollutant concentrations that exceed the CAAQS or NAAQS may experience certain acute and/or chronic health conditions. Studies have linked particulate pollution to problems such as premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms (e.g., coughing) (U.S. Environmental Protection Agency 2019c).

Studies have linked NO_2 pollution to the aggravation and/or development of certain respiratory diseases (e.g., asthma), leading to respiratory symptoms (e.g., coughing), hospital admissions, and visits to emergency rooms (U.S. Environmental Protection Agency 2019d).

There are no models capable of performing a project-specific correlation of project-generated NO_2 or PM emissions to specific health consequences (e.g., increased cases of asthma). Models that quantify changes in ambient pollution and resultant health effects were developed to support regional planning and policy analysis and have limited sensitivity to small changes in criteria pollutant concentrations induced by individual projects. Accordingly, translating project generated NO_2 or PM emissions to the locations where specific health effects could occur or the resultant number of additional days of nonattainment cannot be estimated with a high degree of accuracy.

While there is no available tool to individually model project-level NO_2 or PM health effects, USEPA (2018b) has developed an approach for estimating the average human health impacts related to emissions of direct PM2.5 and PM2.5 precursors (NO_X and SO_2).[9] These benefit per ton (BPT) calculations have been developed for 17 emission sectors (e.g., mobile sources) using nationwide photochemical modeling and demographic input parameters. All estimates are based on a national-scale study and do not account for location-specific meteorology, geographic distribution of receptors, or photochemistry, all of which can affect pollutant dispersion and exposure. The resultant health effects are therefore reflective of national averages and may not be exact when applied to the project level. Nevertheless, the BPT estimates can provide a general order-of-magnitude characterization of potential health consequences associated with project-generated direct PM and precursors to PM (with no secondary formation).

Table 3.3-18 presents the estimated incidence (i.e., cases) of health effects based on the construction inventory for the Project. The estimates were developed by multiplying total project-generated PM2.5 and PM2.5 precursor (NO_X and SO_2) emissions for the 2022 to 2024 period across all air districts (in average tons per year) by the relevant incidence per-ton metric from USEPA (2018b). Emissions for the 2037 to 2038 construction period for the additional parking construction at stations would be lower than the 2022 to 2024 period and thus the health effects would also be correspondingly lower.

As discussed above, caution should be exercised when reviewing these results as they are based on national averages and do not account for any location-specific variables that may influence exposure to project-generated emissions. This analysis is only presented for informational purposes and has no bearing on the impact determination, which is based on a comparison of emissions concentrations to the ambient air quality standards. It is also important to consider the magnitude of project-generated emissions and potential health risks relative to ambient conditions.

[9] Conversion of NO_X to NO_2 occurs in the atmosphere through various reactions. Due to the complex chemistry governing NO_2 and other pollution formation (e.g., ozone), USEPA was not able to derive BPT values for secondary pollutants. USEPA's BPT estimates are therefore only applicable to direct PM2.5 and PM2.5 precursors (NO_X and SO_2) (with no secondary formation).

Table 3.3-18. Estimated Incidence of Health Endpoints Based on Total Directly Emitted NO_X, SO_X, and PM2.5 Emissions during Construction (2022–2024)

Health Endpoint	Incidence (cases per year)[1]
Premature Mortality	3
Respiratory emergency room visits	<1
Acute bronchitis	2
Lower respiratory symptoms	22
Upper respiratory symptoms	33
Minor restricted activity days	965
Work loss days	163
Asthma exacerbation	38
Cardiovascular hospital admissions	<1
Respiratory hospital admissions	<1
Non-fatal heart attacks (Peters)	1
Non-fatal heart attacks (All others)	<1

Source: U.S. Environmental Protection Agency 2018b

[1] Calculated by multiplying total project-generated PM2.5 and PM2.5 precursor (NO_X and SO_2) emissions across all air districts (in average tons per year) for the 2022 to 2024 construction period by the relevant incidence per-ton metric from USEPA (2018b). USEPA's metrics are based on national data and do not account for any location-specific variables that may influence exposure to project-generated emissions. The results presented in this table are presented for informational purposes only. Because this is a scaled analysis based on national data, actual changes in health outcomes due to project emissions could be higher or lower than presented due to intervening effects of location of emissions, meteorology, and photochemistry.

As previously discussed, the magnitude and locations of any potential changes in ambient air quality, and thus health consequences, from these additional emissions cannot be quantified with a high level of certainty due to the dynamic and complex nature of pollutant formation and distribution (e.g., meteorology, emissions sources, sunlight exposure). Similar limitations exist for precisely modeling project-level health consequences of directly emitted PM. However, it is known that public health will continue to be affected in Alameda and San Joaquin Counties so long as the regions do not attain the CAAQS or NAAQS.

Alternatives Analyzed at an Equal Level of Detail

As shown in the tables above:

- The Southfront Road Station Alternative would result in similar construction emissions as the proposed Greenville Station. Impacts would be less than significant with mitigation in the BAAQMD.
- The Stone Cut Alignment Alternative would result in similar, but slightly higher, construction emissions as the proposed Altamont Alignment. Impacts would be less than significant with mitigation in the BAAQMD.
- The West Tracy OMF Alternative would result in similar construction emissions as the proposed Tracy OMF. While the impacts of the OMF construction itself would be mitigated to less than significant, when considering all construction in the SJVAPCD, impacts would be significant and

unavoidable with mitigation in the SJVAPCD due to the localized effect of construction PM10 on ambient air quality.

- The Mountain House Station Alternative would result in similar construction emissions as the proposed Mountain House Station. While the impacts of the station construction itself would be mitigated to less than significant, when considering all construction in the SJVAPCD, impacts would be significant and unavoidable with mitigation in the SJVAPCD due to the localized effect of construction PM10 on ambient air quality.
- The Downtown Tracy Station Parking Alternative 1 and Downtown Tracy Station Parking Alternative 2 would result in higher construction emissions than the proposed Downtown Tracy Station because the parking alternatives would include construction of parking garages. While the impacts of the station construction itself would be mitigated to less than significant, when considering all construction in the SJVAPCD, impacts would be significant and unavoidable with mitigation in the SJVAPCD due to the localized effect of construction PM10 on ambient air quality.
- The combination of the Mountain House Station and the West Tracy OMF would result in higher localized CO and PM10 emissions than the proposed Mountain House Station and Tracy OMF. While the impacts of the station and OMF construction by themselves would be mitigated to less than significant, when considering all construction in the SJVAPCD, impacts would be significant and unavoidable with mitigation in the SJVAPCD due to the localized effect of construction PM10 on ambient air quality.

Impact AQ-2b: Operation of the Proposed Project could 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).

Level of Impact	**Less than Significant**
Mitigation Measures	**None Required**

Impact Characterization

Operation of the Proposed Project has the potential to create air quality impacts through increased Valley Link rail and maintenance facility activity. However, the Proposed Project would improve existing passenger rail opportunities, which would reduce single-occupancy vehicles from the transportation network. Criteria pollutant emissions and reductions generated by these sources were quantified for opening (2025) and design year (2040) conditions to capture changes in project activity and regional emission factors.

The Proposed Project would be implemented between Dublin/Pleasanton and Lathrop. The change in operational emissions would be spread linearly throughout the entire alignment. However, distinct operational characteristics will lead to differences in emissions within the Tri-Valley, Altamont, and Tracy to Lathrop segments. The final impact determination is based on the net change in emissions across the Proposed Project corridor.

Impact Detail and Conclusions

Proposed Project

Table 3.3-19 summarize estimated operational emissions in BAAQMD and SJVAPCD, in pounds per day and tons per year. The estimates reflect the difference between emissions generated by operation of the Valley Link trains and the OMF, and reductions achieved by displaced VMT (where negative values represent a net reduction in emissions under the operating scenario). Refer to Appendix L, *Air Quality, Energy, Greenhouse Gas Emissions, and Health Risk Assessment Supporting Documentation*, for a detailed summary of emissions by source.

As described in Chapter 2, *Project Description*, train technology variant technology variants include DMU, HBMU, BEMU, and DLH, all of which are shown in Table 3.3-19.

Table 3.3-19. Net Criteria Pollutant Emissions from Proposed Project Operation

	Net pounds per day					Net tons per year				
Location/Scenario	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**
Bay Area Air Quality Management District										
Proposed Project										
Greenville IOS 2025 DMU	(9)	(6)	(82)	(24)	(6)	(1)	(1)	(11)	(3)	(1)
Mountain House IOS 2025 DMU	(9)	24	(45)	(24)	(6)	(1)	3	(6)	(3)	(1)
2025 DMU	(16)	(5)	(113)	(39)	(10)	(2)	(1)	(16)	(5)	(1)
2040 DMU	(23)	(51)	(230)	(101)	(25)	(3)	(7)	(32)	(14)	(4)
Greenville IOS 2025 HBMU	(9)	(10)	(87)	(24)	(6)	(1)	(1)	(12)	(3)	(1)
Mountain House IOS 2025 HBMU	(10)	16	(55)	(24)	(6)	(1)	2	(7)	(3)	(1)
2025 HBMU	(16)	(13)	(123)	(39)	(10)	(2)	(2)	(17)	(5)	(1)
2040 HBMU	(23)	(61)	(243)	(102)	(26)	(3)	(8)	(34)	(14)	(4)
Greenville IOS 2025 BEMU	(11)	(39)	(125)	(25)	(6)	(1)	(5)	(17)	(3)	(1)
Mountain House IOS 2025 BEMU	(12)	(41)	(127)	(25)	(7)	(2)	(6)	(17)	(3)	(1)
2025 BEMU	(18)	(68)	(194)	(40)	(11)	(2)	(9)	(27)	(6)	(1)
2040 BEMU	(26)	(135)	(336)	(101)	(26)	(4)	(19)	(47)	(14)	(4)
Greenville IOS 2025 DLH	(9)	2	(71)	(24)	(6)	(1)	<1	(10)	(3)	(1)
Mountain House IOS 2025 DLH	(9)	41	(23)	(24)	(5)	(1)	6	(3)	(3)	(1)
2025 DLH	(15)	12	(91)	(39)	(10)	(2)	2	(13)	(5)	(1)
2040 DLH	(22)	(27)	(200)	(101)	(25)	(3)	(4)	(28)	(14)	(3)
Stone Cut Alignment Alternative[a]										
2025 DMU	(16)	(6)	(114)	(39)	(10)	(2)	(1)	(16)	(5)	(1)
2040 DMU	(23)	(52)	(231)	(101)	(25)	(3)	(7)	(32)	(14)	(4)
BAAQMD Threshold	*54*	*54*	-	*82*	*54*	-	-	-	-	-
San Joaquin Valley Air Pollution Control District										
Proposed Project										
Greenville IOS 2025 DMU	0	0	0	0	0	0	0	0	0	0
Mountain House IOS 2025 DMU	2	5	7	<1	<1	<1	<1	1	<1	<1

	Net pounds per day					Net tons per year				
Location/Scenario	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**
2025 DMU	(5)	<1	(51)	(20)	(4)	(1)	<1	(7)	(3)	(1)
2040 DMU	(12)	(29)	(142)	(62)	(16)	(2)	(4)	(20)	(9)	(2)
Greenville IOS 2025 HBMU	0	0	0	0	0	0	0	0	0	0
Mountain House IOS 2025 HBMU	2	5	7	<1	<1	<1	<1	<1	<1	<1
2025 HBMU	(5)	(3)	(56)	(20)	(4)	(1)	(<1)	(8)	(3)	(1)
2040 HBMU	(12)	(36)	(150)	(62)	(16)	(2)	(5)	(21)	(9)	(2)
Greenville IOS 2025 BEMU	0	0	0	0	0	0	0	0	0	0
Mountain House IOS 2025 BEMU	2	2	3	<1	<1	<1	<1	<1	<1	<1
2025 BEMU	(6)	(31)	(92)	(20)	(5)	(1)	(4)	(13)	(3)	(1)
2040 BEMU	(14)	(83)	(209)	(62)	(16)	(2)	(12)	(29)	(9)	(2)
Greenville IOS 2025 DLH	0	0	0	0	0	0	0	0	0	0.0
Mountain House IOS 2025 DLH	2	10	13	0	0	<1	1	2	<1	<1
2025 DLH	(5)	9	(40)	(20)	(4)	(1)	1	(6)	(3)	(1)
2040 DLH	(12)	(84)	(210)	(62)	(16)	(2)	(13)	(29)	(9)	(2)
SJVAPCD Threshold	*100*	*100*	*100*	*100*	*100*	*10*	*10*	*100*	*15*	*15*

Exceedances of air district thresholds are shown in underline (comparison is made versus the No Project Alternative).

[a] Calculations do not include any potential increase in ridership (and associated VMT-related GHG emissions reductions) with the alternative, although service times will improve compared to the Proposed Project.

ROG = reactive organic gases
NO_X = nitrogen oxide
CO = carbon monoxide
PM10 = particulate matter 10 microns in diameter and smaller
PM2.5 = particulate matter 2.5 microns in diameter and smaller
SO_X = sulfur oxide
BAAQMD = Bay Area Air Quality Management District
SJVAPCD = San Joaquin Valley Air Pollution Control District

With the 2025 IOS, the Proposed Project would result in net reductions of all criteria pollutants in the BAAQMD for all operating scenarios, except for the Greenville IOS with the DLH technology variant, the Mountain House IOS with the DMU, HBMU, or DLH technology variants. Under these scenarios, the Proposed Project would result in an increase in NO_X emissions, but this increase would be less than the BAAQMD threshold.

With the Greenville 2025 IOS, the Proposed Project would not result in any increases for criteria pollutants in the SJVAPCD. With the Mountain House IOS, the Proposed Project would result in increase in criteria pollutants, due to limited train operations and due to OMF operations without a corresponding decrease in VMT-related emissions, but these increases would be less than the SJVAPCD thresholds.

In the BAAQMD, Proposed Project full operations in 2025 and 2040 would result in reductions in all criteria pollutant emissions, with the exception of the NO_X emissions with the DLH technology variant in 2025, which would be less than significant. The BEMU technology variant would result in the greatest reductions among the technology variants.

In the SJVAPCD, Proposed Project full operations in 2025 and 2040 would result in net reductions in criteria pollutants with the exception of 2025 operations with the DMU and DLH technology variants, which would result in an increase in NO_X emissions below the SJVAPCD threshold. In the SJVAPCD, with either the HBMU or BEMU technology variants, all criteria pollutant emissions would be reduced, with the BEMU technology variant resulting in the greatest net reductions.

Since Proposed Project emissions would not exceed BAAQMD nor SJVAPCD significance thresholds and the Proposed Project would result in net reductions of criteria pollutant emissions in most scenarios, there would be no significant impact associated with Project operational criteria pollutants. Impacts would be less than significant.

Alternatives Analyzed at an Equal Level of Detail

As noted at the beginning of this resource section, the West Tracy OMF would not result in different operational emissions compared to the proposed Tracy OMF; the Mountain House Station Alternative would not result in different train operations or ridership compared to the proposed Mountain House Station; and the Downtown Tracy Station Parking Alternatives 1 and 2 would not result in different train operations or ridership compared to the proposed Downtown Tracy Station. Accordingly, the conclusions for the Proposed Project above would apply to those alternatives (i.e., less than significant).

As shown in Table 3.3-14, the Stone Cut Alignment Alternative would have slightly greater construction criteria pollutant emissions than the proposed Altamont Alignment. The Stone Cut Alignment Alternative would be approximately 0.4 mile shorter than the proposed Altamont Alignment. As shown in Table 3.3-19, the reduction in VMT and related emissions would offset the operational emissions of the Project in 2025 and 2040, resulting in a net reduction in criteria pollutant emissions relative to No Project conditions. The reduction in vehicle emissions would more than offset the criteria pollutant emissions from train operations, stations, and the OMF. Thus, impacts would be less than significant. With the savings in service time, it is probable that the Stone Cut Alignment Alternative would have increased ridership compared to the Proposed Project (although no ridership analysis was completed), likely resulting in a greater reduction of vehicle emissions. Overall, operational criteria pollutant emissions of the Stone Cut Alignment Alternative

are expected to be less than the Proposed Project (e.g., the Stone Cut Alignment Alternative would have greater criteria pollutant emissions reductions than the Proposed Project).

Table 3.3-20 summarizes estimated operational emissions for the Southfront Road Station Alternative in BAAQMD and SJVAPCD, in pounds per day and tons per year. The estimates reflect the difference between emissions generated by operation of the Valley Link trains and the OMF and reductions achieved by displaced VMT, where negative values represent a net reduction in emissions under the operating scenario. Refer to Appendix L, *Air Quality, Energy, Greenhouse Gas Emissions, and Health Risk Assessment Supporting Documentation*, for a detailed summary of emissions by source.

Table 3.3-20. Net Criteria Pollutant Emissions from Operation with the Southfront Road Station Alternative

	Net pounds per day					Net tons per year				
Location/Scenario	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**
Bay Area Air Quality Management District										
Southfront IOS 2025 DMU	(10)	(14)	(97)	(26)	(6)	(1)	(2)	(13)	(4)	(1)
Mountain House IOS 2025 DMU	(10)	21	(53)	(25)	(6)	(1)	3	(7)	(3)	(1)
2025 DMU	(16)	(7)	(117)	(40)	(10)	(2)	(1)	(16)	(6)	(1)
2040 DMU	(24)	(56)	(243)	(105)	(26)	(3)	(8)	(34)	(15)	(4)
Southfront IOS 2025 HBMU	(10)	(17)	(101)	(26)	(6)	(1)	(2)	(14)	(4)	(1)
Mountain House IOS 2025 HBMU	(10)	14	(62)	(25)	(6)	(1)	2	(8)	(3)	(1)
2025 HBMU	(16)	(14)	(127)	(40)	(10)	(2)	(2)	(17)	(6)	(1)
2040 HBMU	(24)	(66)	(256)	(106)	(27)	(3)	(9)	(36)	(15)	(4)
Southfront IOS 2025 BEMU	(11)	(42)	(133)	(26)	(7)	(2)	(6)	(18)	(4)	(1)
Mountain House IOS 2025 BEMU	(13)	(42)	(134)	(26)	(7)	(2)	(6)	(18)	(4)	(1)
2025 BEMU	(18)	(70)	(198)	(41)	(11)	(3)	(10)	(27)	(6)	(1)
2040 BEMU	(27)	(141)	(349)	(105)	(27)	(4)	(20)	(49)	(15)	(4)
Southfront IOS 2025 DLH	(10)	(0)	(79)	(26)	(6)	(1)	(0)	(11)	(4)	(1)
Mountain House IOS 2025 DLH	(9)	38	(31)	(25)	(6)	(1)	5	(4)	(3)	(1)
2025 DLH	(15)	11	(95)	(40)	(10)	(2)	1	(13)	(6)	(1)
2040 DLH	(23)	(33)	(213)	(105)	(26)	(3)	(5)	(30)	(15)	(4)
BAAQMD Threshold	*54*	*54*	-	*82*	*54*	-	-	-	-	-
San Joaquin Valley Air Pollution Control District										
Southfront IOS 2025 DMU	0	0	0	0	0	0	0	0	0	0
Mountain House IOS 2025 DMU	2	5	7	<1	<1	<1	<1	1	<1	<1
2025 DMU	(5)	0	(53)	(20)	(4)	(1)	<1	(7)	(3)	(1)
2040 DMU	(13)	(33)	(151)	(64)	(16)	(2)	(5)	(21)	(9)	(2)
Southfront IOS 2025 HBMU	0	0	0	0	0	0	0	0	0	0
Mountain House IOS 2025 HBMU	2	5	7	<1	<1	<1	<1	<1	<1	<1
2025 HBMU	(6)	(4)	(58)	(20)	(4)	(1)	(1)	(8)	(3)	(1)

	Net pounds per day					Net tons per year				
Location/Scenario	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**
2040 HBMU	(13)	(39)	(159)	(65)	(16)	(2)	(5)	(22)	(9)	(2)
Southfront IOS 2025 BEMU	0	0	0	0	0	0	0	0	0	0
Mountain House IOS 2025 BEMU	2	2	3	<1	<1	<1	<1	<1	<1	<1
2025 BEMU	(7)	(32)	(94)	(21)	(5)	(1)	(4)	(13)	(3)	(1)
2040 BEMU	(10)	(14)	(97)	(26)	(6)	(2)	(12)	(30)	(9)	(2)
Southfront IOS 2025 DLH	0	0	0	0	0	0	0	0	0	0
Mountain House IOS 2025 DLH	2	6	9	<1	<1	<1	<1	1	<1	<1
2025 DLH	(5)	9	(42)	(20)	(4)	(1)	1	(6)	(3)	(1)
2040 DLH	(13)	(28)	(144)	(64)	(16)	(2)	(4)	(20)	(9)	(2)
SJVAPCD Threshold	*100*	*100*	*100*	*100*	*100*	*10*	*10*	*100*	*15*	*15*

Exceedances of air district thresholds are shown in underline (comparison is made versus the No Project Alternative).

ROG = reactive organic gases
NO_X = nitrogen oxide
CO = carbon monoxide
PM10 = particulate matter 10 microns in diameter and smaller
PM2.5 = particulate matter 2.5 microns in diameter and smaller
SO_X = sulfur oxide
BAAQMD = Bay Area Air Quality Management District
SJVAPCD = San Joaquin Valley Air Pollution Control District

Operation of the Southfront Road Station Alternative under the 2025 Southfront IOS would result in net reductions of all criteria pollutants in the BAAQMD for all operating scenarios. Operation of the Southfront Road Station Alternative under the Mountain House IOS in 2025 with the DMU, HBMU or DLH technology variants would result in an increase in NO_X emissions in the BAAQMD, but this increase would be less than the BAAQMD threshold. In the BAAQMD, operation of the Southfront Road Station Alternative under full operations in 2025 and 2040 would result in reductions in all criteria pollutant emissions, with the exception of NO_X emissions increase in 2025 with the DLH technology variant which would be less than the BAAQMD threshold. The BEMU technology variant would result in the greatest reductions.

With the 2025 Southfront IOS, operation of the Southfront Road Station Alternative would not result in any increases for criteria pollutants in the SJVAPCD. With the 2025 Mountain House IOS, operation of the Southfront Road Station Alternative would result in an increase in criteria pollutants, due to limited train operations and due to OMF operations without a corresponding decrease in VMT-related emissions. However, these increases would be less than the SJVAPCD thresholds. In the SJVAPCD, operation of the Southfront Road Station Alternative under full operations in 2025 and 2040 would result in net reductions in criteria pollutants with the exception of 2025 operation with the DMU and DLHtechnology variants, which would result in an increase in NO_X emissions well below the SJVAPCD threshold. In the SJVAPCD with either the HBMU or BEMU technology variants, all criteria pollutant emissions would be reduced, with the BEMU technology variant resulting in the greatest net reductions.

Since emissions would not exceed BAAQMD nor SJVAPCD significance thresholds and operation of the Southfront Road Station Alternative would result in net reductions of criteria pollutant emissions in most scenarios, there would be no significant impact associated with operational criteria pollutants. The impact would be less than significant.

Impact AQ-3a: Operation of the Proposed Project could expose sensitive receptors to substantial carbon monoxide concentrations from increased passenger rail traffic.

Level of Impact	**Less than significant**
Mitigation Measures	**None required**

Impact Characterization

Vehicle engine exhaust associated with intersection congestion may elevate localized CO concentrations. Persons 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. Modeling in the SJVAB confirm that construction-period CO emissions would not violate any CO standard or contribute substantially to an existing or projected CO violation (Table 3.3-16). Similarly, the Valley Link trains would be diesel powered and are unlikely to contribute to a CO hot spot during Proposed Project operations. Accordingly, this analysis focuses on potential CO hot spots associated with additional motor vehicles at new Valley Link transit stations.

Impact Detail and Conclusions

Proposed Project

Tri-Valley

Proposed stations in the Tri-Valley segment would include the Dublin/Pleasanton, Isabel, and Greenville Stations. Local intersections that provide ingress and egress to each of these proposed stations would experience an increase in traffic activity and related congestion because of Valley Link station activity. These additional traffic volumes would likely cause an increase in localized CO emissions.

Altamont

The Mountain House Station is the only station proposed for the Altamont segment. Local intersections that provide ingress and egress to the proposed Mountain House Station would experience an increase in traffic activity and related congestion because of Valley Link station activity. These additional traffic volumes would likely cause an increase in localized CO emissions.

Tracy to Lathrop

Proposed stations in the Tracy to Lathrop segment would include the Downtown Tracy, River Islands, and North Lathrop Stations. Local intersections that provide ingress and egress to each of these proposed stations would experience an increase in traffic activity and related congestion because of Valley Link station activity. These additional traffic volumes would likely cause an increase in localized CO emissions.

Impact Quantification

Table 3.3-21 summarizes the ridership productions for 2040 for the Proposed Project. Ridership productions are the total number of Valley Link trips that are produced at each station for the home end of the trip. As shown below, there is very little ridership production at the Dublin/Pleasanton Station, as that is the destination for nearly all Valley Link riders. For a Valley Link rider who drives to the station and parks there, there would be two vehicle trips per day; for commuters this would usually be in the morning and the evening.

Presuming all riders drive and park at the stations (which is a worst-case assumption), Table 3.3-21 shows the potential daily traffic volumes and potential morning or evening traffic volumes. Given the proposed service schedule, morning and evening traffic volumes would be spread out over the morning and evening peak hours with some occurring outside of peak hours. Thus, the morning and evening traffic volumes below substantially exceed the potential peak hour volumes.

Table 3.3-21 shows that the maximum potential morning or evening traffic volumes are far below the BAAQMD 44,000 vehicles per hour screening criteria for all roads as well as the 24,000 vehicles per hour screening criteria for roadways with air circulation limitations (e.g., parking garages, tunnels, underpasses). As such, 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 3.3-21. Maximum Potential 2040 One-Way Station Traffic Volumes

Location	Daily Ridership Productions	Maximum Potential Daily Traffic Volumes (presuming 1 rider = 1 vehicle)	Maximum Potential Morning or Evening Traffic Volumes (presuming 1 rider = 1 vehicle)
Proposed Project			
Dublin/Pleasanton	692	692	346
Isabel	6,064	6,064	3,032
Greenville	2,601	2,601	1,301
Mountain House	2,784	2,784	1,392
Downtown Tracy	6,011	6,011	3,006
River Islands	4,200	4,200	2,100
North Lathrop	9,359	9,359	4,680
Southfront Road Station Alternative			
Dublin/Pleasanton	750	750	375
Isabel	6,015	6,015	3,008
Southfront	3,372	3,372	1,686
Mountain House	2,920	2,920	1,460
Downtown Tracy	6,190	6,190	3,095
River Islands	4,216	4,216	2,108
North Lathrop	9,530	9,530	4,765

Source for ridership productions: Valley Link Ridership, Revenue, and Benefits Technical Memorandum

Alternatives Analyzed at an Equal Level of Detail

Table 3.3-21 summarizes the ridership productions for 2040 for the Southfront Road Station Alternative. Similar to the Proposed Project, Table 3.3-21 shows that the maximum potential morning or evening traffic volumes are far below the BAAQMD 44,000 vehicles per hour screening criteria for all roads as well as the 24,000 vehicles per hour screening criteria for roadways with air circulation limitations (e.g., parking garages, tunnels, underpasses). As such, the Southfront Road Station Alternative would not contribute to CO hot spots or expose receptors to substantial CO concentrations. This impact would be less than significant.

The Mountain House Station Alternative and the Downtown Tracy Station Parking Alternatives 1 and 2 would have the same ridership as the proposed Mountain House Station and the proposed Downtown Tracy Station as shown in Table 3.3-21 and would, therefore, also have less-than-significant CO effects.

Impact AQ-3b: Construction of the Proposed Project could expose sensitive receptors to substantial DPM or localized PM concentrations

Level of Impact Prior to Mitigation	**Significant** All proposed and alternative facilities with nearby sensitive receptors **Less than Significant** Proposed and alternative facilities without nearby sensitive receptors
Mitigation Measures	AQ-2.1: Implement advanced emissions controls for off-road equipment during construction AQ-2.2: Implement off-road equipment engine maintenance and idling restrictions during construction AQ-2.3: Implement advanced emissions controls for trains during construction AQ-2.4: Utilize modern fleet for on-road material delivery and haul trucks during construction
Level of Impact after Mitigation	**Less than Significant** All proposed and alternative facilities

Impact Characterization

Construction has the potential to create inhalation health risks and exposure to PM2.5, which may exceed local significance thresholds for increased cancer and non-cancer health risk at receptor locations adjacent to the track. 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 HRA (Impacts AQ-3b through AQ-3e) focus on DPM emissions, as recommended by BAAQMD, SJVAPCD, 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 highest annual average concentration collected from 5 years of modeling. Because of these conservative assumptions, actual health risks could be less than the projected exposures.

Tables 3.3-21 and 3.3-22 summarize estimated maximum cancer risk, chronic health hazard, and PM2.5 concentrations for the alignments with the highest emission density (grams per meter) and closest proximity to receptors in BAAQMD and SJVAPCD, respectively. Risks are presented for one track segment and station in each alignment.

Impact Detail and Conclusion

Proposed Project

Three track segment sections along I-580 and three stations (Dublin/Pleasanton, Isabel, and Greenville) were modeled for the Tri-Valley segment. Modeling results for the worst-case locations indicate that construction would not exceed BAAQMD's cancer or non-cancer risk thresholds at the maximum exposed receptor location.

The track segment and two stations (Mountain House Station and Mountain House Station Alternative) were modeled for the Altamont segment. Modeling results for the worst-case locations indicate that construction would not exceed BAAQMD and SJVAPCD's cancer or non-cancer risk thresholds at the maximum exposed receptor location.

Two track segment sections and four stations (Downtown Tracy Station Parking Alternative 1, Downtown Tracy Station Parking Alternative 2, River Islands, and North Lathrop) were modeled for the Tracy to Lathrop segment. Modeling results for the worst-case locations indicate that construction would not exceed SJVAPCD's cancer or non-cancer risk thresholds at the maximum exposed receptor location.

Tables 3.3-21 and 3.3-22 summarize estimated maximum cancer risk, chronic health hazard, and PM2.5 concentrations in the BAAQMD and SJVAPCD, respectively. Risks are presented for each geographic segment. Note that only the track segment and station with the highest DPM emission density and closest proximity to receptors are analyzed because it would result in the highest offsite health risks from Proposed Project construction. The modeling assumes implementation of all feasible onsite mitigation measures, as described under Mitigation Measures AQ-2.1 through AQ-2.4 because these mitigation measures for criteria pollutants are required whether or not there are nearby sensitive receptors and whether or not there are significant impacts relative to sensitive receptors.

Table 3.3-22. Estimated Maximum Inhalation Cancer Risk, Chronic and Acute Hazard Index, and PM2.5 Concentration from Construction in the Bay Area Air Quality Management District

Segment/Scenario	Cancer Risk (per million)	Chronic HI	Acute HI	PM2.5 Concentration (ug/m^3)
Tri-Valley				
Section 1 Track Alignment	2.6	<0.1	<0.1	0.2
Dublin/Pleasanton Station	0.3	<0.1	<0.1	0.1
Altamont				
Track Alignment	0.9	<0.1	<0.1	0.1
BAAQMD Threshold	10	1.0	1.0	0.3

Note: Modeling assumes implementation of Mitigation Measures AQ-2.1 through AQ-2.4
PM2.5 = particulate matter 2.5 microns in diameter and smaller
HI = hazard index
ug/m^3 = micrograms per cubic meter
< = less than

Table 3.3-23. Estimated Maximum Inhalation Cancer Risk and Chronic and Acute Hazard Index from Construction in the San Joaquin Valley Air Pollution Control District [a]

Segment/Scenario	Cancer Risk (per million)	Chronic HI	Acute HI
Altamont			
Mountain House Station Alternative[b]	3.8	<0.1	<0.1
Tracy to Lathrop			
Section 1 Track Alignment	1.2	<0.1	0.1
Downtown Tracy Station Alternative 1[c]	10.8	<0.1	<0.1

Segment/Scenario	Cancer Risk (per million)	Chronic HI	Acute HI
Downtown Tracy Station Alternative 2[c]	11.2	<0.1	<0.1
SJVAPCD Threshold	20	1.0	1.0

Note: Modeling assumes implementation of Mitigation Measures AQ-2.1 through AQ-2.4 for criteria pollutants.
[a] PM2.5 concentrations are not presented, consistent with SJVAPCD guidance.
[b] Includes construction of the rail line and stations. Impacts of the Mountain House Station would be less than the Mountain House Station Alternative because the Mountain House Station Alternative is closer to sensitive receptors.
[c] As shown in Table 3.3-15, the Downtown Tracy Station and the parking alternatives would have the same criteria pollutant levels after mitigation. The parking alternatives were modeled instead of the proposed Downtown Tracy Station because the alternatives would have more concentrated construction near sensitive receptors compared to the proposed Downtown Tracy Station, which would have construction spread out over a larger area that on average would be further from sensitive receptors. Since the parking alternatives have less-than-significant impacts, so too would the proposed Downtown Tracy Station.
PM2.5 = particulate matter 2.5 microns in diameter and smaller
HI = hazard index
ug/m^3 = micrograms per cubic meter
< = less than

Alternatives Analyzed at an Equal Level of Detail

While not modeled, there are no sensitive receptors close to the Southfront Road Station Alternative,[10] so it would not result in a significant impact relative to construction DPM emissions. There are no sensitive receptors adjacent to the area where the Stone Cut Alignment Alternative diverges from the proposed Altamont Alignment; therefore, no modeling of health risks were done for this alternative and construction along the area of divergence would have no impact on sensitive receptors. Construction of the West Tracy OMF would be further away from sensitive receptors than the proposed Tracy OMF. As shown in Table 3.3-23, construction of the Mountain House Station Alternative would not result in risks above the applicable thresholds. Construction of the Downtown Tracy Station Parking Alternatives 1 and 2 would result in less-than-significant impacts, as indicated in Table 3.3-23.

Mitigation Measures

For criteria pollutant construction impacts, Mitigation Measures AQ-2.1 through AQ-2-4 would apply to all proposed facilities associated with the Proposed Project (and to any alternatives, if adopted).

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

Refer to measure description under Impact AQ-2a.

Mitigation Measure AQ-2.2: Implement off-road equipment engine maintenance and idling restrictions during construction

Refer to measure description under Impact AQ-2a.

[10] There is one house approximately 130 feet west of the Southfront Road Station Alternative site, but this house will be acquired to construct the Tri-Valley Alignment, so no residents would be present during construction.

Mitigation Measure AQ-2.3: Implement advanced emissions controls for trains during construction

Refer to measure description under Impact AQ-2a.

Mitigation Measure AQ-2.4: Utilize modern fleet for on-road material delivery and haul trucks during construction

Refer to measure description under Impact AQ-2a.

Significance with Application of Mitigation

Proposed Project

As shown in Tables 3.3-21 and 3.3-22, with implementation of Mitigation Measures AQ-2.1 through AQ-2.4, construction would not result in increased cancer or chronic health hazards, or PM2.5 concentrations more than BAAQMD or SJVAPCD thresholds and this impact would be less than significant for the Proposed Project.

Alternatives Analyzed at an Equal Level of Detail

As noted above, there are no sensitive receptors close to the Southfront Road Station Alternative, so it would have less impact than the proposed Greenville Station. Overall, the alternative would have a less-than-significant impact with implementation of the mitigation for criteria pollutants.

As noted above, there are no sensitive receptors along the Stone Cut Alignment Alternative where it diverges from the proposed Altamont Alignment. In addition, there are no sensitive receptors along this portion of the proposed Altamont Alignment. Thus, there is no difference between the Stone Cut Alignment Alternative and the Proposed Project in terms of exposure to TACs during construction and the alternative would have a less-than-significant impact with implementation of the mitigation for criteria pollutants.

Construction of the West Tracy OMF would be further away from sensitive receptors than the proposed Tracy OMF, and thus would have less impact related to construction DPM than the Proposed Project. Overall, this alternative would have a less-than-significant impact with implementation of the mitigation for criteria pollutants.

Construction of the Mountain House Station Alternative would result in higher impacts than the Mountain House Station because of closer proximity to sensitive receptors, but impacts can be mitigated to a less-than-significant level with implementation of Mitigation Measures AQ-2.1 to AQ-2.4. Overall, the alternative would have a less-than-significant impact with implementation of the mitigation for criteria pollutants.

Construction of the Downtown Tracy Station Parking Alternatives 1 and 2 would result in slightly higher impacts than the proposed Downtown Tracy Station. Overall, these alternatives would have a less-than-significant impact with implementation of the mitigation for criteria pollutants.

Impact AQ-3c: Diesel-powered train service operations could expose sensitive receptors to health risks from increased exposure to DPM and PM2.5 concentrations

Level of Impact	**Less than significant**
Mitigation Measures	**None required**

Impact Characterization

Operation of the Valley Link train engines with the DMU or the HBMU technology variants has the potential to create inhalation health risks and exposure to PM2.5, which may exceed local significance thresholds for increased cancer and non-cancer health risk at receptor locations adjacent to the track. The BEMU technology variant would not generate any DPM emissions due to train operations since it would not use diesel fuel.

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 highest annual average concentration collected from 5 years of modeling. Because of these conservative assumptions, actual health risks could be less than the projected exposures. The DMU technology variant was evaluated as it is the technology that would have the highest DPM emissions of the three technology variants.

Impact Detail and Conclusion

Proposed Project

Table 3.3-24 summarizes estimated maximum cancer risk, chronic health hazard,[11] and PM2.5 concentrations in BAAQMD and SJVAPCD for the DLH technology variant for the IOS (2025), opening (2025), and design year (2040) improvement conditions. A 30-year exposure duration was assumed, consistent with OEHHA (2015) guidance. Risks are presented for each geographic segment. In some cases, more than one location is reported within a segment due to differences in representative meteorology and track orientation.

Table 3.3-24. Estimated Maximum Inhalation Cancer Risk, Chronic Hazard Index, and PM2.5 Concentration from Operation of Valley Link Trains, Proposed Project Diesel Locomotive Haul Technology Variant

Segment/Scenario	Cancer Risk (per million)	Chronic HI	PM2.5 Concentration (ug/m^3)[a]
Tri-Valley			
Tri-Valley: Section 1			
2025 Interim	2.45	<0.02	0.00282
Opening (2025)	2.45	<0.02	0.00283
Design Year (2040)	3.33	<0.02	0.00385
Tri-Valley: Section 2			
2025 Interim	2.19	<0.02	0.00253
Opening (2025)	2.20	<0.02	0.00253

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

Segment/Scenario	Cancer Risk (per million)	Chronic HI	PM2.5 Concentration (ug/m^3)[a]
Design Year (2040)	2.97	<0.02	0.00343
Tri-Valley: Section 3			
2025 Interim	2.12	<0.02	0.00245
Opening (2025)	2.13	<0.02	0.00246
Design Year (2040)	2.88	<0.02	0.00333
Altamont			
2025 Interim	2.04	<0.02	0.002
Opening (2025)	2.04	<0.02	0.002
Design Year (2040)	2.77	<0.03	0.003
Tracy to Lathrop			
Tracy to Lathrop: Section 1			
Opening (2025)	1.80	<0.02	-[a]
Design Year (2040)	3.33	<0.02	-[a]
Tracy to Lathrop: Section 2			
Opening (2025)	0.97	<0.02	-[a]
Design Year (2040)	1.81	<0.02	-[a]
Significance Thresholds			
BAAQMD	10	1.0	0.3
SJVAPCD	20	1.0	--

Note: Risk levels due to particulate matter would be approximately 30% lower when using renewable diesel (CalEPA 2015).
[a] PM2.5 concentrations are not presented for SJVAPCD, consistent with SJVAPCD guidance.
PM2.5 = particulate matter 2.5 microns in diameter and smaller
HI = hazard index ug/m^3 = micrograms per cubic meter < = less than

As shown in Table 3.3-24, implementation of Valley Link service with the DLH technology variant would not result in increased cancer or chronic health hazards, or PM2.5 concentrations more than BAAQMD or SJVAPCD thresholds. Emissions would be lower with the DMU and HBMU technology variants (since they consume less fuel than the DLH technology variant) and with use of renewable diesel (since renewable diesel has lower DPM emissions than regular diesel) and would be avoided with the BEMU technology variant. This impact would be less than significant, and no mitigation is required.

Alternatives Analyzed at an Equal Level of Detail

There would be no difference in the impacts of train operations along the mainline tracks on sensitive receptors with any of the alternatives analyzed at an equal level of detail (Southfront Road Station Alternative, Stone Cut Alignment Alternative, Mountain House Station Alternative, West Tracy OMF Alternative, and Downtown Tracy Station Parking Alternatives 1 and 2) as these alternatives would all have the same train operations on the mainline as the Proposed Project and the same location relative to sensitive receptors. Like the Proposed Project, this impact would be less than significant, and no mitigation is required.

Impact AQ-3d: Proposed Project operation could expose sensitive receptors adjacent to Valley Link transit stations and maintenance facilities to health risks from increased exposure to DPM and PM2.5 concentrations

Level of Impact	**Less than significant**
Mitigation Measures	**None required**

Impact Characterization

Implementation of Valley Link would bring train idling to train stations. Receptors located at the residential areas adjacent to these stations may be exposed to increased cancer and non-cancer health risks, like receptors adjacent to the mainline track (analyzed above under Impact AQ-3d).

DPM concentrations were estimated for the DMU technology variant using conservative air quality modeling options and representative local meteorological conditions. The HBMU technology variant would have slightly lower idling emissions than the DMU technology variant, and the BEMU technology variants would have no idling emissions. 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.

Impact Detail and Conclusion

Proposed Project

Table 3.3-25 summarizes the estimated maximum cancer risk and chronic health hazards[12] at each modeled station for opening (2025) and design year (2040), and additional 2025 interim for the Tri-Valley. A 30-year exposure duration was assumed, consistent with OEHHA (2015) guidance. The reported health risks correspond the maximum number of daily train trips that would occur at each station and fueled with traditional diesel.

Table 3.3-25. Estimated Maximum Inhalation Cancer Risk, Chronic Hazard Index, and PM2.5 Concentration from Train Idling at Stations, Diesel Locomotive Haul Technology Variant

Segment/Scenario	Cancer Risk (per million)	Chronic HI	PM2.5 Concentration (ug/m^3)
Proposed Project, DMU Technology Variant			
Tri-Valley			
Dublin/Pleasanton Station			
2025 Interim	0.43	<0.02	0.00050
Opening (2025)	0.43	<0.02	0.00050
Design Year (2040)	0.59	<0.02	0.00068
Isabel Station			
2025 Interim	0.25	<0.02	0.00029
Opening (2025)	0.25	<0.02	0.00029
Design Year (2040)	0.33	<0.02	0.00039
Greenville Station			

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

Segment/Scenario	Cancer Risk (per million)	Chronic HI	PM2.5 Concentration (ug/m³)
2025 Interim	0.08	<0.02	0.00010
Opening (2025)	0.08	<0.02	0.00010
Design Year (2040)	0.11	<0.02	0.00013
BAAQMD Significance Thresholds	**10**	**1.0**	**0.3**
Altamont			
Mountain House Station			
Opening (2025)	<0.02	<0.02	-[a]
Design Year (2040)	<0.02	<0.03	-[a]
Tracy to Lathrop			
Downtown Tracy Station			
Opening (2025)	0.62	<0.02	-[a]
Design Year (2040)	1.15	<0.02	-[a]
River Island Station			
Opening (2025)	0.01	<0.02	-[a]
Design Year (2040)	0.012	<0.03	-[a]
North Lathrop Station			
Opening (2025)	0.37	<0.02	-[a]
Design Year (2040)	0.68	<0.02	-[a]
SJVAPCD Significance Thresholds	**20**	**1.0**	-[a]
Alternatives, DMU Technology Variant			
Mountain House Station Alternative			
Opening (2025)	1.10	<0.02	-[a]
Design Year (2040)	1.50	<0.03	-[a]
Downtown Tracy Station Alternative 1			
Opening (2025)	0.62	<0.02	-[a]
Design Year (2040)	1.15	<0.02	-[a]

Note: Risk levels due to particulate matter with the DMU Technology Variant would be lower by approximately 30% with use of renewable diesel (CalEPA 2015)
[a] PM2.5 concentrations are not presented for SJVAPCD, consistent with SJVAPCD guidance.
PM2.5 = particulate matter 2.5 microns in diameter and smaller
ACE = Altamont Corridor Express HI = hazard index
µg/m³ = micrograms per cubic meter < = less than

As shown in Table 3.3-25, station idling would not result in increased cancer or chronic health hazards more than BAAQMD nor SJVAPCD thresholds. This impact would be less than significant, and no mitigation is required. Emissions would be lower with the DMU or HBMU technology variants and would be avoided with the BEMU technology variant.

Alternatives Analyzed at an Equal Level of Detail

Idling at the Southfront Road Station Alternative was not modeled due to the lack of nearby sensitive receptors with the alternative (the one adjacent resident would be removed due to acquisition to support the alternative). The Stone Cut Alignment Alternative would not change train idling at stations. The Mountain House Station Alternative would have a slightly higher impact than the proposed Mountain House Station due to closer proximity to sensitive receptors, but the impact

would still be less than the applicable thresholds. There would be no difference in the impacts of train idling due to the Downtown Tracy Parking Alternatives 1 and 2 because these alternatives would not affect train operations. This impact would be less than significant for all alternatives analyzed at an equal level of detail and no mitigation is required.

Impact AQ-3e: Realignment of I-580 in the Tri-Valley could expose sensitive receptors to health risks from increased exposure to roadway pollutants

Level of Impact	**Less than significant**
Mitigation Measures	**None required**

Impact Characterization

Realignment of I-580 in the Tri-Valley has the potential to create inhalation health risks and exposure to PM2.5, which may exceed local significance thresholds for increased cancer and non-cancer health risk at receptor locations adjacent to the roadway.

Impact Detail and Conclusion

Proposed Project

As described in the methodology, changes in health risks due to the realignment of I-580 at certain locations between Greenville Road and the BART Dublin/Pleasanton Station were evaluated at select sensitive receptor locations closest to locations where I-580 travel lanes would be realigned. Tables 3.3-26a and 3.3-26b summarize estimated maximum cancer risk, chronic health hazard, and acute risk and PM2.5 concentrations in BAAQMD for a 2018 with Project condition (compared to 2018 existing conditions) and a 2040 with Project condition (compared to 2040 conditions without the project) relative to the I-580 realignment. Since the I-580 realignment would occur during construction, the 2018 condition analysis represents a conservative estimate of the near-term health risk and the 2040 condition analysis represents an estimate of the long-term health risks.

Table 3.3-26a. Estimated Maximum Inhalation Cancer Risk, Chronic Hazard Index, and PM2.5 Concentration from Realignment of I-580 in the Tri-Valley, 2018 with Project vs. 2018 Existing Conditions

Segment/Scenario	Location Relative to nearest I-580 Through Lanes	Roadway Shift Westbound I-580 Lanes	Roadway Shift Eastbound I-580 lanes	Incremental Cancer Risk (per million)	Chronic HI	PM2.5 Concentration (ug/m^3)
BART Dublin/Pleasanton (mixed use)	273 feet north	-32 feet	N/A	+0.60	+<0.01	+0.02
Collier Canyon Road (residential)	165 feet north	-22 feet	N/A	+2.77	+0.01	+0.07
University of Phoenix (institutional)	200 feet north	-5 feet	+14 feet	-1.13	-<0.01	-0.02
Shea Sage (residential)	297 feet north	-4 feet	+17 feet	-1.10	-<0.01	-0.02
Saddleback Road (residential)	368 feet south	11 feet	-13 feet	+0.08	0.00	+<0.01
E. of Las Colinas Road (residential)	225 feet north	-19 feet	N/A	+1.58	+<0.01	+0.03
W. of Vasco Road (residential)	103 feet north	-5 feet	+29 feet	-3.54	-0.02	-0.10
E. of Laughlin Road (residential)	169 feet north	-8 feet	N/A	+0.98	+<0.01	+0.03
Significance Thresholds						
BAAQMD				10	1.0	0.3

PM2.5 = particulate matter 2.5 microns in diameter and smaller
HI = hazard index ug/m^3 = micrograms per cubic meter < = less than

Table 3.3-26b. Estimated Maximum Inhalation Cancer Risk, Chronic Hazard Index, and PM2.5 Concentration from Realignment of I-580 in the Tri-Valley, 2040 with Project vs. 2040 No Project Conditions

Segment/Scenario	Location Relative to nearest I-580 Through Lanes	Roadway Shift Westbound I-580 Lanes	Roadway Shift Eastbound I-580 lanes	Incremental Cancer Risk (per million)	Chronic HI	PM2.5 Concentration (ug/m^3)
BART Dublin/Pleasanton (mixed use)	273 feet north	-32 feet	N/A	+0.12	+<0.01	+0.01
Collier Canyon Road (residential)	165 feet north	-22 feet	N/A	+0.57	+0.01	+0.07
University of Phoenix (institutional)	200 feet north	-5 feet	+14 feet	-0.23	-<0.01	-0.03
Shea Sage (residential)	297 feet north	-4 feet	+17 feet	-0.23	-<0.01	-0.02
Saddleback Road (residential)	368 feet south	11 feet	-13 feet	+0.02	0.00	+<0.01
E. of Las Colinas Road (residential)	225 feet north	-19 feet	N/A	+0.32	+<0.01	+0.03
W. of Vasco Road (residential)	103 feet north	-5 feet	+29 feet	-0.72	-0.02	-0.10
E. of Laughlin Road (residential)	169 feet north	-8 feet	N/A	+0.20	+<0.01	+0.03
Significance Thresholds						
BAAQMD				10	1.0	0.3

PM2.5 = particulate matter 2.5 microns in diameter and smaller
HI = hazard index ug/m^3 = micrograms per cubic meter < = less than

As shown in Table 3.3-26, realignment of I-580 would not result in increased cancer or chronic health hazards, or PM2.5 concentrations more than BAAQMD thresholds. This impact would be less than significant, and no mitigation is required.

Alternatives Analyzed at an Equal Level of Detail

There would be no difference in the realignment of I-580 along the mainline tracks on sensitive receptors with any of the alternatives analyzed at an equal level of detail (Southfront Road Station Alternative, Stone Cut Alignment Alternative, Mountain House Station Alternative, West Tracy OMF Alternative, and Downtown Tracy Station Parking Alternatives 1 and 2) as these alternatives would all have the same I-580 realignment as the Proposed Project. Like the Proposed Project, this impact would be less than significant, and no mitigation is required.

Impact AQ-3f: The Proposed Project could expose sensitive receptors to health risks from increased exposure to DPM and PM2.5 concentrations from multiple operational emission sources

Level of Impact	**Less than significant**
Mitigation Measures	**None required**

Impact Characterization

Impacts AQ-3c through AQ-3e evaluated risks from receptor exposure to DPM from individual operational emission sources (e.g., train movements, station idling, I-580 realignment). At some locations, receptors may be exposed to DPM emissions from multiple sources. The BEMU technology variant would avoid operational exposure to DPM from train operation and idling.

Impact Detail and Conclusion

Proposed Project

Combined risks from train movement and station idling under the DLH technology variant could occur in all segments. The worst-case location was identified as the Dublin/Pleasanton Station in the BAAQMD and the Downtown Tracy Station in the SJVAPCD. Table 3.3-27 summarizes the impact from train movements and idling. The operational risk levels would be lower with the DMU or HBMU technology variants because these variants would have lower fuel consumption than the DLH technology variant. The BEMU technology variant would avoid operational exposure to DPM from train operation and idling.

Table 3.3-27. Estimated 2040 Maximum Inhalation Cancer Risk, Chronic Hazard Index, and PM2.5 Concentrations from Combined Operational Emission Sources[a]

Location/Source	Cancer Risk (per million)	Chronic HI	PM2.5 Concentration (ug/m^3)
Proposed Project			
Tri-Valley (BAAQMD)			
Station Idling, DLH	0.59	<0.02	0.001
Station Idling, BEMU	0.00	0.00	0.000

Location/Source	Cancer Risk (per million)	Chronic HI	PM2.5 Concentration (ug/m^3)
Train Movements, DLH	3.33	<0.02	0.004
Train Movements, BEMU	0.00	0.00	0.000
I-580 realignment (2018)	2.77	0.01	0.07
Total, DLH	6.69	<0.04	0.075
Total, BEMU	2.77	0.01	0.07
BAAQMD Threshold	*10*	*1.0*	*0.3*
Altamont (in the BAAQMD)[a]			
Train Movements, DLH	2.77	<0.03	0.003
Train Movements, BEMU	0.00	0.00	0.0
Tracy to Lathrop (SJVAPCD)			
Station Idling, DLH	1.15	<0.02	-[b]
Station Idling, BEMU	0.00	0.00	-[b]
Train Movements, DLH	3.33	<0.02	-[b]
Train Movements, BEMU	0.00	0.00	-[b]
Total, DLH	4.48	<0.04	-[b]
Total, BEMU	0.00	0.00	-[b]
SJVAPCD Threshold	*20*	*1.0*	-
Alternatives Analyzed at an Equal Level of Detail			
Tracy to Lathrop with Downtown Tracy Station Alternative 1 instead of Proposed Downtown Tracy Station			
Total, DLH	4.48	<0.04	-[b]
Total, BEMU	0.00	0.00	-[b]

Note: Risk levels due to particulate matter with the DLH would be approximately 30% lower with use of renewable diesel (CalEPA 2015).
[a] Although the Mountain House and Mountain House Station Alternative are in the Altamont section, they are in San Joaquin County and thus outside of the BAAQMD and thus BAAQMD thresholds do not apply to those stations.
[b] PM2.5 concentrations are not presented, consistent with SJVAPCD guidance.
SJVAPCD = San Joaquin Valley Air Pollution Control District
BAAQMD = Bay Area Air Quality Management District
PM2.5 = particulate matter 2.5 microns in diameter and smaller
DPM = diesel particulate matter
HI = hazard index < = less than

The cancer risk increase associated with combined train movements, train idling, and the I-580 realignment would not exceed BAAQMD nor SJVAPCD health risk thresholds. This impact for the Proposed Project would be less than significant.

Alternatives Analyzed at an Equal Level of Detail

The Southfront Road Station Alternative was not modeled due to the lack of nearby sensitive receptors with the alternative (the one adjacent resident would be removed due to acquisition to support the alternative). The Stone Cut Alignment Alternative would not change operational health risks relative to the Proposed Project. The Mountain House Station Alternative would have a slightly higher impact than the proposed Mountain House Station due to closer proximity to sensitive receptors, but the impact would still be less than the applicable thresholds. There would be no difference in the impacts of train idling due to the Downtown Tracy Station Parking Alternatives 1

and 2 because these alternatives would not affect train operation. This impact would be less than significant for all alternatives analyzed at an equal level of detail and no mitigation is required.

Impact AQ-3g: The Proposed Project could expose sensitive receptors to cumulative health risks from increased exposure to DPM and PM2.5 concentrations

Level of Impact Prior to Mitigation	**Significant** Proposed Project (construction and DMU/HBMU/DLH operation in the Tri-Valley segment) All alternatives (construction and DMU/HBMU/DLH operation in the Tri-Valley segment) **Less than Significant** Proposed Project (BEMU operations in the Tri-Valley segment; construction and operation outside the Tri-Valley segment) All other alternatives (BEMU operations in the Tri-Valley segment; construction and operation outside the Tri-Valley segment)
Mitigation Measures	AQ-2.1: Implement advanced emissions controls for off-road equipment during construction AQ-2.2: Implement off-road equipment engine maintenance and idling restrictions during construction AQ-2.3: Implement advanced emissions controls for trains during construction AQ-2.4: Utilize modern fleet for on-road material delivery and haul trucks during construction
Level of Impact After Mitigation	**Significant and Unavoidable** Proposed Project (construction and DMU/HBMU/DLH operation in the Tri-Valley segment) Alternatives (construction and DMU/HBMU/DLH operation in the Tri-Valley segment) **Less than Significant** Proposed Project (BEMU operations in the Tri-Valley segment; construction and operation outside the Tri-Valley segment) All other alternatives (BEMU operations in the Tri-Valley segment; construction and operation outside the Tri-Valley segment)

Impact Characterization

Multiple existing sources of cumulative emissions are located within 1,000 feet of the Valley Link alignment and sensitive receptors. When combined with DPM emissions from construction and operation, receptors may be exposed to cumulative health risks more than air district thresholds. BAAQMD has established cumulative risk thresholds, whereas SJVAPCD considers risks in excess of project-level thresholds to result in a cumulatively considerable impact (Siong pers. comm.). Therefore, an assessment of combined ambient and project-level health risks in SJVAPCD was not performed, consistent with SJVAPCD guidance. However, cumulative health risk impacts in SJVAPCD are discussed below based on the results of the project-level analysis presented in Impacts AQ-3b through AQ-3f.

Valley Link spans approximately 25 miles in BAAQMD and traverses numerous densely populated areas with various stationary, roadway, and rail sources. Analyzing health risks from all sources within 1,000 feet of the entire alignment would be unnecessary and redundant. Accordingly, the alignment was screened to select one area per geographic segment to analyze cumulative health

risks. The selected areas were chosen based on their proximity to residential receptors and the Valley Link alignment, as well as overall density of existing sources.

The existing stationary sources within 1,000 feet of the maximum impact residential receptors were identified using BAAQMD's Google Earth files, then emissions from the sources were obtained from BAAQMD. Initially the ambient health risks were calculated using the BAAQMD Health Risk Calculator Tool. The distance adjustment tool only accurately accounts for sources within 1,000 feet of a receptor. BAAQMD's CEQA Guidelines stated, "A lead agency should enlarge the 1,000-foot radius on a case-by-case basis if an unusually large source or sources of risk or hazard emissions that may affect a proposed project is beyond the recommended radius."

Cumulative health risks depend on the locations and densities of sensitive receptors, types, and number of existing sources, and the magnitude of project-related emissions contribution. The highest densities of receptors are found within the Tri-Valley and Tracy to Lathrop segments. Stationary, railway, and highway sources are most numerous in the Tri-Valley segment. The change in DPM emissions associated with Valley Link operation would be spread linearly throughout the entire alignment.

Impact Detail and Conclusion

Proposed Project

Table 3.3-28 summarizes cumulative cancer risk, chronic health hazard, and PM2.5 concentrations at representative locations along the Tri-Valley and Altamont segments in BAAQMD during construction. The table presents the Proposed Project and ambient contribution to the cumulative risk. Refer to Appendix L, *Air Quality, Energy, Greenhouse Gas Emissions, and Health Risk Assessment Supporting Documentation*, for detailed information on the individual sources included in the ambient risk estimate.

Alameda County Waste Management/Landfill is about 2,200 feet from the maximum impact receptor of the Altamont segment, a large source with a wide variety of TAC emissions. To follow BAAQMD's guideline, this source is included in the ambient risk estimate for the segment. However, it would be overstating the cancer risk, chronic HI and PM2.5 concentration by a considerable amount if the ambient risk only relied on the results of the BAAQMD's Health Risk Calculator Tool, which accounts for sources within 1,000 feet of a receptor. Additional dispersion modeling was performed with the emissions of the major contributors of cancer risk (top six pollutants contributing 80 percent of total risk) and also PM2.5 emissions to extend the concentration and risk estimates to the residential receptor location.

Table 3.3-28. Estimated Cumulative Inhalation Cancer Risk, Chronic Hazard Index, and PM2.5 Concentration from Proposed Project Construction in the BAAQMD

Segment/Source	Cancer Risk (per million)	Chronic HI	PM2.5 Concentration ($\mu g/m^3$)
Tri-Valley			
Ambient	123	<0.1	2.2
Construction (Table 3.3-22 with mitigation)	2.6	<0.1	0.2
Total Cumulative	125.6	*<0.2*	2.4

Segment/Source	Cancer Risk (per million)	Chronic HI	PM2.5 Concentration (µg/m³)
Altamont			
Ambient	53	2.9	0.1
Construction (Table 3.3-22 with mitigation)	0.9	<0.1	0.1
Total Cumulative	54	*2.9*	*0.2*
BAAQMD Threshold	*100*	*10.0*	*0.8*

PM2.5 = particulate matter 2.5 microns in diameter and smaller
HI = hazard index
µg/m³ = micrograms per cubic meter
< = less than
BAAQMD = Bay Area Air Quality Management District

Table 3.3-29 summarizes cumulative cancer risk, chronic health hazard, and PM2.5 concentrations at representative locations along the Tri-Valley and Altamont segments in BAAQMD during Proposed Project operations. The table presents the Proposed Project and ambient contribution to the cumulative risk. Refer to Appendix L, *Air Quality, Energy, Greenhouse Gas Emissions, and Health Risk Assessment Supporting Documentation*, for detailed information on the individual sources included in the ambient risk.

Table 3.3-29. Estimated Cumulative Inhalation Cancer Risk, Chronic Hazard Index, and PM2.5 Concentration from Proposed Project Operations in the BAAQMD

Segment/Source	Cancer Risk (per million)	Chronic HI	PM2.5 Concentration (µg/m³)
Tri-Valley			
Ambient	123	0.1	2.23
Project Operations, DLH (Table 3.3-27)	3.9	<0.02	0.01
Project Operations BEMU (Table 3.3-27)	0.0	0.0	0.0
I-580 Roadway Shift (Table 3.3-27)	2.8	0.01	0.07
Total Cumulative, DLH	*129.7*	*<0.13*	*2.31*
Total Cumulative, BEMU	*125.8*	*0.11*	*2.30*
Altamont			
Ambient	53	2.9	<0.1
Project Operations, DLH (Table 3.3-27)	2.77	<0.03	0.003
Project Operations BEMU (Table 3.3-27)	0.0	0.00	0.0
Total Cumulative, DLH	*55.77*	*2.95*	*<0.2*
Total Cumulative, BEMU	*53*	*2.9*	*<0.1*
BAAQMD Threshold	*100*	*10.0*	*0.8*

NOTE: Risk levels due to particulate matter from project operations would be 30% lower with the use of renewable diesel (CalEPA 2015).
PM2.5 = particulate matter 2.5 microns in diameter and smaller
HI = hazard index
µg/m³ = micrograms per cubic meter
< = less than
BAAQMD = Bay Area Air Quality Management District

As shown in Tables 3.3-28 and 3.3-29, total cumulative health risks to sensitive receptors located near the Proposed Project during construction and operations would not exceed BAAQMD's cumulative health risk thresholds for the Altamont segment but would exceed the thresholds for cancer risk and PM2.5 for the Tri-Valley segment. Project operational emissions would be less with the DMU or HBMU technology variants compared to the DLH technology variant. Without the criteria pollutant mitigation, the project contribution would be higher than shown above. These impacts are a result of ambient background concentrations that exceed BAAQMD significance thresholds and a contribution of additional DPM emissions-related health risks due to the Project.

Alternatives Analyzed at an Equal Level of Detail

The Southfront Road Station Alternative was not modeled due to the lack of nearby sensitive receptors with the alternative (the one adjacent resident would be removed due to acquisition to support the alternative). However, due to train operations along the mainline with the Southfront Road Station Alternative, this alternative would still contribute to the cumulatively significant impact for the Tri-Valley segment. The Stone Cut Alignment Alternative would have no differences in construction or operational health risks with the Proposed Project because there are no sensitive receptors along the proposed or alternative alignment at the top of Altamont Pass. The Mountain House Station Alternative would have a slightly higher impact than the proposed Mountain House Station due to closer proximity to sensitive receptors, and would thus contribute a slightly higher amount to the cumulative impact, but the cumulative impact would still be less than the cumulative threshold for the Altamont segment.

Mitigation Measures

For criteria pollutants impacts, Mitigation Measures AQ-2.1 through AQ-2.4 would apply to all the facilities associated with construction of the Proposed Project (and also to the alternatives analyzed at an equal level of detail).

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

Refer to measure description under Impact AQ-2a.

Mitigation Measure AQ-2.2: Implement off-road equipment engine maintenance and idling restrictions during construction

Refer to measure description under Impact AQ-2a.

Mitigation Measure AQ-2.3: Implement advanced emissions controls for trains during construction

Refer to measure description under Impact AQ-2a.

Mitigation Measure AQ-2.4: Utilize modern fleet for on-road material delivery and haul trucks during construction

Refer to measure description under Impact AQ-2a.

Significance After Mitigation

The Authority does not have the jurisdiction to address existing sources of pollution. The Proposed Project contributions to the cumulative impacts are limited and thus there is no feasible mitigation that would reduce this impact to a less-than-significant level for the DMU, HBMU, or DLH technology variants for construction and operation, or for the BEMU technology variant for construction. This impact within the Tri-Valley segment in the BAAQMD is therefore considered significant and unavoidable for the Tri-Valley segment for construction and for operation of the DMU, HBMU, and DLH technology variants. However, the Proposed Project would not contribute to the cumulative impact with operations of the BEMU technology variant.

As discussed in Impacts AQ-3b through AQ-3f, neither construction nor operation of the Proposed Project would result in health risks to sensitive receptors more than SJVAPCD's thresholds of significance. SJVAPCD considers risks greater than 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.

Comparison of Alternatives

The Southfront Road Station Alternative, after mitigation, would have a similar contribution as the Proposed Project to the cumulative significant and unavoidable impact in the Tri-Valley segment for the DMU, HBMU, and DLH technology variants and would have a less-than-significant impact with the BEMU technology variant.

The Stone Cut Alignment Alternative would have no differences in construction or operational health risks with the Proposed Project because there are no sensitive receptors along the proposed or alternative alignment at the top of Altamont Pass.

None of the other alternatives analyzed at an equal level of detail (West Tracy OMF Alternative, Mountain House Station Alternative, and Downtown Tracy Station Parking Alternatives 1 and 2) would have a considerable contribution to a significant cumulative impact related to TACs.

Impact AQ-3h: Construction of the Proposed Project could expose sensitive receptors to increased risk of contracting Valley Fever or exposure to asbestos-containing material.

Level of Impact Prior to Mitigation	**Potentially significant**
Mitigation Measure	AQ-2.5: Implement fugitive dust controls during construction
Level of Impact after Mitigation	**Less than significant**

Impact Characterization

Disturbance of soil containing *C. immitis* could expose the receptors adjacent to the construction sites 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 between 2002 and 2010 in affected California counties, over 60 percent of Valley Fever cases have been in people who live in the San Joaquin Valley. Within the Proposed Project area, San Joaquin

County has the highest hospitalization rate due to Valley Fever and is the eighth most affected county in the state. By comparison, hospitalization rates in Alameda County are relatively low (Lighthouse pers. comm.)

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).

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.

Impact Detail and Conclusion

Proposed Project

Tri-Valley

Construction of the Tri-Valley segment would occur exclusively in Alameda County in areas well west of the San Joaquin Valley. As noted above, because the presence of *C. immitis* is relatively low outside of the San Joaquin Valley, the potential for earthmoving activities to expose receptors to increased risk of contracting Valley Fever likewise is low but are still considered significant before mitigation.

The Proposed Project would require a small amount of demolition activity associated with the Dublin/Pleasanton Station. If ACM were encountered during construction of the existing structures, demolition activities could expose nearby receptors to increased risk from airborne asbestos. Demolition of the existing structures could result in disturbance of ACM if asbestos was historically used for building insulation or other building materials. All demolition activities would be subject to USEPA's asbestos NESHAP if asbestos is present at the existing facilities. The asbestos NESHAP regulations protect the public by minimizing the release of asbestos fibers during activities involving the processing, handling, and disposal of ACM. The asbestos NESHAP regulations for demolition and renovation are outlined in BAAQMD Regulation XI, Rule 11-2. 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 and no mitigation is required.

Altamont

The Altamont segment would require construction in both Alameda and San Joaquin Counties. As noted above, the presence of *C. immitis* is relatively low in most of Alameda County. However, *C.*

immitis is endemic to the Central Valley including San Joaquin County and likely the easternmost parts of Alameda County. Earthmoving activities may release *C. immitis* spores if filaments are present and other soil chemistry and climatic conditions are conducive to spore development. 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. Because all alignment options require earthmoving, the potential risk posed by the different alignment options would be similar and are considered significant before mitigation.

The Tracy OMF would require a small amount of demolition activity. If ACM were used during construction of the existing structures, demolition activities could expose nearby receptors to increased risk from airborne asbestos. The asbestos NESHAP regulations for demolition and renovation are outlined in BAAQMD Regulation XI, Rule 11-2 and 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 and no mitigation is required.

Tracy to Lathrop

Construction of the Tracy to Lathrop segment would occur exclusively in San Joaquin County. *C. immitis* is endemic to the Central Valley including San Joaquin County. Earthmoving activities may release *C. immitis* spores if filaments are present and other soil chemistry and climatic conditions are conducive to spore development. 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. Because all alignment options require earthmoving, the potential risk posed by the different options would be similar and are considered significant before mitigation.

The Downtown Tracy Station would require a small amount of demolition. If ACM were used during construction of the existing structures, 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 and no mitigation is required.

Alternatives Analyzed at an Equal Level of Detail

Construction of the alternatives analyzed at an equal level of detail (Southfront Road Station Alternative, Stone Cut Alignment Alternative, Mountain House Station Alternative, West Tracy OMF Alternative, and Downtown Tracy Station Parking Alternatives 1 and 2) would have the same potential impacts relative to Valley Fever as their counterparts in the Proposed Project.

The Southfront Road Station Alternative would require a small amount of demolition activity. If ACM were used during construction of the existing structures, demolition activities could expose nearby receptors to increased risk from airborne asbestos. 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 and no mitigation is required.

The Mountain House Station Alternative would not require demolition. Therefore, no potential exists for receptors to be exposed to structural asbestos.

The West Tracy OMF Alternative would require a small amount of demolition activity. If ACM were used during construction of the existing structures, demolition activities could expose nearby receptors to increased risk from airborne asbestos. 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 and no mitigation is required.

Mitigation Measures

Mitigation Measure AQ-2.5 would apply to all proposed alignments, stations, and OMFs associated with the Proposed Project (and the alternatives analyzed at an equal level of detail) for potential impacts on air quality.

Mitigation Measure AQ-2.5: Implement fugitive dust controls during construction

Refer to measure description under Impact AQ-2a.

Significance with Application of Mitigation

Dust-control measures are the primary defense against Valley Fever infection (U.S. Geological Survey 2000). Fugitive dust controls (per Mitigation Measure AQ-2.5) would avoid dusty conditions and reduce the risk of contracting Valley Fever through routine watering and other controls. This impact would be less than significant with mitigation for the Proposed Project.

For the same reasons, the impact from the alternatives analyzed at an equal level of detail would be less than significant after implementation of Mitigation Measure AQ-2.5.

Comparison of Alternatives

With mitigation, construction of the alternatives analyzed at an equal level of detail would have the same potential impacts (less than significant after mitigation) relative to Valley Fever as their counterparts in the Proposed Project.

Impact AQ-4: Construction and operation of the Proposed Project could result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

Level of Impact	**Less than significant**
Mitigation Measures	**None required**

Impact Characterization

The generation and severity of odors is dependent on several factors, including the nature, frequency, and intensity of the source; wind direction; and the location of the receptor(s). Odors rarely cause physical harm, but can cause discomfort, leading to complaints to regulatory agencies. 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 associated with construction of the Proposed Project would be localized and generally confined to the immediate area surrounding the construction site. Proposed Project operations do not include any uses identified by CARB as being associated with odors. However, expanded passenger rail operation throughout the Proposed Project alignment may increase the potential for odors resulting from diesel fuel combustion.

Impact Detail and Conclusion

Proposed Project

Construction activities may result in short-term odors that are detectable by adjacent receptors. These odors would be temporary and localized, and they would cease once construction activities have been completed. In general, the potential for odor generation would be similar among the Proposed Project area due to the similar amount of construction activity that would be required.

The stations would not generate any additional odors during normal building operations, relative to existing conditions. However, expanded passenger rail operation on the existing tracks that access the stations may increase odors from train operation. These odors would be intermittent, occurring only as trains pass by receptors, and would be consistent with existing land uses and passenger rail operation.

Construction of the new OMFs would result in short-term odors, like the construction activities for the alignment options. In general, the potential for odor generation would be similar among the OMFs. The OMFs themselves would not represent a significant source of odor emissions. However, expanded passenger rail operation on the tracks that access the OMFs may increase odors from train operation. These odors would be intermittent, occurring only as trains pass by receptors, and would be consistent with existing land uses and passenger rail operation.

Construction of the Proposed Project would utilize typical construction techniques and the equipment odors would be typical of most construction sites and temporary in nature. These odors would be temporary and localized, and they would cease once construction activities have been completed. SJVAPCD and BAAQMD have both 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.

Any odors resulting from diesel fuel combustion along Valley Link line or at new stations would be short-term, occurring as trains pass by, and are not considered a significant odor-generating source (California Air Resources Board 2005). This impact would be less than significant, and no mitigation is required.

Alternatives Analyzed at an Equal Level of Detail

Construction of the alternatives analyzed at an equal level of detail (Southfront Road Station Alternative, Stone Cut Alignment Alternative, West Tracy OMF Alternative, Mountain House Station Alternative, and Downtown Tracy Station Parking Alternatives 1 and 2) would have the same potential impacts relative to odors as their counterparts in the Proposed Project.