3.8 Greenhouse Gas Emissions

3.8.1 Introduction

This section describes the regulatory and environmental setting for greenhouse gas (GHG) emissions for 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). It also describes the impacts from GHG emissions (and thus contributions to climate change) 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, and Health Risk Assessment Supporting Documentation*, contains additional technical information for this section. Air quality impacts are discussed separately in Section 3.3, *Air Quality*. GHG emissions cumulatively contribute to the significant adverse environmental impacts of global climate change. Accordingly, the analysis presented in this section is representative of Proposed Project and cumulative GHG impacts.

This section describes the construction and operational GHG impacts of the Proposed Project and the alternatives analyzed at an equal level of detail. For construction, GHG impacts are analyzed for the Proposed Project and the alternatives analyzed at an equal level of detail. For operations, GHG 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 GHG 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.

3.8.2 Regulatory Setting

Relevant regulatory agencies for GHG 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). This section summarizes federal, state, regional, and local regulations related to GHGs and climate change and applicable to the Proposed Project, as well as the alternatives analyzed at an equal level of detail.

3.8.2.1 Federal

In *Massachusetts v. U.S. Environmental Protection Agency, et al.*, 549 U.S. 497 (2007), the United States Supreme Court ruled that GHGs fit within the Clean Air Act's (CAA) definition of air pollutants and that the USEPA has the authority to regulate GHGs. There is no federal overarching law specifically related to climate change or the reduction of GHGs. USEPA has issued regulations

through its authority under the CAA that affect certain categories of emission sources. There have also been settlement agreements between USEPA, several states, and nongovernmental organizations to address GHG emissions from electric generating units and refineries.

In September 2009, USEPA published a Final Rule that requires reporting of GHG emissions from large sources in the U.S. Facilities that emit 25,000 metric tons or more per year of GHG emissions must submit annual reports to USEPA. Although this is not a transportation-related regulation, the methodology developed as part of this regulation is helpful in identifying potential GHG emissions.

In December 2009, USEPA issued the *Final Endangerment and Cause or Contribute Findings for Greenhouse Gases* under Section 202(a) of the CAA. The endangerment finding states that current and projected concentrations of GHGs threaten the public health and welfare of current and future generations. It states that the combined emissions of GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare. The Endangerment Finding is the basis for USEPA regulation of GHG emissions from motor vehicles.

In 2015, USEPA adopted the Clean Power Plan which included regulations to control carbon dioxide (CO_2) emissions from new and existing coal-fired power plants. The Clean Power Plan was stayed by the U.S. Supreme Court in 2016 and never went into effect. In 2019, USEPA issued the Affordable Clean Energy rule, which establishes emission guidelines for states to develop plans to address GHG emissions from existing coal-fired power plants. The Affordable Clean Energy rule replaced the 2015 Clean Power Plan. The ultimate fate of the Affordable Clean Energy rule is uncertain given pending litigation in federal courts.

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 CO_2 emissions standards for passenger cars and light trucks and establish new standards covering model years 2021 through 2026. The final rule retains 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 into account would result in a higher GHG reduction 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.

3.8.2.2 State

California has adopted statewide legislation addressing various aspects of climate change and GHG emissions reduction. The legislation establishes a broad framework for the state's long-term GHG reduction and climate change adaptation program. The Governor of California has also issued several executive orders related to the state's evolving climate change policy. Summaries of key policies, regulations, and legislation at the state levels that are relevant to the Proposed Project are provided in the following sections.

Executive Order S-3-05

California Executive Order (EO) S-3-05 sets forth a series of target dates by which statewide emissions of GHGs need to be progressively reduced, as follows: by 2010, reduce GHG emissions to 2000 levels (approximately 457 million metric tons of carbon dioxide equivalent [CO_2e]); by 2020, reduce emissions to 1990 levels (approximately 427 million metric tons CO_2e); and by 2050, reduce emissions to 80 percent below 1990 levels (approximately 85 million metric tons CO_2e). EOs are binding only on state agencies. Accordingly, California EO S-03-05 will guide state agencies' efforts to control and regulate GHG emissions, but will have no direct binding effect on local government or private actions. The Secretary of the California Environmental Protection Agency is required to report to the Governor and state legislature biannually on the impacts of global warming on California, mitigation and adaptation plans, and progress made toward reducing GHG emissions to meet the targets established in this EO.

Assembly Bill 1493, Pavley Rules (2002, amendments 2009)/Advanced Clean Cars

Known as "Pavley I," Assembly Bill (AB) 1493 outlines the nation's first GHG standards for automobiles. In 2012, CARB adopted strengthened Pavley standards (referred to previously as "Pavley II," and now referred to as the "Advanced Clean Cars" program) for vehicle model years 2017–2020. Together, the two standards are expected to increase average light-duty vehicle fuel economy to roughly 43 miles per gallon by 2020 and reduce GHG emissions from the transportation sector in California by approximately 14 percent. USEPA and CARB also adopted joint rulemaking to establish GHG emissions standards for 2017–2025 model year passenger vehicles.

Assembly Bill 32 (2006) and California Climate Change Scoping Plan

In 2006, the California legislature passed AB 32 (California Health and Safety Code Division 25.5, § 38500 et seq.), also known as the California Global Warming Solutions Act. AB 32 requires CARB to implement emission limits, regulations, and other feasible and cost-effective measures such that statewide GHG emissions are reduced to 1990 levels by 2020.

Pursuant to AB 32, CARB adopted the Climate Change Scoping Plan (Scoping Plan) in December 2008, which outlines measures for meeting the 2020 GHG emissions reduction limits. The Scoping Plan must be updated every 5 years to evaluate AB 32 policies and ensure that California is on track to achieve the 2020 GHG emissions reduction goal. In 2014, CARB released the First Update to the Climate Change Scoping Plan (First Update), which builds upon the initial scoping plan with new strategies and recommendations. The First Update identifies opportunities to leverage existing and new funds and drive GHG emissions reductions through strategic planning and targeted low-carbon investments. This update defines CARB's climate change priorities for the next 5 years and sets the groundwork for reaching the long-term goals set forth in California EO S-3-05. The First Update highlights California's progress toward meeting the 2020 GHG emissions reduction goals in the initial Scoping Plan. It also evaluates actions to align the state's longer-term GHG emissions reduction strategies with other state policy priorities for water, waste, natural resources, clean energy, transportation, and land use.

CARB released the 2017 Scoping Plan Update in January 2017. It outlines policies and actions for the state's 2030 GHG emission target, as outlined under Senate Bill (SB) 32.

Executive Order S-01-07, Low Carbon Fuel Standard

California EO S-01-07 mandates (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020, and (2) that a low-carbon fuel standard for transportation fuels be established in California. The EO initiates a research and regulatory process at CARB.

Senate Bill 375 (Steinberg)

SB 375, also known as the Sustainable Communities and Climate Protection Act of 2008, will reduce carbon emissions from land use. SB 375 requires regional transportation plans (RTPs) developed by each of the state's 18 metropolitan planning organizations (MPOs) to incorporate a sustainable communities strategy (SCS) in each RTP to achieve the GHG emissions reduction targets set by CARB. The per-capita GHG emissions reduction targets for the San Francisco Bay Area (Bay Area) and San Joaquin Valley are 10 and 12 percent, respectively, by 2020; and 19 and 16 percent, respectively, by 2035 from 2005 levels (CARB 2018a).

Senate Bills 1078, 107, and 2—Renewables Portfolio Standard

SBs 1078 (2002), 107 (2006) and 2 (2011), California's Renewables Portfolio Standard (RPS), obligates investor-owned utilities, energy service providers, and Community Choice Aggregators to procure additional retail sales per year from eligible renewable sources with the long-range target of procuring 33 percent of retail sales from renewable resources by 2020. The California Public Utilities Commission (CPUC) and California Energy Commission (CEC) are jointly responsible for implementing the program.

Senate Bills 350 and 100—De Leon (Clean Energy and Pollution Reduction Act of 2015, 100 Percent Clean Energy Act of 2017)

SB 350 was approved by the California legislature in September 2015 and signed by Governor Brown in October 2015. Its key provisions are to require the following by 2030: (1) an RPS of 50 percent and (2) a doubling of energy efficiency (electrical and natural gas) by 2030, including improvements to the efficiency of existing buildings. These mandates will be implemented by future actions of CPUC and CEC. SB 100 was approved by the California legislature in August 2018 and signed by Governor Brown in September 2018. Its key provisions include updating the SB 350 RPS requirement from 50 percent to 60 percent by 2030 and creating the policy of planning to meet all the state's retail electricity supply with a mix of RPS-eligible and zero-carbon resources by December 31, 2045, for a total of 100 percent clean energy.

Senate Bill 32 and Assembly Bill 197

SB 32 (2016) requires CARB to ensure that statewide GHG emissions are reduced to at least 40 percent below the 1990 level by 2030, consistent with the target set forth in EO B-30-15. CARB adopted the 2017 Climate Change Scoping Plan in November 2017 to meet the GHG reduction requirement set forth in SB 32. It proposes continuing the major programs of the previous Scoping Plan, including Cap-and-Trade Regulation; low carbon fuel standard; more efficient cars, trucks, and freight movement; RPS; and reducing methane emissions from agricultural and other wastes. The Scoping Plan also addresses for the first time the GHG emissions from natural and working lands in California.

Executive Order B-55-18

EO B-55-18 acknowledges the environmental, community, and public health risks posed by future climate change. It further recognizes the climate stabilization goal adopted by 194 states and the European Union under the Paris Agreement. While the United States was not party to the agreement, California is committed to meeting the Paris Agreement goals and going beyond them wherever possible. Based on the worldwide scientific agreement that carbon neutrality must be achieved by midcentury, EO B-55-18 establishes a new state goal to achieve carbon neutrality as soon as possible and no later than 2045, and to achieve and maintain net negative emissions thereafter. The EO charges the CARB with developing a framework for implementing and tracking progress towards these goals. EO B-55-18 extends EO S-3-05 but currently is only binding on state agencies.

3.8.2.3 Regional and Local

Bay Area Air Quality Management District

BAAQMD has local jurisdiction over air quality in the San Francisco Bay Area Air Basin (SFBAAB), including Alameda County, but has no land use jurisdiction and has no authority over mobile sources, such as trains. BAAQMD (2017) has published advisory emission thresholds to assist CEQA lead agencies in determining the level of significance of a project's GHG emissions, which are outlined in its California Environmental Quality Act (CEQA) Air Quality Guidelines. The Guidelines also outline methods for quantifying GHG emissions, as well as potential mitigation measures.

San Joaquin Valley Air Pollution Control District

SJVAPCD has local air quality jurisdiction in the San Joaquin Valley Air Basin (SJVAB), including those in San Joaquin County, but does not have land use jurisdiction or jurisdiction over mobile sources. Similar to the BAAQMD, SJVAPCD has adopted advisory thresholds for the analysis of GHG emissions in their *Guide for Assessing and Mitigating Air Quality Impacts*.

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 project is proposed. Section 15125(d) of the CEQA Guidelines requires an environmental impact report 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 project 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 GHG emissions identified in Appendix I.

Table 3.3-2 in Section 3.3, *Air Quality*, provides a summary of the county and city general plans that have been identified, reviewed, and considered for the preparation of this analysis. Alameda County and the City of Livermore have adopted a climate action plan. These plans all call for reductions in GHG emissions below current levels and all call for actions to reduce vehicle miles traveled (VMT)

[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.

and associated transportation emissions. All include increased transit service as a key strategy in reducing local GHG emissions.

Although the Proposed Project would increase railroad-related emissions by introducing service using DMUs in the jurisdictions the alignment traverses, the Proposed Project would result in a transportation mode shift (i.e., attract passengers who otherwise would have driven their cars). This shift would reduce travel by highway vehicles, reducing mobile source emissions and congestion. Accordingly, even though the local climate action plans do not legally apply to the emissions associated with operation of the Proposed Project, the Proposed Project and the alternatives analyzed at an equal level of detail would be consistent with local GHG policies and climate action plans.

3.8.3 Environmental Setting

This section describes the environmental setting related to GHGs and climate change. The study area is much broader than for the air quality analysis due to the global nature of climate change. While the GHG analysis focuses along the Proposed Project corridor, the analysis considers potential regional and global GHG effects.

3.8.3.1 Climate Change

The phenomenon known as the *greenhouse effect* keeps the atmosphere near the Earth's surface warm enough for the successful habitation of humans and other life. Present in the Earth's lower atmosphere, GHGs play a critical role in maintaining the Earth's temperature. Sunlight including infrared, visible, and ultraviolet radiation passes through the atmosphere. Some of the sunlight striking the earth is absorbed and converted to heat, which warms the surface. The surface emits infrared radiation to the atmosphere, where some of it is absorbed by GHGs and re-emitted toward the surface; some of the heat is not trapped by GHGs and escapes into space. Human activities that emit additional GHGs to the atmosphere increase the amount of infrared radiation that gets absorbed before escaping into space, thus enhancing the greenhouse effect and amplifying the warming of the earth (Center for Climate and Energy Solutions 2011).

Increases in fossil fuel combustion and deforestation have increased concentrations of GHGs in the atmosphere since the Industrial Revolution. Rising atmospheric concentrations of GHGs more than natural levels enhance the greenhouse effect, which contributes to global warming of the Earth's lower atmosphere. This warming induces large-scale changes in earth surface temperatures, ocean circulation patterns, precipitation patterns, global ice cover, biological distributions, and other changes to the earth system that are collectively referred to as *climate change*.

3.8.3.2 Principal Greenhouse Gases

As defined in AB 32, GHGs include the following gases: CO_2, methane (CH_4), nitrous oxide (N_2O), perfluorinated carbons, sulfur hexafluoride, and hydrofluorocarbons. The state CEQA Guidelines (§ 15364.5) also identify these six gases as GHGs.[2] The primary GHGs of concern associated with the Proposed Project are CO_2, CH_4, and N_2O. The principal characteristics of these pollutants are discussed in this section.

[2] Water vapor, the most abundant GHG, is not included in this list because its natural concentrations and fluctuations far outweigh its anthropogenic (human-made) sources.

- **CO_2** enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and respiration, as well other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or *sequestered*) when it is absorbed by plants as part of the biological carbon cycle.
- **CH_4** is emitted during the production and transport of coal, natural gas, and oil. CH_4 emissions also result from livestock and other agricultural practices and the decay of organic waste in municipal solid waste landfills.
- **N_2O**. is emitted during agricultural and industrial activities as well as during the combustion of fossil fuels and solid waste.

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

Table 3.8-1 lists the GWP of CO_2, CH_4, and N_2O, their atmospheric lifetimes, and most recent abundances in the atmosphere.

Table 3.8-1. Lifetimes and Global Warming Potentials of Key Greenhouse Gases

Greenhouse Gases	Global Warming Potential (100 years)	Lifetime (years)	Atmospheric Abundance
CO_2	1	100–300	400 ppm
CH_4	25	12.4	1,834 ppb
N_2O	298	121	328 ppb

Sources: CARB 2018b; Blasing 2016.
CH_4 = methane
CO_2 = carbon dioxide
N_2O = nitrous oxide
ppb = parts per billion
ppm = parts per million

3.8.3.3 Greenhouse Gas Emissions Inventories

A GHG inventory is a quantification of all GHG emissions and sinks[3] within a selected physical and/or economic boundary. GHG inventories can be performed on a large scale (e.g., for global and national entities) or on a small scale (e.g., for a building or person). Although many processes are difficult to evaluate, several agencies have developed tools to quantify emissions from certain sources. Table 3.8-2 outlines the most recent global, national, statewide, and local GHG inventories to help contextualize the magnitude of potential project-related emissions.

[3] A *GHG sink* is a process, activity, or mechanism that removes a GHG from the atmosphere.

Table 3.8-2. Global, National, State, and Local Greenhouse Gas Emissions Inventories

Emissions Inventory	CO_2e (metric tons per year)
2017 IPCC Global GHG Emissions Inventory	53,500,000,000
2016 USEPA National GHG Emissions Inventory	6,511,300,000
2016 CARB State GHG Emissions Inventory	429,400,000
2011 SFBAAB GHG Emissions Inventory	86,600,000

Sources: IPCC 2018; USEPA 2018; CARB 2018b; BAAQMD 2015

CARB = California Air Resources Board
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
IPCC = Intergovernmental Panel on Climate Change
USEPA = U.S. Environmental Protection Agency
SFBAAB = San Francisco Bay Area Air Basin

3.8.3.4 Potential Effects of Climate Change in California and the Study Area

Climate change is a complex phenomenon that has the potential to alter local climatic patterns and meteorology. Although modeling indicates that climate change will result in sea level rise (both globally and regionally) as well as changes in climate and rainfall, among other effects, there remains uncertainty with regard to characterizing precise *local* climate characteristics and predicting precisely how various ecological and social systems will react to any changes in the existing climate at the local level. Regardless of this uncertainty, it is widely understood that substantial climate change is expected to occur in the future, although the precise extent will take further research to define. Consequently, the SFBAAB and SJVAB, including the study area, will be affected by changing climatic conditions, including the following (PRBO Conservation Science 2011).

- Hotter and drier climate, with average annual temperatures increasing 1.6–1.9°F by 2070 and mean annual rainfall decreasing by 61–188 millimeters (2.4–7.4 inches).
- More frequent and intense wildfires, with the area burned projected to increase by an estimated 10–50 percent by 2070–2090.
- Decreases in chaparral/coastal scrub (19–43 percent by 2070) and blue oak woodland/foothill pine (44–55 percent by 2070); increases in grassland (85–140 percent by 2070).
- Increased salinity in San Francisco Bay, with salinity increasing by 1–3 practical salinity units during dry years.
- Increase in estuarine flows into the San Francisco Bay estuary, with winter gains approximately balancing spring-summer losses.
- Increased heat and decreased air quality, with the result that public health will be placed at risk, and native plant and animal species may be lost.

3.8.4 Impact Analysis

This section describes the environmental impacts of the Proposed Project and the alternatives analyzed at an equal level of detail on GHG emissions. It describes the methods used to evaluate the impacts and the thresholds used to determine whether an impact would be significant. Measures to mitigate significant impacts are provided, where appropriate.

3.8.4.1 Methods for Analysis

GHG impacts associated with construction operation were assessed and quantified using standard and accepted software tools, techniques, and emission factors. A summary of the methodology is provided in this section. A full list of assumptions is provided in Appendix L, *Air Quality, Energy, Greenhouse Gas, and Health Risk Assessment Supporting Documentation*.

Construction

Construction would generate GHG (CO_2, CH_4, and N_2O) emissions from off-road equipment exhaust, and on-road vehicles (employee vehicle and haul truck) exhaust. These emissions would be temporary (i.e., limited to the construction period) and would cease when construction activities are complete. Project construction emissions forecasts were estimated using emission factors from CalEEMod (version 2016.3.1), CARB's EMFAC2017 model, and the methods summarized in Section 3.3.4.1, *Methods for Analysis*.

Emissions Estimates

Annual GHG emissions generated by construction of each segment were quantified using the methods described above. To estimate worst-case GHG construction emissions, Proposed Project track variants with the highest total emissions estimates within each segment were summed together to generate an estimate of total annual emissions across the entire Proposed Project alignment. Table 3.8-3 provides a summary of variants selected within each alignment segment for the emissions estimates.

Table 3.8-3. Proposed Project Alignments, Stations, and OMFs Included in the Emissions Estimates

Segment	Proposed Facilities included in 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, Interim OMF, 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 components results in the highest total emissions estimates across the entire corridor. Refer to Chapter 2, *Project Description*, for more information.

Valley Link Rail Transit Operations

The new Valley Link passenger rail service would result in increased diesel fuel combustion and associated GHG emissions from increased train activity. Engine exhaust CO_2, CH_4, and N_2O were estimated using USEPA emission factors (grams per gallon of diesel fuel combustion) and an average fuel consumption estimate of 1.81 miles per gallon of diesel fuel for the DMU technology variant engines (Bombardier 2018). To estimate GHG emissions under the HBMU technology variant, the 1.81 miles per gallons estimate was reduced by 11.38 percent (Lo pers. comm. A) to 1.61 miles per gallon. To estimate GHG emissions under the DLH technology variant, a fuel consumption factor was derived by scaling from emissions estimated for Tier 4 locomotives for the ACE Extension to Ceres and Merced EIR (San Joaquin Regional Rail Commission 2018) and adjusting for the shorter trains expected for Valley Link.

Train Idling

Valley Link trains would idle during passenger boarding and exits; however, the gallons per mile fuel consumption estimates discussed above already account for train idling activity. Accordingly, to avoid double counting, station idling emissions were not quantified separately for the mass emissions analysis.

Station Operation

The Proposed Project would construct nine new station platforms. Operation of new platforms would increase electricity consumption for lighting and elevator use. The platforms would not include bathrooms or other structures that would use water, nor would they consume natural gas. GHG emissions from electricity use were quantified based on the estimated monthly electricity consumption for each platform and CalEEMod emission factors.

OMF Operation

The Proposed Project would construct an OMF that would service and maintain the Valley Link rail transit cars. OMF worker vehicles would consume fuel during home-work trips; and the OMF buildings would use electricity train maintenance and repair activities. In addition, the OMF building would consume electricity and natural gas for temperature control.

Displaced Vehicles Miles

The Valley Link service would cause some commuters to mode-shift from automobile use to transit use. This would cause a reduction in 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 GHG emissions reductions.

Net Operational Emissions

The impact analysis evaluates total operational emissions inclusive of the four emission components (i.e., Valley Link train operation, station operation, OMF operation, and displaced vehicle miles) discussed above. Emissions related to train activity, station activity, and OMF operations would result in an increase in GHG emissions, relative to no build condition (also referred to as the No Project Alternative). Displaced VMT would result in a decrease in GHG emissions, relative to the No Project Alternative. Proposed Project-related emissions increases and decreases were netted to disclose net Proposed Project operational GHG emissions.

3.8.4.2 Thresholds of Significance

CEQA Thresholds

The State CEQA Guidelines Appendix G (14 California Code of Regulations § 15000 et seq.) has identified significance criteria to be considered for determining whether a project could have significant impacts from GHG emissions.

An impact would be considered significant if construction or operation of the Proposed Project would have any of the following consequences.

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. For this analysis, a significant level of GHG emissions is defined as emission levels that would conflict with statewide GHG reduction goals, as discussed further under *Supplemental Thresholds.*
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. For the purposes of this analysis, applicable plans and regulations include AB 32, SB 32, relevant transportation plans, and adopted local climate action plans.

The State CEQA Guidelines (§ 15125) indicate that existing conditions at the time a Notice of Preparation is released or when environmental review begins "normally" constitute the baseline for environmental analysis. In 2010, the California Supreme Court issued an opinion 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 project, would be an illusory basis for a finding of no significant impact from the 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 GHG impacts would misrepresent and mislead the public and decision makers with respect to potential climate change impacts, for the following reasons: (1) changes in on-road emission factors and (2) net 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 Proposed Project.
2. Using the relatively higher "existing conditions" emissions factors to quantify emissions reduction benefits assorted with Proposed Project-related VMT reductions in the years 2025 and 2040 would overstate the Proposed Project's emissions reduction benefits.

These facts represent substantial evidence in support of using a future conditions analysis, rather than existing conditions, to evaluate GHG 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 GHG 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 Valley Link construction and operation would result in a significant impact within the context of generating GHG emissions that conflict with adopted plans and policies.

GHG emissions and global climate change represent cumulative impacts of human activities and development projects locally, regionally, nationally, and worldwide. GHG emissions cumulatively contribute to the significant adverse environmental impacts of global climate change. No single project could generate enough GHG emissions to noticeably change the global average temperature; instead, the combination of GHG emissions from past, present, and future projects and activities have contributed and will contribute to global climate change and its associated environmental impacts.

Neither BAAQMD's CEQA Guidelines nor SJVAPCD's *Guide for Assessing and Mitigating Air Quality Impacts* identify a GHG emission threshold for construction-related emissions. Instead, BAAQMD recommends that GHG emissions from construction be quantified and disclosed, and that a determination regarding the significance of these GHG emissions be made with respect to whether a project is consistent with the AB 32 GHG emission reduction goals. The BAAQMD further recommends incorporation of best management practices (BMPs) to reduce GHG emissions during construction, as feasible and applicable.

Both air districts have adopted significance thresholds to evaluate operational emissions, but these are only applicable to land use development and stationary source projects. These thresholds were also established based on statewide emission reduction goals outlined in AB 32, and do not consider deeper reductions that will be required to meet the long-term goals of SB 32 and California EO S-03-05 (if legislatively adopted).

Valley Link is a transportation project that does not fit into the land use development or stationary source project categories. Accordingly, there are no adopted quantitative GHG thresholds relevant to Valley Link. Therefore, Project direct and indirect GHG emissions are discussed with respect to larger statewide GHG emission reduction goals, where a significant impact would occur if Project emissions would obstruct attainment of the targets outlined under AB 32, SB 32, or California EO S-03-05 and EO S-55-18.

3.8.4.3 Impacts and Mitigation Measures

Impact GHG-1: Construction and operation of the Proposed Project could generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.

Level of Impact	**Less than significant (beneficial)**
Mitigation Measures	**None Required**

Impact Characterization

Construction of the Proposed Project would generate GHG impacts from heavy-duty equipment, construction worker vehicle trips, and truck hauling trips. GHG emissions generated by these sources were quantified using emission factors from CalEEMod, EMFAC2017, and other sources, as

described in Section 3.8.4.1, *Methods for Analysis*. The GHG emissions related to construction activity would be temporary and would cease when construction is complete.

Operation of the Proposed Project would generate GHG emissions through Valley Link train operations, platform stations, and OMF activity; however, these emissions would be off-set under the IOS scenarios and the full buildout scenarios. GHG emissions were quantified using emission factors from CalEEMod, EMFAC2017, and other sources, as described in Section 3.8.4.1, *Methods for Analysis*.

Impact Detail and Conclusion

Proposed Project

The construction-period GHG emissions and operations-period GHG emissions reductions would be attributed to the Valley Link system rather than segment by segment because the study area for Proposed Project GHG emissions effects is the State of California, rather than rail segments or air basins that were established for the regulation of criteria pollutant emissions.

Table 3.8-4 summarizes the annual and total Proposed Project estimate of construction-period GHG emissions in metric tons. The emissions modeling assumes implementation of Mitigation Measures AQ-2.1 through AQ-2.3, which are required to reduce criteria pollutant emissions (refer to Section 3.3, *Air Quality*). Refer to Appendix L, *Air Quality, Energy, Greenhouse Gas, and Health Risk Assessment Supporting Documentation*, for a detailed emissions calculation. These mitigation measures are not required to reduce GHG emissions because, as discussed below, the Proposed Project would not result in significant GHG emissions overall.

Table 3.8-4. Construction Emissions

	Metric Tons CO2e (MTCO2e)			
	CO_2	**CH_4**	**N_2O**	**CO_2e**
Proposed Project				
Proposed Project Total Construction Emissions[a]	80,948	5	3	81,903
Difference in Emissions with Alternatives				
Southfront Road Station Alternative vs. Greenville Station	267	0	0	269
Stone Cut Alignment Alternative vs. Proposed Altamont Alignment	(185)	0	0	(187)
Mountain House Station Alternative vs. Mountain House Station	668	0	0	674
West Tracy OMF Alternative vs. Proposed Tracy OMF	(643)	0	0	(646)
Downtown Tracy Alt. 1 vs. Downtown Tracy Station	(1,271)	0	0	(1,282)
Downtown Tracy Alt. 2 vs. Downtown Tracy Station	(1,271)	0	0	(1,282)

[a] Represents the total GHG emissions that would be generated by Proposed Project construction over the initial 3-year construction period (2022 to 2024) and the construction of additional station parking (2037–2038)

CO_2e = carbon dioxide equivalent
< = less than
CO_2 = carbon dioxide
CH_4 = methane
N_2O = nitrous oxide

As shown in Table 3.8-4, construction would generate up to 82,000 metric tons CO_2e during the construction period. These amounts are equivalent to adding 1 year of driving associated with 17,700 typical passenger vehicles (USEPA 2016b).

Operation

Table 3.8-5 provides a summary of GHG emissions by evaluation year, train technology, and fuel type options. These estimates reflect the GHG emission increases that would be generated by trains, station platforms, and OMF operation activities netted against GHG emissions reductions that would be achieved due automobile VMT displacement. Refer to Appendix L, *Air Quality, Energy, Greenhouse Gas, and Health Risk Assessment Supporting Documentation*, for a detailed summary of emission and reductions by source for each analysis option.

Table 3.8-5. Estimate of Operational Greenhouse Gas Emissions during Operation

	Net $MTCO_2e$/Year		
Scenario	**Proposed Project**	**Scenario**	**Southfront Road Station Alternative**
DMU			
2025 Greenville IOS	(4,075)	2025 Southfront IOS	(5,511)
2025 Mountain House IOS	(3,481)	2025 Mountain House IOS	(3,980)
2025 Full Build	(12,852)	2025 Full Build	(13,221)
2040 Full Build	(32,220)	2040 Full Build	(33,880)
HBMU			
2025 Greenville IOS	(4,340)	2025 Southfront IOS	(5,733)
2025 Mountain House IOS	(3,991)	2025 Mountain House IOS	(4,490)
2025 Full Build	(13,576)	2025 Full Build	(13,946)
2040 Full Build	(33,291)	2040 Full Build	(34,951)
BEMU			
2025 Greenville IOS	(5,739)	2025 Southfront IOS	(6,871)
2025 Mountain House IOS	(6,673)	2025 Mountain House IOS	(7,172)
2025 Full Build	(17,247)	2025 Full Build	(17,616)
2040 Full Build	(40,990)	2040 Full Build	(42,650)
DLH			
2025 Greenville IOS	(3,551)	2025 Southfront IOS	(4,616)
2025 Mountain House IOS	(2,323)	2025 Mountain House IOS	(2,822)
2025 Full Build	(11,191)	2025 Full Build	(11,561)
2040 Full Build	(29,776)	2040 Full Build	(31,436)
Stone Cut Alignment Alternative[b]			
2025 DMU Full Build	(12,920)	2025 DMU Full Build	(13,292)
2040 DMU Full Build	(32,314)	2040 DMU Full Build	(33,979)
2025 HBMU Full Build	(13,637)	2025 HBMU Full Build	(14,008)
2040 HBMU Full Build	(33,374)	2040 HBMU Full Build	(35,038)
2025 BEMU Full Build	(17,268)	2025 BEMU Full Build	(17,638)

	Net $MTCO_2e$/Year		
Scenario	Proposed Project	Scenario	Southfront Road Station Alternative
2040 BEMU Full Build	(40,997)	2040 BEMU Full Build	(42,657)
2025 DLH Full Build	(11,278)	2025 Diesel Locomotive Haul Full Build	(11,650)
2040 DLH Full Build	(29,894)	2040 Diesel Locomotive Haul Full Build	(31,561)

[a] The emissions estimates reflect the difference between emissions generated by operation of the Valley Link trains, OMF operation, and platform stations operation netted against reductions achieved by displaced VMT, where negative values represent a net reduction in emissions under the operating scenario. Refer to Appendix L, *Air Quality, Greenhouse Gas, Energy, and Health Risk Assessment Supporting Documentation*, for a detailed summary of emission and reductions by source for each analysis option.

[a] The emissions estimates for the Stone Cut Alignment Alternative are shown with the Proposed Project Stations and with the Southfront Station instead of the proposed Greenville Station. 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.

As shown in Table 3.8-5, Proposed Project operations would result in net GHG emission reductions in all IOS and full build operational scenarios. Construction emissions would be offset within 5 to 7 years of commencing operation (based on 2025 Full Build net operational emissions reductions, depending on technology variant).[4]

Net GHG emissions reductions achieved for all IOS and full build scenarios would be an environmental benefit and would assist the state in meeting larger statewide GHG reduction goals outlined under AB 32, SB 32, EO S-03-05, and EO S-55-18. Accordingly, this impact would be less than significant for all of these scenarios.

Alternatives Analyzed at an Equal Level of Detail

As shown in Table 3.8-5, Valley Link operation with the Southfront Road Station Alternative would result in net GHG emissions reductions under IOS and buildout scenarios. Net GHG emissions reductions would be an environmental benefit and would assist the state in meeting larger statewide GHG reduction goals outlined under AB 32, SB 32, EO S-03-05, and EO S-55-18. Accordingly, this impact would be less than significant for the Southfront Road Station Alternative.

As shown in Table 3.8-4, the Stone Cut Alignment Alternative would have slightly lower construction GHG 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 3.8-5, 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 GHG emissions relative to No Project conditions. The reduction in vehicle emissions would more than offset the GHG emissions from train operation, stations, and the OMF. With the savings in service time, it is probable that the Stone Cut Alignment

[4] While there are no thresholds for construction-related emissions, BAAQMD recommends projects incorporate BMPs to reduce GHG emissions during construction. BAAQMD recommends use of alternative-fueled (e.g., biodiesel, electric) construction vehicles and equipment for at least 15 percent of the fleet, use of at least 10 percent of local building materials, and recycling or reusing at least 50 percent of construction waste or demolition materials. However, since the Proposed Project will result in a net reduction of GHG emissions under all scenarios, these BMPs are recommended but are not mandatorily required as mitigation because no significant impacts have been identified.

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

As noted at the beginning of this chapter, the Mountain House Station Alternative would not result in different train operation or ridership compared to the proposed Mountain House Station, the Downtown Tracy Station Parking Alternative 1 and Alternative 2 would not result in different train operation or ridership compared to the proposed Downtown Tracy Station, and the West Tracy OMF would not result in different operational emissions compared to the proposed Tracy OMF. Accordingly, these alternatives would also have less-than-significant GHG emissions impacts.

Impact GHG-2: Operation of the Proposed Project could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

Level of Impact	**Less than significant (beneficial)**
Mitigation Measures	**None Required**

Impact Characterization

California adopted AB 32 in 2006 and SB 32 in 2016, which codified the state's short-term (2020) and mid-term (2030) GHG reduction targets, respectively. Several jurisdictions in the study area have adopted or are currently preparing climate action plans to reduce community GHG emissions. The local MPOs (e.g., the Metropolitan Transportation Commission) have also developed transportation plans with policies and goals that are relevant to transportation and rail projects. Consistency with these documents is evaluated in this impact. This analysis also considers the long-range (2045 and 2050) reduction targets outlined in California EO S-55-18 and EO S-3-05.

AB 32 codifies the state's GHG reduction target for 2020, and SB 32 establishes the state's GHG reduction target for 2030. CARB adopted the 2008 Scoping Plan and 2014 First Update as a framework for achieving AB 32. The 2008 Scoping Plan and 2014 First Update outline a series of technologically feasible and cost-effective measures to reduce statewide GHG emissions. Some reductions would need to come in the form of changes pertaining to vehicle emissions and mileage standards. Some would come from changes pertaining to sources of electricity and increased energy efficiency at existing facilities. The remainder would need to come from state and local plans, policies, or regulations that will lower carbon emissions, such as those adopted by local government throughout the plan area. The 2017 Scoping Plan Update for achieving SB 32 extends and furthers much of the policies and programs included in the AB 32 Scoping Plan.

The Proposed Project would provide new commuter rail service and offer opportunities for commuters to mode-shift from passenger vehicles to transit. The AB 32 Scoping Plan and local climate action plans include strategies to reduce single-occupancy vehicle usage and to increase different transportation modes. These benefits also would support implementation the Metropolitan Transportation Commission's metropolitan transportation plan/SCS, San Joaquin Council of Governments' RTP/SCS, and Stanislaus Council of Governments' RTP/SCS, all of which were adopted pursuant to SB 375. Project implementation would also be consistent with the California High-Speed Rail Authority's *2016 Business Plan* (CHSRA 2016) and the *2013 CA State Rail Plan.* The emission reductions achieved by full operation of the Proposed Project (see Table 3.8-5) would facilitate attainment of state and local GHG reduction goals, and is consistent with the trajectory of statewide

climate change planning, as represented by the California EO S-03-05 long-term goal of reducing statewide emissions by 80 percent below 1990 levels by 2050 and the California EO S-55-18 long-term goal of being carbon neutral by 2045.

Impact Detail and Conclusion

Proposed Project

The GHG reductions that stem from commuter mode-shift from passenger vehicles to transit would be attributed to the system rather than segment by segment. This plan, policy, and regulation consistency analysis is based on the entirety of emissions across the entire alignment. This is because the study area for Project GHG emissions effects is the State of California.

The Proposed Project would expand rail transportation options, alleviate traffic congestion, and reduce VMT throughout northern California. These benefits are consistent with goals and objectives local climate action plans, RTPs, and statewide rail plans. The GHG reductions achieved by operation of the Proposed Project would support attainment of the State's GHG polices and reduction targets outlined under AB 32, SB 32, and California EO S-03-05 and EO S-55-18. Therefore, this impact would be less than significant.

Alternatives Analyzed at an Equal Level of Detail

The Southfront Road Station Alternative would reduce GHG emissions more than the Proposed Project. The Stone Cut Alignment Alternative would also result in net GHG emissions reductions greater than the Proposed Project. Net GHG emissions reductions are an environmental benefit and would assist the state in meeting larger statewide GHG reduction goals outlined under AB 32, SB 32, EO S-03-05, and EO S-55-18. Accordingly, this impact would be less than significant for the Southfront Road Station Alternative and the Stone Cut Alignment Alternative.

As noted at the beginning of this chapter, the Mountain House Station Alternative would not result in different train operations or ridership compared to the proposed Mountain House Station, the Downtown Tracy Parking Alternatives 1 and 2 would not result in different train operations or ridership compared to the proposed Downtown Tracy Station, and the West Tracy OMF Alternative would not result in different operational emissions compared to the proposed Tracy OMF. Accordingly, these alternatives would also have less-than-significant GHG emissions impacts related to consistency with policies and plans to reduce GHG emissions.