4.9 Greenhouse Gas Emissions/Climate Change

This section discusses potential impacts related to greenhouse gas emissions and climate change. Air quality impacts are discussed in Section 4.3, *Air Quality*. The section also provides a discussion of the applicable federal, state, regional, and local agencies that regulate, monitor, and control GHG emissions. Calculations made to estimate GHG emissions associated with the 2018 RTP/SCS and supporting technical data are provided in Appendix C of this EIR.

4.9.1 Setting

a. Climate Change and Greenhouse Gases

Gases that absorb and re-emit infrared radiation in the atmosphere are called greenhouse gases (GHGs). The GHGs that are widely seen as the principal contributors to human-induced climate change include carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), fluorinated gases such as hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Water vapor is excluded from the list of GHGs because it is short-lived in the atmosphere and its atmospheric concentrations are primarily determined by natural processes, such as oceanic evaporation.

GHGs are emitted by both natural processes and human activities. Of these gases, CO_2, CH_4, and N_2O are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills. N_2O is produced by microbial processes in soil and water, including those reactions that occur in fertilizers that contain nitrogen, fossil fuel combustion, and other chemical processes.

Man-made GHGs, many of which have greater heat-absorption potential than CO_2, include fluorinated gases and SF_6 (California Environmental Protection Agency [CalEPA] 2006). Different types of GHGs have varying global warming potentials (GWPs). The GWP of a GHG is the potential of a gas or aerosol to trap heat in the atmosphere over a specified timescale (generally, 100 years). Because GHGs absorb different amounts of heat, a common reference gas (CO_2) is used to relate the amount of heat absorbed to the amount of the gas emissions, referred to as "carbon dioxide equivalent" (CO_2e), and is the amount of a GHG emitted multiplied by its GWP. Carbon dioxide has a 100-year GWP of one. By contrast, methane has a GWP of 25, meaning its global warming effect is 25 times greater than carbon dioxide on a molecule-per-molecule basis (Intergovernmental Panel on Climate Change [IPCC] 2007).

b. Greenhouse Gas Emissions Inventories

Federal Emissions Inventory

Total U.S. GHG emissions were 6,586.7 million metric tons (MMT or gigatonne) CO_2e in 2015 (U.S. EPA 2017). Total U.S. emissions have increased by 3.5 percent since 1990. However, emissions decreased by 2.3 percent from 2014 to 2015 (U.S. EPA 2017). The decrease from 2014 to 2015 was a result of multiple factors, including: (1) substitution from coal to natural gas consumption in the electric power sector, (2) warmer winter conditions in 2015 resulting in a decreased demand for heating fuel in the residential and commercial sectors, and (3) a slight decrease in electricity demand (U.S. EPA 2017). Since 1990, U.S. emissions have increased at an average annual rate of 0.2 percent. In 2015, the industrial and transportation end-use sectors accounted for 29 percent and 27

percent of CO_2 emissions (with electricity-related emissions distributed), respectively. Meanwhile, the residential and commercial end-use sectors accounted for 16 percent and 17 percent of CO_2 emissions, respectively (U.S. EPA 2017).

California Emissions Inventory

Based on the California Air Resources Board (CARB) California Greenhouse Gas Inventory for 2000-2014, California produced 440.4 MMT CO_2e in 2015 (CARB 2017c). The largest single source of GHG in California is transportation, contributing 39 percent of the state's total GHG emissions. Industrial sources are the second-largest source of the state's GHG emissions, contributing 23 percent of the state's GHG emissions (CARB 2017c). California relatively high magnitude of GHG emissions are due largely to its greater size and population as compared to other states. However, the state's mild climate reduces California's per capita fuel use and GHG emissions as compared to other states. CARB has projected statewide unregulated GHG emissions for the year 2020 will be 509.4 MMT CO_2e (CARB 2017d). These projections represent the emissions that would be expected to occur in the absence of any GHG reduction measures.

c. Potential Effects of Climate Change

Globally, climate change has the potential to affect numerous environmental resources through potential impacts related to future air temperatures and precipitation patterns. Scientific modeling predicts that continued GHG emissions at or above current rates would induce more extreme climate changes during the 21st century than were observed during the 20th century. Long-term trends have found that each of the past three decades has been warmer than all the previous decades in the instrumental record, and the decade from 2000 through 2010 has been the warmest. The global combined land and ocean temperature data show an increase of about 0.89°C (0.69°C to 1.08°C) over the period 1901 to 2012, and about 0.72°C (0.49°C to 0.89°C) over the period 1951 to 2012 when described by a linear trend. Several independently analyzed data records of global and regional Land-Surface Air Temperature (LSAT) obtained from station observations are in agreement that LSAT as well as sea surface temperatures have increased. In addition to these findings, there are identifiable signs that global warming is currently taking place, including substantial ice loss in the Arctic over the past two decades (IPCC 2014).

Potential impacts of climate change in California may include loss in snow pack, sea level rise, more extreme heat days per year, more high-ozone days, more large forest fires, and more drought years (CalEPA 2010). Below is a summary of some of the potential effects that could be experienced in California as a result of climate change.

Air Quality

Higher temperatures, which are conducive to air pollution formation, could worsen air quality in California. Climate change may increase the concentration of ground-level ozone, but the magnitude of the effect, and therefore its indirect effects, are uncertain. If higher temperatures are accompanied by drier conditions, the potential for large wildfires could increase, which, in turn, would further worsen air quality. However, if higher temperatures are accompanied by wetter rather than drier conditions, the rains would tend to temporarily clear the air of particulate pollution and reduce the incidence of large wildfires, thereby ameliorating the pollution associated with wildfires. Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the state (CEC 2009).

Water Supply

Analysis of paleoclimatic data, such as tree-ring reconstructions of stream flow and precipitation, indicates a history of naturally and widely varying hydrologic conditions in California and the west, including a pattern of recurring and extended droughts. Uncertainty remains with respect to the overall impact of climate change on future water supplies in California. However, the average early spring snowpack in the Sierra Nevada decreased by about 10 percent during the last century, a loss of 1.5 million acre-feet of snowpack storage. During the same period, sea level rose eight inches along California's coast. California's temperature has risen 1°F, mostly at night and during the winter, with higher elevations experiencing the highest increase. Many Southern California cities have experienced their lowest recorded annual precipitation twice within the past decade. In a span of two years, Los Angeles experienced both its driest and wettest years on record (California Department of Water Resources [DWR] 2008, California Climate Change Center [CCCC] 2009).

This uncertainty complicates the analysis of future water demand, especially where the relationship between climate change and its potential effect on water demand is not well understood. The Sierra snowpack provides the majority of California's water supply by accumulating snow during the state's wet winters and releasing it slowly during the state's dry springs and summers. Based on historical data and modeling, the DWR projects that the Sierra snowpack will experience a 25 to 40 percent reduction from its historic average by 2050. Climate change is also anticipated to bring warmer storms that result in less snowfall at lower elevations, reducing the total snowpack (DWR 2008). Climate change may reduce groundwater recharge, putting further strain on an already limited water supply in the region.

Hydrology

Climate change could potentially affect the amount of snowfall, rainfall, and snow pack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high tide and high runoff events); sea level rise and coastal flooding; coastal erosion; and the potential for saltwater intrusion. According to *The Impacts of Sea-Level Rise on the California Coast*, climate change has the potential to induce substantial sea level rise in the coming century(CCCC 2009). The rate of increase of global mean sea levels over the 2001 to 2010 decade, as observed by satellites, ocean buoys, and land gauges, was approximately 3.2 mm per year, which is double the observed 20th century trend of 1.6 mm per year (World Meteorological Organization [WMO] 2013). The most recent IPCC report (2013) predicts a mean global sea level rise of 11 to 38 inches by 2100. In its report, *Rising Seas in California*, the Ocean Protection Council (OPC) predicts that sea levels along the California coast would likely (67% probability) rise by 0.2 to 1.1 feet by 2050 and 0.7 to 3.6 feet by 2100 (OPC 2017). A rise in sea levels could result in coastal flooding and erosion, and could jeopardize California's water supply due to saltwater intrusion. In addition, increased CO_2 emissions can cause oceans to acidify due to the carbonic acid it forms. Increased storm intensity and frequency could affect the ability of flood-control facilities, including levees, to handle storm events.

The ocean covers over 70 percent of the earth's surface and acts as a major carbon sink in the global carbon cycle. As the concentration of CO_2 in the atmosphere increases, so does the concentration of carbon in the ocean. The reaction of dissolved CO_2 with seawater results in the creation of carbonic acid (H_2CO_3), carbonate, bicarbonate, and hydrogen ions, which lowers pH causing higher seawater acidity. Higher acidity in seawater affects many aquatic animals ability to fix calcium for body structure, which could have significant negative effects across the entire food chain.

Agriculture

California has a $30 billion annual agricultural industry that produces approximately half of the country's fruits and vegetables. Higher CO_2 levels can stimulate plant production and increase plant water-use efficiency. However, if temperatures rise and drier conditions prevail, water demand could increase, crop-yield could be threatened by a less reliable water supply, and greater air pollution could render plants more susceptible to pest and disease outbreaks. In addition, temperature increases could change the time of year certain crops, such as wine grapes, bloom or ripen, and thereby affect their quality (CCCC 2006).

Ecosystems and Wildlife

Climate change and the potential resulting changes in weather patterns could have ecological effects on a global, regional, and local scale. Increasing concentrations of GHGs are likely to accelerate the rate of climate change. Scientists project that the average global surface temperature could rise by 1.0 to 4.5°F (0.6 to 2.5°C) in the next 50 years, and 2.2 to 10°F (1.4 to 5.8°C) in the next century, with substantial regional variation. Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. Rising temperatures could have four major impacts on plants and animals:

- Timing of ecological events;
- Geographic range;
- Species' composition within communities; and
- Ecosystem processes, such as carbon cycling and storage (Parmesan 2006).

d. Regulatory Setting

Federal

The U.S. Supreme Court in *Massachusetts et al. v. Environmental Protection Agency et al*. ([2007] 549 U.S. 05-1120) held that the U.S. EPA has the authority to regulate motor-vehicle GHG emissions under the federal Clean Air Act. The U.S. EPA issued a Final Rule for mandatory reporting of GHG emissions in October 2009. This Final Rule applies to fossil fuel suppliers, industrial gas suppliers, direct GHG emitters, and manufacturers of heavy-duty and off-road vehicles and vehicle engines, and requires annual reporting of emissions. In 2012, the U.S. EPA issued a Final Rule that establishes the GHG permitting thresholds that determine when Clean Air Act permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities.

In 2014, the U.S. Supreme Court in *Utility Air Regulatory Group v. EPA* (134 S. Ct. 2427 [2014]) held that U.S. EPA may not treat GHGs as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or Title V permit. The Court also held that PSD permits that are otherwise required (based on emissions of other pollutants) may continue to require limitations on GHG emissions based on the application of Best Available Control Technology (BACT).

State

CARB is responsible for the coordination and oversight of State and local air pollution control programs in California. California has established numerous programs and regulations aimed at reducing the state's GHG emissions. These initiatives are summarized below.

California Advanced Clean Cars Program

Assembly Bill (AB) 1493 (2002), California's Advanced Clean Cars program (referred to as "Pavley"), requires CARB to develop and adopt regulations to achieve "the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." On June 30, 2009, U.S. EPA granted the waiver of Clean Air Act preemption to California for its GHG emission standards for motor vehicles beginning with the 2009 model year. Pavley I regulates model years from 2009 to 2016 and Pavley II, which is now referred to as "LEV (Low Emission Vehicle) III GHG," regulates model years from 2017 to 2025. The Advanced Clean Cars program coordinates the goals of the Low Emissions Vehicles (LEV), Zero Emissions Vehicles (ZEV), and Clean Fuels Outlet programs, and would provide major reductions in GHG emissions. By 2025, when the rules will be fully implemented, new automobiles will emit 34 percent fewer GHGs and 75 percent fewer smog-forming emissions from their model year 2016 levels (CARB 2011).

Assembly Bill 32

California's major initiative for reducing GHG emissions is outlined in Assembly Bill 32, the "California Global Warming Solutions Act of 2006." AB 32 codifies the statewide goal of reducing GHG emissions to 1990 levels by 2020, and requires CARB to prepare a Scoping Plan that outlines the main state strategies for reducing GHGs to meet the 2020 deadline. In addition, AB 32 requires CARB to adopt regulations to require reporting and verification of statewide GHG emissions. The initial Scoping Plan was approved by CARB on December 11, 2008, and included measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. Many of the GHG reduction measures included in the Scoping Plan (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, and Cap-and-Trade) have been adopted since approval of the Scoping Plan.

In May 2014, CARB approved the first update to the original Scoping Plan. The 2013 Scoping Plan Update defined CARB's climate change priorities for the next five years and set the groundwork to reach post-2020 statewide goals. The update highlights California's progress toward meeting the "near-term" 2020 GHG emission reduction goals defined in the original Scoping Plan. It also evaluated how to align the state's longer-term GHG reduction strategies with other state policy priorities, such as for water, waste, natural resources, clean energy and transportation, and land use (CARB 2018).

Executive Order No. S-3-05 and B-30-15

EO-S-3-05, issued in June 2005, established short-term, mid-term, and long-term GHG emission reduction targets for California of reducing GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and 80 percent below 1990 levels by 2050. EO-B-30-15, issued in April 2015, added an intermediate reduction target of 40 percent below 1990 levels by 2030.

Senate Bill 97

Senate Bill (SB) 97, signed in August 2007, acknowledges that climate change is an environmental issue that requires analysis in CEQA documents. In March 2010, the California Resources Agency adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHG and climate change impacts.

Senate Bill 375

Senate Bill 375, signed in August 2008, enhances the state's ability to reach AB 32 goals by directing CARB to develop regional GHG emission reduction targets to be achieved from passenger vehicles for 2020 and 2035. In addition, SB 375 directs each of the state's 18 major Metropolitan Planning Organizations (MPO) to prepare a "sustainable communities strategy" (SCS) that contains a growth strategy to meet these emission targets for inclusion in the Regional Transportation Plan (RTP). Current GHG reduction targets set by CARB for SJCOG are a 5 percent per capita reduction from 2005 levels by 2020 and a 10 percent per capita reduction from 2005 levels by 2035.

Senate Bill 32

On September 8, 2016, the governor signed Senate Bill 32 (SB 32) into law, extending AB 32 by requiring the State to further reduce GHGs to 40 percent below 1990 levels by 2030 (the other provisions of AB 32 remain unchanged). On December 14, 2017, CARB adopted the 2017 Scoping Plan, which provides a framework for achieving the 2030 target (CARB 2017e). The 2017 Scoping Plan relies on the continuation and expansion of existing policies and regulations, such as the Cap-and-Trade Program, as well as implementation of recently adopted policies and policies, such as SB 350 and SB 1383 (see below). The 2017 Scoping Plan also puts an increased emphasis on innovation, adoption of existing technology, and strategic investment to support its strategies. As with the 2013 Scoping Plan Update, the 2017 Scoping Plan does not provide project-level thresholds for land use development. Instead, it recommends that local governments adopt policies and locally-appropriate quantitative thresholds consistent with a statewide per capita goal of six metric tons (MT) CO_2e by 2030 and two MT CO_2e by 2050 (ARB 2017c). As stated in the 2017 Scoping Plan, these goals may be appropriate for plan-level analyses (city, county, subregional, or regional level), but not for specific individual projects because they include all emissions sectors in the state.

Senate Bill 1383

Adopted in September 2016, SB 1383 requires the CARB to approve and begin implementing a comprehensive strategy to reduce emissions of short-lived climate pollutants. The bill requires the strategy to achieve the following reduction targets by 2030:

- Methane – 40% below 2013 levels
- Hydrofluorocarbons – 40% below 2013 levels
- Anthropogenic black carbon – 50% below 2013 levels

The bill also requires CalRecycle, in consultation with the State board, to adopt regulations that achieve specified targets for reducing organic waste in landfills.

Senate Bill 350

Adopted on October 7, 2015, SB 350 supports the reduction of GHG emissions from the electricity sector through a number of measures, including requiring electricity providers to achieve a 50 percent renewables portfolio standard by 2030 and a cumulative doubling of statewide energy efficiency savings in electricity and natural gas by retail customers by 2030.

California Environmental Quality Act

Pursuant to the requirements of SB 97, the Resources Agency has adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The

adopted State CEQA Guidelines provide general regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts. To date, a variety of air districts have adopted quantitative significance thresholds for GHGs.

For more information on the Senate and Assembly Bills, Executive Orders, and reports discussed above, and to view reports and research referenced above, please refer to the following websites: www.climatechange.ca.gov and www.arb.ca.gov/cc/cc.htm.

Regional and Local

Dibs (formerly Commute Connection

Dibs (formerly Commute Connection) is a program of SJCOG serving San Joaquin, Stanislaus, and Merced counties. It was established to promote and encourage smart travel through carpooling, vanpooling, riding transit, walking, & biking. The program's core focus is to reduce single occupant vehicle commutes, thus reducing congestion and improving air quality.

Local GHG Reduction Plans

Four of SJCOG's member jurisdictions have adopted GHG reduction plans that set goals and outline policies to achieve GHG reduction targets. Baseline and target GHG emissions established in the GHG reduction plans are shown in Table 25.

Table 25 Local GHG Reduction Plans in the SJCOG Region

Jurisdiction	Type	Status	Baseline Annual Emissions ($MT CO_2e$)	Emission Targets	
				2020	2030
City of Lodi	Climate Action Plan	Adopted November 2014	2008: 486,628	4.5 MT CO_2e/ service population	3.0 MT CO_2e/ service population
City of Manteca	Climate Action Plan	Adopted October 2013	2005: 400,346	429,693 MT CO_2e 4.91 MT CO_2e/ service population	–
City of Stockton	Climate Action Plan	Adopted August 2014	2005: 2,360,932	2,122,000 MT CO_2e	–
City of Tracy	Sustainability Action Plan	Adopted February 2011	2006: 11.6	9.86 MT CO_2e	–

Sources: City of Lodi 2014, City of Manteca 2013, City of Stockton 2014, City of Tracy 2011

The completed climate action planning documents address issues related to emissions produced by transportation, energy usage, and other operational emissions such as water supply and conveyance, wastewater treatment, and solid waste disposal. The types and quantity of emissions produced in the SJCOG region vary among jurisdictional boundaries. However, for most jurisdictions, transportation and energy usage produce a majority of GHG emissions.

Climate action planning policies in the region establish a framework for improved circulation networks and energy conservation. Transportation policies aim to reduce vehicle miles traveled (VMT) by offering more opportunities for alternative transportation modes, including bicycling, walking, and transit use. In addition, many of the documents include policies to promote transit oriented development (TOD) and land use policies that encourage a greater diversity of land use in

closer proximity to one another. In order to reduce emissions caused by energy usage, jurisdictions have established policies that will facilitate and encourage energy efficiency for both residential and commercial land uses. Cities and counties include programs to improve energy efficiencies in old and new buildings and decrease the use of fossil fuels by providing incentives for use of renewable energy.

Other Local Plans

GHG reduction policies can also be found in other local plans, particularly General Plans. A summary of GHG reduction policies adopted by jurisdictions in San Joaquin County are summarized below.

SAN JOAQUIN COUNTY GENERAL PLAN 2035 (2016)

The County's General Plan 2035 includes a suite of policies that support reductions in GHG emissions by promoting transportation alternatives to single-occupancy driving, energy efficiency, incorporation of sustainable technologies, alleviation of congestion, sustainable land use patterns (including infill development), development of alternative fueling stations, and other sustainability strategies. Appendix A of the General Plan provides a compilation of Sustainability Policies and Programs with some quantified emission reductions (County of San Joaquin 2016).

4.9.2 Impact Analysis

a. Significance Thresholds and Methodology

Significance Thresholds

Appendix G of the State CEQA Guidelines identifies the following criteria for determining whether a project's impacts would have a significant impact related to GHG emissions:

1. Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. SJCOG has determined that significant adverse impacts related to GHG emissions could result if the project would meet the following criteria:
    - Generate a net increase in GHG emissions compared to baseline conditions
    - Generate GHG emissions exceeding CARB's recommended plan-level GHG emission reduction goals of six MT CO2e per capita by 2030 and two MT CO2e per capita by 2050
    - Generate substantial short-term emissions
2. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. SJCOG has determined that significant adverse impacts related to GHG emissions could result if the project would meet the following criteria:
    - Obstruct the state's ability to achieve AB 32 and SB 32 GHG reduction targets. The project would obstruct achievement of statewide targets if it would:
        - Exceed SB 375 regional emission reduction targets for passenger vehicle emissions established by CARB (five percent reduction from 2005 levels by 2020 and 10 percent from 2005 levels by 2035)
    - Conflict with local GHG reduction plans and policies

CEQA Guidelines Section 15064.4(b) indicates that a lead agency should consider the following in determining the significance of GHG emissions: 1) the extent to which a project may increase or

reduce GHG emissions as compared to the existing environmental setting, 2) whether project emissions exceed a threshold of significance that the lead agency determines applies to the project, and 3) the extent to which the project complies with plans and policies to reduce GHG emissions. The first requirement is addressed under Threshold 1a (see below), the second requirement is addressed under Threshold 1b, and the third requirement is addressed under Threshold 2a and 2b.

The 2017 Scoping Plan recommends statewide targets of no more than six MT CO_2e per capita by 2030 and two MT CO_2e per capita by 2050 to achieve the 2030 SB 32 target and the longer term reduction goal of 80 percent below 1990 levels by 2050 set forth in EO S-3-05. The 2017 Scoping Plan also states, "These goals are appropriate for the plan level (city, county, subregional, or regional level), but not for specific individuals because they include all emissions sectors in the State." Thus, these targets are applicable to the 2018 RTP/SCS, which is a plan-level document, and are applied as significance thresholds under Threshold 1b.

The 2017 Scoping Plan also identifies implementation of SB 375 as a key mechanism to achieving statewide emission targets established under AB 32 and SB 32. Therefore, consistency with SB 375 reduction targets is required for the 2018 RTP/SCS to be consistent with AB 32 and SB 32 and is included as Threshold 2a.

The SJVAPCD provides guidance to land use agencies in determining the significance of project-specific GHG emissions in its document, *District Guidance for Land-Use Agencies in Addressing GHG Emissions*. However, this guidance is intended to be applied to individual projects, rather than a program of projects or a plan, such as the RTP/SCS, and it is ultimately up to the lead agency to establish criteria for determining significance. Therefore, SJVAPCD guidance is not used in this analysis.

Short-Term Emissions Methodology

Construction emissions typically comprise a relatively small portion of a project's GHG footprint due to their short duration relative to the lifetime of a project (i.e. months to a few years of construction versus 30 to 50 years of operation). In addition, construction-related emissions are speculative at the plan level because they are highly dependent on the characteristics of individual projects. Consequently, impacts related to construction emissions are evaluated qualitatively.

Long-Term Emissions Methodology

The project's total operational GHG emissions were calculated by estimating emissions generated by mobile sources, electricity use, natural gas use, waste disposal, and water treatment, distribution, and conveyance, and wastewater treatment. Mobile source emissions were modeled using VMIP2 and EMFAC 2014, as previously described in Section 4.3, *Air Quality*; mobile source emissions take into consideration emission reductions from the Advanced Clean Cars program, as well as per-capita VMT reductions resulting from more compact growth. Electricity and natural gas emissions were estimated using the number of residential units and square feet of commercial space (derived from employment estimates), statewide average consumption rate, and emission factors for electricity and natural gas. Waste emissions were estimated using the total population, the statewide average disposal rate, and an emission factor for waste. Water emissions were estimated using total population, energy intensity for water treatment, conveyance, distribution, and wastewater treatment, and the emission factor for electricity. Emission factors and consumption rates were not adjusted for 2042 to reflect adopted policies that would reduce the carbon intensity of energy and improve energy efficiency (SB 350), or statewide initiatives to enhance water conservation and water efficiency and reduce waste disposal, and thus provide a

conservative estimate of future emissions from these sources. Calculations for emissions from non-mobile sources, along with data sources are provided in Appendix C.

To determine project per-capita emissions, emissions were totaled for all sectors and divided by the service population (employment + residential population).

Project emissions to evaluate consistency with SB 375 reduction targets were calculated with EMFAC 2014 using the SB 375 mode, in accordance with CARB guidance; SB 375 emissions only include emissions from passenger vehicles (automobiles and light trucks), do not include reductions associated with the Advanced Clean Car Program, and exclude pass-through trips.

b. Project Impacts and Mitigation Measures

This section describes generalized GHG and climate change impacts associated with the 2018 RTP/SCS. Due to the programmatic nature of the plan, a quantitative, project-level analysis of the specific impacts associated with individual transportation and land use projects is not possible at this time. In general, however, implementation of proposed transportation improvements and future projects under the land use scenario envisioned by the 2018 RTP/SCS could result in GHG and climate change impacts as described in the following sections.

Threshold 1:	Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. A significant impact would occur if the project would: a. Generate a net increase in GHG emissions compared to baseline conditions b. Generate GHG emissions exceeding six MT CO2e per capita by 2030 and two MT CO2e per capita by 2050.

IMPACT GHG-1 IMPLEMENTATION OF THE 2018 RTP/SCS WOULD RESULT IN A NET DECREASE IN REGIONAL LONG-TERM GHG EMISSIONS AS COMPARED TO EXISTING 2015 CONDITIONS AND WOULD NOT EXCEED STATEWIDE PER-CAPITA TARGETS FOR 2030 AND 2050. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

The 2018 RTP/SCS would impact long-term regional GHG emissions by supporting compact land use development and implementing transportation improvement projects, as well as adopting regional policies to reduce GHG emissions. Table 26 summarizes estimated GHG emissions under 2015 conditions and 2042 with project conditions. Mobile source emissions would decrease under 2042 with project conditions primarily due to a decrease in per-capita VMT and more stringent vehicle emission standards implemented through statewide policies. GHG emissions from non-mobile sources are estimated to increase due to population and job growth; however, as discussed in the methodology section, estimated emissions presented in this analysis do not take into consideration adopted policies and statewide initiatives that could reduce future consumption rates and the carbon intensity of these sources, such as SB 350. Because mobile source emissions comprise the majority of the project's associated emissions, overall, regional emissions would decrease under 2042 with project conditions by 648,843 MT CO_2e relative to 2015 conditions.

Under 2015 conditions, per capita emissions are estimated to have been 4.3 MT CO_2e per service population, which already meets the 2030 statewide target of six MT CO_2e per service population by 2030. Per capita emissions would decrease over time with the project; thus, the project would not obstruct the San Joaquin County region from meeting the 2030 statewide per capita target. Under 2042 with project conditions, per capita emissions would decrease to 2.6 MT CO_2e. This level of emissions would be consistent with the trajectory set by the 2030 and 2050 targets, which, assuming a linear trajectory, would require an emission reduction of 0.2 MT CO_2e per capita per

year between 2030 and 2050, resulting in a 2042 target of 3.6 MT CO_2e per capita. Because 2042 with project emissions would be below 3.6 MT CO_2e per capita, the project would be consistent with statewide per-capita targets and the project would not generate substantial quantities of GHG emissions. Project impacts would be less than significant.

Table 26 Net Change in Operational GHG Emissions (tons/day)

	Annual Emissions (MT CO_2e)	
Emission Sources	**SJCOG 2015 Baseline**	**2042 with Project**
Mobile sources (all vehicle classes)	3,620,070	2,834,590
Residential electricity	216,852	320,597
Commercial electricity	184,749	211,245
Residential Natural Gas	11,543	17,024
Commercial Natural Gas	3,524	4,030
Waste Disposal	747	1,081
Water treatment, conveyance, distribution, and wastewater treatment	167	241
Total	**4,037,652**	**3,388,809**
Net Change	–	-648,843
Per Capita Emissions	4.3	2.6

Notes: Calculations for emissions from non-mobile sources are provided in Appendix C. Mobile source emissions were calculated using EMFAC 2014.

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 1: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. A significant impact would occur if the project would:

c. Generate substantial short-term emissions

IMPACT GHG-2 IMPLEMENTATION OF THE 2018 RTP/SCS WOULD RESULT IN SHORT-TERM MOBILE GHG EMISSIONS RELATED TO CONSTRUCTION ACTIVITIES. IMPACTS WOULD BE SIGNIFICANT BUT MITIGABLE.

Construction activities associated with transportation improvement projects and future land use patterns envisioned by the 2018 RTP/SCS would generate GHG emissions from the operation of construction equipment, as well as employee travel and truck trips to and from the construction site. Due to the temporary and limited nature of construction activities, construction emissions typically comprise only a small portion of a project's GHG footprint. Because project-level details are not currently known, construction-related emissions at the RTP/SCS level are speculative and cannot be quantified. Therefore, impacts related to short-term emissions would be potentially significant, but mitigable.

Mitigation Measure

For all transportation projects under SJCOG's jurisdiction, transportation project sponsor agencies can and should implement the following mitigation measure developed for the 2018 RTP/SCS program for transportation projects generating construction GHG emissions. Local agencies in the SJCOG region can and should implement this measure, where relevant, to land use projects implementing the 2018 RTP/SCS.

GHG-2 Construction GHG Reduction Measures

The project sponsor shall require the construction contractor to incorporate the most recent GHG reduction measures and/or technologies for reducing diesel particulate and NO_X emissions measures for off-road construction vehicles. The required measures shall be noted on all construction plans and the project sponsor shall perform periodic site inspections. Current GHG-reducing measures include, but are not limited to, the following:

- Use of diesel construction equipment meeting CARB's Tier 4 certified engines wherever feasible for off-road heavy-duty diesel engines, and comply with the State Off-Road Regulation. Where the use of Tier 4 engines is not feasible, Tier 3 certified engines shall be used; where Tier 3 engines are not feasible, Tier 2 certified engines shall be used;
- Use of on-road heavy-duty trucks that meet the CARB's 2007 or cleaner certification standard for on-road heavy-duty diesel engines, and comply with the State On-Road Regulation;
- All on and off-road diesel equipment shall not idle for more than 5 minutes. Signs shall be posted in the designated queuing areas and or job sites to remind drivers and operators of the five minute idling limit;
- Use of electric powered equipment in place of diesel powered equipment, when feasible;
- Substitute gasoline-powered in place of diesel-powered equipment, when feasible;
- Use of alternatively fueled construction equipment, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane or biodiesel, in place of diesel powered equipment for 15 percent of the fleet;
- Use of materials sourced from local suppliers, as feasible; and
- Recycling of at least 50 percent of construction waste materials.

Significance After Mitigation

With implementation Mitigation Measure GHG-2, impacts related to construction GHG emissions would be less than significant.

Threshold 2:	Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. A significant impact would occur if the project would: a. Obstruct the state's ability to achieve AB 32 and SB 32 GHG reduction targets. The project would obstruct achievement of statewide targets if it would: - Generate emissions exceeding SB 375 regional emission reduction targets for passenger vehicle emissions established by CARB (five percent reduction from 2005 levels by 2020 and 10 percent from 2005 levels by 2035)

IMPACT GHG-3 IMPLEMENTATION OF THE 2018 RTP/SCS WOULD NOT INTERFERE WITH THE ACHIEVEMENT OF STATEWIDE GHG REDUCTION TARGETS ENCODED IN AB 32 AND SB 32. THERE WOULD BE NO IMPACT.

As discussed above under "Significance Thresholds," SB 375 comprises one of California's key strategies to reduce GHG emissions from transportation sources, which generate the majority of California's GHG emissions. SB 375 requires that local MPOs develop integrated land use and transportation plans to meet GHG reduction targets for cars and light trucks established by CARB; importantly, CARB is required to review and revise reduction targets every eight years, allowing for increasingly stringent reduction targets over time and updated time horizons. According to the Scoping Plan, with implementation of SB 375 and other strategies outlined in the Scoping Plan, California will be able to meet statewide targets set forth in AB 32 and SB 32.

For San Joaquin County, the current per capita emission reduction targets set by CARB are a five percent reduction relative to 2005 levels by 2020, and a 10 percent reduction from 2005 levels by 2035. Table 27shows SB 375 regional emissions and targets for 2020 and 2035, as well as 2005 baseline conditions. As shown in Table 27, the 2018 RTP/SCS exceeds currently adopted targets, providing GHG reductions of 7.0 percent in 2020 and 17.6 percent in 2035. In addition, as discussed under Impact GHG-1, plan-level emissions would meet statewide per capita targets consistent with AB 32, SB 32, and the state's long-term 2050 target, set forth in EO-S-3-05. Therefore, the project would not impede California's achievement of statewide targets encoded in AB 32 and SB 32. There would be no impact.

Table 27 SB 375 Regional Emissions and Targets

Scenario	CO_2 Emissions (lbs/day)	Population	Per Capita CO_2 Emissions (lbs/day/person)	% Reduction in Emissions Compared to 2005 Baseline
2005 Baseline	13,307,632	652,339	20.4	–
2020 with 2018 RTP/SCS	14,714,243	775,819	19.0	7.0
2035 with 2018 RTP/SCS	15,927,732	947,835	16.8	17.6

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

There would be no impact without mitigation.

Threshold 2:	Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. A significant impact would occur if the project would: b. Conflict with local GHG reduction plans and policies

IMPACT GHG-4 THE 2018 RTP/SCS SUPPORTS COMPACT, TRANSIT-ORIENTED GROWTH, INCLUDES TRANSIT AND ACTIVE TRANSPORTATION PROJECTS, AS WELL AS INITIATIVES TO FURTHER SUPPORT REGIONAL GHG REDUCTIONS AND CLIMATE CHANGE ADAPTATION. THEREFORE, THE PROJECT WOULD NOT CONFLICT WITH LOCAL GHG REDUCTION PLANS AND POLICIES. THERE WOULD BE NO IMPACT.

Within San Joaquin County, the cities of Lodi, Manteca, Stockton, and Tracy have adopted CAPs that establish community GHG emission baselines, set GHG reduction targets, and outline policies and implementing measures to help achieve those targets. As discussed above under *Local GHG Reduction Plans*, these plans include policies and implementing measures to reduce local GHG emissions by promoting active transport, zero emission vehicle adoption, infill and transit-oriented development, increased building energy efficiency, and/or other strategies.

The 2018 RTP/SCS supports local efforts to reduce GHG emissions by adopting a compact growth land use scenario and including active transportation and transit projects in its project list. As discussed under Impact GHG-1, implementation of the 2018 RTP/SCS would help the region reduce emissions and achieve statewide per capita targets. In addition, Chapter 3 of the 2018 RTP/SCS identifies two future studies to be implemented by SJCOG that would further support efforts to reduce GHG emissions and address climate change: an SCS Implementation Study that would provide insight on the barriers to SCS implementation, focusing on first mile/last mile planning, impediments to transit use to job centers, and recommendations on shared mobility initiatives and emerging technologies; a Climate Adaptation and Resiliency Planning Study that identifies current risks and vulnerabilities and develops regional level strategies to assist in meeting state goals and federal planning requirements. Therefore, the project would not conflict with local GHG reduction plans. There would be no impact.

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

The project would have no impact without mitigation.

c. Cumulative Impacts

Climate change is inherently a cumulative impact as it is the accumulation of large quantities of GHGs in the atmosphere that results in impacts to global climate. While the vast majority of individual projects do not generate sufficient GHG emissions to directly influence climate change, project emissions can contribute incrementally to cumulative effects that are significant, even if individual changes resulting from a single project are limited. Thus, the issue of climate change typically involves an analysis of whether a project's contribution towards an impact is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (CEQA Guidelines, Section 15064[h][1]).

As discussed above under Impacts GHG-1 and GHG-3, the 2018 RTP/SCS would reduce mobile source GHG emissions relative to 2015 conditions and would achieve overall quantitative reductions in GHG emissions consistent with statewide per capita targets and SB 375. Thus, based on criteria established in state statutes and guidance documents, the project's contribution to atmospheric GHGs would be considered less than significant.

For this reason, at its December 14, 2017 meeting, the CARB Board of Directors expressed consensus that CARB will shift its recommended approach to implementing SB 375 away from an emphasis on modeling to an emphasis on implementing strategies and solutions that have been proven to be effective. Furthermore, the 2017 Scoping Plan identifies that "there is a gap between what SB 375 can provide and what is needed to meet the State's 2030 and 2050 goals." Appendix C of the Scoping Plan provides strategies to close the gap, including the following:

- Explore and develop financing, regulatory, and other tools to support more efficient and more equitable development: The State will evaluate and develop financing mechanisms, incentives, guidelines, and other tools to substantially accelerate more efficient and equitable development outcomes. This includes: reducing barriers to housing development in infill areas; promoting infill development and necessary infrastructure in existing communities; and implementing strategies to ensure that long-time residents can stay in place as neighborhoods improve.
- Support transportation policies such as priced express lanes, reduced parking requirements for development, and transit commuter incentives that promote infill development and reduce vehicle miles traveled: The State will implement road user and parking pricing policies, and coordinate these policies with programs to avoid adverse impacts on low-income drivers and with infrastructure investments as described above. Further, the State will invest in technology to improve transportation system efficiency that provide choices that enable people and goods to reach destinations quickly and cleanly.

Due to the uncertainty associated with project emissions and future statewide emission reductions, as well as the gap identified by the Scoping Plan for achieving reductions from SB 375 sufficient to meet statewide targets, the project would have a potentially significant cumulative impact related to GHG emissions.

Mitigation Measure

GHG-Cumulative Regional Measures to Support GHG Reductions

To support GHG reductions on a regional level, as well as address the gap between SB 375 and needed reductions from the transportation and land use sectors to achieve statewide targets, SJCOG shall take the following actions, as feasible (the following measures have been adapted from Appendix C of the 2017 Scoping Plan):

- Explore and develop financing and tools to support more efficient and more equitable development, including reducing barriers to housing development in infill areas; promoting infill development and necessary infrastructure in existing communities; and implementing strategies to ensure that long-time residents can stay in place as neighborhoods improve.
- Support transportation policies such as priced express lanes, reduced parking requirements for development, and transit commuter incentives that promote infill development and reduce vehicle miles traveled.

- Explore transit pass subsidies or other ways to reduce transit fares, particularly for disadvantaged communities, students, seniors, the disabled, and other transit-dependent users.
- Support expansion and improvement of active transportation infrastructure to help meet the California Transportation Plan goal of quadrupling active transportation mode share by 2040.
- Explore ways to expand access to car share, bike share, and ride share services.
- Explore ways to increase use of lower-carbon construction materials for transportation infrastructure projects.
- Implement sustainable landscaping practices for transportation infrastructure projects that contribute to the enhancement of a multi-modal transportation system.
- Explore ways to:
  - Promote teleworking and alternative work schedules.
  - Incentivize use of transit and active transportation for commuting.
  - Increase ride sharing to work to help meet the California Transportation Plan goal of increasing carpool vehicles by 15% by 2040.

SJCOG and member agencies shall promote the use of Dibs (formerly Commute Connection), a program of SJCOG serving San Joaquin, Stanislaus, and Merced counties. Dibs promotes and encourages smart travel through carpooling, vanpooling, riding transit, walking, & biking. The program's core focus is to reduce single occupant vehicle commutes, thus reducing congestion and GHG emissions, and improving air quality. Information on Dibs can be found here: https://www.dibsmyway.com/