

4.7 GREENHOUSE GAS EMISSIONS

4.7.1 INTRODUCTION

This section discusses the existing global, national, and statewide conditions related to greenhouse gases (GHG) and global climate change, provides a discussion of the applicable federal, state, regional, and local agencies that regulate, monitor, and control GHG emissions, and evaluates the potential impacts on global climate from the implementation of the proposed Scott Ranch project. It also presents potential impacts to greenhouse gas emissions from the construction and operation of a proposed regional park trail that would extend from the western boundary of the project site to the existing Ridge Trail on Helen Putnam Regional Park (see **Section 4.7.4.4** below).

4.7.2 ENVIRONMENTAL SETTING

4.7.2.1 Background

Global climate change refers to any significant change in climate measurements, such as temperature, precipitation, or wind, lasting for an extended period (i.e., decades or longer) (US EPA 2013). Climate change may result from:

- Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun;
- Natural processes within the climate system (e.g., changes in ocean circulation, reduction in sunlight from the addition of GHG and other gases to the atmosphere from volcanic eruptions); and
- Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, desertification).

In recent decades, changes in climate have caused impacts on natural and human systems on all continents and across the oceans. Impacts are due to observed climate change, irrespective of its cause, indicating the sensitivity of natural and human systems to changing climate (IPCC 2013). Continuing changes to the global climate system and ecosystems, and to California, are projected to include:

- Rapidly diminishing sea ice and mountain snowpack levels, thereby increasing sea levels and sea surface evaporation rates with a corresponding increase in tropospheric water vapor due to the atmosphere's ability to hold more water vapor at higher temperatures (IPCC 2013);
- Rising average global sea levels primarily due to thermal expansion and the melting of glaciers, ice caps, and the Greenland and Antarctic ice sheets;

- Changing weather patterns, including changes to precipitation, ocean salinity, and wind patterns, and more energetic aspects of extreme weather, including droughts, heavy precipitation, heat waves, extreme cold, and the intensity of tropical cyclones;
- Changing levels in snowpack, river flow and sea levels indicating that climate change is already affecting California's water resources (Cal EPA 2010);
- An increasing number of days conducive to ozone formation by 25 to 85 percent (depending on the future temperature scenario) in high ozone areas located in the Southern California area and the San Joaquin Valley by the end of the 21st century (Cal EPA 2006);
- Increasing potential for erosion of California's coastlines and sea water intrusion into the Sacramento and San Joaquin Delta and associated levee systems due to the rise in sea level (Cal EPA 2006);
- Dry seasons that start earlier and end later, evoking more frequent and intense wildland fires (Cal EPA 2010); and
- Increasing demand for electricity due to rising temperatures (Cal EPA 2010).

The natural process through which heat is retained in the troposphere¹ is called the "greenhouse effect." Various gases in the Earth's atmosphere, classified as atmospheric greenhouse gases, play a critical role in determining the Earth's surface temperature. Solar radiation enters Earth's atmosphere as short wave radiation. It travels through the atmosphere without warming it and is absorbed by the Earth's surface. When the Earth re-emits this radiation back toward space, the radiation changes to long wave radiation. GHGs are transparent to incoming short-wave solar radiation but absorb outgoing long wave radiation. As a result, radiation that otherwise would escape back into space is now retained, warming the atmosphere. This phenomenon is known as the greenhouse effect.

4.7.2.2 Greenhouse Gases

State law defines GHGs to include the following six compounds:

- **Carbon Dioxide (CO₂).** Carbon dioxide primarily is generated by fossil fuel combustion from stationary and mobile sources. Due to the emergence of industrial facilities and mobile sources over the past 250 years, the concentration of carbon dioxide in the atmosphere has increased 35 percent (US EPA 2008b). Carbon dioxide is the most widely emitted GHG and is the reference gas (GWP of 1) for determining the GWP of other GHGs. In 2004, 82.8 percent of California's GHG emissions were carbon dioxide (California Energy Commission 2007).
- **Methane (CH₄).** Methane is emitted from biogenic sources (i.e., resulting from the activity of living organisms), incomplete combustion in forest fires, landfills, manure management, and leaks in natural gas pipelines. In the United States, the top three sources of methane are landfills, natural gas systems,

¹ The troposphere is the bottom layer of the atmosphere, which varies in height from the Earth's surface from 6 to 7 miles).

and enteric fermentation (US EPA n.d.[a]). Methane is the primary component of natural gas, which is used for space and water heating, steam production, and power generation. The GWP of methane is 21.

- **Nitrous Oxide (N₂O).** Nitrous oxide is produced by natural and human-related sources. Primary human-related sources include agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic acid production, and nitric acid production. The GWP of nitrous oxide is 310.
- **Hydrofluorocarbons (HFCs).** HFCs typically are used as refrigerants in both stationary refrigeration and mobile air conditioning. The use of HFCs for cooling and foam blowing is growing particularly as the continued phase-out of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) gains momentum. The GWP of HFCs ranges from 140 for HFC-152a to 6,300 for HFC-236fa.
- **Perfluorocarbons (PFCs).** Perfluorocarbons are compounds consisting of carbon and fluorine. They are primarily created as a byproduct of aluminum production and semiconductor manufacturing. Perfluorocarbons are potent GHGs with a GWP several thousand times that of carbon dioxide, depending on the specific PFC. Another area of concern regarding PFCs is their long atmospheric lifetime (up to 50,000 years) (Energy Information Administration 2007). The GWPs of PFCs range from 5,700 to 11,900.
- **Sulfur Hexafluoride (SF₆).** Sulfur hexafluoride is a colorless, odorless, nontoxic, nonflammable gas. It is most commonly used as an electrical insulator in high voltage equipment that transmits and distributes electricity. Sulfur hexafluoride is the most potent GHG that has been evaluated by the Intergovernmental Panel on Climate Change with a GWP of 23,900. However, its global warming contribution is not as high as the GWP would indicate due to its low mixing ratio, as compared to carbon dioxide (4 parts per trillion [ppt] in 1990 versus 365 parts per million [ppm] of CO₂) (US EPA 2016).

While water vapor and carbon dioxide (CO₂) are the most abundant GHGs, other trace GHGs have a greater ability to absorb and re-radiate long-wave radiation. To gauge the potency of GHGs, scientists have established a Global Warming Potential (GWP) for each GHG based on its ability to absorb and re-emit long-wave radiation over a specific period. The GWP of a gas is determined using CO₂ as the reference gas, which has a GWP of 1 over 100 years (IPCC 2007).² For example, a gas with a GWP of 10 is 10 times more potent than CO₂ over 100 years. The use of GWP allows GHG emissions to be reported using CO₂ as a baseline. The sum of each GHG multiplied by its associated GWP is referred to as “carbon dioxide equivalents” (CO₂e). This essentially means that 1 metric ton of a GHG with a GWP of 10 has the same climate change impacts as 10 metric tons of CO₂. As illustrated in **Table 4.7-1, Global Warming Potential of Greenhouse Gases**, the other GHGs are less abundant but have higher GWP than CO₂. To account for this higher potential, emissions of other GHGs are frequently expressed in the equivalent mass of CO₂, denoted as CO₂e. Expressing GHG emissions in carbon dioxide equivalents takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that

² All Global Warming Potentials are given as 100-year values.

would occur if only CO₂ were being emitted. High GWP gases such as HFCs, PFCs, and SF₆ are the most heat-absorbent.

**Table 4.7-1
Global Warming Potential of Greenhouse Gases**

Greenhouse Gas	Global Warming Potential Factor (100-Year)
Carbon Dioxide (CO ₂)	1
Methane (CH ₄)	28
Nitrous Oxide (N ₂ O)	265
Perfluorocarbons (PFCs)	6,630-11,100
Hydrofluorocarbons (HFCs)	4-12,400
Sulfur Hexafluoride (SF ₆)	23,500

Source: IPCC. 2013. *Climate Change 2013: The Physical Science Basis*.

Note: Global warming potential measures how much heat a GHG traps in the atmosphere, in this case, over a 100-year period.

4.7.2.3 GHG Emissions Classification

To achieve consistency in reporting across different geographies, GHG emissions are classified into three categories based on the nature and source of the emissions.

- Scope 1 GHG emissions include direct emissions that are emitted on the project site/facility and are associated with on-site combustion of natural gas, fuel use in vehicle fleets, and fugitive emissions of gases used for refrigeration and scientific research. Fugitive gases include hydrofluorocarbon gases, perfluorocarbon gases, and sulfur hexafluoride (SF₆).
- Scope 2 GHG emissions include indirect emissions associated with the consumption of purchased energy from off-site sources. Scope 2 electricity emissions reflect emissions from all energy used at the electricity-generating power plant, but exclude transmission and distribution losses, which are reported under Scope 3.
- Scope 3 GHG emissions include indirect emissions not covered in Scope 2, including GHG emissions from employee commuting, business air and ground travel, electricity transmission and distribution losses, off-site wastewater treatment, and off-site municipal solid waste disposal.

Note that CEQA requires an evaluation of direct and indirect emissions. With the exception of business air and ground travel, all of the Scope 1, 2, and 3 emission sources listed above must be addressed in a CEQA document. In addition, CEQA requires that the estimate of project emissions include emissions from the supply, treatment and distribution of water used by the project.

4.7.2.4 Contributions to Greenhouse Gas Emissions

Global

Worldwide anthropogenic (manmade) GHG emissions are tracked for industrialized nations (referred to as Annex I) and developing nations (referred to as Non-Annex I). Man-made GHG emissions for Annex I and Annex II nations are available through 2014. The sum of these emissions totaled approximately 29,249 million metric tons of CO₂ equivalents (MMTCO_{2e}).³ It should be noted that global emissions inventory data may vary depending on the source of the emissions inventory data.⁴ The top five countries and the European Union accounted for approximately 60 percent of the total global GHG emissions based on 2014 data⁵ (See **Table 4.7-2, Top Five GHG Producer Countries and the European Union [Annual]**). The GHG emissions in more recent years may differ from the inventories presented in **Table 4.7-2**; however, the data is representative of currently available global inventory data.

**Table 4.7-2
Top Five GHG Producer Countries and the European Union (Annual)**

Emitting Countries	2014 GHG Emissions (MMTCO _{2e})
China	11,601
United States	6,319
European Union (EU), 28 Member States	3,625
India	3,202
Indonesia	2,472
Russia	2,030
Total	29,249

Source: World Resources Institute, "Climate Analysis Indicators Tool (CAIT)," <http://cait.wri.org/>. 2017 Excludes emissions and removals from land use, land-use change, and forestry (LULUCF).

Note: Emissions are based on 2014 data.

United States

As noted in **Table 4.7-2**, the United States was the number two producer of global GHG emissions. The primary GHG emitted by human activities in the United States was CO₂, representing approximately

3 The CO₂ equivalent emissions commonly are expressed as "million metric tons of carbon dioxide equivalent (MMTCO_{2E})." The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP, such that MMTCO_{2E} = (million metric tons of a GHG) × (GWP of the GHG). For example, the GWP for methane is 28. This means that the emission of one million metric tons of methane is equivalent to the emission of 28 million metric tons of CO₂.

4 The global emissions are the sum of Annex I and non-Annex I countries, without counting Land-Use, Land-Use Change and Forestry (LULUCF).

5 Worldwide GHG emissions in 2014 were approximately 48,892 MT CO_{2e}.

82 percent of the total US GHG emissions. The main human activity that emits CO₂ is the combustion of fossil fuels for energy and transportation as well as certain industrial processes. Methane, nitrous oxide, and fluorinated gases account for approximately 10, 6, and 3 percent, respectively, of the United States global GHG emissions. Methane is emitted during the production and transport of coal, natural gas, and oil as well as from livestock, agricultural practices, and solid waste landfills. Nitrous oxide (N₂O) is emitted from agriculture, fuel combustion, and as a byproduct of industrial production. Fluorinated gases were developed to replace ozone-depleting substances. The major emissions source of these compounds is their use as refrigerants in air conditioning systems. Other sources of fluorinated gases include as a byproduct of industrial processes such as aluminum production and through the transmission and distribution of electricity (US EPA 2015).

State of California

The California Air Resources Board (CARB) compiles GHG inventories for the State of California. Based on the 2017 GHG inventory data (the latest year for which data are available), California emitted 424.1 MMTCO_{2e} (million MTCO_{2e}) in that year. That included emissions resulting from imported electrical power. Based on the CARB inventory data and GHG inventories compiled by the World Resources Institute, California's total statewide GHG emissions rank second in the United States (Texas was ranked number one).

The primary contributors to GHG emissions in California are transportation, electric power production from both in-state and out-of-state sources, industry, agriculture and forestry, and other sources, which include commercial and residential activities. **Table 4.7-3, GHG Emissions in California**, provides a summary of GHG emissions reported in California in 2000 and 2017 separated by categories defined by the United Nations Intergovernmental Panel on Climate Change (IPCC).

As demonstrated in **Table 4.7-3**, California's 2017 GHG emissions are lower than 2000 levels. In 2007, California statewide GHG emissions peaked at 490.9 MT CO_{2e}/year, since that time emissions have been following a declining trend. In 2017, emissions from routine emitting activities statewide were 66.8 million metric tons of CO_{2e} (MMTCO_{2e}) lower than peak GHG levels in 2007 (47 MMTCO_{2e}) and lower than GHG levels in 2000 (CARB 2019).

Between 2000 and 2018, the population of California grew by approximately 5.7 million (from 33.9 to 39.6 million) (US Census). This represents an increase of approximately 16.8 percent from 2000 population. In addition, the California economy, measured as gross state product, grew from \$1.4 trillion in 2000 to \$2.9 trillion in 2018 representing an increase of approximately 116 percent. Despite the population and economic growth, California's net GHG emissions decreased by approximately 10 percent.

**Table 4.7-3
GHG Emissions in California**

Source Category	2000 (MMTCO₂e)	Percent of Total	2017 (MMTCO₂e)	Percent of Total
ENERGY	413.8	87.52%	348.9	82.3%
Energy Industries	159.12	--	109.66	--
Manufacturing Industries & Construction	22.75	--	19.88	--
Transport	179.13	--	168.93	--
Other Sectors (Residential/Commercial/Institutional)	44.67	--	41.24	--
Fugitive Emissions from Solid Fuels	0.04	--	0.02	--
Fugitive Emissions from Oil & Natural Gas	6.89	--	8.20	--
Fugitive Emissions from Geothermal Energy Production	1.13	--	0.93	--
Pollution Control Devices	0.11	--	0.05	--
INDUSTRIAL PROCESSES & PRODUCT USE	19.60	4.20%	33.6	7.92%
Mineral Industry	5.60	--	4.93	--
Chemical Industry	0.06	--	0.03	--
Non-Energy Products from Fuels & Solvent Use	3.30	--	1.88	--
Electronics Industry	0.20	--	0.17	--
Substitutes for Ozone Depleting Substances	5.57	--	19.64	--
Other Product Manufacture and Use	1.52	--	1.18	--
Other	3.31	--	5.81	--
AGRICULTURE, FORESTRY, & OTHER LAND USE	28.40	6.29%	30.70	7.24%
Livestock	19.12	--	22.68	--
Aggregate Sources & Non-CO ₂ Sources on Land	9.27	--	8.07	--
WASTE	9.30	1.99%	10.80	2.55%
Solid Waste Disposal and Biological Treatment	7.22	--	8.54	--
Biological Treatment of Solid Waste	0.13	--	0.35	--
Wastewater Treatment & Discharge	1.93	--	1.94	--
EMISSIONS SUMMARY				
Gross California Emissions	471.1		424.1	

Source: California Air Resources Board, "California Greenhouse Gas 2000-2017 Inventory by IPCC Category - Summary,"
https://ww3.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_ipcc_sum_2000-17.pdf, Last Updated August 12, 2019. Accessed September 25, 2019.

4.7.3 REGULATORY CONSIDERATIONS

4.7.3.1 International

Intergovernmental Panel on Climate Change (IPCC)

The World Meteorological Organization (WMO) and United Nations Environmental Program (UNEP) established the IPCC in 1988. The goal of the IPCC is to evaluate the risk of climate change caused by human activities. Rather than performing research or monitoring climate, the IPCC relies on peer-reviewed and published scientific literature to make its assessment. While not a regulatory body, the IPCC assesses information (i.e., scientific literature) regarding human-induced climate change and the impacts of human-induced climate change, and recommends options to policy makers for the adaptation and mitigation of climate change. The IPCC reports its evaluations in special reports called “assessment reports.” The latest assessment report (i.e., Fifth Assessment Report, consisting of three working group reports and a synthesis report based on the first four reports) was published in 2013.⁶ In its 2013 report, the IPCC stated that “Each of the last three decades has been successively warmer at the Earth’s surface than any preceding decade since 1850. In the Northern Hemisphere, 1983-2012 was *likely* the warmest 30-year period of the last 1,400 years.”

Paris Climate Accord

The most recent international climate change agreement was adopted at the United Nations Framework Convention on Climate Change in Paris in December 2015 (the “Paris Accord”). In the Paris Accord, the United States set its intended nationally determined contribution to reduce its GHG emissions by 26 to 28 percent below its 2005 level in 2025 and to make best efforts to reduce its emissions by 28 percent. These targets were set with the goal of limiting global temperature rise to below 2 degrees Celsius and getting to the 80 percent emission reduction by 2050. However, in June 2017, the U.S. announced its intent to withdraw from the Paris Accord. The earliest effective date of a withdrawal by the U.S. is November 2020.

4.7.3.2 Federal

Energy Independence and Security Act

In *Massachusetts vs. EPA*, the Supreme Court held that United States Environmental Protection Agency (US EPA) has the statutory authority under Section 202 of the Clean Air Act (CAA) to regulate GHGs from new motor vehicles. The court did not hold that the US EPA was required to regulate GHG emissions; however, it indicated that the agency must decide whether GHGs from motor vehicles cause or contribute to air

⁶ The IPCC’s Fifth Assessment Report is available online at <https://www.ipcc.ch/report/ar5/>

pollution that is reasonably anticipated to endanger public health or welfare. Upon the final decision, President George W. Bush signed Executive Order 13432 on May 14, 2007, directing the US EPA, along with the Departments of Transportation, Energy, and Agriculture, to initiate a regulatory process that responds to the Supreme Court's decision.

Signed on December 19, 2007 by President Bush, the Energy Independence and Security Act of 2007 sets a mandatory Renewable Fuel Standard (RFS) requiring fuel producers to use at least 36 billion gallons of biofuel in 2022 and sets a national fuel economy standard of 35 miles per gallon by 2020. The act also contains provisions for energy efficiency in lighting and appliances and for the implementation of green building technologies in federal buildings. On July 11, 2008, the US EPA issued an Advanced Notice of Proposed Rulemaking (ANPRM) on regulating GHGs under the CAA. The ANPRM reviewed the various CAA provisions that may be applicable to the regulation of GHGs and presents potential regulatory approaches and technologies for reducing GHG emissions. On April 10, 2009, the US EPA published the Proposed Mandatory Greenhouse Gas Reporting Rule in the *Federal Register* (US EPA 2009). The rule was adopted on September 22, 2009 and covers approximately 10,000 facilities nationwide, accounting for 85 percent of US GHG emissions.

In May 2010, the US EPA and the Department of Transportation's (DOT) National Highway Traffic Safety Administration (NHTSA) issued the final rule to establish a national program consisting of new standards for model year 2012 through 2016 light-duty vehicles that will reduce GHG emissions and improve fuel economy. The proposed standards would be phased in and would require passenger cars and light-duty trucks to comply with a declining emissions standard. In 2012, passenger cars and light-duty trucks would have to meet an average standard of 295 grams of CO₂ per mile and 30.1 miles per gallon. By 2016, the vehicles would have to meet an average standard of 250 grams of CO₂ per mile and 35.5 miles per gallon.⁷ These standards were formally adopted by the US EPA and DOT on April 1, 2010.

On December 7, 2009, the US EPA Administrator signed two distinct findings regarding GHGs under section 202(a) of the Clean Air Act:

- **Endangerment Finding:** The Administrator finds that the current and projected concentrations of the six key well-mixed GHGs (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) in the atmosphere threaten the public health and welfare of current and future generations.
- **Cause or Contribute Finding:** The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

⁷ The CO₂ emission standards and fuel economy standards stated are based on US EPA formulas.

While these findings did not impose additional requirements on industry or other entities, this action was a prerequisite to finalizing the US EPA’s proposed GHG emissions standards for light-duty vehicles, which were jointly proposed by the US EPA and DOT. On August 28, 2012, the US EPA and the NHSTA extended the light-duty vehicle emissions and fuel economy standards from model years 2017 to 2025. By 2025, vehicles would have to meet an average standards of 163 grams CO₂ per mile and 54.5 miles per gallon.

4.7.3.3 State Regulations

Title 24 Building Standards Code

The California Energy Commission first adopted Energy Efficiency Standards for Residential and Nonresidential Buildings (California Code of Regulations, Title 24, Part 6) in 1978 in response to a legislative mandate to reduce energy consumption in the state. Although not originally intended to reduce GHG emissions, increased energy efficiency, and reduced consumption of electricity, natural gas, and other fuels associated with Title 24 compliance would result in fewer GHG emissions from residential and nonresidential buildings subject to the standard.

Part 11 of the Title 24 Building Standards Code is referred to as the California Green Building Standards Code (CALGreen Code). The purpose of the CALGreen Code is to “improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a positive environmental impact and encouraging sustainable construction practices in the following categories: (1) Planning and design; (2) Energy efficiency; (3) Water efficiency and conservation; (4) Material conservation and resource efficiency; and (5) Environmental air quality (California Building Standards Commission 2010). The CALGreen Code is not intended to substitute or be identified as meeting the certification requirements of any green building program that is not established and adopted by the California Building Standards Commission (CBSC). The 2019 *CALGreen* Code was published on July 1, 2019 and became effective January 1, 2020. The CalGreen Code proposes mandatory and voluntary building standards for residential and nonresidential developments within California in order to outline planning, design, and development methods to protect the environmental quality of the site and surrounding area.

Assembly Bill 1493

In response to the transportation sector’s contribution of more than half of California’s CO₂ emissions, Assembly Bill 1493 (AB 1493, Pavley) was enacted on July 22, 2002. AB 1493 requires CARB to set GHG emission standards for passenger vehicles, light-duty trucks, and other vehicles whose primary use is noncommercial personal transportation. CARB adopted the standards in September 2004. The new standards will be phased in during the 2009 through 2016 model years. When fully phased in, standards for 2009–2012 model year vehicles will achieve a reduction of about 22 percent in GHG emissions compared

to the emissions from the 2002 fleet, while the standards for 2013–2016 model year vehicles will result in a reduction of about 30 percent.

Before these regulations may go into effect, the US EPA must grant California a waiver under the federal CAA, which ordinarily preempts state regulation of motor vehicle emission standards. On June 30, 2009, the US EPA formally approved California’s waiver request. However, in light of the September 15, 2009, announcement by the US EPA and NHTSA regarding the national program to reduce vehicle GHG emissions, California—and states adopting California emissions standards—have agreed to defer to the proposed national standard through model year 2016 if granted a waiver by the US EPA. The 2016 endpoint of the two standards is similar, although the national standard ramps up slightly more slowly than required under the California standard. The Pavley standards require additional reductions in CO₂ emissions beyond 2016 (referred to as Phase II standards). While the Phase II standards have yet to be fully developed, CARB has made it clear that the state intends to pursue additional reductions from motor vehicles in the 2017 through 2020 timeframe under the California Global Warming Solutions Act of 2006.

On September 19, 2019, President Trump announced the “One Nation Program Rule,” which will enable the federal government to provide nationwide uniform fuel economy and greenhouse gas emission standards for automobiles and light duty trucks. The rule determines that only the federal government may set fuel economy standards, and state and local governments may not establish their own separate fuel economy standard, repealing California’s Clean Air Act waiver.

Executive Order S-3-05 and the Climate Action Team

In June 2005, Governor Schwarzenegger established California’s GHG emissions reduction targets in Executive Order S-3-05. The Executive Order established the following goals: GHG emissions should be reduced to 2000 levels by 2010, 1990 levels by 2020, and 80 percent below 1990 levels by 2050. The Secretary of Cal/EPA is required to coordinate efforts of various agencies in order to collectively and efficiently reduce GHGs. Some of the agency representatives involved in the GHG reduction plan include the Secretary of the Business, Transportation, and Housing Agency; the Secretary of the Department of Food and Agriculture; the Secretary of the Resources Agency; the Chairperson of CARB; the Chairperson of the CEC; and the President of the Public Utilities Commission.

Representatives from each of the aforementioned agencies comprise the Climate Action Team. The Cal/EPA secretary is required to submit a biannual progress report from the Climate Action Team to the governor and state legislature disclosing the progress made toward GHG emission reduction targets. In addition, another biannual report must be submitted illustrating the impacts of global warming on California’s water supply, public health, agriculture, coastline, and forests, and reporting possible

mitigation and adaptation plans to combat these impacts. Some strategies currently being implemented by state agencies include CARB introducing vehicle climate change standards and diesel anti-idling measures, the CEC implementing building and appliance efficiency standards, and the Cal/EPA implementing their green building initiative. The Climate Action Team also recommends future emission reduction strategies, such as using only low-GWP refrigerants in new vehicles, developing ethanol as an alternative fuel, reforestation, solar power initiatives for homes and businesses, and investor-owned utility energy efficiency programs. According to the report, implementation of current and future emission reduction strategies have the potential to achieve the goals set forth in Executive Order S-3-05.

Executive Order B-30-15

On April 29, 2015, Governor Brown Jr. issued an executive order to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. According to the state, California is on track to meet or exceed the current target of reducing GHG emissions to 1990 levels by 2020, as established in AB 32. The new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the ultimate goal of reducing emissions 80 percent under 1990 levels by 2050, established by EO S-3-05.

Executive Order B-55-18

On September 10, 2018, Governor Brown Jr. issued Executive Order B-55-18 to establish a statewide goal to achieve carbon neutrality by 2045 and to achieve and maintain net negative emissions thereafter. The executive order is in addition to the existing statewide goals of reduce climate change, such as AB 32 and SB 32. EO B-55-18 tasks CARB with addressing this goal in future Scoping Plans.

Assembly Bill 32

In September 2006, AB 32 was signed into law by Governor Arnold Schwarzenegger, focusing on achieving GHG emissions equivalent to statewide levels in 1990 by 2020. It mandates that the CARB establish a quantified emissions cap, institute a schedule to meet the cap, implement regulations to reduce statewide GHG emissions from stationary sources, and develop tracking, reporting, and enforcement mechanisms to ensure that reductions are achieved.

CARB developed an AB 32 Scoping Plan that contains strategies to achieve the 2020 emissions cap. This Scoping Plan, developed by CARB in coordination with the Climate Action Team (CAT), was first published in October 2008 (the “2008 Scoping Plan”). The 2008 Scoping Plan proposed a comprehensive set of actions designed to reduce overall GHG emissions in California, improve the environment, reduce the state’s dependence on oil, diversify the state’s energy sources, save energy, create new jobs, and enhance public health. It accommodated the State’s projected population growth. Moreover, it expressly called for

coordinated planning of growth, including the location of dense residential projects near transportation infrastructure, including public transit.

On May 22, 2014, ARB approved its first update to the AB 32 Scoping Plan, recalculating 1990 GHG emissions using IPCC Fourth Assessment Report (AR4) released in 2007. The updated Scoping Plan states that based on the AR4 global warming potentials, the 1990 emissions level would be slightly higher (at 431 MMTCO_{2e}) than calculated in the original Scoping Plan (at 427 MMTCO_{2e}). Based on the revised estimates of expected 2020 emissions identified in the 2011 supplement to the Functional Equivalent Document (FED) and updated 1990 emissions levels identified in the draft first update to the Scoping Plan, achieving the 1990 emission level would require a reduction of 76 MMTCO_{2e} or a reduction by approximately 15.3 percent (down from 28.4 percent) to achieve in 2020 emissions levels in the BAU (Business as Usual)⁸ condition. ARB's First Update "lays the foundation for establishing a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050," and many of the emission reduction strategies recommended by CARB would serve to reduce the project's post-2020 emissions level to the extent applicable by law by focusing on reductions from several sectors (ARB 2014).

On December 14, 2017, CARB approved the final version of *California's 2017 Climate Change Scoping Plan* (2017 Scoping Plan), which outlines the proposed framework of action for achieving the SB 32 2030 GHG target of 40 percent reduction in GHG emissions relative to 1990 levels (CARB 2017). See further discussion below.

Nearly all reductions are to come from sources that are controlled at the statewide level by state agencies, including the CARB, Public Utilities Commission (PUC), High Speed Rail Authority (HSRA), and California Energy Commission (CEC). The few actions that are directly or indirectly associated with local government control are in the Transportation sector. Of these actions, only one (GHG reductions through coordinated planning) specifically identifies local governments as the responsible agency.

Senate Bill 97 (State CEQA Guidelines)

In August 2007, the legislature enacted SB 97 (Dutton), which directed the Governor's Office of Planning and Research (OPR) to develop guidelines under the California Environmental Quality Act (CEQA) for the mitigation of GHG emissions. A number of actions have taken place under SB 97, which are discussed below.

On June 19, 2008, OPR issued a technical advisory as interim guidance regarding the analysis of GHG emissions in CEQA documents (OPR 2008). The advisory indicated that a project's GHG emissions,

⁸ The BAU scenario refers to the anticipated GHG emissions if no reduction measures were implemented.

including those associated with vehicular traffic and construction activities should be identified and estimated. The advisory further recommended that the lead agency determine significance of the impacts and impose all mitigation measures that are necessary to reduce GHG emissions to a less-than-significant level. The advisory did not recommend a specific threshold of significance. Instead, OPR requested that CARB recommend a method for setting thresholds that lead agencies may adopt (OPR 2009).

To formulate CEQA Guideline Amendments for GHG emissions, OPR submitted the *Proposed Draft CEQA Guideline Amendments for Greenhouse Gas Emissions* to the Secretary for Natural Resources on April 13, 2009. The Natural Resources Agency conducted formal rulemaking procedures in 2009 and adopted the CEQA Guideline Amendments on December 30, 2009. They became effective in March 2010.

Senate Bill 375

On September 30, 2008, SB 375 was instituted to help achieve AB 32 goals through regulation of long-term transportation and housing plans, which includes transportation from public transit, cars, and trucks. SB 375 aligns three policy areas of importance to local government: (1) regional long-range transportation plans and investments; (2) regional allocation of the obligation for cities and counties to zone for housing; and (3) a process to achieve GHG emissions reductions targets for the transportation sector. It establishes a process for CARB to develop GHG emissions reductions targets for each region (as opposed to individual local governments or households). SB 375 also requires Metropolitan Planning Organizations (“MPOs”) to prepare a Sustainable Communities Strategy (SCS) within the Regional Transportation Plan (RTP) that guides growth while taking into account the transportation, housing, environmental, and economic needs of the region.

In February 2018, CARB released its updated final report on the *Proposed Update to the SB 375 Greenhouse Gas Emission Reduction Targets*, which recommends updates to the SB 375 GHG emission reduction targets across the state (CARB 2018). This report addresses several statutory, technological, and policy factors that have changed since the original 2010 targets. The original 2020 SB 375 target set for the Metropolitan Transportation Commissions/Association of Bay Area Governments (MTC/ABAG) region was a seven percent reduction. The proposed 2035 target to meet SB 375 for the MTC/ABAG region could increase from a 15 percent to a 19 percent reduction.

Senate Bill 350

On October 7, 2015, Senate Bill 350: Clean Energy and Pollution Reduction Act (SB 350) was signed into law, establishing new clean energy, clean air and greenhouse gas reduction goals for 2030 and beyond. Building off of AB 32, SB 350 established California’s 2030 greenhouse gas reduction target of 40 percent below 1990 levels. To achieve this goal, SB 350 set ambitious 2030 targets for energy efficiency and

renewable electricity, among other actions aimed at reducing greenhouse gas emissions. SB 350 increases California's renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030. This will increase the use of Renewables Portfolio Standard (RPS) eligible resources, including solar, wind, biomass, geothermal, and others. In addition, SB 350 requires the state to double statewide energy efficiency savings in electricity and natural gas end uses by 2030.

Senate Bill 32 (SB 32) and AB 197

On September 8, 2016, California signed into law Senate Bill 32 (SB 32), which adds Section 38566 to the Health and Safety Code and requires a commitment to reducing statewide GHG emissions by 2020 to 1990 levels and by 2030 to 40 percent less than 1990 levels. SB 32 was passed with companion legislation AB 197 Chapter 250, Statutes of 2016), which provides greater legislative oversight of CARB's GHG regulatory programs, requires CARB to account for the social costs of GHG emissions, and establishes a legislative preference for direct reductions of GHG emissions.

In November 2017, CARB adopted California's 2017 Climate Change Scoping Plan (2017 Scoping Plan), which outlines the proposed framework of action for achieving California's SB 32 2030 GHG target: a 40 percent reduction in GHG emissions by 2030 relative to 1990 levels (CARB 2017). The 2030 target is intended to ensure that California remains on track to achieve the goal set forth by E.O. B-30-15 to reduce statewide GHG emissions by 2050 to 80 percent below 1990 levels.

The 2017 Update identifies key sectors of the implementation strategy, which includes improvements in low carbon energy, industry, transportation sustainability, natural and working lands, waste management, and water. Through a combination of data synthesis and modeling, CARB determined that the target statewide 2030 emissions limit is 260 MMTCO_{2e}, and that further commitments will need to be made to achieve an additional reduction of 50 MMTCO_{2e} beyond current policies and programs. Key elements of the 2017 Update include a proposed 20 percent reduction in GHG emissions from refineries and an expansion of the Cap-and-Trade program to meet the aggressive 2030 GHG emissions goal and ensure achievement of the 2050 limit set forth by E.O. B-30-15. For the transportations sector, the 2017 Update indicates that while most of the GHG reductions will come from technologies and low carbon fuels, a reduction in the growth of vehicle miles traveled (VMT) is also needed. The 2017 Update indicates that stronger SB 375 GHG reduction targets will enable the state to make significant progress toward this goal, but alone will not provide all of the VMT growth reductions that will be needed. It notes the gap between what SB 375 can provide and what is needed to meet the State's 2030 and 2050 goals. The 2017 Update recommends that local governments consider policies to reduce VMT, including: "land use and community design that reduces VMT; transit-oriented development; street design policies that prioritize transit, biking,

and walking; and increasing low carbon mobility choices, including improved access to viable and affordable public transportation and active transportation opportunities.”

4.7.3.4 Regional Programs

Bay Area Air Quality Management District

On June 2, 2010, the Bay Area Air Quality Management District (BAAQMD) adopted updated *CEQA Guidelines*. These guidelines were most recently updated on May 9, 2017 (BAAQMD 2017). They contain GHG operational emissions significance thresholds and recommended methodologies and models to be used for assessing the impacts of project-specific GHG emissions on global climate change. The updated BAAQMD *CEQA Air Quality Guidelines* state that thresholds of significance for GHG emissions should be related to AB 32’s GHG reduction goals or the state’s strategy to achieve the 2020 GHG emissions limit, and also include measures for reducing GHG emissions from land use development projects and stationary sources. The BAAQMD’s GHG thresholds are only designed to achieve the 2020 state reduction goals and, as a result, the thresholds do not extend beyond 2020.

Sonoma County Regional Climate Action Plan

The Sonoma County Regional Climate Action Plan is an advisory document to assist the City in achieving its stated intent to reduce GHG emissions. The Plan outline 20 goals for reducing GHG emissions in Sonoma County, including: increase building energy efficiency; increase renewable energy use; switch equipment from fossil fuel to electricity; reduce travel demand through focused growth; encourage a shift toward low-carbon transportation options; increase vehicle and equipment fuel efficiency; encourage a shift toward low-carbon fuels in vehicles and equipment; reduce idling; increase solid waste diversion; increase capture and use of methane from landfills; reduce water consumption; increase recycled water and graywater use; increase water and wastewater infrastructure efficiency; increase use of renewable energy in water and wastewater systems; reduce emissions from livestock operations; reduce emissions from fertilizer use; protect and enhance the value of open and working lands; promote sustainable agriculture; increase carbon sequestration; and reduce emissions from consumption of goods and services.

The Plan focuses on near-term actions that will be implemented through 2020 in order to achieve a 25% reduction in countywide GHG emissions compared to 1990 levels. Development projects within the City of Petaluma are encouraged to comply with the intent of the Climate Action Plan and realize GHG reductions through voluntary application of reduction measures.

4.7.3.5 Local Plans and Policies

City of Petaluma General Plan 2025

The City of Petaluma's General Plan 2025 (2010) contains the following goals and policies relating GHG emissions.

Chapter 1 Land Use, Growth Management, and the Built Environment

Policy 1-P-29: It is the policy of the City to build within the agreed upon Urban Growth Boundary (UGB). No urban development shall be permitted beyond the UGB.

Policy 1-P-35: Growth shall be contained within the boundaries of the Urban Growth Boundary; the necessary infrastructure for growth will be provided within the Urban Growth Boundary.

Policy 1-P-49: Preserve existing tree resources and add to inventory and diversity of native/indigenous species.

Policy 1-P-50: Preserve and expand the inventory of trees on public property.

Chapter 2 Community Design, Character, and Green Building

Policy 2-P-56: Preserve and enhance the oak woodland setting and integrate development to protect and enhance these resources.

Policy 2-P-67: Create an open space network through residential areas by requiring integration of open space with public trails when properties are developed.

Policy 2-P-88: Provide enhanced pedestrian and bicycle network connections between the industrial, commercial, and residential clusters.

Policy 2-P-116: Street trees shall be preserved and their numbers increased as development/redevelopment/remodeling occurs.

Policy 2-P-122: Require development projects to prepare a Construction Phase Recycling Plan that would address the reuse and recycling of major waste materials (soil, vegetation, concrete, lumber, metal scraps, cardboard packaging, etc.) generated by any demolition activities and construction of the project.

Chapter 4 The Natural Environment

Policy 4-P-6: Improve air quality through required planting of trees along streets and within park and urban separators, and retaining tree and plant resources along the river and creek corridors.

- A. Require planting of trees for every significant tree removed at a project site. Replacement planting may occur on the project site or on a publicly owned area, with long-term maintenance assured.
- Encourage the use of trees which provide biogenic benefits to air quality and are suitable to the local environment.
 - Establish ratio and size of replacement trees as part of the development code update.

Policy 4-P-7: Reduce motor vehicle related air pollution.

- A. Enforce land use and transportation strategies described in Chapter 1: Land Use and Chapter 5: Mobility that promote use of alternatives to the automobile for transportation, including walking, bicycling, bus transit, and carpooling.

Policy 4-P-13: Require development of traffic roundabouts, where feasible, as an alternative to a traffic signal, to reduce idling vehicles.

Policy 4-P-15: Improve air quality by reducing emissions from stationary point sources of air pollution (e.g., equipment at commercial and industrial facilities) and stationary area sources (e.g., wood-burning fireplaces & gas powered lawnmowers) which cumulatively emit large quantities of emissions.

- A. Continue to work with the Bay Area Air Quality Management District to achieve emissions reductions for nonattainment pollutants; including carbon monoxide, ozone, and PM-10, by implementation of air pollution control measures as required by State and federal statutes. The BAAQMD's CEQA Guidelines should be used as the foundation for the City's review of air quality impacts under CEQA.

- B. Continue to use Petaluma’s development review process and the California Environmental Quality Act (CEQA) regulations to evaluate and mitigate the local and cumulative effects of new development on air quality.
- C. Continue to require development projects to abide by the standard construction dust abatement measures included in BAAQMD’s CEQA Guidelines. These measures would reduce exhaust and particulate emissions from construction and grading activities.
- D. Reduce emissions from residential and commercial uses by requiring the following:
 - Use of high efficiency heating and other appliances, such as cooking equipment, refrigerators, and furnaces, and low NOx water heaters in new and existing residential units;
 - Compliance with or exceed requirements of CCR Title 24 for new residential and commercial buildings;
 - Incorporation of passive solar building design and landscaping conducive to passive solar energy use for both residential and commercial uses, i.e., building orientation in a south to southeast direction, encourage planting of deciduous trees on west sides of structures, landscaping with drought resistant species, and use of groundcovers rather than pavement to reduce heat reflection;
 - Use of battery-powered, electric, or other similar equipment that does not impact local air quality for non-residential maintenance activities;
 - Provide natural gas hookups to fireplaces or require residential use of EPA-certified wood stoves, pellet stoves, or fireplace inserts.

Policy 4-P-16:

To reduce combustion emissions during construction and demolition phases, the contractor of future individual projects should include in construction contracts the following requirements or measures shown to be equally effective:

- Maintain construction equipment engines in good condition and in proper tune per manufacturer’s specification for the duration of construction;

- Minimize idling time of construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment;
- Use alternative fuel construction equipment (i.e., compressed natural gas, liquid petroleum gas, and unleaded gasoline);
- Use add-on control devices such as diesel oxidation catalysts or particulate filters;
- Use diesel equipment that meets the ARB's 2000 or newer certification standard for off-road heavy-duty diesel engines.

Policy 4-P-19: Encourage use and development of renewable or nontraditional sources of energy.

Policy 4-P-21: Reduce solid waste and increase reduction, reuse and/or recycling, in compliance with the Countywide Integrated Waste Management Plan (CoIWMP).

B. Require new or remodeled multifamily residential and all non-residential development to incorporate sufficient, attractive, and convenient interior and exterior storage areas for recyclables and green waste.

D. Develop a residential and commercial food waste composting program.

F. Continue to cooperate, require, and/or support the operation of resource recovery facilities by the City waste hauler and the disposal site operators.

Section 4.5 Greenhouse Gas Emissions

Policy 4-P-24: Comply with AB 32 and its governing regulations to the full extent of the City's jurisdictional authority.

Policy 4-P-25: To the full extent of the City's jurisdictional authority, implement any additional adopted State legislative or regulatory standards, policies and practices designed to reduce greenhouse gas emissions, as those measures are developed.

Chapter 5 Mobility

Policy 5-P-1: Develop an interconnected mobility system that allows travel on multiple routes by multiple modes.

Policy 5-P-15: Implement the bikeway system as outlined in the Bicycle and Pedestrian Plan, and expand and improve the bikeway system wherever the opportunity arises.

- Policy 5-P-18:** The City shall require Class II bike lanes on all new arterial and collector streets.
- Policy 5-P-19:** All new and redesigned streets shall be bicycle and pedestrian friendly in design.
- Policy 5-P-20:** Ensure that new development provides connections to and does not interfere with existing and proposed bicycle facilities.
- Policy 5-P-22:** Preserve and enhance pedestrian connectivity in existing neighborhoods and require a well-connected pedestrian network linking new and existing developments to adjacent land uses.
- Policy 5-P-23:** Require the provision of pedestrian site access for all new development.
- Policy 5-P-25:** Establish a network of multi-use trails to facilitate safe and direct off-street bicycle and pedestrian travel. At the minimum, Class I standards shall be applied unless otherwise specified.
- Policy 5-P-30:** Require all new development abutting any public trail to provide access to the trail.
- Policy 5-P-31:** Make bicycling and walking more desirable by providing or requiring development to provide necessary support facilities throughout the day.

Chapter 6 Recreation and Parks

- Policy 6-P-3:** Connect city parks with other public facilities, open spaces, employment centers, and residential neighborhoods by locating new recreational facilities in proximity to these uses and by fully integrating the parks system with the city's pedestrian, bicycle, and transit system.
- Policy 6-P-19:** Support efforts by the City's Tree Advisory Committee to disseminate current information to the public advocating the use of Best Management Practices for the care and perpetuation of the urban forest, including issues such as planting the right tree in the right place, strategic tree planting that considers site conditions as well as shading in selection and placement of trees, proper planting and pruning techniques, and the importance of using Integrated Pest Management practices in order to minimize the use of chemicals harmful to the environment.

Policy 6-P-20: Where trees, larger than 8” in diameter, must be removed to accommodate development, they shall be replaced at a ratio established in the Development Code. Replacement trees may be planted on, or in the vicinity of, the development site, subject to approval by the Community Development Department or through the discretionary approval process.

Chapter 7 Community Facilities, Services, and Education

Policy 7-P-15: Improve and expand safe pedestrian, bicycle, and transit access to all school sites and campuses.

Chapter 8 Water Resources

Policy 8-P-18: Reduce potable water demand through conservation measures.

City of Petaluma Greenhouse Gas Emission Reduction Action Plan

The City of Petaluma has prepared a draft Greenhouse Gas Emission Reduction Action Plan for its municipal government activities and sources per Resolution 2002-117. The purpose of the plan is to identify and prioritize programs, projects, and procedural policies that will help the City government achieve the municipal GHG emission goals of Resolution 2005-118 by more than 20 percent below 2000 levels by 2015. The plan does not apply to land development projects.

City of Petaluma GHG Resolutions

The City of Petaluma has taken steps to address GHG emissions within city limits. The City adopted Resolutions 2002-117, 2005-118, and 2018-009 (incorporated herein by reference), which calls for the City’s participation in the Cities for Climate Project effort and established GHG emission reduction targets.

On January 22, 2018, the City of Petaluma adopted Resolution No. 2018-009 N.C.S reaffirming the City’s intent to reduce greenhouse gas emissions as part of a coordinated effort through the Sonoma County Regional Climate Protection Authority. As presented in the Sonoma County Climate Action Plan, the City of Petaluma could achieve GHG reduction through a combination of state, regional and local measures. Reduction measures at the state level are promulgated through state laws and mandates addressing topics, including but not limited to vehicle fuel efficiency standard, green building standards, low carbon fuel standards and the Renewable Portfolio Standard. When realized locally in Petaluma, these measures will achieve a GHG reduction in the amount of 119,000 metric tons of carbon dioxide equivalence (MTCO_{2e}). Separate regional efforts implemented within Petaluma by entities such as the Regional Climate Protection Authority, Sonoma County Water Agency, County of Sonoma Energy Independence Office, Sonoma

County Transportation Authority, and Sonoma Clean Power will result in an additional GHG reduction of 28,200 MTCO_{2e}.

Under the City of Petaluma’s authority, the Sonoma County Climate Action Plan identifies 12 goals and 24 measures that would achieve an additional GHG reduction of 18,490 MTCO_{2e}. Taken altogether, the state, regional and local measures combined can achieve a GHG reduction of 166,350 MTCO_{2e} within Petaluma.

Under a business as usual approach (i.e., without state, regional or local GHG reduction measures), the City of Petaluma is projected to emit 542,970 MTCO_{2e} by 2020. With implementation of reduction measures, GHG emissions would be reduced to 376,620 MTCO_{2e}. This represents a 31% reduction of GHG emissions relative to the 1990 per capita emission levels.

The Sonoma County Regional Climate Action Plan is an advisory document to assist the City in achieving its stated intent to reduce GHG emissions. Development projects within the City of Petaluma are encouraged to comply with the intent of the Climate Action Plan and realize GHG reductions through voluntary application of reduction measures.

City of Petaluma Climate Emergency Resolution

On May 6, 2019, the City of Petaluma passed a Climate Emergency Resolution. In order to navigate the next steps following the declaration of the emergency, the city approved an ordinance to establish Petaluma’s Climate Action Commission in July 2019. The Commission has five main objectives in order to address climate change, these include: coordinate workshops with experts; address greenhouse gas emissions; suggest policies; encourage community involvement; and examine actions taken by other jurisdictions that could be pursued locally.

4.7.4 IMPACTS AND MITIGATION MEASURES

4.7.4.1 Significance Criteria

The impacts related to GHG emissions resulting from implementation of the proposed project would be considered significant if they would exceed the following significance criteria, in accordance with Appendix G of the *State CEQA Guidelines*:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

As noted by the BAAQMD in its guidelines, “GHG emissions contribute, on a cumulative basis, to the significant adverse environmental impacts of global climate change.” “No single land use project could generate enough GHG emissions to noticeably change the global average temperature” (BAAQMD 2017).

The *State CEQA Guidelines* include Section 15064.4, which states that, when making a determination with respect to the significance of a project’s GHG emissions, a lead agency shall have discretion to determine whether to: (1) Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use; and/or (2) Rely on a qualitative analysis or performance-based standards.

Section 15064.4 also states that a lead agency should consider the following factors when assessing the significance of the impact of GHG emissions on the environment: (1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting; (2) Whether the 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 regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions.

A project’s impact relative to the first Appendix G criterion of the *CEQA Guidelines* may be evaluated by performing a direct calculation of the GHG emissions resulting from the proposed project and comparing the emissions with the BAAQMD CEQA thresholds of significance for GHG emissions. The BAAQMD thresholds were developed specifically for the Bay Area after considering the latest Bay Area GHG inventory and the effects of AB 32 scoping plan measures that would reduce regional emissions. In developing the thresholds, the BAAQMD intends to achieve GHG reductions from new land use developments to close the gap between projected regional emissions with AB 32 scoping plan measures and the AB 32 targets.

BAAQMD’s GHG thresholds include a bright-line threshold of 1,100 metric tons of CO₂e per year (MTCO₂e/year). Projects that have operational emissions below 1,100 metric tons of CO₂e per year are considered to have less than significant GHG emissions. For projects that result in operational emissions that exceed the bright-line threshold, the BAAQMD has put forth a GHG efficiency threshold of 4.6 metric tons CO₂e/service person/year (where service persons are residents and employees). Land development

projects that have operational emissions below 4.6 metric tons of CO₂e/service person/year are considered to have less than significant GHG emissions.⁹

There are no thresholds put forth by the BAAQMD for evaluating the significance of a project's construction-phase GHG emissions, though the BAAQMD recommends that emissions be quantified, reported, and evaluated if a proposed project does not meet the BAAQMD screening criteria.

A project's impact relative to the second Appendix G criterion may be evaluated by demonstrating compliance with plans, policies, or regulations adopted by local governments to curb GHG emissions. According to the Natural Resources Agency:

Provided that such plans contain specific requirements with respect to resources that are within the agency's jurisdiction to avoid or substantially lessen the agency's contributions to GHG emissions, both from its own projects and from private projects it has approved or will approve, such plans may be appropriately relied on in a cumulative impacts analysis (Natural Resources Agency 2009).

As noted above, the City of Petaluma has prepared a draft Greenhouse Gas Emission Reduction Action Plan for its municipal government activities and sources. However, that plan is not applicable to land development projects, such as the proposed project. However, the City's General Plan contains policies that are specifically focused on reducing GHG emissions and other policies that are focused on other actions that would indirectly reduce GHG emissions. Therefore, the project's potential to conflict with applicable General Plan policies is evaluated below, as well as its potential to conflict with state law.

4.7.4.2 Methodology

GHG emissions of the proposed project were evaluated based on the BAAQMD 2017 CEQA Guidelines. Chapter 3 of the BAAQMD 2017 CEQA Guidelines provide screening criteria developed for greenhouse gases. The screening criteria provided in these guidelines are used to determine whether or not the proposed project would generate greenhouse gas emissions that would have a significant impact on the environment. If a project is below the applicable screening criteria stated in Table 3-1 of the BAAQMD 2017 CEQA Guidelines, it is not anticipated to exceed the 1,100 MTCO₂e/year GHG threshold of significance.

The GHG analysis presented below was also based on an evaluation of GHG emissions using the most recent version of the California Emissions Estimator Model (CalEEMod) Version 2016.3.2, released in

⁹ The BAAQMD guidelines also contain a threshold of 10,000 MTCO₂e that may be used to evaluate the impacts associated with a stationary source of GHG emissions. However, the proposed project does not include any stationary sources and this threshold is not applicable. The guidelines also provide for the evaluation of a project's GHG impact based on the project's compliance with a qualified GHG reduction strategy. However, the City of Petaluma does not have a qualified GHG reduction strategy at this time.

November 2017, with similar project input to those used in quantifying pollutants emissions in **Section 4.3, Air Quality**, of this document. In order to account for the most conservative condition, the model input used estimated weekday trips of the residential component (322 trips per day) and estimated weekend trips for the park extension component (62 trips per day), as quantified in the traffic analysis **Section 4.13, Transportation**.

The 2020 BAAQMD bright-line threshold of 1,100 MT CO_{2e}/year were developed considering the Bay Area GHG inventory and the effects of AB 32 scoping plan measures that would reduce regional emissions. By using these thresholds, the BAAQMD intended to achieve GHG reductions from new land use developments to close the gap between projected regional emissions and the AB 32 targets. However, the thresholds were designed for compliance with AB 32 which has a target date of 2020. BAAQMD has suggested that for projects that would become operational after 2020, lead agencies should consider developing additional thresholds to evaluate a project's GHG impact.

Based on the current schedule, the proposed project is anticipated to be fully constructed and occupied by 2022. The project's operational emissions would essentially occur in the years after 2020, therefore in order to evaluate the project's impact, a new bright-line threshold that is consistent with the direction provided by SB 32 was calculated and used. CEQA gives lead agencies the discretion to establish significance thresholds for their respective jurisdictions. In establishing those thresholds, a lead agency may appropriately look to thresholds developed by other public agencies, or suggested by other experts, as long as any threshold chosen is supported by substantial evidence (See CEQA Guidelines Section 15064.7(c)).¹⁰ In this case, the Bay Area's AB 32 target has been adopted by the lead agency as a threshold for the proposed project. In addition, development of the 2030 GHG threshold for the proposed project have taken into account GHG emissions target at 40 percent below 1990 levels, as defined in Executive Order (EO) B-30-15.

Calculation of 2030 Bright-Line Threshold

Consistent with BAAQMD's methodology to determine the 2020 bright-line threshold as detailed in the BAAQMD's *CEQA Air Quality Guidelines*, the first step in calculating a 2030 bright-line threshold is determining the 2030 Business as Usual (BAU) emissions and the 2030 emissions target to determine the statewide reduction in emissions required. According to CARB's 2017 Scoping Plan, the 2030 BAU emissions are estimated to be 392 million metric tons of CO_{2e}/year (MMT CO_{2e}/year) and the 2030 reduction target goal is 260 MMT CO_{2e}/year. Therefore, the state will be required to reduce BAU emissions by 33.67 percent in order to meet 2030 reduction goals. CARB's 2017 Scoping Plan is estimated to reduce GHG

¹⁰ See *CEQA Guidelines* Section 15384 "Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts."

emissions 20 to 30 percent.¹¹ Assuming CARB would meet a 30 percent reduction from the Scoping Plan, the BAAQMD would be required to reduce emissions equivalent to the remaining 3.67 percent to reach the 33.67 percent target reduction. As shown in **Table 4.7-4**, BAAQMD is responsible for 20 percent of the total statewide GHG emissions. Therefore, BAAQMD emissions under the 2030 BAU conditions would be 78.4 MMT CO₂e/year. To reduce the 2030 BAU emissions by 3.67 percent, BAAQMD would have to reduce its emissions by 2.87 MMT CO₂e/year. Considering that 400 projects are constructed within the Bay Area district each year, a total of 4,000 projects would be constructed between 2020 and 2030. Therefore, to reduce emissions by 2.87 MMT CO₂e/year each of these projects would need to not exceed the 2030 bright-line threshold of approximately 717 MT CO₂e/year (0.000717 MMT CO₂e/year).

Table 4.7-4
Calculated 2030 Bright-line GHG Target

Estimated 2030 BAAQMD Data	Year 2030 (MMT CO ₂ e/year)
Estimated 2030 BAU Emission (MM CO ₂ e)	392
BAAQMD Percentage of Total CA Emissions	20%
BAAQMD BAU 2030 Emissions	78.4
Reduction Needed to Meet State Goals	3.67%
TOTAL BAAQMD Reduction Needed (MMT CO ₂ e)	2.87
Years of Implementation	10
Projects Constructed per Year	400
2030 Threshold	0.000717

Source: CARB. 2017 Scoping Plan. Available online at: https://ww3.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf, accessed October 8, 2019.

BAAQMD. CEQA Air Quality Guidelines. Available online at: http://www.baaqmd.gov/~media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en, accessed October 8, 2019.

In order to determine project significance, the project's annual GHG emissions were compared to BAAQMD's 2020 bright-line threshold of 1,100 MT CO₂e/year and the calculated 2030 bright-line of 717 MT CO₂e/year.

4.7.4.3 Project Impacts and Mitigation Measures

Impact GHG-1: **The proposed project would not generate greenhouse gas emissions, either directly or indirectly, that would have a significant impact on the environment. (Less than Significant)**

¹¹ According to CARB, Cap and Trade Program will make up the remainder of the 40% reduction required by SB 32.

Construction Phase Emissions

During construction, the proposed project would directly contribute to climate change through its contribution of GHGs from the exhaust of construction equipment and construction workers' vehicles. The BAAQMD recommends that GHG emissions from the construction of a proposed project be estimated, reported and evaluated. However, BAAQMD does not provide any guidance on what level of construction-phase GHG emissions would be considered substantial enough to result in a significant impact. Construction emissions were assumed to occur from 2020 to 2022, including the construction of the Davidon (28-Lot) Residential Project Component and Putnam Park Extension Project Component.

Davidon (28-Lot) Residential Project Component

The overall construction duration of the Davidon (28-Lot) Residential Project component would last approximately 30 months. Site clearing, grading, and trenching for the Davidon (28-Lot) Residential Project component is anticipated to last for nine months and the construction for the remaining phases of the Davidon (28-Lot) Residential Project component is anticipated to last an additional 21 months. As described in **Section 3.0, Project Description**, grading activity would require 112,000 cubic yards of cut and 112,000 cubic yards of fill. All soil is anticipated to be balanced on site. In order to model emissions, the CalEEMod defaults were used for each phase of construction, with the exception of the trenching phase for which CalEEMod does not have default equipment. For this phase, the analysis relied on the equipment modeled in the air quality analysis of the 2013 EIR prepared for a substantially larger residential development at the project site, see modeling output files in Appendix 4.2. This provides a conservative analysis as the most recent iteration of the proposed project is less than half the size of the development at the project site, analyzed in the 2013 EIR.

Putnam Park Extension Project Component

The Putnam Park Extension Project component is anticipated to be constructed in three phases, as described in **Section 3.0, Project Description**. Construction of Phase 1 would last approximately three to four months overlapping with the last months of construction of the Davidon (28-Lot) Residential Project component. Phase 2 and Phase 3 construction is anticipated to last six to nine months and three to four months, respectively.

Table 4.7-5, Construction Greenhouse Gas Emissions, presents the total project's GHG emissions during construction that includes the construction of the Davidon (28-Lot) Residential Project component and the Putnam Park Extension Project component.

Construction of the proposed project is estimated to generate a total of 1,194 MT CO_{2e}. Amortized over a 30-year period, representing the lifetime of the project, the project is anticipated to emit approximately 39.8 MT CO_{2e}/year.

**Table 4.7-5
Construction Greenhouse Gas Emissions**

Source	Emissions (MT CO _{2e})
Davidon (28-Lot) Residential Project Component	947
Putnam Park Extension Project Component Phase 1	82
Putnam Park Extension Project Component Phase 2 and 3	165
Total	1,194
<i>Amortized (30-year period)¹</i>	39.8

Source: Impact Sciences, 2019. See Appendix 4.2.

Note: The BAAQMD does not have a threshold for construction GHG emissions, in order to determine significance, emissions were amortized over a 30-year construction period and added to operational emissions, consistent with projects across the BAAQMD.

Operational Emissions

Operational emissions associated with the proposed project are generated from sources such as area sources, energy usage, mobile sources, waste, and water.

Area source emissions are based on the land use sizes, GHG emission factors for fuel combustion, and the global warming potential (GWP) values for the GHG emitted. Energy usage emissions are based on the land uses, default demand factors for the land use, GHG emission factors for the utility provider, and the GWP values of the GHG emitted. Mobile-source GHG emissions are determined based on the project's estimated annual VMT, which is calculated in CalEEMod based on the daily trip generation rates provided in the project's traffic report. Waste and water emissions are derived from the anticipated water usage and wastewater generated based on the project's proposed land uses and the associated water demand factors.

To analyze operational emissions with respect to BAAQMD thresholds, GHG emissions during project operation were estimated with CalEEMod. The model analysis assumed a total of 322 vehicle trips per day (during weekdays) generated by the Davidon (28-Lot) Residential Project component as quantified in the traffic analysis (see **Section 4.13, Transportation**). Additionally, the analysis assumed a total of 62 trips per day generated by the Putnam Park Extension Project component on the weekends (Saturday and Sunday) based on the Institute of Transportation Engineers 10th edition. Default trip rates were used for the weekday park and weekend residential trips (**Section 4.13, Transportation**). As shown in **Table 4.7-6, Operational**

Greenhouse Gas Emissions, the project's annual GHG emissions at full project build out of the Davidon (28-Lot) Residential Project component as well as the Putnam Park Extension Project component are estimated to be approximately 592 MT CO₂e/year.

**Table 4.7-6
Operational Greenhouse Gas Emissions**

Source	Emissions (MT CO ₂ e/year)	
Construction (Amortized)	39.8	
Davidon (28-Lot) Residential Project Component	431	
Putnam Park Extension Project Component Phase 1	41	
Putnam Park Extension Project Component Phase 2 and 3	80	
Total Operational Emissions	592	
BAAQMD 2020 Bright-line Threshold	1,100	
<i>Exceed Thresholds?</i>		<i>No</i>
Estimated BAAQMD 2030 Bright-line Threshold	717	
<i>Exceed Thresholds?</i>		<i>No</i>

Source: Impact Sciences, 2019. See Appendix 4.2.

The project's total annual operational GHG emissions would be significantly lower than the BAAQMD's 2020 bright-line threshold of 1,100 MT CO₂e/year and the estimated BAAQMD 2030 bright-line threshold of 717 MT CO₂e/year.

This is a conservative estimate because it uses model defaults to estimate the GHG emissions from electricity use in the proposed homes; it does not take into account the increased energy efficiency that new homes have to comply with under state law; and it does not account for the planting of 156 oak trees as part of the proposed project and the removal of approximately 30 trees. Furthermore, it does not take into account the green features included in the proposed project. As stated in **Section 3.0, Project Description**, the proposed project would adhere to the new energy efficiency requirements of Title 24. The following design features would be incorporated into the project to minimize energy use:

- Dual-glazed energy efficient windows and doors with a U-factor and solar heat gain coefficient
- South facing balconies, which reduce solar heat gain
- Energy-efficient street lights throughout the project site
- Energy efficient lighting comprised of compact fluorescent lamps installed in public areas and homes

- Light-colored roof materials that reflect heat (cool roofs)
- Exterior walls with R-19 minimum insulation, which exceeds the R-15/4 Title 24 requirements

Green building practices would be incorporated into the building design phase and would follow the applicable City and state codes, ordinances, and guidelines. The project proposes to incorporate water conservation devices and measures pursuant to applicable standards contained in Petaluma Municipal Code, Chapter 15.17 including the following:

- High efficiency toilets (1.28 gallons per flush or less, includes dual flush)
- High efficiency urinals (0.5 gallons per flush or less, includes waterless)
- Faucet hardware in restrooms with a faucet flow rate of 1.5 gallons per minute or less
- Showerheads with a flow rate of 2.0 gallons per minute or less
- Limit showers to one showerhead per shower stall
- High efficiency clothes washers (water factor of 6.0 or less)
- High efficiency dishwashers (Energy Star rated)
- Domestic water heating systems located in close proximity to point(s) of use, as feasible; use of tank-less and on-demand water heaters as feasible
- Irrigation systems that meet the following requirements:
 - Weather-based irrigation controller with rain shutoff
 - Flow sensor and master valve shutoff (large landscapes)
 - Matched precipitation (flow) rates for sprinkler heads
 - Drip/microspray/subsurface irrigation where appropriate
 - Minimum irrigation system distribution uniformity of 75 percent
 - Proper hydro-zoning, turf minimization and use of native/drought tolerant plant materials
 - Use of landscaping contouring to minimize precipitation runoff

Additionally, 240-volt outlets would be installed in all residential garages and 4 electrical vehicle (EV) charging stalls would be installed in the proposed parking lots. Residences would be equipped with solar panels consistent with the 2019 California building codes. Implementation of these measures would further reduce the operational emissions below the estimate reported in **Table 4.7-6** above. Even without inclusion

of energy efficient elements of the project, operational GHG emission would fall below the bright-line threshold of 1,100 MTCO₂e/year and below the projected 2030 threshold of 717 MTCO₂e/year.

To further examine impacts during operation, the project's components were compared to the BAAQMD's screening criteria for operational GHG emissions. Like construction and operational criteria air pollutant emissions, the BAAQMD has developed screening criteria for the emissions of GHG during project operation. The BAAQMD operational GHG screening criteria for single-family houses and park use is 56 dwelling units and 600 acres, respectively. These thresholds are significantly higher than the 28 single-family homes and 44 acres of park use proposed by the project. As a result, it is expected that the project would not result in significant emissions of GHG.

Therefore, the GHG impact related to the project's operational emissions would be less than significant.

Mitigation Measures: No mitigation measures are required.

Impact GHG-2: Operation of the proposed project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing greenhouse gas emissions. (*Less than Significant*)

The proposed project would result in a significant impact related to GHG emissions if the project conflicted with an applicable plan, policy, or regulation concerning GHG reductions. As noted above, there are no local plans adopted by the City of Petaluma for the purpose of reducing GHG emissions from land development projects, and the City's Climate Action Plan applies only to municipal operations. However, the City's General Plan contains policies to curb GHG emissions and the project was reviewed relative to these General Plan policies for potential conflict. As **Table 4.8-2, City of Petaluma 2025 General Plan Policy Consistency Analysis**, from **Section 4.8, Land Use** shows, the project would not conflict with applicable General Plan policies. In addition, the project was reviewed relative to state regulations for compliance. AB 32 is the basis for reduction of GHG emissions in California. Local agencies such as the BAAQMD base their planning and regulations on the requirements included in AB 32, which include a reduction of GHG emissions to 1990 rates by 2020. The BAAQMD adopted the GHG significance thresholds specifically to meet AB 32 requirements within its jurisdiction, and so plans and projects that meet those thresholds can be assumed to meet the requirements of AB 32. As the analysis under **Impact GHG-1** shows, the project's operational emissions would be well below the BAAQMD bright-line threshold for project-level GHG emissions. Therefore, the project would not conflict with AB 32. Although more recent state laws require that state-wide emissions be reduced further, CARB and the BAAQMD have not come forth with regulations and programs to address the new state laws, and any evaluation of the project's consistency

with future regulations and programs would involve speculation. However, in an effort to demonstrate consistency with the reduction requirements set forth in SB 32, **Impact GHG-1** includes an estimated 2030 bright-line threshold for the BAAQMD region (717 MTCO_{2e}). The proposed project would generate an estimated 592 MTCO_{2e} annually (**Table 4.7-6**), which is below the estimated 2030 threshold for the region. Therefore, impacts would be less than significant.

In summary, the total operational emissions associated with the proposed project are anticipated to be well below the threshold put forth by the BAAQMD due to the fact the proposed project is much smaller than the BAAQMD GHG screening criteria, and as stated in **Impact GHG-1** above, the project includes energy and water efficiency features that would further reduce GHG emissions. Furthermore, carbon sequestration provided by the planting of 156 oak trees as replacement for the removal of approximately 30 trees replacement trees would also reduce the project's operational emissions. Therefore, the proposed project would not conflict with plans, policies, or regulations for reducing GHG emissions, and the impact would be less than significant.

Mitigation Measures: No mitigation measures are required.

4.7.4.4 Regional Park Trail Impacts and Mitigation Measures

Environmental Setting

The alignment of the proposed regional park trail is undeveloped land and there are no sources of GHG emissions on the proposed regional park trail site.

Impacts and Mitigation Measures

RPT Impact GHG-1: **The proposed regional park trail project would not generate greenhouse gas emissions, either directly or indirectly, that would have a significant impact on the environment, nor would the proposed regional park trail conflict with any applicable plans or policies for reducing greenhouse gas emissions. (*Less than Significant*)**

GHG Emissions

As discussed in **Section 3.0, Project Description**, the proposed regional park trail would be approximately 0.5 mile long and 4 feet wide, which is the standard width for trails. Regional park trail construction would disturb approximately 0.25 acre of land and would require the removal of overhanging vegetation and

branches as well as low lying saplings, weeds, and brush along the trail length. Mature trees would not be removed as part of trail construction. Some grading may be required to create a shelf for the trail depending on the hillside slope and to achieve trail slopes that are usable. Trail dozers may be used for initial grading and excavation. All cut and fill material would be balanced on-site and no additional haul trips would be required. Small construction equipment such as power wheel barrows and bob cats would haul spoils from the regional park trail construction site. The final regional park trail construction would be done by hand. The regional park trail would be composed of compacted earth with gravel used only where needed to provide stability. Exposed soil in the construction area would be seeded. Given the scale and nature of the construction activities, and the small number of construction equipment and vehicles that would be used, regional park trail construction would result in minimal GHG emissions, which would not be substantial enough to result in a significant GHG impact.

A small increase in vehicle trips to Helen Putnam Regional Park may occur due to operation of the proposed regional park trail, but this increase would be negligible (note that the GHG emissions from the vehicle trips to the trailhead parking lots off of D Street on the Scott Ranch project site are accounted for in the emissions estimate above for the Scott Ranch project). There would be no other source of operational GHG emissions associated with the regional park trail project, and the impact would be less than significant.

Conflict with Plans and Regulations

Construction and operation of the regional park trail would not generate substantial GHG emissions and thus, the proposed regional park trail project would not conflict with AB 32, SB 32, or other state laws and regulations related to GHG emissions. The impact would be less than significant.

Mitigation Measures: No mitigation measures are required.

4.7.4.5 Cumulative Impacts and Mitigation Measures

Cumulative Impact GHG-1: **The proposed project and the regional park trail project would not result in a significant cumulative greenhouse gas impact. (*Less than Significant*)**

The accumulation of GHGs in the atmosphere results in global climate change. As a result, climate change impacts are cumulative in nature and no typical single project would result in emission of such a magnitude that it, in and of itself would be significant. The analysis presented in **Impact GHG-1** above provides an

adequate analysis of the proposed project's and regional park trail cumulative impact related to GHG emissions. Based on the analysis above, the proposed project would result in a less than significant cumulative impact.

Mitigation Measures: No mitigation measures are required.

4.7.5 REFERENCES

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