5.5 GREENHOUSE GAS EMISSIONS

INTRODUCTION

This section discusses the existing global, national, and statewide conditions related to greenhouse gases (GHG) and global climate change and evaluates the potential impacts on global climate from development of the proposed project. The proposed project is located in the Contra Costa County, California, on the west side of Kirker Pass Road, immediately south of the existing Pittsburg City limits. The proposed project generally consists of a request for rezoning of the main project site from HPD (Hillside Planned Development) to RS-6 (Single-Family Residential, with 6,000-square-foot minimum lot sizes) and approval of the preliminary grading plan for 356 single-family lots and homes. Construction is anticipated to begin in April 2015, and continue to be built on phases, through March 2018. Assuming an aggressive construction schedule, the proposed project would be fully operational by 2018.

This section provides discussion of the applicable federal, state, regional, and local agencies that regulate, monitor, and control GHG emissions. Copies of the calculations made to estimate GHG emissions associated with the proposed project, and supporting technical data, are found in **Appendix 5.5** of this EIR.

ENVIRONMENTAL SETTING

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 2008a). 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/or
- human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, desertification).

The primary effect of global climate change has been a rise in the average global tropospheric temperature of 0.2 degree Celsius (°C) per decade, determined from meteorological measurements worldwide between 1990 and 2005. Climate change modeling using 2000 emission rates shows that further warming is likely to occur, which would induce further changes in the global climate system

during the current century (IPCC 2007). Changes to the global climate system and ecosystems, and to California, could include:

- declining 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 2007);
- rising average global sea levels primarily due to thermal expansion and the melting of glaciers, ice caps, and the Greenland and Antarctic ice sheets (model-based projections of global average sea level rise at the end of the 21st century (2090–2099) range from 0.18 meter to 0.59 meter or 0.59 foot to 1.94 feet) (IPCC 2007);
- 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 (IPCC 2007);
- declining Sierra snowpack levels, which account for approximately half of the surface water storage in California, by 70 percent to as much as 90 percent over the next 100 years (Cal EPA 2006);
- increasing the 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 the 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);
- increasing pest infestation, making California more susceptible to forest fires (Cal EPA 2006);
- increasing the demand for electricity by 1 to 3 percent by 2020 due to rising temperatures resulting in hundreds of millions of dollars in extra expenditures (Cal EPA 2006); and
- summer warming projections in the first 30 years of the 21st century ranging from about 0.5 to 2 °C (0.9 to 3.6 °F) and by the last 30 years of the 21st century, from about 1.5 to 5.8 °C (2.7 to 10.5 °F) (Cal EPA 2006).

The natural process through which heat is retained in the troposphere[1] is called the "greenhouse effect." The greenhouse effect traps heat in the troposphere through a threefold process as follows: (1) short-wave radiation in the form of visible light emitted by the Sun is absorbed by the Earth as heat; (2) long-wave radiation re-emitted by the Earth; and (3) GHGs in the upper atmosphere absorbing or trapping the long-wave radiation and re-emitting it back towards the Earth and into space. This third process is the focus of current climate change actions.

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

While water vapor and carbon dioxide (CO_2) 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 CO_2 as the reference gas, which has a GWP of 1 over 100 years (IPCC 1996).[2] For example, a gas with a GWP of 10 is 10 times more potent than CO_2 over 100 years. The use of GWP allows GHG emissions to be reported using CO_2 as a baseline. The sum of each GHG multiplied by its associated GWP is referred to as "carbon dioxide equivalents" (CO_2e). 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 CO_2.

Greenhouse Gases

State law defines GHGs to include the following six compounds:

- **Carbon Dioxide (CO_2)**. 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 (CH_4)**. 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, 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 (N_2O)**. 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

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

lifetime (up to 50,000 years) (Energy Information Administration 2007). The GWPs of PFCs range from 5,700 to 11,900.

- **Sulfur Hexafluoride (SF_6)**. 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 CO_2) (US EPA n.d.[b]).

Contributions to Greenhouse Gas Emissions

Global

Worldwide anthropogenic (man-made) 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 nations are available through 2007. Man-made GHG emissions for Non-Annex I nations are available through 2005. The sum of these emissions totaled approximately 42,133 million metric tons of CO_2 equivalents ($MMTCO_2e$).[3] It should be noted that global emissions inventory data are not all from the same year and may vary depending on the source of the emissions inventory data.[4] The top five countries and the European Union accounted for approximately 55 percent of the total global GHG emissions according to the most recently available data (See **Table 5.5-1, 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 5.5-1**; however, the data is representative of currently available global inventory data.

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3 The CO_2 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) x (GWP of the GHG). For example, the GWP for methane is 21. This means that the emission of one million metric tons of methane is equivalent to the emission of 21 million metric tons of CO_2.

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). For countries without 2005 data, the UNFCCC data for the most recent year were used. United Nations Framework Convention on Climate Change, "Annex I Parties – GHG total without LULUCF," http://unfccc.int/ghg_emissions_data/ghg_data_from_unfccc/time_series_annex_i/ items/3841.php and "Flexible GHG Data Queries" with selections for total GHG emissions excluding LULUCF/LUCF, all years, and non-Annex I countries, http://unfccc.int/di/FlexibleQueries/Event.do?event= showProjection. n.d.

Table 5.5-1
Top Five GHG Producer Countries and the European Union (Annual)

Emitting Countries	GHG Emissions ($MMTCO_2e$)
China	7,250
United States	7,217
European Union (EU), 27 Member States	5,402
Russian Federation	2,202
India	1,863
Japan	1,412
Total	**25,346**

Source: World Resources Institute, "Climate Analysis Indicators Tool (CAIT)," http://cait.wri.org/. 2010. Excludes emissions and removals from land use, land-use change, and forestry (LULUCF).
Note: Emissions for Annex I nations are based on 2007 data. Emissions for Non-Annex I nations (e.g., China, India) are based on 2005 data).

United States

As noted in **Table 5.5-1**, the United States was the number two producer of global GHG emissions. The primary GHG emitted by human activities in the United States was CO_2, representing approximately 84 percent of the total US GHG emissions (US EPA 2008a). Carbon dioxide from fossil fuel combustion, the largest source of GHG emissions, accounted for approximately 80 percent of US GHG emissions (US EPA 2008a).

State of California

The California Air Resources Board (CARB) compiles GHG inventories for the State of California. Based on the 2008 GHG inventory data (i.e., the latest year for which data is available), California emitted 474 $MMTCO_2e$ including emissions resulting from imported electrical power in 2008 (CARB 2010). 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 is number one) with emissions of 417 $MMTCO_2e$ excluding emissions related to imported power (CARB 2010).

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 5.5-2, GHG Emissions in California**, provides a summary of GHG emissions reported in California in 1990 and 2008 separated by categories defined by the United Nations Intergovernmental Panel on Climate Change (IPCC).

Table 5.5-2
GHG Emissions in California

Source Category	1990 ($MMTCO_2e$)	Percent of Total	2008 ($MMTCO_2e$)	Percent of Total
ENERGY	**386.41**	**89.2%**	**413.80**	**86.6%**
Energy Industries	157.33	36.3%	171.23	35.8%
Manufacturing Industries & Construction	24.24	5.6%	16.67	3.5%
Transport	150.02	34.6%	173.94	36.4%
Other (Residential/Commercial/Institutional)	48.19	11.1%	46.59	9.8%
Non-Specified	1.38	0.3%	0.00	0.0%
Fugitive Emissions from Oil & Natural Gas	2.94	0.7%	3.28	0.7%
Fugitive Emissions from Other Energy Production	2.31	0.5%	2.09	0.4%
INDUSTRIAL PROCESSES & PRODUCT USE	**18.34**	**4.2%**	**30.11**	**6.3%**
Mineral Industry	4.85	1.1%	5.35	1.1%
Chemical Industry	2.34	0.5%	0.06	0.0%
Non-Energy Products from Fuels & Solvent Use	2.29	0.5%	1.97	0.4%
Electronics Industry	0.59	0.1%	0.80	0.2%
Substitutes for Ozone Depleting Substances	0.04	0.0%	13.89	2.9%
Other Product Manufacture and Use	3.18	0.7%	1.66	0.3%
Other	5.05	1.2%	6.39	1.3%
AGRICULTURE, FORESTRY, & OTHER LAND USE	**19.11**	**4.3%**	**24.32**	**5.1%**
Livestock	11.67	2.7%	16.28	3.4%
Land	0.19	0.0%	0.19	0.0%
Aggregate Sources & Non-CO_2 Sources on Land	7.26	1.7%	7.95	1.7%
WASTE	**9.42**	**2.2%**	**9.41**	**2.0%**
Solid Waste Disposal	6.26	1.4%	6.71	1.4%
Wastewater Treatment & Discharge	3.17	0.7%	2.70	0.6%
EMISSIONS SUMMARY				
Gross California Emissions	433.29		477.74	
Sinks from Forests and Rangelands	-6.69		-3.98	
Net California Emissions	426.60		473.76	

Sources:
[1] *California Air Resources Board, "California Greenhouse Gas 1990-2004 Inventory by IPCC Category - Summary," http://www.arb.ca.gov/cc/inventory/archive/archive.htm. 2010.*
[2] *California Air Resources Board, "California Greenhouse Gas 2000-2008 Inventory by IPCC Category - Summary," http://www.arb.ca.gov/cc/inventory/data/data.htm. 2010.*

Between 1990 and 2008, the population of California grew by approximately 7.3 million (from 29.8 to 37.9 million) (US Census 2009). This represents an increase of approximately 27.2 percent from 1990 population levels. In addition, the California economy, measured as gross State product, grew from $788 billion in 1990 to $1.8 trillion in 2008 representing an increase of approximately 128 percent (over twice the 1990 gross State product) (CA Department of Finance 2009). Despite the population and

economic growth, California's net GHG emissions only grew by approximately 11 percent. The California Energy Commission (CEC) attributes the slow rate of growth in GHG emissions to the success of California's renewable energy programs and its commitment to clean air and clean energy (CEC 2006a).

Global Ambient CO_2 Concentrations

Air trapped by ice has been extracted from core samples taken from polar ice sheets to determine the global atmospheric variation of carbon dioxide, methane, and nitrous oxide from before the start of industrialization, around 1750, to over 650,000 years ago. For that period, it was found that carbon dioxide concentrations ranged from 180 ppm to 300 ppm. For the period from around 1750 to the present, global carbon dioxide concentrations increased from a pre-industrialization period concentration of 280 ppm to 379 ppm in 2005, with the 2005 value far exceeding the upper end of the pre-industrial period range (California Energy Commission 2006a). Global methane and nitrous oxide concentrations show similar increases for the same period (see **Table 5.5-3, Comparison of Global Pre-Industrial and Current GHG Concentrations**).

Table 5.5-3
Comparison of Global Pre-Industrial and Current GHG Concentrations

Greenhouse Gas	Early Industrial Period Concentrations (ppm)	Natural Range for Last 650,000 Years (ppm)	2005 Concentrations (ppm)
Carbon Dioxide (CO_2)	280	180 to 300	379
Methane (CH_4)	715	320 to 790	1774
Nitrous Oxide (N_2O)	270	NA	319

Source: Intergovernmental Panel on Climate Change, Climate Change 2007: The Physical Science Basis, Summary for Policymakers, (2007).

REGULATORY FRAMEWORK

Intergovernmental Panel on Climate Change

The World Meteorological Organization (WMO) and United Nations Environmental Program (UNEP) established the Intergovernmental Panel on Climate Change (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., Fourth Assessment Report, consisting of three working group reports and a synthesis report based on the first three reports) was published in 2007.[5] In its 2007 report, the IPCC stated that global temperature increases since the mid-20th century were "very likely" attributable to man-made activities (greater than 90 percent certainty) (IPCC 2007).

Federal

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 pollution that is reasonably anticipated to endanger public health or welfare. Upon the final decision, the President 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.

In December 2007, the President signed the Energy Independence and Security Act of 2007, which 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 reviews 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.

On September 15, 2009, the US EPA and the Department of Transportation's (DOT) National Highway Traffic Safety Administration (NHTSA) issued a joint proposal 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

5 The IPCC's Fourth Assessment Report is available online at http://www.ipcc.ch/.

light-duty trucks would have to meet an average standard of 295 grams of CO_2 per mile and 30.1 miles per gallon. By 2016, the vehicles would have to meet an average standard of 250 grams of CO_2 per mile and 35.5 miles per gallon.[6] 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.

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 April 1, 2010, the US EPA and NHTSA issued final rules requiring that by the 2016 model-year, manufacturers must achieve a combined average vehicle emission level of 250 grams of CO_2 per mile, which is equivalent to 35.5 miles per gallon as measured by US EPA standards. These agencies are currently in the process of developing similar regulations for the 2017–2025 model years.

State

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 would result in fewer GHG emissions from residential and nonresidential buildings subject to the standard. The standards are updated periodically to allow for the consideration and inclusion of new energy efficiency technologies and methods. The latest revisions were adopted in 2008 and became effective on January 1, 2010.

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6 The CO_2 emission standards and fuel economy standards stated are based on US EPA formulas.

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 2009). 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 CBSC has released a *2010 Draft California Green Building Standards Code* on its website (California Building Standards Commission 2010). The update to Part 11 of the Title 24 Building Standards Code became effective on January 1, 2011. Unless otherwise noted in the regulation, all newly constructed buildings in California are subject of the requirements of the CALGreen Code.

Assembly Bill 1493

In response to the transportation sector's contribution of more than half of California's CO_2 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 2009–2016 model years. When fully phased in, the near term (2009–2012) standards will result in a reduction of about 22 percent in GHG emissions compared to the emissions from the 2002 fleet, while the midterm (2013–2016) standards 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 CO_2 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.

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.

Assembly Bill 32

In furtherance of the goals established in Executive Order S-3-05, the legislature enacted Assembly Bill 32 (AB 32, Nuñez and Pavley), the California Global Warming Solutions Act of 2006, which Governor Schwarzenegger signed on September 27, 2006. AB 32 represents the first enforceable statewide program to limit GHG emissions from all major industries with penalties for noncompliance. AB 32 requires the state to undertake several actions. The major requirements are discussed below.

CARB Early Action Measures

CARB is responsible for carrying out and developing the programs and requirements necessary to achieve the goal of AB 32—the reduction of California's GHG emissions to 1990 levels by 2020. The first action under AB 32 resulted in CARB's adoption of a report listing three specific early-action greenhouse

gas emission reduction measures on June 21, 2007. On October 25, 2007, CARB approved six additional early-action GHG reduction measures under AB 32. CARB has adopted regulations for all early action measures. The early-action measures are divided into three categories:

- Group 1 – GHG rules for immediate adoption and implementation
- Group 2 – Several additional GHG measures under development
- Group 3 – Air pollution controls with potential climate co-benefits

The original three adopted early-action regulations meeting the narrow legal definition of "discrete early-action GHG reduction measures" include:

- A low-carbon fuel standard to reduce the "carbon intensity" of California fuels;
- Reduction of refrigerant losses from motor vehicle air conditioning system maintenance to restrict the sale of "do-it-yourself" automotive refrigerants; and
- Increased methane capture from landfills to require broader use of state-of-the-art methane capture technologies.

The six additional early-action regulations adopted on October 25, 2007, also meeting the narrow legal definition of "discrete early-action GHG reduction measures," include:

- Reduction of aerodynamic drag, and thereby fuel consumption, from existing trucks and trailers through retrofit technology;
- Reduction of auxiliary engine emissions of docked ships by requiring port electrification;
- Reduction of perfluorocarbons from the semiconductor industry;
- Reduction of propellants in consumer products (e.g., aerosols, tire inflators, and dust removal products);
- The requirement that all tune-up, smog check and oil change mechanics ensure proper tire inflation as part of overall service in order to maintain fuel efficiency; and
- Restriction on the use of sulfur hexafluoride (SF_6) from non-electricity sectors if viable alternatives are available.

State of California Greenhouse Gas Inventory and 2020 Limit

As required under AB 32, on December 6, 2007, CARB approved the 1990 greenhouse gas emissions inventory, thereby establishing the emissions limit for 2020. The 2020 emissions limit was set at 427 $MMTCO_2e$. CARB also projected the state's 2020 GHG emissions under "business as usual" (BAU)

conditions—that is, emissions that would occur without any plans, policies, or regulations to reduce GHG emissions. CARB used an average of the state's GHG emissions from 2002 through 2004 and projected the 2020 levels based on population and economic forecasts. The projected net emissions totaled approximately 596 $MMTCO_2e$. Therefore, the state must reduce its 2020 BAU emissions by approximately 29 percent in order to meet the 1990 target.

The inventory revealed that in 1990, transportation, with 35 percent of the state's total emissions, was the largest single sector, followed by industrial emissions, 24 percent; imported electricity, 14 percent; in-state electricity generation, 11 percent; residential use, 7 percent; agriculture, 5 percent; and commercial uses, 3 percent (these figures represent the 1990 values, compared to **Table 5.5-2**, which presents 2006 values). AB 32 does not require individual sectors to meet their individual 1990 GHG emissions levels; the total statewide emissions are required to meet the 1990 threshold by 2020.

CARB Mandatory Reporting Requirements

In addition to the 1990 emissions inventory, CARB also adopted regulations requiring the mandatory reporting of GHG emissions for large facilities on December 6, 2007. The mandatory reporting regulations require annual reporting from the largest facilities in the state, which account for approximately 94 percent of point source greenhouse gas emissions from industrial and commercial stationary sources in California. About 800 separate sources fall under the new reporting rules and include electricity-generating facilities, electricity retail providers and power marketers, oil refineries, hydrogen plants, cement plants, cogeneration facilities, and industrial sources that emit over 25,000 tons of carbon dioxide each year from on-site stationary combustion sources. Transportation sources, which account for 38 percent of California's total GHG emissions, are not covered by these regulations but will continue to be tracked through existing means.

AB 32 Climate Change Scoping Plan

As indicated above, AB 32 requires CARB to adopt a scoping plan indicating how reductions in significant GHG sources will be achieved through regulations, market mechanisms, and other actions. After receiving public input on their discussion draft of the scoping plan, the CARB Governing Board approved the *Climate Change Scoping Plan* on December 11, 2008. Key elements of the Scoping Plan include the following recommendations:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewable energy mix of 33 percent;

- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- Establishing targets for transportation-related greenhouse gas emissions for regions throughout California and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the state's long-term commitment to AB 32 implementation.

Under the Scoping Plan, approximately 85 percent of the state's emissions are subject to a cap-and-trade program where covered sectors are placed under a declining emissions cap. The emissions cap incorporates a margin of safety whereas the 2020 emissions limit will still be achieved even in the event that uncapped sectors do not fully meet their anticipated emission reductions. Emissions reductions will be achieved through regulatory requirements and the option to reduce emissions further or purchase allowances to cover compliance obligations. It is expected that emission reduction from this cap-and-trade program will account for a large portion of the reductions required by AB 32.

Table 5.5-4, AB 32 Scoping Plan Measures (SPMs), lists CARB's preliminary recommendations for achieving GHG emissions reductions under AB 32 along with a brief description of the requirements and applicability.

Table 5.5-4
AB 32 Scoping Plan Measures (SPMs)

Scoping Plan Measure	Description
SPM-1: California Cap-and-Trade Program linked to Western Climate Initiative	Implement a broad-based cap-and-trade program that links with other Western Climate Initiative Partner programs to create a regional market system. Ensure California's program meets all applicable AB 32 requirements for market-based mechanisms. Capped sectors include transportation, electricity, natural gas, and industry. Projected 2020 business-as-usual emissions are estimated at 512 $MTCO_2e$; preliminary 2020 emissions limit under cap-and-trade program are estimated at 365 $MTCO_2e$ (29 percent reduction).
SPM-2: California Light-Duty Vehicle GHG Standards	Implement adopted Pavley standards and planned second phase of the program. AB 32 states that if the Pavley standards (AB 1493) do not remain in effect, CARB shall implement equivalent or greater alternative regulations to control mobile sources.
SPM-3: Energy Efficiency	Maximize energy efficiency building and appliance standards, and pursue additional efficiency efforts. The Scoping Plan considers green building standards as a framework to achieve reductions in other sectors, such as electricity.
SPM-4: Renewables Portfolio Standard	Achieve 33 percent Renewables Portfolio Standard by both investor-owned and publicly owned utilities.

Scoping Plan Measure	Description
SPM-5: Low Carbon Fuel Standard	CARB identified the Low Carbon Fuel Standard as a Discrete Early Action item and the final regulation was adopted on April 23, 2009. In January 2007, Governor Schwarzenegger issued Executive Order S-1-07, which called for the reduction of the carbon intensity of California's transportation fuels by at least 10 percent by 2020.
SPM-6: Regional Transportation-Related Greenhouse Gas Targets	Develop regional greenhouse gas emissions reduction targets for passenger vehicles. Senate Bill (SB) 375 requires CARB to develop, in consultation with metropolitan planning organizations (MPOs), passenger vehicle greenhouse gas emissions reduction targets for 2020 and 2035 by September 30, 2010. SB 375 requires MPOs to prepare a sustainable communities strategy to reach the regional target provided by CARB.
SPM-7: Vehicle Efficiency Measures	Implement light-duty vehicle efficiency measures. CARB is pursuing fuel-efficient tire standards and measures to ensure properly inflated tires during vehicle servicing.
SPM-8: Goods Movement	Implement adopted regulations for port drayage trucks and the use of shore power for ships at berth. Improve efficiency in goods movement operations.
SPM-9: Million Solar Roofs Program	Install 3,000 MW of solar-electric capacity under California's existing solar programs.
SPM-10: Heavy/Medium-Duty Vehicles	Adopt heavy- and medium-duty vehicle and engine measures targeting aerodynamic efficiency, vehicle hybridization, and engine efficiency.
SPM-11: Industrial Emissions	Require assessment of large industrial sources to determine whether individual sources within a facility can cost-effectively reduce greenhouse gas emissions and provide other pollution reduction co-benefits. Reduce greenhouse gas emissions from fugitive emissions from oil and gas extraction and gas transmission. Adopt and implement regulations to control fugitive methane emissions and reduce flaring at refineries.
SPM-12: High Speed Rail	Support implementation of a high-speed rail (HSR) system. This measure supports implementation of plans to construct and operate a HSR system between Northern and Southern California serving major metropolitan centers.
SPM-13: Green Building Strategy	Expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings.
SPM-14: High GWP Gases	Adopt measures to reduce high global warming potential gases. The Scoping Plan contains 6 measures to reduce high-GWP gases from mobile sources, consumer products, stationary sources, and semiconductor manufacturing.
SPM-15: Recycling and Waste	Reduce methane emissions at landfills. Increase waste diversion, composting, and commercial recycling. Move toward zero-waste.
SPM-16: Sustainable Forests	Preserve forest sequestration and encourage the use of forest biomass for sustainable energy generation. The federal government and California's Board of Forestry and Fire Protection have the regulatory authority to implement the Forest Practice Act to provide for sustainable management practices. This measure is expected to play a greater role in the 2050 goals.
SPM-17: Water	Continue efficiency programs and use cleaner energy sources to move water. California will also establish a public goods charge for funding investments in water efficiency that will lead to as yet undetermined reductions in greenhouse gases.
SPM-18: Agriculture	In the near-term, encourage investment in manure digesters and at the five-year Scoping Plan update determine if the program should be made mandatory by 2020. Increase efficiency and encourage use of agricultural biomass for sustainable energy production. CARB has begun research on nitrogen fertilizers and will explore opportunities for emission reductions.

Source: California Air Resources Board, Climate Change Scoping Plan, (2008).
$MTCO_2e$ = metric tons of CO_2 equivalents

As of October 2010, CARB has identified ongoing programs and has adopted regulations for 29 individual measures to reduce GHG emissions in accordance with the *Climate Change Scoping Plan* strategies. The *Climate Change Scoping Plan* was re-approved by CARB in August 2011.

In September 2012, CARB adopted a California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms, which established the cap-and-trade program to manage greenhouse gas emissions, for California. The cap-and-trade program is a key element that will enable California to achieve the greenhouse gas emission goals of AB 32. The cap-and-trade program is a market-based approach wherein the government determines an overall emission target, or "cap," for a particular set of facilities. The cap is the total amount of emissions that all of the facilities can produce. Tradable emissions allowances totaling the overall emissions cap, are distributed, either by auction or given out, amongst the particular set of facilities. The emissions allowances can be traded amongst the facilities.

The Renewables Portfolio Standard (RPS) Program was established in 2002 under Senate Bill (SB) 1078 which required 20 percent of the electricity used by California to come from renewable energy sources by 2017. This was accelerated by SB 107 in 2006 which required 20 percent of electricity retail sales to come from renewable energy sources by 2010 and then by Executive Order S-14-08 in 2008 which required 33 percent of electricity sold by retail sellers to be produced by renewable energy in 2020. In April 2011, SB X1-2 required that all electricity retailers adopt the new RPS goals providing 20 percent renewable sources by the end of 2013, 25 percent by the end of 2016, and 33 percent by the end of 2020.

Senate Bill 97 (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 greenhouse gas emissions. A number of actions have taken place under SB 97, which are discussed below.

OPR Climate Change Technical Advisory

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, 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).

CEQA Guideline Amendments

In its work 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

The California legislature passed SB 375 (Steinberg) on September 1, 2008. SB 375 requires CARB to set regional greenhouse gas reduction targets after consultation with local governments. The target must then be incorporated within that region's regional transportation plan (RTP), which is used for long-term transportation planning, in a Sustainable Communities Strategy (SCS). SB 375 also requires each region's regional housing needs assessment (RHNA) to be adjusted based on the SCS in its RTP. Additionally, SB 375 reforms the environmental review process to create incentives to implement the strategy, especially transit priority projects. The governor signed SB 375 into law on September 30, 2008.

On January 23, 2009, CARB appointed a Regional Targets Advisory Committee (RTAC) to provide recommendations and methodologies to be used in the target setting process. The RTAC provided its recommendations in a report to CARB on September 29, 2009. On August 9, 2010, CARB staff issued the *Proposed Regional Greenhouse Gas Emission Reduction Targets for Automobiles and Light Trucks Pursuant to Senate Bill 375* (CARB 2010b). CARB staff proposed draft reduction targets for the four largest MPOs (Bay Area, Sacramento, Southern California, and San Diego) of 7 to 8 percent for 2020 and reduction targets between 13 to 16 percent for 2035. For the Bay Area, CARB established a draft target of 7 percent for 2020 and 15 percent for 2035. These targets were recommended to CARB by the Metropolitan Transportation Commission (MTC), which adopted the thresholds for its planning purposes on July 28, 2010. Of note, the proposed reduction targets explicitly exclude emission reductions expected from the AB 1493 and low carbon fuel standard regulations. CARB adopted the final targets on September 23, 2010.

Regional Programs

Bay Area Air Quality Management District CEQA Air Quality Guidelines

On June 2, 2010, the Bay Area Air Quality Management District (BAAQMD) adopted updated *CEQA Air Quality Guidelines*. These guidelines 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 (BAAQMD 2010a). The updated 2010 *CEQA Air Quality Guidelines* recommend 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 provide recommended measures for reducing GHG emissions from land use development projects and stationary sources.

The significance thresholds under BAAQMD's 2010 *CEQA Air Quality Guidelines* were challenged in a lawsuit, and on March 5, 2012, the Alameda County Superior Court ordered that the BAAQMD must set aside the 2010 *CEQA Air Quality Guidelines* and not approve any new Guidelines until the District complies with CEQA regarding implementation of the revised thresholds. The BAAQMD accordingly issued a statement recommending that the 2010 significance thresholds not be used to determine the significance of air quality impacts, including impacts from GHG emissions. Instead, the BAAQMD recommended that the lead agency should "determine appropriate air quality thresholds of significance based on substantial evidence in the record" (BAAQMD 2012). On July 13, 2013, the Court of Appeal ruled that adoption of the thresholds by the BAAQMD was not subject to CEQA. While the 2010 *CEQA Air Quality Guidelines* have yet to be officially reinstated and although this decision may be appealed, the City has determined that in this circumstance it will use the methodological approach and emissions thresholds in the 2010 *CEQA Air Quality Guidelines* to evaluate the impacts of the proposed project. The thresholds for the evaluation of GHG impacts from the 2010 *CEQA Air Quality Guidelines* are presented under **Thresholds of Significance** below.

Metropolitan Transportation Commission/Association of Bay Area Governments Plan Bay Area

In July 2013, the MTC and the Association of Bay Area Governments (ABAG) adopted the Plan Bay Area, which is the update to the 2009 RTP and the new SCS for the San Francisco Bay Area. The Plan Bay Area is a joint effort led by MTC and ABAG and was completed in partnership with the Bay Area's other two regional government agencies, the BAAQMD, and the Bay Conservation and Development Commission (BCDC). As required by SB 375, the SCS demonstrates how the region will meet its greenhouse gas (GHG) reduction targets established by the CARB through integrated land use, housing, and transportation planning.

US Cool Counties Climate Stabilization Declaration

In October 2007, Contra Costa County adopted the long-term community-wide GHG reduction target set by the US Cool Counties Climate Stabilization Declaration which calls on the County to work with local, state, and federal governments and other local leaders to develop a regional plan to reduce Countywide GHG emissions to 80 percent below baseline levels by 2050.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Thresholds of Significance

In accordance with Appendix G of the *2013 State CEQA Guidelines*, the impact of the proposed project related to greenhouse gas emissions would be considered significant if it would:

- 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.

The amended *State CEQA Guidelines* include a new 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.

The first Appendix G criterion may be evaluated by performing a direct calculation of the GHG emissions resulting from the proposed project and comparing the emissions with the available significance thresholds. As noted above, the BAAQMD has put forth significance thresholds for operational GHG emissions in its 2010 *CEQA Air Quality Guidelines*. The guidelines include a bright-line threshold of 1,100 metric tons of CO_2e per year. Projects that have emissions below 1,100 metric tons of CO_2e per year are considered to have a less than significant impact from GHG emissions. For projects that result in emissions that exceed the bright-line threshold, the BAAQMD has put forth a GHG efficiency threshold of 4.6 metric tons CO_2e/service person/year (where service persons are residents plus employees). Projects that have emissions below 4.6 metric tons of CO_2e/service person/year are considered to have less than significant GHG impacts. The third threshold of significance for operational-related GHG emissions is compliance with a Qualified GHG Reduction Strategy. There are no thresholds put forth by the BAAQMD (or any other Air District in the state) for evaluating the significance of a project's

construction-phase GHG emissions, though the BAAQMD recommends that emissions be quantified, reported, and evaluated.

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).*

Under CEQA, "the determination of whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on scientific and factual data" (*State CEQA Guidelines* Section 15064). CEQA grants agencies with the general authority to adopt criteria for determining whether a given impact is "significant" (California Public Resources Code Section 21082). When no guidance exists under CEQA, the agency may look to and assess general compliance with comparable regulatory schemes. As noted earlier, the BAAQMD's CAP represents a comparable regulatory scheme, but specifically states that it is not to be considered a GHG reduction plan. As the basis for the BAAQMD's regulations to control GHG emissions is AB 32, AB 32 is considered the most relevant regulation for the purposes of this analysis.

Based on the above, the proposed project's significance with respect to the GHG emissions and global climate change will be assessed based on the BAAQMD's GHG thresholds of significance and on the project features and GHG reduction measures that are consistent with the BAAQMD's recommended measures to reduce GHG emissions.

CEQA Checklist Items Adequately Addressed in the Initial Study

All greenhouse gas emissions issues listed above are addressed below.

Methodology

OPR in its Technical Advisory has recommended that GHG emissions from project-related traffic, energy consumption, water usage, and construction activities, should be identified and estimated, to the extent that data are available to calculate such emissions. In addition, CARB staff has considered extensively the value of indirect emissions in a mandatory reporting program. CARB believes that indirect energy usage provides a more complete picture of the emissions footprint of a facility. According to CARB,

"As facilities consider changes that would affect their emissions – addition of a cogeneration unit to boost overall efficiency even as it increases direct emissions, for example – the relative impact on total (direct plus indirect) emissions by the facility should be monitored. Annually reported indirect energy usage also aids the conservation awareness of the facility" For these reasons, CARB has proposed requiring the calculation of direct and indirect GHG emissions as part of the AB 32 reporting requirements, and this analysis does so (CARB 2007).

The California Air Pollution Control Officers Association (CAPCOA) has stated that the information needed to characterize GHG emissions from manufacture, transport, and end-of-life of construction materials (often referred to as lifecycle emissions) would be speculative at the CEQA analysis level (CAPCOA 2008). Since accurate and reliable data does not exist for estimating lifecycle emissions for the proposed project, the analysis does not assess such lifecycle GHG emissions.

The data sources and tools used to estimate the GHG emissions associated with operation of the proposed project include the CalEEMod emissions estimating model and calculation algorithms supported by the sources listed above. The CalEEMod model utilizes the EMFAC2007 emissions factor model for on-road motor vehicle sources and the OFFROAD2007 emissions factor model for off-road equipment. Site-specific or project-specific data were used in the CalEEMod model where available. Where information was not available for the project, model default values were selected. As discussed in **Section 5.2, Air Quality,** development of the proposed project will take in four phases. Since all four phases are essentially similar, only one phase was modeled and values from the model outputs were multiplied by four to obtain total GHG emissions for construction and operation. Emission calculations conducted for the proposed project are contained in **Appendix 5.5**.

It should be noted that the methodology for this section is different than the methodology used in the Initial Study (IS). The GHG analysis in the IS used the URBEMIS model to estimate emissions, along with spreadsheet-based calculations using emission factors gathered from various sources as described in the IS. The CalEEMod model (used for this Draft EIR analysis) incorporates slightly different sources, and is also much more up to date with regards to adopted or upcoming regulatory requirements for GHG emissions from vehicles and other sources. For these reasons, the BAAQMD recommends the use of CalEEMod, rather than URBEMIS, and this is why it was used for this Draft EIR analysis. It is important to note that, the use of the CalEEMod model for this analysis has resulted in different emissions estimates than what was originally included in the IS, and consequently different conclusions.

Impact Analysis

The proposed project consists of the development of 356 single-family homes on previously undeveloped land near Pittsburg, California. The assumed final population of the development would be 1,146 residents.

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

Construction GHG Emissions

During construction, the proposed project would directly contribute to climate change through its contribution of the GHGs from the exhaust of construction equipment and construction workers' vehicles. The manufacturing of construction materials used by the project would indirectly contribute to climate change (upstream emission source). Upstream emissions are emissions that are generated during the manufacture of products used for construction (e.g., cement, steel, and transport of materials to the region). The upstream GHG emissions for this project, which may also include perfluorocarbons and sulfur hexafluoride, are not estimated in this impact analysis because they are not within the control of the developer and the lack of data precludes their quantification without speculation.

The BAAQMD does not provide any guidance on evaluation of the impacts from GHG emissions from construction activities for a project-level analysis. It is simply recommended that GHG emissions from construction be estimated, reported, and evaluated. Using the methodology described above, CO_2 emissions associated with construction activities are approximately 3,913 metric tons over four years of construction, or approximately 978 metric tons per year. This amount, which is below the bright-line threshold of 1,100 metric tons, is too small to have a measureable effect on global climate. Therefore, the impact from construction-phase GHG emissions would be less than significant.

Operational GHG Emissions

The proposed project would be operational in 2018 and would result in direct annual emissions of GHGs. These emissions, primarily CO_2, CH_4, and N_2O, would be the result of fuel combustion in building heating systems and motor vehicles. Building and motor vehicle air conditioning systems may use HFCs (and Hydrochlorofluorocarbons [HCFCs] and CFCs to the extent that they have not been completely phased out at later dates); however, these emissions are not quantified since they would only occur through accidental leaks and it is not possible to estimate the frequency of accidental leaks without some level of speculation. It should be noted that CARB has adopted regulations that would reduce emissions

of these refrigerants from stationary refrigeration and air-conditioning systems by requiring persons subject to the rule to reclaim, recover, or recycle refrigerant and to properly repair or replace faulty refrigeration and air conditioning equipment.[7]

Direct emissions of GHGs emitted from operation of the proposed project are primarily due to natural gas combustion, hearth (fireplace) emissions, landscaping equipment, and mobile source emissions. These emissions were calculated using CalEEMod.

The proposed project would also result in indirect GHG emissions due to the electricity demand. These indirect emissions were estimated based on factors from Pacific Gas & Electric, the electrical utility that would serve the proposed project. Pacific Gas & Electric emission factors for CO_2, CH_4, and N_2O are based on information contained in CARB's *Local Government Operations Protocol*.[8] The emission factors take into account the current mix of energy sources used to generate electricity and the relative carbon intensities of these sources. Pacific Gas & Electric's energy sources include natural gas, coal, nuclear, large hydroelectric, and other renewable sources of energy. Electricity consumption for the proposed project was based on estimated consumption data found in CalEEMod for single-family residences.

In addition to electrical demand, the project would also result in indirect GHG emissions due to water consumption, wastewater treatment, and solid waste generation. GHG emissions from water consumption are due to the electricity needed to convey, treat, and distribute water. The annual electrical demand factors as well as consumption for potable water are the default values found in CalEEMod. GHG emissions from wastewater are due to the electricity needed to treat wastewater and the treatment process itself, which primarily releases CH_4 into the atmosphere. The CalEEMod default values were also used for rates of generation and GHG emissions for wastewater and solid waste.[9]

The annual GHG emissions associated with the operation of the proposed project are provided below in **Table 5.5-5, Estimated Operational Greenhouse Gas Emissions**. Modeling calculations are provided in **Appendix 5.5.** Direct and indirect operational emissions associated with the proposed project are compared with the BAAQMD's threshold of significance for land use projects, which for this project, is 4.6 $MTCO_2e$/service population (SP)/year. According to the BAAQMD, the significance of a project's GHG emissions may be evaluated by comparing the project's per service population GHG emissions with the 4.6 $MTCO_2e$/SP/year threshold. The service population for the proposed project would be the

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7 California Air Resources Board, "Stationary Equipment Refrigerant Management Program," http://www.arb.ca.gov/cc/reftrack/reftrack.htm. 2011. This regulation is an early action measure under AB 32.

8 California Air Resources Board, *Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories*, Version 1.1, (2010) 208.

9 The Keller Canyon Landfill is equipped with landfill-gas-to-energy facilities.

residents, which are estimated to total 1,146. As shown in **Table 5.5-5**, the proposed project would emit 4.3 $MTCO_2e$/SP/year.

Table 5.5-5
Estimated Operational GHG Emissions

GHG Emissions Source	Emissions (Metric Tons CO_2e/year)
Mobile Sources (Transportation)	2,725
Area Sources	4
Energy	1,411
Water	80
Waste	195
Total Operational GHG Emissions	**4,415**
Total Net Operational GHG Emissions per SP	**3.9**
BAAQMD Threshold	**4.6**
Exceeds Threshold?	NO

*Source: Impact Sciences, Inc. Emissions calculations are provided in **Appendix 5.5**.*

As shown in **Table 5.5-5**, the proposed project's operational emissions would not exceed the threshold of 4.6 $MTCO_2e$/SP/year for proposed projects. The project's impact would be less than significant.

Mitigation Measures

No mitigation measures are required.

Impact GHG-2 **The development would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. *(Less than significant)***

Development of the proposed project would result in a significant impact related to GHG emissions if the project were in conflict with an applicable plan, policy, or regulation concerning greenhouse gas reductions. AB 32, which was enacted by the legislature to further the goals established in Executive Order S-3-05, is the relevant regulation with which to review 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 its GHG significance thresholds specifically to meet AB 32 requirements within its jurisdiction. Plans and projects that meet those thresholds can be

assumed to meet the requirements of AB 32. As the GHG emissions that are estimated to result from project construction and operation are below the BAAQMD threshold for GHG emissions, the project is in compliance with AB 32.

As discussed above, consistent with the requirements of SB 375, the MTC and ABAG have adopted a RTP that includes a SCS component. The focus of the SCS is to reduce emissions from passenger vehicles and light duty trucks through integrated land use, housing, and transportation planning. While the SCS encourages compact urban development, it also allows for suburban and rural development including single-family homes. Additionally, the MTC and ABAG have no control of zoning or actual land use decisions in the regions included in the SCS. Finally, the SCS uses existing zoning and planning documents to form estimates of future growth. The proposed project is included in the Pittsburg 2020 General Plan, and the main project site is zoned for single-family homes. This would certainly be included in baseline data for the SCS and the proposed project would therefore not represent an obstacle for implementation of the SCS and attainment of SB 375 goals.

In the resolution adopting the US Cool Counties Climate Stabilization Declaration (Resolution No. 2007-541), the County committed to developing a GHG emissions inventory and regional plan that established short-, mid- and long-term GHG reduction targets. In December 2012, the County issued a Draft Climate Action Plan to provide strategies for reducing GHG emissions through 2035. However, the plan is applicable to unincorporated areas of the County, and not incorporated cities like Pittsburg. Since the project is proposed for development with the Pittsburg City Limits, the County's Climate Action Plan and US Cool Counties declaration adopted by the County, are not applicable to the proposed project. However, as discussed above, the proposed project would meet 2020 reduction goals established by AB 32, as the GHG emissions that are estimated to result from project construction and operation are below the BAAQMD threshold for GHG emissions.

The City of Pittsburg has also developed Green Building Design Guidelines that include features that may be included in new development in the City. Compliance with Green Building Design Guidelines would further reduce the emissions associated with the project.

Mitigation Measures

No mitigation measures are required.

Cumulative Impacts

Impact GHG-3: **The proposed development would not generate GHG emissions, either directly or indirectly, that may have a cumulatively significant impact on the environment. (*Less than significant*)**

As the impact from a project's GHG emissions is essentially a cumulative impact, the analysis presented in the section provides an adequate analysis of the proposed project's cumulative impact related to GHG emissions. No further analysis is required.

Mitigation Measures

No mitigation measures are required.

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