

4.6 GREENHOUSE GAS EMISSIONS

INTRODUCTION

This section of the EIR addresses the Project's potential effect on global climate change (GCC) due to generation of greenhouse gas (GHG) emissions. Relevant regulations and existing conditions are described as well as the potential for the Project to result in GCC-related impacts due to generation of GHG emissions that would exceed applicable thresholds of significance, either directly or indirectly, or conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the GHG emissions. Data used to prepare this section was obtained from the *Cielo Vista Greenhouse Gas Analysis, County of Orange, California*, prepared by Urban Crossroads, Inc. on March 7, 2013, which is included as Appendix F of this EIR.

1. ENVIRONMENTAL SETTING

Global climate change refers to the change in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation and storms. For the purposes of this analysis, emissions of carbon dioxide, methane, and nitrous oxide are evaluated as GHGs because these gasses are the primary contributors to GCC from development projects. Although other substances such as fluorinated gases also contribute to GCC, sources of fluorinated gases are not well defined and no accepted emissions factors or methodology exist to accurately calculate these gases. Below is a discussion of Regulatory Framework with regards to GCG.

a. Regulatory Framework

(1) International Regulations

In 1988, the United Nations established the Intergovernmental Panel on GCC to evaluate the impacts of global warming and to develop strategies that nations could implement to curtail GCC. In 1992, the United States joined other countries around the world in signing the United Nations' Framework Convention on Climate Change (UNFCCC) agreement with the goal of controlling greenhouse gas emissions. As a result, the Climate Change Action Plan was developed to address the reduction of GHGs in the United States. The Plan currently consists of more than 50 voluntary programs for member nations to adopt.

The Kyoto protocol is a treaty made under the UNFCCC and was the first international agreement to regulate GHG emissions. Some have estimated that if the commitments outlined in the Kyoto protocol are met, global GHG emissions could be reduced an estimated five percent from 1990 levels during the first commitment period of 2008-2012. Notably, while the United States is a signatory to the Kyoto protocol, Congress has not ratified the Protocol and the United States is not bound by the Protocol's commitments. In December 2009, international leaders from 192 nations met in Copenhagen to address the future of international climate change commitments post-Kyoto.

(2) Federal

Coinciding with the 2009 meeting in Copenhagen, on December 7, 2009, the U.S. Environmental Protection Agency (EPA) issued an Endangerment Finding under Section 202(a) of the Clean Air Act, opening the door

to federal regulation of GHGs. The Endangerment Finding notes that GHGs threaten public health and welfare and are subject to regulation under the Clean Air Act. To date, the EPA has not promulgated regulations on GHG emissions, but it has already begun to develop them.

Previously the EPA had not regulated GHGs under the Clean Air Act because it asserted that the Act did not authorize it to issue mandatory regulations to address GCC and that such regulation would be unwise without an unequivocally established causal link between GHGs and the increase in global surface air temperatures. In *Massachusetts v. Environmental Protection Agency et al.* (127 S. Ct. 1438 (2007)), however, the U.S. Supreme Court held that GHGs are pollutants under the Clean Air Act and directed the EPA to decide whether the gases endangered public health or welfare. The EPA had also not moved aggressively to regulate GHGs because it expected Congress to make progress on GHG legislation, primarily from the standpoint of a cap-and-trade system. However, proposals circulated in both the House of Representative and Senate have been controversial and it may be some time before the U.S. Congress adopts major climate change legislation. The EPA's Endangerment Finding paves the way for federal regulation of GHGs with or without Congress.

Although GCC did not become an international concern until the 1980s, efforts to reduce energy consumption began in California in response to the oil crisis in the 1970s, resulting in the incidental reduction of GHG emissions. In order to manage the state's energy needs and promote energy efficiency, AB 1575 (Stats, Chapter 2761, Statutes of 1974)¹ created the California Energy Commission (CEC) in 1975.

(3) State

(a) Title 24 Energy Standards

The CEC 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.

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."² 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

¹ On May 24, 1974, Governor Reagan signed into law, the Warren-Alquist State Energy Resources and Conservation Act (formerly A.B. 1575) which established the Energy Resources and Conservation Commission (see *STATS*, Chapter 2761, Page 500, Statutes of 1974).

² California Building Standards Commission, 2008 California Green Building Standards Code, (2009).

CBSC has released the *2010 California Green Building Standards Code* on its Web site.³ Unless otherwise noted in the regulation, all newly constructed buildings in California are subject to the requirements of the CALGreen Code.

(b) California Assembly Bill No. 1493 (AB 1493, Pavley), (Chapter 200, Statutes of 2002)⁴

AB 1493 (Pavley, Chapter 200, Statutes of 2002) requires the California Air Resources Board (CARB) to develop and adopt the nation's first greenhouse gas emission standards for automobiles. The Legislature declared in AB 1493 (Pavley, Chapter 200, Statutes of 2002) that global warming was a matter of increasing concern for public health and environment in California. Further, the legislature stated that technological solutions to reduce greenhouse gas emissions would stimulate the California economy and provide jobs.

To meet the requirements of AB 1493 (Chapter 200, Statutes of 2002), CARB approved amendments to the California Code of Regulations (CCR) adding GHG emission standards to California's existing motor vehicle emission standards in 2004. Amendments to CCR Title 13 Sections 1900 (13 CCR 1900) and 1961 (13 CCR 1961) and adoption of Section 1961.1 (13 CCR 1961.1) require automobile manufacturers to meet fleet average GHG emission limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty passenger vehicle weight classes beginning with the 2009 model year. Emission limits are further reduced each model year through 2016.

In December 2004 a group of car dealerships, automobile manufacturers, and trade groups representing automobile manufacturers filed suit against the CARB to prevent enforcement of 13 CCR 1900 and C 13 CR1961 as amended by AB 1493 (Chapter 200, Statutes of 2002) and 13 CCR 1961.1 (Central Valley Chrysler-Jeep et al. v. Catherine E. Witherspoon, in her official capacity as Executive Director of the California Air Resources Board, et al.). The suit, heard in the U.S. District Court for the Eastern District of California, contended that California's implementation of regulations that in effect regulate vehicle fuel economy violates various federal laws, regulations, and policies. In January 2007, the judge hearing the case accepted a request from the State Attorney General's office that the trial be postponed until a decision is reached by the U.S. Supreme Court on a separate case addressing GHGs. In the Supreme Court Case, *Massachusetts vs. EPA*, the primary issue in question is whether the federal CAA provides authority for USEPA to regulate carbon dioxide (CO₂) emissions. In April 2007, the U.S. Supreme Court ruled in *Massachusetts' favor*, holding that GHGs are air pollutants under the CAA. On December 11, 2007, the judge in the Central Valley Chrysler-Jeep case rejected each plaintiff's arguments and ruled in California's favor. On December 19, 2007, the EPA denied California's waiver request. California filed a petition with the Ninth Circuit Court of Appeals challenging USEPA's denial on January 2, 2008.

The Obama administration subsequently directed the EPA to re-examine their decision. On May 19, 2009, challenging parties, automakers, the State of California, and the federal government reached an agreement on a series of actions that would resolve these current and potential future disputes over the standards through model year 2016. In summary, the EPA and the U.S. Department of Transportation agreed to adopt a federal program to reduce GHGs and improve fuel economy, respectively, from passenger vehicles in order to achieve equivalent or greater greenhouse gas benefits as the AB 1493 (Pavley, Chapter 200, Statutes of

³ CALGreen website. <http://www.bsc.ca.gov> Accessed, July 2012.

⁴ http://www.leginfo.ca.gov/pub/01-02/bill/asm/ab_1451-1500/ab_1493_bill_20020722_chaptered.pdf.

2002) regulations for the 2012–2016 model years. Manufacturers agreed to ultimately drop current and forego similar future legal challenges, including challenging a waiver grant, which occurred on June 30, 2009. The State of California committed to (1) revise its standards to allow manufacturers to demonstrate compliance with the fleet-average GHG emission standard by “pooling” California and specified State vehicle sales; (2) revise its standards for 2012–2016 model year vehicles so that compliance with USEPA-adopted GHG standards would also comply with California’s standards; and (3) revise its standards, as necessary, to allow manufacturers to use emissions data from the federal CAFE program to demonstrate compliance with the AB 1493 (Pavley, Chapter 200, Statutes of 2002) regulations both of these programs are aimed at light-duty auto and light-duty trucks.

(c) Executive Order S-3-05

Executive Order S-3-05, which was signed by Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra’s snowpack, further exacerbate California’s air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the Executive Order established total greenhouse gas emission targets. Specifically, emissions are to be reduced to the 1990 level by 2020, and to 80 percent below the 1990 level by 2050. The Executive Order directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce greenhouse gas emissions to the target levels. The Secretary also is required to submit biannual reports to the Governor and state Legislature describing: (1) progress made toward reaching the emission targets; (2) impacts of global warming on California’s resources; and (3) mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the Secretary of the CalEPA created a Climate Action Team (CAT) made up of members from various state agencies and commission. CAT released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.

(d) California Assembly Bill 32 (AB 32, Nunez) (Chapter 488, Statutes of 2006)⁵

In September 2006, Governor Arnold Schwarzenegger signed AB 32 (Chapter 488, Statutes of 2006), the California Climate Solutions Act of 2006. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by the year 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 (Chapter 200, Statutes of 2002) should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 (Chapter 200, Statutes of 2002) regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that CARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically

⁵ http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0001-0050/ab_32_bill_20060927_chaptered.pdf.

efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

In November 2007, CARB completed its estimates of 1990 GHG levels. Net emission 1990 levels were estimated at 427 million metric tons (MMTs) (emission sources by sector were: transportation – 35 percent; electricity generation – 26 percent; industrial – 24 percent; residential – 7 percent; agriculture – 5 percent; and commercial – 3 percent).⁶ Accordingly, 427 MMTs of CO₂ equivalent (CO₂e) was established as the emissions limit for 2020. For comparison, CARB's estimate for baseline GHG emissions was 473 MMT for 2000 and 532 MMT for 2010. "Business as usual" conditions (without the 30 percent reduction to be implemented by CARB regulations) for 2020 were projected to be 596 MMTs.

In December 2007, CARB approved a regulation for mandatory reporting and verification of GHG emissions for major sources. This regulation covered major stationary sources such as cement plants, oil refineries, electric generating facilities/providers, and co-generation facilities, which comprise 94 percent of the point source CO₂ emissions in the State.

On December 11, 2008, CARB adopted a scoping plan to reduce GHG emissions to 1990 levels. The Scoping Plan's recommendations for reducing GHG emissions to 1990 levels by 2020 include emission reduction measures, including a cap-and-trade program linked to Western Climate Initiative partner jurisdictions, green building strategies, recycling and waste-related measures, as well as Voluntary Early Actions and Reductions.

Table 4.6-1, Scoping Plan GHG Reduction Measures Toward 2020 Target, shows the proposed reductions from regulations and programs outlined in the Scoping Plan. While local government operations were not accounted for in achieving the 2020 emissions reduction, local land use changes are estimated to result in a reduction of 5 MMTs of CO₂e, which is approximately 3 percent of the 2020 GHG emissions reduction goal. In recognition of the critical role local governments will play in successful implementation of AB 32, CARB is recommending GHG reduction goals of 15 percent of 2006 levels by 2020 to ensure that municipal and community-wide emissions match the state's reduction target. According to the Measure Documentation Supplement to the Scoping Plan, local government actions and targets are anticipated to reduce vehicle miles by approximately 2 percent through land use planning, resulting in a potential GHG reduction of 2 MMTs of CO₂e (or approximately 1.2 percent of the GHG reduction target).

(e) California Senate Bill No. 1368 (SB 1368, (Perata) (Chapter 598, Statutes of 2006))⁷

In 2006, the State Legislature adopted SB 1368 (Chapter 598, Statutes of 2006) which directs the California Public Utilities Commission ("CPUC") to adopt a greenhouse gas emission performance standard ("EPS") for the future power purchases of California utilities. SB 1368 (Chapter 598, Statutes of 2006) seeks to limit carbon emissions associated with electrical energy consumed in California by forbidding procurement

⁶ On a national level, the EPA's Endangerment Finding stated that electricity generation is the largest emitting sector (34%), followed by transportation (28%), and industry (19%).

⁷ SB 1368 Emissions Performance Standards. http://www.energy.ca.gov/emission_standards/.

Table 4.6-1

Scoping Plan GHG Reduction Measures Toward 2020 Target

Recommended Reduction Measures	Reductions Counted Toward 2020 Target of 169 MMT CO ₂ e	Percentage of Statewide 2020 Target
Cap and Trade Program and Associated Measures		
California Light-Duty Vehicle GHG Standards	31.7	19%
Energy Efficiency	26.3	16%
Renewable Portfolio Standard (33 percent by 2020)	21.3	13%
Low Carbon Fuel Standard	15	9%
Regional Transportation-Related GHG Targets ¹	5	3%
Vehicle Efficiency Measures	4.5	3%
Goods Movement	3.7	2%
Million Solar Roofs	2.1	1%
Medium/Heavy Duty Vehicles	1.4	1%
High Speed Rail	1.0	1%
Industrial Measures	0.3	0%
Additional Reduction Necessary to Achieve Cap	34.4	20%
Total Cap and Trade Program Reductions	146.7	87%
Uncapped Sources/Sectors Measures		
High Global Warming Potential Gas Measures	20.2	12%
Sustainable Forests	5	3%
Industrial Measures (for sources not covered under cap and trade program)	1.1	1%
Recycling and Waste (landfill methane capture)	1	1%
Total Uncapped Sources/Sectors Reductions	27.3	16%
Total Reductions Counted toward 2020 Target	174	100%
Other Recommended Measures – Not Counted toward 2020 Target		
State Government Operations	1.0 to 2.0	1%
Local Government Operations	To Be Determined ²	NA
Green Buildings	26	15%
Recycling and Waste	9	5%
Water Sector Measures	4.8	3%
Methane Capture at Large Dairies	1	1%
Total Other Recommended Measures – Not Counted toward 2020 Target	42.8	NA

Source: CARB. 2008, MMTons CO₂e: million metric tons of CO₂e ¹ Reductions represent an estimate of what may be achieved from local land use changes. It is not the SB 375 regional target. ² According to the Measure Documentation Supplement to the Scoping Plan, local government actions and targets are anticipated to reduce vehicle miles by approximately 2 percent through land use planning, resulting in a potential GHG reduction of 2 million metric tons of CO₂e (or approximately 1.2 percent of the GHG reduction target). However, these reductions were not included in the Scoping Plan reductions to achieve the 2020 Target

arrangements for energy longer than five years from resources that exceed the emissions of a relatively clean, combined cycle natural gas power plant. Due to the carbon content of its fuel source, a coal-fired plant cannot meet this standard because such plants emit roughly twice as much carbon as natural gas, combined cycle plants. Accordingly, the new law will effectively prevent California's utilities from investing in, otherwise financially supporting, or purchasing power from new coal plants located in or out of the State. Thus, SB 1368 (Chapter 598, Statutes of 2006) will lead to dramatically lower greenhouse gas emissions associated with California energy demand, as SB 1368 (Chapter 598, Statutes of 2006) will effectively prohibit California utilities from purchasing power from out of state producers that cannot satisfy the EPS standard required by SB 1368 (Chapter 598, Statutes of 2006).

(f) Senate Bill 97 (SB 97, (Dutton) (Chapter 185, Statutes of 2007))⁸

Pursuant to the direction of SB 97 (Chapter 185, Statutes of 2007), the Office of Planning and Research (OPR) released preliminary draft CEQA Guideline amendments for greenhouse gas emissions on January 8, 2009, and submitted its final proposed guidelines to the Secretary for Natural Resources on April 13, 2009. The Natural Resources Agency adopted the Guideline amendments and they became effective on March 18, 2010.

Of note, the new guidelines state that a lead agency⁹ shall have discretion to determine whether to use a quantitative model or methodology, or in the alternative, rely on a qualitative analysis or performance based standards. CEQA Guideline Section 15064.4(a) "A lead agency shall have discretion to determine, in the context of a particular project, whether to: (1) Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use; or (2) Rely on a qualitative analysis or performance based standards."

CEQA emphasizes that the effects of greenhouse gas emissions are cumulative, and should be analyzed in the context of CEQA's requirements for cumulative impacts analysis. (See CEQA Guidelines Section 15130(f)). Section 15064.4(b) of the CEQA Guidelines provides direction for lead agencies for assessing the significance of impacts of greenhouse gas emissions:

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; or
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. Such regulations or requirements must be adopted by the relevant public agency through a public review process and must include specific requirements that reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

⁸ http://opr.ca.gov/docs/SB_97_bill_20070824_chaptered.pdf.

⁹⁹ *A Lead Agency is the public agency which has the principle responsibility for carrying out or approving a project which may have a significant effect upon the environment.*

The CEQA Guideline amendments do not identify a threshold of significance for greenhouse gas emissions, nor do they prescribe assessment methodologies or specific mitigation measures. Instead, they call for a “good-faith effort, based on available information, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project.” The amendments encourage lead agencies to consider many factors in performing a CEQA analysis and preserve lead agencies’ discretion to make their own determinations based upon substantial evidence. The amendments also encourage public agencies to make use of programmatic mitigation plans and programs from which to tier when they perform individual project analyses.

Please refer to the “Methodology” section below for further discussion of the significance thresholds utilized in this analysis.

(g) Executive Order S-01-07

On January 18, 2007 California Governor Arnold Schwarzenegger, through Executive Order S-01-07, mandated a statewide goal to reduce the carbon intensity of California’s transportation fuel by at least ten percent by 2020. The order also requires that a California specific Low Carbon Fuel Standard be established for transportation fuels.

(h) Senate Bill 1078 (SB 1078, Sher) (Chapter 516, Statutes of 2002)¹⁰ and Senate Bill 107 (SB 107, Simitian) (Chapter 464, Statutes of 2006)¹¹ and Executive Order S-14-08

SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20% of their supply from renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010. In November 2008 Governor Schwarzenegger signed Executive Order S-14-08, which expands the state's Renewable Energy Standard to 33% renewable power by 2020.

(i) Senate Bill 375 (SB 375, Steinberg) (Chapter 728, Statutes of 2008)¹²:

SB 375, signed in September 2008 (Chapter 728, Statutes of 2008), aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 (Chapter 728, Statutes of 2008) requires metropolitan planning organizations (MPOs) to adopt a sustainable communities strategy (SCS) or alternative planning strategy (APS) that will prescribe land use allocation in that MPO’s regional transportation plan. Air Resources Board (ARB), in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every 8 years but can be updated every 4 years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO’s SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects will not be eligible for funding programmed after January 1, 2012.

¹⁰ <http://www.energy.ca.gov/portfolio/documents/documents/SB1078.PDF>.

¹¹ http://www.leginfo.ca.gov/pub/05-06/bill/sen/sb_0101-0150/sb_107_bill_20060926_chaptered.pdf.

¹² http://www.leginfo.ca.gov/pub/07-08/bill/sen/sb_0351-0400/sb_375_bill_20080930_chaptered.pdf.

On September 23, 2010, ARB adopted Regional Targets for the reduction of GHG applying to the years 2020 and 2035.¹³ For the area under SCAG's jurisdiction, including the project area, ARB adopted Regional Targets for reduction of GHG emissions by 8 percent for 2020 and by 13 percent for 2035. On February 15, 2011, the ARB's Executive Officer approved the final targets.¹⁴

SCAG's SCS is included in the SCAG 2012-2035 Regional Transportation Plan Sustainable Communities Strategy (RTP/SCS) (SCAG 2012). The document was adopted by SCAG in April 2012. The goals and policies of the RTP/SCS that reduce VMT focus on transportation and land use planning that include building infill projects, locating residents closer to where they work and play and designing communities so there is access to high quality transit service. The RTP/SCS adopts land use patterns at the jurisdictional level.¹⁵

This law also extends the minimum time period for the regional housing needs allocation cycle from 5 years to 8 years for local governments located within an MPO that meets certain requirements. City or county land use policies (including general plans) are not required to be consistent with the regional transportation plan (and associated SCS or APS). However, new provisions of CEQA would incentivize (through streamlining and other provisions) qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."

b. Existing Conditions

(1) Global Climate Change

As indicated above, GCC refers to the change in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation and storms. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, CO₂ (Carbon Dioxide), N₂O (Nitrous Oxide), CH₄ (Methane), hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. These particular gases are important due to their residence time (duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the Earth's atmosphere, but prevent radioactive heat from escaping, thus warming the Earth's atmosphere. GCC can occur naturally as it has in the past with the previous ice ages. According to CARB, the climate change since the industrial revolution differs from previous climate changes in both rate and magnitude.

Gases that trap heat in the atmosphere are often referred to as GHGs. GHGs are released into the atmosphere by both natural and anthropogenic (human) activity. Without the natural greenhouse gas effect, the Earth's average temperature would be much cooler¹⁶. The cumulative accumulation of these gases in the earth's atmosphere is considered to be the cause for the observed increase in the earth's temperature.

¹³ ARB. 2010. *Notice of Decision: Regional Greenhouse Gas Emissions Reduction Targets for Automobiles and Light Trucks Pursuant to Senate Bill 375*. Sacramento, CA: ARB. <http://www.arb.ca.gov/cc/sb375/notice%20of%20decision.pdf>

¹⁴ ARB. 2011. *Executive Order No. G-11-024: Relating to Adoption of Regional Greenhouse Gas Emission Reduction Targets for Automobiles and Light Trucks Pursuant to Senate Bill 375*. Sacramento, CA: ARB. (February)

¹⁵ SCAG 2012-2035 *Regional Transportation Plan Sustainable Communities Strategy, Table 18, Growth Forecast Appendix*.

¹⁶ At present, the average temperature on Earth is about 14°C. Without the greenhouse effect, the average temperature would be -18°C (32 degrees colder than the present temperature - too cold for most living beings) - http://www.wmo.int/pages/index_en.html.

GCC is currently one of the most controversial environmental issues in the United States, and much debate exists within the scientific community about whether or not GCC is occurring naturally or as a result of human activity. Some data suggests that GCC has occurred in the past over the course of thousands or millions of years. These historical changes to the Earth's climate have occurred naturally without human influence, as in the case of an ice age. However, many scientists believe that the climate shift taking place following the industrial revolution (mid 1700s – mid 1800s) is occurring at a quicker rate and magnitude than in the past. Scientific evidence suggests that GCC is the result of increased concentrations of GHGs in the earth's atmosphere, including carbon dioxide, methane, nitrous oxide, and fluorinated gases. Many scientists believe that this increased rate of climate change is the result of GHGs resulting from human activity and industrialization over the past 200 years.

An individual project like the Project evaluated in this EIR section cannot generate enough GHG emissions to effect a discernible change in global climate. However, such a project may influence the potential for GCC through its incremental contribution of GHGs to cumulative increases from other sources which taken together may have an effect on GCC. This analysis will evaluate the potential for the Project to have an effect upon the environment as a result of its potential contribution to the greenhouse effect.

(2) Greenhouse Gas Emissions Inventories

(a) Global

Worldwide anthropogenic (man-made) GHG emissions are tracked by the Intergovernmental Panel on Climate Change for industrialized nations (referred to as Annex I) and developing nations (referred to as Non-Annex I). Man-made GHG emissions data for Annex I nations are available through 2009. Man-made GHG emissions data for Non-Annex I nations are available through 2007. For the Year 2009 the sum of these emissions totaled approximately 40,084 MMTCO₂e.¹⁷ Emissions from the top five countries and the European Union accounted for approximately 65 percent of the total global GHG emissions, according to the most recently available data (refer to **Table 4.6-2, Top GHG Producer Countries and the European Union**). The GHG emissions in more recent years may differ from the inventories presented in Table 2-1; however, the data is representative of currently available inventory data.

(b) United States

As shown in Table 4.6-2, the United States was the number two producer of GHG emissions in 2009. The primary greenhouse gas emitted by human activities in the United States was CO₂, representing approximately 83 percent of total greenhouse gas emissions.¹⁸ Carbon dioxide from fossil fuel combustion, the largest source of US GHG emissions, accounted for approximately 78 percent of the GHG emissions.¹⁹

¹⁷ *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.*

¹⁸ *US Environmental Protection Agency, "Inventory of US Greenhouse Gas Emissions and Sinks 1990-2009," <http://www.epa.gov/climatechange> Accessed July 2012.*

¹⁹ *Ibid*

Table 4.6-2

Top GHG Producer Countries and the European Union ^a

Emitting Countries	GHG Emissions (MMT CO ₂ e)
China	6,703
United States	6,608
European Union	8,338
Russian Federation	2,159
India	1,410
Japan	1,209
Total	26,427

^A World Resources Institute, "Climate Analysis Indicator Tool (CAIT) Excludes emissions and removals from land use, land-use change and forestry (LULUCF) Emissions Inventory," <http://cait.wri.org>, Accessed July 2012.

Source: Cielo Vista Greenhouse Gas Analysis, County of Orange, California, prepared by Urban Crossroads, Inc., dated March 7, 2013.

(c) State of California

CARB compiles GHG inventories for the State of California. Based upon the 2008 GHG inventory data (i.e., the latest year for which data are available) for the 2000-2008 greenhouse gas emissions inventory, California emitted 474 MMTs of CO₂e **including** emissions resulting from imported electrical power in 2008.²⁰ Based on the CARB inventory data and GHG inventories compiled by the World Resources Institute,²¹ California's total statewide GHG emissions rank second in the United States (Texas is number one) with emissions of 417 MMT of CO₂e **excluding** emissions related to imported power.

Although California's rate of growth of greenhouse gas emissions is slowing, the state is still a substantial contributor to the U.S. emissions inventory total. In 2004, California is estimated to have produced 492 million gross metric tons of CO₂e greenhouse gas emissions. Despite a population increase of 16 percent between 1990 and 2004, California has significantly slowed the rate of growth of greenhouse gas emissions due to the implementation of energy efficiency programs as well as adoption of strict emission controls.²²

(3) Greenhouse Gasses

As indicated above, for the purposes of this analysis, emissions of carbon dioxide, methane, and nitrous oxide were evaluated because these gasses are the primary contributors to GCC from development projects. Although other substances such as fluorinated gases also contribute to GCC, sources of fluorinated gases are not well defined and no accepted emissions factors or methodology exist to accurately calculate these gasses.

²⁰ California Air Resources Board, "California Greenhouse Gas 2000-2008 Inventory by Scoping Plan Category - Summary," <http://www.arb.ca.gov/cc/inventory/data/data.htm>. 2010.

²¹ World Resources Institute, "Climate Analysis Indicator Tool (CAIT)-US - Yearly Emissions Inventory," <http://cait.wri.org>

²² California Energy Commission, "Inventory of California Greenhouse Gas Emissions and Sinks," <http://www.energy.ca.gov/2005publications/CEC-600-2005-025/CEC-600-2005-025.PDF>. 2005.

GHGs have varying global warming potential (GWP) values; GWP values represent the potential of a gas to trap heat in the atmosphere. Carbon dioxide (CO₂) is utilized as the reference gas for GWP, and thus has a GWP of 1.

The atmospheric lifetime and GWP of selected GHGs are summarized in **Table 4.6-3, Global Warming Potentials and Atmospheric Lifetime of Select GHGs**. As shown in the table, GWP range from 1 for carbon dioxide to 23,900 for sulfur hexafluoride.

Table 4.6-3

Global Warming Potentials and Atmospheric Lifetime of Select GHGs

Gas	Atmospheric Lifetime (years)	Global Warming Potential (GWP) (100 year time horizon)
Carbon Dioxide	50-200	1
Methane	12 ± 3	21
Nitrous Oxide	120	310
HFC-23	264	11,700
HFC-134a	14.6	1,300
HFC-152a	1.5	140
PFC: Tetrafluoromethane (CH ₄)	50,000	6,500
PFC: Hexafluoroethane (C ₂ F ₆)	10,000	9,200
Sulfur Hexafluoride (SF ₆)	3,200	23,900

Source: EPA 2006 (URL: <http://www.epa.gov/nonco2/econ-inv/table.html>)

Water Vapor: Water vapor (H₂O) is the most abundant, important, and variable greenhouse gas in the atmosphere. Water vapor is not considered a pollutant; in the atmosphere it maintains a climate necessary for life. Changes in its concentration are primarily considered to be a result of climate feedbacks related to the warming of the atmosphere rather than a direct result of industrialization. A climate feedback is an indirect, or secondary, change, either positive or negative, that occurs within the climate system in response to a forcing mechanism. The feedback loop in which water is involved is critically important to projecting future climate change.

As the temperature of the atmosphere rises, more water is evaporated from ground storage (rivers, oceans, reservoirs, soil). Because the air is warmer, the relative humidity can be higher (in essence, the air is able to 'hold' more water when it is warmer), leading to more water vapor in the atmosphere. As a GHG, the higher concentration of water vapor is then able to absorb more thermal indirect energy radiated from the Earth, thus further warming the atmosphere. The warmer atmosphere can then hold more water vapor. This is referred to as a "positive feedback loop." The extent to which this positive feedback loop will continue is unknown as there are also dynamics that hold the positive feedback loop in check. As an example, when water vapor increases in the atmosphere, more of it will eventually also condense into clouds, which are more able to reflect incoming solar radiation (thus allowing less energy to reach the Earth's surface and heat it up).

There are no human health effects from water vapor itself; however, when some pollutants come in contact with water vapor, they can dissolve and the water vapor can then act as a pollutant-carrying agent. The main source of water vapor is evaporation from the oceans (approximately 85 percent).²³ Other sources include: evaporation from other water bodies, sublimation (change from solid to gas) from sea ice and snow, and transpiration from plant leaves.

Carbon Dioxide: Carbon dioxide (CO₂) is an odorless and colorless GHG. Outdoor levels of carbon dioxide are not high enough to result in negative health effects. Carbon dioxide is emitted from natural and manmade sources. Natural sources include: the decomposition of dead organic matter; respiration of bacteria, plants, animals and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources include: the burning of coal, oil, natural gas, and wood. Carbon dioxide is naturally removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and chemical weathering of carbonate rocks.²⁴

Since the industrial revolution began in the mid-1700s, the sort of human activity that increases GHG emissions has increased dramatically in scale and distribution. Data from the past 50 years suggests a corollary increase in levels and concentrations. As an example, prior to the industrial revolution, CO₂ concentrations were fairly stable at 280 parts per million (ppm). Today, they are around 370 ppm, an increase of more than 30 percent. Left unchecked, the concentration of carbon dioxide in the atmosphere is projected to increase to a minimum of 540 ppm by 2100 as a direct result of anthropogenic sources.²⁵

Methane: Methane (CH₄) is an extremely effective absorber of radiation, though its atmospheric concentration is less than carbon dioxide and its lifetime in the atmosphere is brief (10-12 years), compared to other GHGs.

Methane has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of methane. Other anthropocentric sources include fossil-fuel combustion and biomass burning.²⁶

²³ California Energy Commission, "Inventory of California Greenhouse Gas Emissions and Sinks," <http://www.energy.ca.gov/2005publications/CEC-600-2005-025/CEC-600-2005-025.PDF>. 2005.

²⁴ On a warmer Earth, chemical weathering is promoted by more vigorous cycling of water through the atmosphere and higher temperatures. "More chemical weathering removes more CO₂ from the atmosphere as carbonic acid reacts with silicate minerals, producing bicarbonate ion." *Carbon Cycle and Climate Change* - J Bret Bennington, Hofstra University. http://www.cengage.com/custom/enrichment_modules/data/Carbon_Cycle_0495738557_LowRes.pdf

²⁵ International Panel on Climate Change 2007, "Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report," http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm

²⁶ *Ibid.*

Nitrous Oxide: Nitrous oxide (N₂O), also known as laughing gas, is a colorless greenhouse gas. Nitrous oxide can cause dizziness, euphoria, and sometimes slight hallucinations. In small doses, it is considered harmless. However, in some cases, heavy and extended use can cause Olney's Lesions (brain damage).²⁷

Concentrations of nitrous oxide also began to rise at the beginning of the industrial revolution. In 1998, the global concentration was 314 parts per billion (ppb).²⁸ Nitrous oxide is produced by microbial processes in soil and water, including those reactions which occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, i.e., in whipped cream bottles. It is also used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars. Nitrous oxide can be transported into the stratosphere, be deposited on the Earth's surface, and be converted to other compounds by chemical reaction

Chlorofluorocarbons: Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane (C₂H₆) with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble and chemically unreactive in the troposphere (the level of air at the Earth's surface). CFCs are no longer being used; therefore, it is not likely that health effects would be experienced. Nonetheless, in confined indoor locations, working with CFC-113 or other CFCs is thought to result in death by cardiac arrhythmia (heart frequency too high or too low) or asphyxiation.

CFCs have no natural source, but were first synthesized in 1928. They were used for refrigerants, aerosol propellants and cleaning solvents. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and was extremely successful, so much so that levels of the major CFCs are now remaining steady or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years.

Hydrofluorocarbons: Hydrofluorocarbons (HFCs) are synthetic, man-made chemicals that are used as a substitute for CFCs. Out of all the GHGs, they are one of three groups with the highest global warming potential. The HFCs with the largest measured atmospheric abundances are (in order), HFC-23 (CHF₃), HFC-134a (CF₃CH₂F), and HFC-152a (CH₃CHF₂). Prior to 1990, the only significant emissions were of HFC-23. HFC-134a emissions are increasing due to its use as a refrigerant. The EPA estimates that concentrations of HFC-23 and HFC-134a are now about 10 parts per trillion (ppt) each; and that concentrations of HFC-152a are about 1 ppt.²⁹ No health effects are known to result from exposure to HFCs, which are manmade for applications such as automobile air conditioners and refrigerants.

Perfluorocarbons: Perfluorocarbons (PFCs) have stable molecular structures and do not break down through chemical processes in the lower atmosphere. High-energy ultraviolet rays, which occur about 60 kilometers above Earth's surface, are able to destroy the compounds. Because of this, PFCs have very long lifetimes,

²⁷ U.S. Department of Labor. *Occupational Safety and Health Guideline for Nitrous Oxide.* <http://www.osha.gov/SLTC/healthguidelines/nitrousoxide/recognition.html>

²⁸ *Ibid.*

²⁹ U.S. EPA. *High Global Warming Potential (GWP) Gases.* <http://www.epa.gov/highgwp/scientific.html>

between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane (CF₄) and hexafluoroethane (C₂F₆). The U.S. EPA estimates that concentrations of CF₄ in the atmosphere are over 70 ppt.³⁰

No health effects are known to result from exposure to PFCs. The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

Sulfur Hexafluoride: Sulfur hexafluoride (SF₆) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest GWP of any gas evaluated (23,900). The U.S. EPA indicates that concentrations in the 1990s were about 4 ppt.³¹ In high concentrations in confined areas, the gas presents the hazard of suffocation because it displaces the oxygen needed for breathing.

Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

(4) Effects of Climate Change in California

The CalEPA published a report titled “Scenarios of Climate Change in California: An Overview” (Climate Scenarios report) in February 2006 (California Climate Change Center 2006), that while not adequate for a CEQA project-specific or cumulative analysis, is generally instructive about the statewide impacts of global warming.

The Climate Scenarios report uses a range of emissions scenarios developed by the Intergovernmental Panel on Climate Change (IPCC) to project a series of potential warming ranges (i.e., temperature increases) that may occur in California during the 21st century: lower warming range (3.0-5.5°F); medium warming range (5.5-8.0°F); and higher warming range (8.0-10.5°F). The Climate Scenarios report then presents an analysis of future climate in California under each warming range, that while uncertain, present a picture of the impacts of GCC trends in California.

In addition, on August 5, 2009, the State’s Natural Resources Agency released a public review draft of its “California Climate Adaptation Strategy” report that details many vulnerabilities arising from climate change with respect to matters such as temperature extremes, sea level rise, wildfires, floods and droughts and precipitation changes.

According to the reports, substantial temperature increases arising from increased GHG emissions potentially could result in a variety of impacts on the people, economy, and environment of California associated with a projected increase in extreme conditions, with the severity of the impacts depending upon actual future emissions of GHGs and associated warming. Under the emissions scenarios of the Climate Scenarios report, the impacts of global warming in California have the potential to include, but are not limited to, the following areas:

³⁰ *Ibid.*

³¹ *Ibid.*

(a) Public Health

According to CalEPA, higher temperatures may increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to ozone formation could increase from 25 to 35 percent under the lower warming range to 75 to 85 percent under the medium warming range. In addition, if global background ozone levels increase as predicted in some scenarios, it may become difficult to meet local air quality standards. Air quality could be further compromised by increases in wildfires, which emit fine particulate matter that can travel long distances, depending on wind conditions. The Climate Scenarios report indicates that large wildfires could become more frequent if GHG emissions are not significantly reduced.

In addition, under the higher warming range scenario, there could be up to 100 more days per year with temperatures above 90°F in Los Angeles and 95°F in Sacramento by 2100. This is a large increase over historical patterns and approximately twice the increase projected, if temperatures remain within or below the lower warming range. Rising temperatures could increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

(b) Water Resources

A vast network of man-made reservoirs and aqueducts captures and transports water throughout the state from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages.

If temperatures continue to increase, more precipitation could fall as rain instead of snow, and the snow that does fall could melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. Under the lower warming range scenario, snowpack losses could be only half as large as those possible if temperatures were to rise to the higher warming range. How much snowpack could be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snowpack could pose challenges to water managers and hamper hydropower generation. It could also adversely affect winter tourism. Under the lower warming range, the ski season at lower elevations could be reduced by as much as a month. If temperatures reach the higher warming range and precipitation declines, there might be many years with insufficient snow for skiing and snowboarding.

The State's water supplies are also at risk from rising sea levels. An influx of saltwater could degrade California's estuaries, wetlands, and groundwater aquifers. Saltwater intrusion caused by rising sea levels is a major threat to the quality and reliability of water within the southern edge of the Sacramento/San Joaquin River Delta – a major fresh water supply.

(c) Agriculture

Increased temperatures could cause widespread changes to the agriculture industry reducing the quantity and quality of agricultural products statewide. First, California farmers could possibly lose as much as 25 percent of the water supply they need. Although higher CO₂ levels can stimulate plant production and increase plant water-use efficiency, California's farmers could face greater water demand for crops and a less

reliable water supply as temperatures rise. Crop growth and development could change, as could the intensity and frequency of pest and disease outbreaks. Rising temperatures could aggravate ozone (O₃) pollution, which makes plants more susceptible to disease and pests and interferes with plant growth.

Plant growth tends to be slow at low temperatures, increasing with rising temperatures up to a threshold. However, faster growth can result in less-than-optimal development for many crops, so rising temperatures could worsen the quantity and quality of yield for a number of California's agricultural products. Products likely to be most affected include wine grapes, fruits and nuts.

In addition, continued GCC could shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion could occur in many species while range contractions may be less likely in rapidly evolving species with significant populations already established. Should range contractions occur, new or different weed species could fill the emerging gaps. Continued GCC could alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates.

(d) Forests and Landscapes

Global climate change has the potential to intensify the current threat to forests and landscapes by increasing the risk of wildfire and altering the distribution and character of natural vegetation. If temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55 percent, which is almost twice the increase expected if temperatures stay in the lower warming range. However, since wildfire risk is determined by a combination of factors, including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the state.

Moreover, continued GCC has the potential to alter natural ecosystems and biological diversity within the state. For example, alpine and subalpine ecosystems could decline by as much as 60 to 80 percent by the end of the century as a result of increasing temperatures. The productivity of the state's forests has the potential to decrease as a result of GCC.

(e) Rising Sea Levels

Rising sea levels, more intense coastal storms, and warmer water temperatures could increasingly threaten the state's coastal regions. Under the higher warming range scenario, sea level is anticipated to rise 22 to 35 inches by 2100. Elevations of this magnitude would inundate low-lying coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats. Under the lower warming range scenario, sea level could rise 12-14 inches.

(5) Human Health Effects

The potential health effects related directly to the emissions of carbon dioxide, methane, and nitrous oxide as they relate to development projects such as the Project are still being debated in the scientific community. Their cumulative effects to GCC have the potential to cause adverse effects to human health. Increases in Earth's ambient temperatures would result in more intense heat waves, causing more heat-related deaths. Scientists also purport that higher ambient temperatures would increase disease survival rates and result in

more widespread disease. Climate change will likely cause shifts in weather patterns, potentially resulting in devastating droughts and food shortages in some areas.

Specific health effects associated with directly emitted GHG emissions are as follows:

Water Vapor: There are no known direct health effects related to water vapor at this time. It should be noted however that when some pollutants react with water vapor, the reaction forms a transport mechanism for some of these pollutants to enter the human body through water vapor.

Carbon Dioxide: According to the National Institute for Occupational Safety and Health (NIOSH) high concentrations of CO₂ can result in health effects such as: headaches, dizziness, restlessness, difficulty breathing, sweating, increased heart rate, increased cardiac output, increased blood pressure, coma, asphyxia, and/or convulsions. It should be noted that current concentrations of CO₂ in the earth's atmosphere are estimated to be approximately 370 ppm, the actual reference exposure level (level at which adverse health effects typically occur) is at exposure levels of 5,000 ppm averaged over 10 hours in a 40-hour workweek and short-term reference exposure levels of 30,000 ppm averaged over a 15 minute period.

Methane: Methane is extremely reactive with oxidizers, halogens, and other halogen-containing compounds. Methane is also an asphyxiant and may displace oxygen in an enclosed space.

Nitrous Oxide: Nitrous Oxide is often referred to as laughing gas; it is a colorless greenhouse gas. The health effects associated with exposure to elevated concentrations of nitrous oxide include dizziness, euphoria, slight hallucinations, and in extreme cases of elevated concentrations nitrous oxide can also cause brain damage.

Fluorinated Gases: High concentrations of fluorinated gases can also result in adverse health effects such as asphyxiation, dizziness, headache, cardiovascular disease, cardiac disorders, and in extreme cases, increased mortality.

Aerosols: The health effects of aerosols are similar to that of other fine particulate matter. Thus aerosols can cause elevated respiratory and cardiovascular diseases as well as increased mortality.

(6) Existing Greenhouse Gas Emissions

The project site currently has five oil wells in operation. During operation, the wells emit GHGs as a result of energy usage for equipment (process heaters and pumps) and fugitive emissions from the well heads during oil extraction. Fugitive emissions from oil production operations are limited by South Coast Air Quality management District (SCAQMD) Rule 1148 which includes methane emissions (refer to Section 4.2, *Air Quality*, for further details on SCAQMD Rules). More specifically, Rule 1148 requires emissions controls on oil wells to minimize release of gases emitted during drilling activities. The site also has an idle well and abandoned well. Rule 1148 also includes requirements for abandoned wells which limit the amount of emissions from such wells. Therefore, existing CO₂e emissions are minimal.

2. ENVIRONMENTAL IMPACTS

a. Methodology

The evaluation of potential impacts related to the emission of greenhouse gasses is based on the comparison of the Project to the thresholds stated below and applicable regulatory requirements. The analysis is based on the information contained in the *Cielo Vista Greenhouse Gas Analysis, County of Orange, California*, prepared by Urban Crossroads, Inc., dated March 7, 2013.

Given that various agencies have provided guidance on assessing impacts associated with GHGs, the following discussions provide an overview of the significance thresholds available to assess such impacts.

(1) CARB's Preliminary Draft Staff Proposal for Interim Significance Thresholds

Separate from its Scoping Plan approved in December of 2008, CARB issued a Staff Proposal in October 2008, as its first step toward developing recommended statewide interim thresholds of significance for GHGs that may be adopted by local agencies for their own use. CARB staff's objective in this proposal is to develop a threshold of significance that will result in the vast majority (approximately 90 percent statewide) of GHG emissions from new industrial projects being subject to CEQA's requirement to impose feasible mitigation. The proposal does not attempt to address every type of project that may be subject to CEQA, but instead focuses on common project types that, collectively, are responsible for substantial GHG emissions – specifically, industrial, residential, and commercial projects. CARB is developing these thresholds in these sectors to advance climate objectives, streamline project review, and encourage consistency and uniformity in the CEQA analysis of GHG emissions throughout the state. These draft thresholds are under revision in response to comments. There is currently no timetable for finalized thresholds at this time.

As currently proposed by CARB, the threshold consists of a quantitative threshold of 7,000 metric tons (MT) of CO₂e per year for operational emissions (excluding transportation), and performance standards for construction and transportation emissions. These performance standards have not yet been developed.

However, CARB's proposal is not yet final, and thus cannot be applied to the Project. Further, CARB's proposal sets forth draft thresholds for industrial projects that have high operational stationary GHG emissions, such as manufacturing plants, or uses that utilize combustion engines. Thus, mobile source emissions are not addressed. This Project's GHG emissions are mostly from mobile sources, and as such, the CARB proposal is not applicable to the Project.

(2) South Coast Air Quality Management District Recommendations for Significance Thresholds:

In April 2008, the SCAQMD, in order to provide guidance to local lead agencies on determining the significance of GHG emissions identified in CEQA documents, convened a "GHG CEQA Significance Threshold Working Group." The goal of the working group is to develop and reach consensus on an acceptable CEQA significance threshold for GHG emissions that would be utilized on an interim basis until CARB (or some other state agency) develops statewide guidance on assessing the significance of GHG emissions under CEQA.

Initially, SCAQMD staff presented the working group with a significance threshold that could be applied to various types of projects—residential; non-residential; industrial; etc. However, the threshold is still under development. In December 2008, staff presented the SCAQMD Governing Board with a significance

threshold for stationary source projects where it is the lead agency. This threshold uses a tiered approach to determine a project's significance, with 10,000 metric tons of carbon dioxide equivalent (MTCO_{2e}) as a screening numerical threshold for stationary sources.

In September 2010, the Working Group released additional revisions which recommended a threshold of 3,500 MTCO_{2e} for residential projects, 1,400 MTCO_{2e} for commercial projects, and 3,000 MTCO_{2e} for mixed use or all land use projects. Additionally the working group identified project-level efficiency target of 4.8 MTCO_{2e} per service population as a 2020 target and 3.0 MTCO_{2e} per service population as a 2035 target. The recommended plan-level target for 2020 was 6.6 MTCO_{2e} and the plan level target for 2035 was 4.1 MTCO_{2e}. The SCAQMD has not announced when staff is expecting to present a finalized version of these thresholds to the Governing Board. The SCAQMD has also adopted Rules 2700, 2701, and 2702 that address GHG reductions; however, these rules are currently applicable to boilers and process heaters, forestry, and manure management projects.

(3) Project Thresholds Utilized by the County of Orange

As discussed above, the CEQA Guideline amendments do not identify a threshold of significance for greenhouse gas emissions, nor do they prescribe assessment methodologies or specific mitigation measures. Instead, they call for a "good-faith effort, based on available information, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project." Neither SCAQMD nor the County of Orange has adopted a significance threshold for the GHG emissions from non-industrial development projects. Consequently, the County has determined, pursuant to the discretion afforded by Sections 15064.4(a) and 15064.4(b) of the CEQA Guidelines, to quantify the GHG emissions from the Project based on the methodologies proposed by SCAQMD. In the absence of adopted thresholds, the County has determined to assess the significance of the Project's GHG emissions using: (1) the SCAQMD's recommended Tier 3 screening threshold of 3,000 MTCO_{2e}/yr for all land use types, and (2) an analysis of the Project's consistency with plans, policies, and regulations adopted for the purpose of reducing GHG emissions. It is noted that the use of the SCAQMD's screening threshold is selected as a threshold for the proposed Project because it is located in the South Coast Air Basin and these thresholds are based on the best available information and data at the time of preparation of this analysis. The development of CEQA project-level thresholds is an ongoing effort on State, regional, and County levels, and significance thresholds may differ for future projects based on further data and information that may be available at that time.

(4) Project Related Greenhouse Gas Emissions

CEQA Guidelines Section 15064.4 (b)(1) states that a lead agency may use a model or methodology to quantify greenhouse gas emissions associated with a project.

On February 3, 2011, the SCAQMD released the California Emissions Estimator Model (CALEEMOD) Emissions Inventory Model™. The purpose of this model is to more accurately calculate air quality and GHG emissions from direct and indirect sources and quantify applicable air quality and GHG reductions achieved from mitigation measures. As such, the February 2011 CALEEMOD™ was used for this Project. The CalEEMod™ model includes GHG emissions from the following source categories: construction, area, energy, mobile, waste, water. Below is a discussion of each of these source categories.

(a) Construction Emissions

Construction activities associated with the Project would result in emissions of CO₂ and CH₄ from the following construction activities:

- Site Preparation
- Grading
- Building Construction
- Paving
- Architectural Coatings (Painting)
- Construction Workers Commuting

CalEEMod model defaults for duration of specific construction activity and the number and type of equipment were utilized. Please refer to specific detailed modeling inputs/outputs contained in Appendix B of this Draft EIR for a detailed summary of construction equipment assumptions by phase.

Construction emissions for construction worker vehicles traveling to and from the project site, as well as vendor trips (construction materials delivered to the project site) were estimated based on CalEEMod defaults. "Site preparation" is expected to occur from January 2014 through March 2014; Grading activities are expected to occur from March 2014 through June 2014; Building Construction is expected to occur from June 2014 through June 2015; Paving is expected to occur from June 2015 through August 2015; and Architecture Coating is expected to occur from August 2015 through November 2015. This construction schedule represents a "worst-case" analysis scenario should construction occur any time after these respective dates since emission factors for construction equipment decrease as the analysis year increases.

For construction phase project emissions, GHGs are quantified and amortized over the life of the project. To amortize the emissions over the life of the project, the SCAQMD recommend calculating the total greenhouse gas emissions for the construction activities, dividing it by the project life (i.e., 30 years) then adding that number to the annual operational phase GHG emissions (SCAQMD, 2009). As such, construction emissions were amortized over a 30 year period and added to the annual operational phase GHG emissions.

(b) Operational Emissions

Operational activities associated with the Project would result in emissions of CO₂, CH₄, and N₂O from the following primary sources:

- Building Energy Use
- Water Supply, Treatment and Distribution
- Solid Waste
- Mobile Source Emissions

Building Energy Use. GHGs are emitted from buildings as a result of activities for which electricity and natural gas are typically used as energy sources. Combustion of any type of fuel emits CO₂ and other GHGs directly into the atmosphere; these emissions are considered direct emissions associated with a building.

GHGs are also emitted during the generation of electricity from fossil fuels; these emissions are considered to be indirect emissions. Unless otherwise noted, CalEEMod™ default parameters were used.

Water Supply, Treatment and Distribution. Indirect GHG emissions result from the production of electricity used to convey, treat and distribute water and wastewater. The amount of electricity required to convey, treat and distribute water depends on the volume of water as well as the sources of the water. Unless otherwise noted, CalEEMod™ default parameters were used.

Solid Waste. Residential land uses will result in the generation and disposal of solid waste. A large percentage of this waste will be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting. The remainder of the waste not diverted would be disposed of at a landfill. GHG emissions from landfills are associated with the anaerobic breakdown of material. GHG emissions associated with the disposal of solid waste associated with the Project were calculated by the CalEEMod™ model using default parameters.

Mobile Source Emissions. GHG emissions would also result from mobile sources associated with the Project. These mobile source emissions will result from the typical daily operation of motor vehicles by visitors, employees, and customers. Project mobile source emissions are dependent on both overall daily vehicle trip generation. Trip characteristics available from the report, *Cielo Vista Traffic Impact Analysis* (Urban Crossroads, Inc., July 2012) were utilized in this analysis. This report is included as Appendix K in this Draft EIR.

In summary, based on the emissions calculated in the CalEEMod™ model for construction and operational activities associated with the Project, the GHG emissions are compared to the Project thresholds utilized by the County of Orange, as described above, to determine if the Project would either directly or indirectly, have a significant impact on the environment.

b. Thresholds of Significance

Appendix G of the *CEQA Guidelines* and the County of Orange Environmental Analysis Checklist provide thresholds of significance to determine whether a project would have a significant environmental impact regarding greenhouse gas emissions. Based on the size and scope of the Project and the potential for GHG impacts, the thresholds identified below are included for evaluation in this Draft EIR.

Would the Project:

- Threshold 1: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
- Threshold 2: Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

c. Project Design Features

No Project Design Features (PDFs) have been identified for the Project specifically related to GHG impacts. However, it acknowledged that the Project would be required to comply with all mandatory regulatory requirements imposed by the State of California and the SCAQMD aimed at the reduction of GHG emissions. Those that are particularly applicable to the Project and that would assist in the reduction of GHG emissions are:

- Global Warming Solutions Act of 2006 (AB32 Chapter 488, Statutes of 2006)
- Regional GHG Emissions Reduction Targets/Sustainable Communities Strategies (SB 375, Chapter 728, Statutes of 2008)
- Pavely Fuel Efficiency Standards (AB1493, Chapter 200, Statutes of 2002). Establishes fuel efficiency ratings for new vehicles.
- Title 24 California Code of Regulations (California Building Code). Establishes energy efficiency requirements for new construction.
- Title 20 California Code of Regulations (Appliance Energy Efficiency Standards). Establishes energy efficiency requirements for appliances.
- Title 17 California Code of Regulations (Low Carbon Fuel Standard). Requires carbon content of fuel sold in California to be 10% less by 2020.
- California Water Conservation in Landscaping Act of 2006 (AB1881) (Laird, Chapter 559, Statutes of 2006)³². Requires local agencies to adopt the Department of Water Resources updated Water Efficient Landscape Ordinance or equivalent by January 1, 2010 to ensure efficient landscapes in new development and reduced water waste in existing landscapes.
- Statewide Retail Provider Emissions Performance Standards (SB 1368) (Perata, Chapter 598, Statutes of 2006). Requires energy generators to achieve performance standards for GHG emissions.
- Renewable Portfolio Standards (SB 1078) (Sher, Chapter 516, Statutes of 2002). Requires electric corporations to increase the amount of energy obtained from eligible renewable energy resources to 20 percent by 2010 and 33 percent by 2020.

d. Analysis of Project Impacts

GENERATION OF GHGs

Threshold	Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
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4.6-1 Based on the applicable threshold of significance utilized by the County of Orange, Project implementation would not generate greenhouse gas emissions, either directly or indirectly, such that a significant impact on the environment would occur. A less than significant impact would occur in this regard.

³² http://www.energy.ca.gov/appliances/irrigation/ab_1881_bill_20060928_chaptered.pdf.

The annual GHG emissions associated with the construction and operation of the Project are summarized in **Table 4.6-4, Total Project Greenhouse Gas Emissions**. As shown therein, the Project is estimated to generate 2,283 MTCO₂e per year. The County's threshold for determining if the Project would result in a significant impact is 3,000 MTCO₂e per year. As the Project would not exceed the County's threshold, the Project would result in a less than significant impact with respect to GHG emissions. The emissions shown in Table 4.6-4 do not include emissions generated by potential future oil operations, which are discussed below.

Table 4.6-4**Total Project Greenhouse Gas Emissions (Annual) (Metric Tons Per Year)**

Emission Source	Emissions (metric tons per year) ^{a,b,c}			
	CO ₂	CH ₄	N ₂ O	Total CO ₂ E
Annual construction-related emissions amortized over 30 years	36	0.003	--	36
Area Source Emissions	75	--	--	75
Energy	463	0.01	0.01	466
Mobile Sources	1,595	0.06	--	1,596
Waste	27	1.57	--	60
Water Usage	43	0.22	0.01	50
Total CO₂E (All Sources)^e				2,283
SCAQMD Threshold MT CO₂E/Yr (All Land Uses) Significant?				3,000.00
				NO

^a CalEEMod™ model output utilized to calculate GHG emissions. Numbers may not add up exactly due to rounding.

^b Totals obtained from CalEEMod™

^c The first three columns in the table represent CO₂, CH₄, and N₂O, all of which have different global warming factors, in order to normalize emissions for comparison purposes, GHG totals in the far right column are presented in terms of a CO₂E or carbon dioxide equivalent value. As such, the total in the far right column for each row does not equal the total of the emissions in the first three columns.

^e Existing uses include five operating wells. These wells would be abandoned during project implementation and may be reconsolidated to the drilling pad which would result in no net increase in GHG emissions. Therefore, these emissions are not included as part of the emissions in the table.

Source: Cielo Vista Greenhouse Gas Analysis, County of Orange, California, prepared by Urban Crossroads, Inc., dated March 7, 2013.

The Project would include a 1.8-acre parcel located in Planning Area 1 (also referred to as the "drilling pad") that could be utilized for continued oil operations including consolidation of wells relocated from the rest of the project site and slant drilling of new wells below ground. However, the Project is not proposing new oil wells and as such, would not drill new wells. The drilling pad would be made available to the current oil operators following the Project's construction activities for continued oil operations with permitting and site planning to be pursued by the oil operators. Should construction of the reconsolidated wells occur following

development of the project site, the construction activities would be limited to the installation of the wells and screening, as necessary. But, development of the drilling pad is also part of the Project.

As discussed in Section 4.7, *Hazards and Hazardous Materials*, prior to grading activities, existing on-site oil wells and facilities, and production facilities would be abandoned or re-abandoned, as necessary, in accordance with California Division of Oil, Gas and Geothermal Resources (DOGGR) standards (see PDF 7-1 in Section 4.7). To ensure that all wells are properly abandoned, Mitigation Measure 4.7-4 (in Section 4.7) requires a qualified environmental consultant to inspect the abandoned wells and perform a review of well decommission documentation. Mitigation Measure 4.7-4 and PDF 7-1 provide for the safe abandonment or re-abandonment of oil wells on the project site in compliance with DOGGR requirements and would effectively ensure that methane and other GHG emissions are not released from the abandoned wells such that significant impacts on the environment could occur.

Should oil wells be reconsolidated to the drilling pad, they would be installed per applicable DOGGR, OCFA and County of Orange requirements (refer to PDF 7-4 in Section 4.7). Also, as discussed in Section 4.2, *Air Quality*, the Project would comply with applicable SCAQMD Rules such as: SCAQMD Regulation XIII, Rule 1146 (Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters); Rule 1146.1 (Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters), Rule 1148.1 (Oil and Gas Production Wells); and Rule 1401 (New Source Review of Toxic Air Contaminants). Each of these rules is described in the Regulatory Framework sub-section in Section 4.2. The number of potential wells would not be increased compared to existing conditions. Accordingly, with compliance to the above referenced SCAQMD rules and utilization of current best available, lowest-emitting control technology as part of the new wells per SCAQMD Regulation XIII, the reconsolidated wells would be more energy efficient and lower-GHG emitting than those currently on the project site. Therefore, as GHG emissions from the reconsolidated wells would not be greater than under existing conditions and in consideration of the factors cited above, operational GHG impacts associated with the potential new oils wells would be less than significant.

CONSISTENCY WITH APPLICABLE GHG PLANS

Threshold	Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?
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4.6-2 *The Project would not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. As such, a less than significant impact would occur in this regard.*

AB 32 is the State of California's primary GHG emissions regulation, as previously discussed. The SCAQMD GHG significance threshold was designed to ensure compliance with AB 32 emissions reductions requirements in the South Coast Air Basin. Therefore, if a proposed project emits below the draft significance threshold it can be assumed to comply with AB 32 within the SCAQMD's jurisdiction. As the Project would emit less than 3,000.00 MTCO_{2e} per year, the Project would not conflict with the state's ability to achieve the reduction targets defined in AB 32. Further, the Project would be developed in a manner consistent with Title 24 of the CBC which establishes energy efficiency requirements for new construction. Also, the Project would be consistent with the growth projections for the project area in the County's General

Plan and larger area designated as the Murdock/Travis Property in the Land Use Element of the City of Yorba Linda, as discussed in Section 4.9, *Land Use and Planning*. Finally, the Project would also comply with the various regulations outlined in the discussion of Project Design Features above, which would further reduce GHG emissions. As such, the Project would have a less than significant impact in this regard.

3. CUMULATIVE IMPACTS

4.6-3 *The Project combined with the related projects would not result in substantial adverse effects related to global climate change. Thus, cumulative greenhouse gas emissions impacts would be less than significant.*

Under Section 15064(h)(1) of the CEQA Guidelines, a project must be assessed to determine if it would have a cumulatively considerable effect on a resource, where cumulatively considerable is defined as "...the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects."³³ Section 15064(h)(4) further states, "The mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable."³⁴

The California Air Pollution Control Officers Association (CAPCOA), a statewide organization made up of representatives of all California Air Quality Management Districts and Air Pollution Control Districts, has stated that it is generally the case that an individual project of this size is of insufficient magnitude by itself to influence climate change or result in a substantial contribution to the global GHG inventory.³⁵ CAPCOA has also stated that "GHG impacts are exclusively cumulative impacts; there are no non-cumulative GHG emission impacts from a climate change perspective."³⁶ Therefore, the fact that the Project would result in emissions of GHGs (chiefly carbon dioxide), and that global GHG emissions, including those from the neighboring Esperanza Hills project, contribute to global climate change, does not necessarily mean that the Project would have a cumulatively considerable impact on global climate.

The amount of GHGs emitted to the atmosphere which will result in climate change is not precisely known, but it is clear that the quantity is very large. On a global scale, no single project alone will measurably contribute to a noticeable incremental change in global average temperature. Therefore, GHG impacts to global climate change are inherently cumulative. On a statewide level, California has set goals within AB 32 which will reduce the rate of GHG emissions and the state's associated contribution to climate change.

Project-level thresholds defined above are based on AB 32 goals and provide a useful means by which to compare one project to another and to evaluate whether a project is consistent with statewide goals. The SCAQMD Tier 3 screening threshold of 3,000 MTCO₂e/yr for all land use types was designed to capture 90

³³ California Environmental Quality Act (CEQA) Guidelines, *California Code of Regulations (CCR), Title 14, Division 6, Chapter 3, Section 15064*.

³⁴ *Ibid.*

³⁵ *California Air Pollution Control Officers Association, CEQA & Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act, (2008) 35.*

³⁶ *Ibid.*

percent of GHG emissions from land use projects.³⁷ As discussed above, the Project would result in less than significant impacts with regard to construction and operational GHG emissions. As shown in Table 4.6-4, the GHG emissions from the Project would not exceed the SCAQMD threshold of significance. As with the Project, it is expected that other related projects in the vicinity and throughout the State would be required to comply with energy efficiency requirements for new construction and other regulations intended to support compliance with AB 32. Furthermore, other air districts within the state have established that projects which are consistent with project-level GHG thresholds would not be “cumulatively considerable”.³⁸ As the Project would result in less than significant impacts based on AB 32 derived thresholds, the Project would not have cumulatively considerable impacts. In addition to compliance with AB 32 goals, the Project would be developed in a manner consistent with Title 24 of the CBC which establishes energy efficiency requirements for new construction and would incorporate Project Design Features to reduce GHG emissions.

Overall, the Project would not exceed GHG significance thresholds and would not conflict with applicable plans to reduce GHG emissions. Therefore, the incremental GHG emissions from the Project would result in a less than significant project-level and cumulative-level impact.

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³⁸ Bay Area Air Quality Management District Proposed Air Quality CEQA Thresholds of Significance. May 3, 2010.

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