4.6 GREENHOUSE GAS EMISSIONS

4.6.1 Existing Conditions

Introduction/Background

The Earth's climate has changed many times during the planet's history, with events ranging from ice ages to long periods of warmth. Historically, natural factors such as volcanic eruptions, changes in the Earth's orbit, and the amount of energy released from the Sun have affected the Earth's climate.

The Earth's greenhouse effect is a natural occurrence that helps regulate the temperature of our planet. When the Sun heats the Earth, some of this heat escapes back to space. The rest of the heat, also known as infrared radiation, is trapped in the atmosphere by clouds and greenhouse gases (GHGs), such as water vapor and carbon dioxide (CO_2), which occur naturally. If all of these GHGs were to suddenly disappear, our planet would be 60°F colder and could not support life as we know it. Since the Industrial Revolution in the 1700s, most scientists agree that human activities, including burning of oil, coal, and gas and deforestation, increased CO_2 concentrations in the atmosphere by 35 percent as of 2005.~~However, beginning in the late 18th century human activities associated with the Industrial Revolution have enhanced the natural greenhouse effect by adding GHGs to the natural mix at a faster rate than at any other time on record.~~[1] The five major fuel consuming sectors contributing to CO2 emissions from fossil fuel combustion are electricity generation, transportation, industrial, residential, and commercial.

Scientists have observed a global warming trend beginning around the late 1800s. The global temperature record shows an average warming of about 1.3°F over the past century. The most rapid warming has occurred in recent decades. According to the National Oceanic and Atmospheric Administration (NOAA), seven of the eight warmest years on record have occurred since 2001. Within the past 30 years, the rate of warming across the globe has been approximately three times greater than the rate over the last 100 years. Past climate information suggests the warmth of the last half-century is unusual in at least the previous 1,300 years in the Northern Hemisphere. The preponderance of scientific evidence indicates that most of this recent warming is very likely the result of human activities.

In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change (IPCC) to assess the scientific, technical, and socioeconomic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation. In February 2007, the IPCC issued a report on global climate change. The IPCC concluded that warming of the Earth's climate system is now "unequivocal" (i.e., "definite") and that changes in climate are now affecting physical and biological systems on every continent. The IPCC bases these conclusions on observations of increases in average air and ocean temperatures, melting of snow and ice, and rising average sea level across the globe.

The IPCC's best estimates are that the average global temperature rise between years 2000 and 2100 could range from 0.6 degrees Celsius (1.08 degrees Fahrenheit) with no increase in GHG emissions above 2000 levels, to 4.0 degrees Celsius (7.2 degrees Fahrenheit) with a

[1] Environmental Protection Agency (EPA), *Frequently Asked Questions About Global Warming and Climate Change: Back to Basics, http://www.epa.gov/climatechange/downloads/Climate_Basics.pdf. Accessed 12/13/11.*

substantial increase in GHG emissions (IPCC, 2007). Large increases in global temperatures could have massive deleterious impacts on the natural and human environments.

Climate change could impact the natural environment in California by triggering, among others things:

- Rising sea levels along the California coastline;
- Extreme-heat conditions, such as heat waves and very high temperatures, which could last longer and become more frequent;
- Increase in heat-related human deaths, an increase in infectious diseases, and a higher risk of respiratory problems caused by deteriorating air quality;
- Reduced snow pack and stream flow in the Sierra Nevada mountains, affecting winter recreation and water supplies;
- Potential increase in the severity of winter storms, affecting peak stream flows and flooding;
- Changes in growing season conditions that could affect California agriculture, causing variations in crop quality and yield; and
- Changes in distribution of plant and wildlife species due to changes in temperature, competition from colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects.

These changes in California's climate and ecosystems could occur at a time when California's population is expected to increase from 34 million to 59 million by the year 2040 (California Energy Commission, 2005).

In 2004, total worldwide greenhouse gas emissions were estimated to be 20,135 Million Metric Tons (MMT)[2] of carbon dioxide equivalents (CO_2e), excluding emissions/removals from land use, land use change, and forestry (Association of Environmental Professionals AEP, 2007). In 2004, greenhouse emissions in the U.S. were 7074.4 MMT CO_2Eq (Association of Environmental Professionals, 2007). California is a substantial contributor of greenhouse gas as it is the second largest contributor in the U.S. and the sixteenth largest in the world (California Energy Commission, 2006). In 2004, California produced approximately 500MMT CO_2e, which is approximately seven percent of U.S. emissions (California Energy Commission, 2006). The major source of greenhouse gas in California is transportation, contributing 41 percent of the State's total greenhouse emissions. Electricity generation is the second largest source, contributing 22 percent of the State's greenhouse gas emissions. California experienced a statewide GHG reduction from 464 MMT of CO2e (gross) in 2000 to 457 MMT of CO2e (gross) in 2009, a decrease of 1.5 percent. The 2009 levels are the lowest in the ten-year period, with the highest level 489 MMT of CO2e experienced in 2007. Since 1990 GHG emissions have increased approximately 5.5 percent through 2009. A 5.8 percent decrease in emissions from 2008 through 2009 occurred, but has been attributed to the slower economy. In 2009 the United States GHG emissions were 6,633.2 MMT CO_2e (US Environmental Protection Agency, 2011), of which California's emissions represents 6.9 percent, and indicating a decreasing trend.

[2] Also expressed in teragrams. One teragram equals approximately 1,000,000 metric tons.

Climate Change and Global Warming

The term climate change is often used interchangeably with the term global warming, but according to the National Academy of Sciences, "the phrase 'climate change' is growing in preferred use to 'global warming' because it helps convey that there are [other] changes in addition to rising temperatures." When used in this analysis, the term climate change refers to any distinct change in measures of climate lasting for a long period of time. In other words, “climate change” means major changes in temperature, rainfall, snow, or wind patterns lasting for decades or longer. Global warming is an average increase in temperatures near the Earth’s surface and in the lowest layer of the atmosphere. Increases in temperatures in our Earth’s atmosphere can contribute to changes in global climate patterns. Global warming can be considered part of climate change along with changes in precipitation, sea level, etc. Global change is a broad term that refers to changes in the global environment, including climate change, ozone depletion, and land use change.

Primary Greenhouse Gas Emissions

According to the US Environmental Protection Agency (EPA), a GHG is any gas that absorbs infrared radiation in the atmosphere. This absorption traps heat within the atmosphere creating a greenhouse effect that is slowly raising global temperatures. California state law defines GHG to include the following: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) (Health and Safety Code, § 38505(g)).

Although CO_2 is the most common of these gases, the other gases generally have a higher global warming potential (GWP). CO_2 equivalent (CO_2e) is a measure of GHG emissions that compares the global warming potential (GWP) of the individual greenhouse gases with the GWP of CO_2. CO_2e emissions are calculated by multiplying the metric tons of a gas by the appropriate GWP factor and are commonly expressed as metric tons of carbon dioxide equivalents ($MTCO_2e$). Below is a description of each GHG, as described by the California Climate Action Registry (CCAR) General Reporting Protocol, including their sources of emissions and GWP.

Carbon Dioxide (CO_2)

Consisting of a single carbon and two oxygen atoms. CO_2 is the most common of the six GHGs and provides the reference point for the GWP of other gases. Thus, the GWP of CO_2 is equal to one. CO_2 is emitted in a number of ways, including naturally through the carbon cycle, and through human activities, most notably the burning of fossil fuels. Carbon dioxide emissions are also produced as a by-product of various non-energy related industrial activities including production of metals such as steel, production of mineral products such as cement, and chemical production.

Nitrous Oxide (N_2O)

Consisting of two nitrogen atoms and a single oxygen atom. N_2O possesses a GWP of 310, and is typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.

Methane (CH_4)

Consisting of a single carbon atom and four hydrogen atoms. CH_4 possesses a GWP of 21, and is produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.

Hydrofluorocarbons (HFCs)

Primarily used as refrigerants, HFCs consist of a class of gases containing hydrogen, fluorine, and carbon that possess a range of high and very high GWP values from 120 to 12,000. HFCs can slowly leak out of air conditioning systems by permeation through hoses, or leakage due to deterioration of seals, and fittings. In mobile air conditioning systems, larger leaks may occur during traffic accidents, maintenance and servicing, and vehicle disposal.

Perfluorocarbons (PFCs)

PFCs consist of a class of gases containing carbon and fluorine that possess a very high GWP range from 5,700 to 11,900.PFCs were originally introduced as alternatives to ozone depleting substances and are typically emitted as by-products of industrial and manufacturing processes.

Sulfur Hexafluoride (SF_6)

SF_6 consists of a single sulfur atom and six fluoride atoms. SF_6possesses a very high GWP of 23,900 andis primarily used in electrical transmission and distribution systems.

Regulatory Framework

Global climate change is addressed through the efforts of various federal, state, regional, and local government agencies as well as national and international scientific and governmental conventions and programs. These agencies work jointly and individually to understand and regulate the effects of greenhouse gas emissions and resulting climate change through legislation, regulations, planning, policy-making, education, and a variety of programs. The significant agencies, conventions, and programs focused on global climate change are discussed below.

Federal U.S. Environmental Protection Agency

The USEPA is responsible for implementing federal policy to address global climate change. The federal government administers a wide array of public-private partnerships to reduce GHG intensity generated by the United States. These programs focus on energy efficiency, renewable energy, methane and other non-CO2 gases, agricultural practices, and implementation of technologies to achieve GHG reductions.

Currently, there are no federal regulations that address GHG emissions. However, in *Massachusetts v. Environmental Protection Agency*, 579 U.S. 497, 127 S. Ct. 1438 (2007), the United States Supreme Court found that the United States Environmental Protection Agency (EPA) has statutory authority under the Clean Air Act to regulate “greenhouse gas” emissions

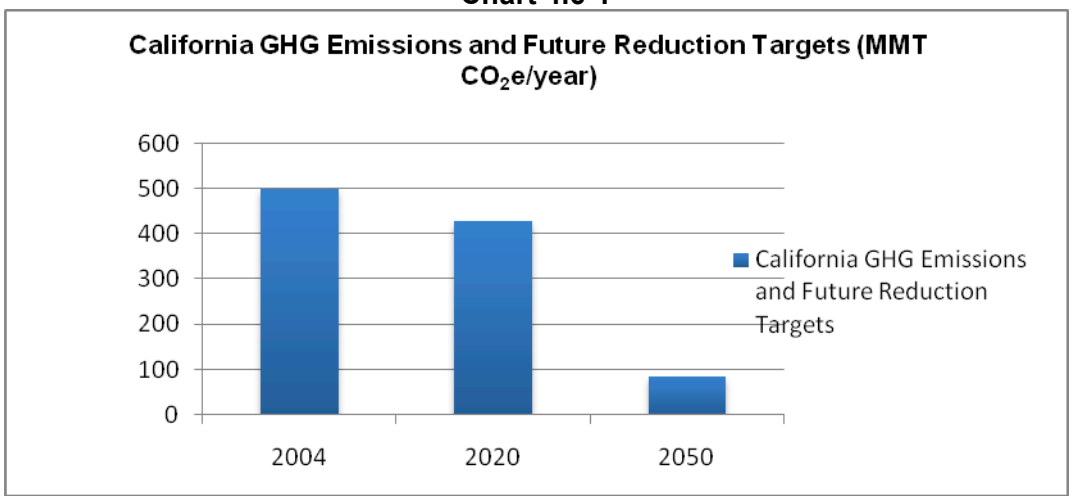
(including CO_2 emissions) from new motor vehicles.[3] In response to this court case's decision, the EPA is drafting regulations that address GHG emissions.

California Air Resources Board

California Executive Order S-3-05

In 2005, Governor Arnold Schwarzenegger issued California Executive Order S-3-05 establishing the following emission targets for California: 1) reduce GHG emissions to 2000 levels by 2010; 2) reduce GHG emissions to 1990 levels (427 $MMTCO_2e$) by 2020; and 3) reduce GHG emissions to 80 percent below 1990 levels (85 MMT CO_2e) by 2050. Executive Orders are binding on State agencies. Accordingly, S-3-05 will guide State agencies' efforts to control and regulate GHG emissions but will have no direct binding effect on local efforts.

Chart 4.6-1



California Global Warming Solutions Action of 2006 (AB 32)

In September 2006, Governor Arnold Schwarzenegger signed Assembly Bill (AB) 32, the *California Global Warming Solutions Act of 2006*. AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide greenhouse gas (GHG) emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. AB 32 also includes guidance to institute emission reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions. AB 32 demonstrates California's commitment to reducing the rate of GHG emissions and the State's associated contribution to climate change, without intent to limit population or economic growth. Although AB 32 did not amend CEQA, it identifies the environmental problems in California caused by global warming (*see* Health and Safety Code § 38501).

[3] Abreu, Heidy and Miguel Loza, *Massachusetts v. Environmental Protection Agency (05-1120). The Legal Information Institute, Cornell Law School.* 2007, August 5, 2007 http://www.law.cornell.edu/supct/cert/05-1120.html.

Senate Bill (SB) 97

Senate Bill (SB) 97, enacted in 2007, amends the CEQA statute to establish that GHG emissions and their effects is a prominent environmental issue that requires analysis under CEQA. This bill directed the Governor's Office of Planning and Research (OPR) to prepare, develop, and transmit to the California Natural Resources Agency (Resources Agency) guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions by July 1, 2009. On April 13, 2009, OPR submitted to the Resources Agency proposed amendments to the state CEQA Guidelines for GHG emissions. The Natural Resources Agency adopted amendments to the CEQA Guidelines for greenhouse gas emissions that became effective on March 18, 2010. These new CEQA Guidelines provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents.

As an interim step toward development of required guidelines, OPR published a technical advisory entitled, *CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act Review*, in June 2008. OPR recommends that lead agencies make a good-faith effort, based on available information, to estimate the quantity of GHG emissions that would be generated by a proposed project, and to mitigate the impacts where feasible. OPR acknowledges in this document that the most difficult part of the climate change analysis will be the determination of significance. OPR also asked the California Air Resources Board (ARB) technical staff to recommend a method for setting thresholds, which would encourage consistency and uniformity in the CEQA analysis of GHG emissions throughout the state.

State of California Climate Change Proposed Scoping Plan

In October 2008, CARB published its *Climate Change Proposed Scoping Plan* (*Proposed Scoping Plan*), which is the State's plan to achieve GHG reductions required by AB 32.The *Proposed Scoping Plan* contains the main strategies California will implement to achieve a reduction of 169 MMT of CO_2e, or approximately 30 percent from the state's projected 2020 emission level of 596 MMT of CO_2e under a business-as-usual scenario. The *Proposed Scoping Plan* states that land use planning and urban growth decisions will play an important role in the State's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. ARB further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The *Proposed Scoping Plan* was approved by the ARB on December 11, 2008.

In addition to the Scoping Plan, ARB has also released the Preliminary Draft Staff Proposal: Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act (ARB Draft Staff Proposal). The ARB Draft Staff Proposal includes potential interim performance standards for project types and emissions sources including construction, energy, water use, waste, transportation, and total mass GHG emissions. Specific thresholds and performance criteria for these categories have yet to be developed.

Senate Bill (SB) 375

SB 375 was signed in September 2008 and aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS), which will prescribe land use allocation in that

MPO's Regional Transportation Plan (RTP). It also establishes new streamlining opportunities for compatible projects under CEQA. SB 375 will likely take several years to become fully implemented due to the complex relationship between state, regional, and local agencies. First, the State must develop the modeling guidelines and the GHG regional reduction targets, and then regional agencies must develop their sustainable communities strategies. Only after the State and regional agencies accomplish their SB 375 responsibilities will cities and counties be required to bring their housing elements into conformity and be able to take advantage of the new CEQA streamlining tools.

Regional

Santa Barbara County Air Pollution Control District (APCD)

The Santa Barbara County Air Pollution Control District (APCD) is the agency principally responsible for comprehensive air pollution control in Santa Barbara County. In order to provide GHG emission guidance to the local jurisdictions, the APCD to date has been developing a proposal to adopt greenhouse gas thresholds of significance for stationary source projects. A public workshop was held on February 2011, and the District's Community Advisory Council received a briefing on this topic on May 2011. Additional public review for consideration and adoption of greenhouse gas thresholds is expected, but the timing of the adoption of greenhouse gas thresholds for stationary source projects is unknown.

Local

City of Goleta Energy Efficiency Standards

The Goleta General Plan/Coastal Land Use Plan does not address air quality or GHGs. However, on November 2, 2010, the Goleta City Council adopted the 2010 Edition of the California Green Building Standards Code ~~California Green Building Standards~~ (CALGreen Code) (24 California Code of Regulations~~, Title 24~~Part 11) as the Green Building Code of the City. The Green Building Code is set forth in Goleta Municipal Code ~~,~~ Chapter 15.12 ~~of Title 15 of the Goleta Municipal Code~~. That action became effective January 1, 2011. The Green Building Code ~~of the City~~ mandates new requirements for planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, environmental quality, and installer and special inspector qualifications. Also on November 2, 2010, the City adopted Goleta Municipal Code Chapter 15.13, entitled ~~of Title 15 of the Goleta Municipal Code~~ "Energy Efficiency Standards," ~~to set forth~~ establishing ~~increased~~ minimum energy efficiency standards for new building construction. The ~~Code~~ GMC ~~required~~ requires that new residential and nonresidential construction and additions greater than 500 square feet use the performance approach to demonstrate that they exceed the ~~2008 and 2010~~ California Green Building Standards ~~(CALGreen Code) (California Code of Regulations, Title 24)~~ by 15 percent, or, in the case of nonresidential buildings, that a permit applicant may use an alternative Envelope Only or Lighting Only compliance path that requires exceeding the standards by 10 percent according to prescriptive envelope and lighting metrics.

4.6.2 Thresholds of Significance

As noted above, the State Natural Resources Agency adopted amendments to the CEQA Guidelines for GHG emissions that became effective on March 18, 2010. These new CEQA Guidelines provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents. According to the amendments made to Appendix G of the CEQA Guidelines, the project would have a significant impact if it would:

a. Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or

b. Conflict with an applicable plan, policy, or regulation adopted for the purposed of reducing the emissions of GHGs.

The adopted CEQA amendments require a lead agency to make a good-faith effort based, to the extent possible, on scientific and factual data in order to describe, calculate, or estimate the amount of GHG emissions resulting from a project. They give discretion to the lead agency in whether to:

1) Use a model or methodology to quantify GHG emissions resulting from a project, and which model or methodology to use; and/or
2) Rely on a qualitative analysis or performance-based standards.

In addition, a lead agency should consider the following factors, among others, when assessing the significance of impacts from GHG emissions on the environment:

1) The extent to which the project may increase or reduce GHG 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 GHG emissions.

The amendments ~~call on~~ encourage lead agencies to establish significance thresholds for their respective jurisdictions and clarify that the effects of GHG emissions are cumulative, and should be analyzed in the context of CEQA's requirements for cumulative impact analysis.

Currently, neither the City of Goleta nor the State of California has adopted significance thresholds for GHG emissions. Establishment of thresholds at the State and/or local level has been a point of discussion and analysis by various agencies and boards (i.e., OPR, ARB, CAPCOA [California Air Pollution Control Officers Association]).

In June 2010, the Bay Area Air Quality Management District (BAAQMD) became the first regulatory agency in the nation to approve guidelines that establish thresholds of significance for GHG emissions. These thresholds are summarized in **Table 4.6-1**.

Table 4.6-1
Bay Area Air Quality Management District GHG Thresholds of Significance

GHG Emission Source Category	Operational Emissions
Commercial and Residential (land use projects)	1,100 MT CO_2e/yr or 4.6 MT CO_2e/SP/yr [a]
Stationary Sources[b]	10,000 MT CO_2e /yr

Source: Santa Barbara County APCD, Scope and Content of Air Quality Sections in Environmental Documents, June 2010.

[a] SP = Service Population(residents + employees).

[b] Stationary Sources includestationary combustion sources (industrial-type uses) regulated by the APCD.

On June 10, 2010, Santa Barbara County Planning & Development Department produced a memorandum "*Support for Use of Bay Area Air Quality Management District Greenhouse Gas Emissions Standards,"*[4] which states, "While Santa Barbara County land use patterns differ from those in the Bay Area as a whole, Santa Barbara County is similar to certain Bay Area counties (in particular, Sonoma, Solano, and Marin) in terms of population growth, land use patterns, General Plan/Coastal Land Use Plan policies, and average commute patterns and times. Because of these similarities, the methodology used by BAAQMD to develop its GHG emission significance thresholds, as well as the thresholds themselves, have applicability to Santa Barbara County and represent the best available interim standards for Santa Barbara County." In accordance with CEQA Guidelines Sections 15064.4.b.2, and 15064.7(c), the City has consistently relied upon Santa Barbara County's "*Support for Use of Bay Area Air Quality Management District Greenhouse Gas Emissions Standards,"* as the expert recommended threshold for establishing greenhouse gas impacts of a project. The City of Goleta is located in Santa Barbara County and shares meteorological attributes, as well as similar land use patterns and policies, and thresholds deemed applicable in Santa Barbara County would also reasonably apply to projects within the City Goleta. In addition, the City of Goleta would rely upon the Santa Barbara County Air Pollution Control District (APCD), as a ~~CEQA responsible~~ commenting agency, to review the GHG analysis, and these thresholds would represent a consistent approach and uniformity for impact determinations for City and County projects under the District's review. Therefore, this analysis uses the BAAQMD/Santa Barbara County Interim Thresholds of Significance to determine the significance of GHG emissions related to this project, based on the 1,100 MT CO_2e/year or 4.6 MT CO_2e per service population per year threshold for commercial and residential land uses. There is no BAAQMD threshold of significance for construction emissions.

In 2012, a court judgment determined that the BAAQMD GHG emissions thresholds of significance were not properly adopted under CEQA and cannot be readopted until compliance with CEQA occurs.[5] Nevertheless, thresholds of significance that are adopted or recommended by other public agencies or by experts may be considered as appropriate thresholds of significance. As previously explained, a significant amount of public and expert opinion and input went into the development of the BAAQMD thresholds of significance. Moreover, since

[4] Santa Barbara County Planning & Development Department, *Support for Use of Bay Area Air Quality Management District Greenhouse Gas Emissions Standards. Interim GHG Emissions – Evidentiary Support*, June10, 2010.

[5] -California Building Industry Assoc. v. Bay Area Air Quality Management District, (March 5, 2012) Alameda Super. Ct. Case No. RG10-548693.

adoption of these thresholds, there have been numerous expert opinions and evaluations of these thresholds, including the applicability within Santa Barbara County.

According to the applicable thresholds for this project, the project would result in a significant impact if it:

a. Generates operational emissions in an amount more than 4.6 MT CO_2e/SP/yr (SP=service population, including residents and employees), and/or results in significant construction or operational GHG emissions based on a qualitative analysis. ~~Thresholds for construction-related emissions are not provided.~~
b. Fails to employ reasonable and feasible means to minimize GHG emissions from a qualitative standpoint, in a manner that is consistent with the goals and objectives of AB 32.

It is also noted that the use of the BAAQMD threshold does not imply that it is a threshold that the City has formally adopted or should adopt as a GHG emissions significance threshold.

4.6.3 Project Impacts

~~Given the global nature of climate change resulting from GHG emissions, GHG emission impacts are inherently cumulative in nature. As such, the determination of whether a project's GHG emissions impacts are significant depends on whether those emissions would make a cumulatively considerable contribution to the significant cumulative impact. This is assessed in the following subsection.~~

~~4.6.4 Cumulative Impacts~~

Construction

Construction activities can alter the carbon cycle in many different ways. Construction equipment typically utilizes fossil fuels, which generates GHGs such as carbon dioxide, methane, and nitrous oxide. Methane may also be emitted during the fueling of heavy equipment. The raw materials used to construct new buildings can sequester carbon. However, demolition of structures can result in the gradual release of the carbon stored in waste building materials into the atmosphere as those materials decompose in landfills. Since the exact nature of the origin or make-up of the construction materials is unknown, construction-related emissions are typically based on the operation of vehicles and equipment during construction.

Construction is a temporary source of emissions necessary to facilitate development in the proposed project area. The following operational activities are typically associated with the operation of residential and commercial facilities that will contribute to the generation of GHG emissions in the project area.

Vehicular Trips

Vehicle trips generated by growth within the project area would result in GHG emissions through combustion of fossil fuels. Carbon dioxide emissions were determined based on the annual vehicle miles traveled (VMT) provided in the traffic analysis with trip rates and average trip lengths in the CalEEMod software averaged to match as close as possible the VMT in the traffic analysis. Methane and nitrous oxide emissions were estimated using the VMT from the traffic analysis and USEPA emissions factors for on-road vehicles.

On-site Use of Natural Gas and Other Fuels

Natural gas would be used by the project area development for heating of residential space, resulting in a direct release of GHGs. The use of landscaping equipment would also result in on-site GHG emissions. Estimated emissions from the combustion of natural gas and other fuels from the implementation of the proposed project is based on the number of dwelling units and square footage of communal living areas, and as estimated by the CalEEMod software. GHG emissions associated with building envelope energy use vary based on the size of the structures, the type and extent of energy-efficiency measures incorporated into structural designs, and the type and size of equipment installed. Complete building envelope details could not be incorporated into the project inventory, as such information was not available at the time of the analysis. Therefore, it was assumed that the building envelopes would comply with the current minimal standards for all business-as-usual (BAU) analysis and for new development in the project area.

Electricity Use

Electricity is generated by a combination of methods, which include combustion of fossil fuels. By using electricity, new development in the project area would contribute to the indirect emissions associated with electricity production. Indirect emissions from the use of electricity at the proposed project site are based on the number of dwelling units and square footage of communal living areas, and as estimated by the CalEEMod software.

Water Use and Wastewater Generation

California's water conveyance system is energy-intensive, with electricity used to pump and treat water. Typically, development in the proposed project area would contribute to indirect emissions by consuming water and generating wastewater. Water consumption and wastewater generation, and the associated emissions, were calculated based on the number of residential units and square feet of communal living areas in CalEEMod.

Solid Waste

Disposal of organic waste in landfills can lead to the generation of methane, a potent greenhouse gas. By generating solid wastes, proposed development would contribute to the emission of fugitive methane from landfills, as well as CO2, CH4 and N2O from the operation of trash collection vehicles.

Operational Emissions[6]

Impact GHG 1: The project would generate greenhouse gas emissions.

Significance Before Mitigation: Potentially Significant

Implementation of the project would contribute to short-term and long-term increases in GHGs as a result of traffic increases (mobile sources) and minor secondary fuel combustion emissions from space heating, etc. Development occurring as a result of the project would also result in secondary operational increases in GHG emissions as a result of electricity generation to meet project-related increases in energy demand. Electricity generation in California is mainly from natural gas-fired power plants. However, since California imports about 20 to 25 percent of its

[6] Addresses Thresholds "a" , 'b"

total electricity, GHG emissions associated with electricity generation could also occur outside of California.

Methodology

For purposes of this analysis, project related GHG emissions were aggregated into transportation and non-transportation sources. The transportation component is calculated and reported in the Urban Emissions Model (URBEMIS) 2007 computer model. The non-transportation sources require additional analysis.

URBEMIS was the most consistently used model for estimating a project's direct impacts from GHG emissions. URBEMIS is designed to model emissions associated with development of urban land uses and attempts to summarize criteria air pollutants and CO_2 emissions that would occur during operation of new development.

The URBEMIS model does not contain emission factors for GHGs other than CO_2, except for methane from mobile sources, which is converted to CO_2e. This may not be a major problem since CO_2 is the most important GHG from land development projects (CAPCOA, 2008). It also constitutes approximately 84 percent of all GHG emissions in California and is considered a "reference gas" for relating the amount of heat absorbed to the level of GHGs emitted.

The URBEMIS model also does not calculate GHGs associated with consumption of energy produced off-site (indirect impacts) and may in some instances, result in the double counting of "linked" trips (i.e., the concept that a residential trip and a commercial trip are quite possibly the same trip, resulting in "double-counting"). However, as noted above, this model is still considered appropriate. Therefore, the methodology used herein for quantifying GHG emissions relies upon the URBEMIS 2007 9.2.4 air quality modeling software, which is the most current version available.

In February 2011, SCAQMD released new air quality modeling software as the California Emissions Estimator Model (CalEEMod) that among other updates, includes calculations for a project's CO_2(e) emissions from mobile and non-mobile sources. The current version CalEEMod.2011.1.1 was used subsequent to the previously discussed URBEMIS 2007 9.2.4 model, to provide the most accurate accounting of the project's operational GHG emissions. The CalEEMod results are included in Appendix A.

Project Construction Emissions

Implementation of the project would contribute to GHG emissions from construction activities. Using the prototype equipment fleet listed in Section 4.2 *Air Quality* Table 4.2-4, along with estimated annual emissions for demolition, grading, construction, painting, and paving, as provided in Table 4.2-5, project-related annual construction emissions were converted from CO_2 pounds per year (without mitigation) to CO_2e[7] emissions. For a 23-month schedule, the project construction would generate approximately 819 $MTCO_2e$ per year. For an accelerated 15-month schedule, project-related construction emissions would be approximately 1,256 $MTCO_2e$ per year. These emissions are temporary during construction and the construction would not conflict with CARB's greenhouse gas emissions reduction targets under AB 32 (as described above in the *Regulatory Framework* section). The project's construction emissions would be less than significant.

[7] -MT CO2x 1.011 conversion factor for CO2 to CO2e. 1.1 conversion factor for short tons to metric units.

Project Transportation Emissions

Implementation of the project would contribute to transportation GHG emissions from mobile sources as a result of traffic increases. The URBEMIS 2007 Output (included as Appendix A) estimates that total project-related CO_2 emissions from transportation sources would be 5,119 short tons per year, or 4,644 metric tons per year. Applying a CO_2e conversion factor of 1.011 results in a total GHG emissions from project related transportation of 4,695 $MTCO_2e$. Using the CalEEMod estimations, transportation related GHG emissions from project operations would be 3,603 $MTCO_2e$ as shown in **Table 4.6-3b**.

Project Non-Transportation Sources

As mentioned above, long-term emissions associated with the operation of the project would include emissions from energy that is consumed off-site in order to service the project (such as at utility providers associated with the project's energy demands). These emissions are expected to be minor and incremental for utility providers, which would not require the construction of any new utility facility, and would not conflict with programs that utility providers have adopted in order to reduce GHG contributions.

Estimated project energy use from non-transportation sources and CO_2e emissions calculations, using the URBEMIS 2007 Model are summarized in **Table 4.6-2**. As shown, project-related CO_2e emissions from these sources are estimated at ~~2,036~~ 2,042 metric tons (MT) per year.

Using the CalEEMod estimations, non-transportation related GHG emissions from project operations would be 993 MT CO_2e if unmitigated, or 952 MT CO_2e with mitigation as shown in Table 4.6-4.

Table 4.6-2
URBEMIS2007 Annual Non-Transportation Consumption/Generation

Land Use	Electricity (MWH)	Solid Waste[c] (tons)	Water[c] (million gallons)	Natural Gas[d]	Total GHG Emissions
Commercial	~~1,209~~ 1,227[a]	132.76	6.9	–	–
Residential	1,629[b]	344.85	26.1	–	–
Total	**~~2,838~~ 2,856**	**477.61**	**33**	**–**	**–**
GHG Conversion Factor	0.331[e]	0.58[f]	4.2[g]	–	–
CO_2e Emissions Metric Tons/yr	**~~939~~ 945**	**277**	**139**	**681**	**~~2,036~~ 2,042**

[a] Santa Barbara County APCD, Scope and Content of Air Quality Sections in Environmental Documents, June 2010 ~~Santa Barbara APCD GHG Guidelines~~ Commercial Use =13.63 ~~13.43~~ kWh/sq. ft./yr).
[b] Santa Barbara County APCD, Scope and Content of Air Quality Sections in Environmental Documents, June 2010. ~~Santa Barbara APCD GHG Guidelines~~ (Residential Use = 5,838.56 kWh/~~sq.ft.~~household/yr).
[c] Section 4.14 Utilities and Service Systems of this document for generation rates.
[d] Calculated by URBEMIS2007 computer model.
[e] California Climate Action Registry, Version 3.1, Table C.2.
[f] EPA Warm Computer Model, landfill gas control but minimal waste-to-energy.
[g] California Energy Commission, Integrated Energy Policy Report, 2006.

Total Emissions

URMEBIS 2007 model generated operational GHG emissions from the project are summarized in **Table 4.6-3**. Based on this model, the project's long-term total annual operational GHG emissions would be ~~6,731~~ 6,737 MTCO_2e, of which approximately 70 percent would be generated by transportation sources. This level of emissions represents 0.001 percent of the State's GHG emissions, which were estimated at 500MMT of CO_2e in 2004 (California Energy Commission, 2006). At buildout, the project is expected to accommodate 726 residents (2.6 persons per unit) as discussed in Section 2.0 *Project Description*, and ~~273~~ 430 employees (~~1~~ 44 employees/~~344sf~~ acre)[8] within the commercial area ~~(Southern California Association of Governments 2001)~~. Additionally, ~~and~~ up to ten employees would be onsite to manage and maintain the residential component (as estimated by the applicant), resulting in a total service population of 1,166 persons. Consequently, the project would produce ~~6.67~~ 5.78 MT CO_2e/service population/year (residents + employees),[9] which exceeds the threshold of 4.6 MT CO_2e per service population per year threshold ~~and would be considered a significant impact~~.

Table 4.6-3
URBEMIS 2007 Total Project GHG Emissions

Emission Source	CO_2e (MT)
Transportation	
Vehicle Miles Traveled (VMT)	4,695[a]
Non-Transportation	
From Table 4.6-2 above	~~2,036~~ 2,042
Total (MT)	**~~6,731~~ 6,737**
[a] URBEMIS2007, 4,644 MT CO_2x 1.011 conversion factor for CO_2 to CO_2e.	

Using the most current CalEEMod estimations, the project's long-term total annual operational GHG emissions would be 4,597 MT CO_2e if unmitigated, as shown in **Table 4.6-4**. This table also shows that with mitigation to reduce energy usage onsite, total GHG emissions would be 4,555 MT CO_2e, of which approximately 79 percent would be generated by transportation sources. Based on the CalEEMod GHG estimations, without any mitigations, the project would produce 3.9 MT CO_2e/service population/year (residents + employees), which would be below the threshold of 4.6 MT CO_2e per service population per year threshold and would be considered a less than significant impact.

Additionally, the process by which the operational emissions are deemed to have a less than significant impact is consistent with the AB 32 Scoping Plan and the project will be constructed in compliance with the City's Green Building Code and the Energy Efficiency Standards, which are discussed earlier in the Existing Setting, Section 4.6.1, under the Regulatory Framework.

[8] Santa Barbara County Association of Governments (SBCAG), Regional Growth Forecast 2005-2040, August 2007, Appendix 5 pg. 13. Employees = 9.765 acres x 44 employees / acre = 430

[9] 6,737 MT CO_2e / (726 residents + 10 residential employees + 430 commercial employees) = 5.78 MT CO_2e per resident or employee. Number of Residents is based on City of Goleta General Plan/Coastal Land Use Plan Housing Element Technical Appendix, November 2010, Page 10A-20.

Table 4.6-4
CalEEMod Annual Operational GHG Emissions

Emission Source	Unmitigated CO_2(e) (MT/year)	Mitigated CO_2(e) (MT/year)
Area	3.51	3.51
Energy	818.15	776.48
Waste	101.40	101.40
Water	70.54	70.54
Total Non-transportation Sources	993	952
Mobile	3,602.98	3,602.98
Total Metric Tons CO_2(e)	4,596.58	4,554.91

SBAPCD recommends the use of CalEEMod for project-level review, as it uses current emission factors and updated default values, and has the ability to quantify indirect GHG emissions and GHG mitigation. As such, based on the CalEEMod approach to emissions modeling, the project impacts are considered less than significant.

4.6.5 Mitigation Measures

To reduce emissions from transportation sources this EIR includes Mitigation Measure AQ 2-1 (see Section 4.2 Air Quality) that requires the implementation of an Alternative Transportation/Transportation Demand Management Program, which would also reduce the project's transportation related GHG emissions.

Project-related GHG emissions would be considered less than significant; however, the following energy conservation mitigation measures are recommended ~~required to assure that the project's impacts are reduced to the maximum extent feasible.~~ to further reduce the project's non-transportation related emissions ~~are to be reduced~~ through increased energy efficiency provided by the following recommended mitigation measure.

GHG 1-1: **(Recommended)** Energy conservation measures ~~shall~~ must be included in the project. All new residential and commercial buildings must comply with Goleta Municipal Code Chapter 15.13~~,~~ entitled ~~Title 15 of the Goleta Municipal Code~~ "Energy Efficiency Standards", which require energy savings measures that exceed 2008 State of California Title 24 Energy Requirements by 15 percent, and with the 2010 ~~State of~~ California Green Building Code, as adopted by ~~as the Green Building Code of the City, in Chapter 15.12, Title 15 of the~~ Goleta Municipal Code Chapter 15.12.

Plan Requirements: The following additional energy conservation measures ~~shall~~ must be included in the plans unless the permittee demonstrates their financial infeasibility to the satisfaction of the Planning and Environmental Services Director, or designee~~City staff~~:

a) use of photovoltaic systems;
b) passive cooling strategies such as passive or fan aided cooling plan designed into the structure and/or a roof opening for hot air venting or installation of underground cooling tubes;
c) high efficiency outdoor lighting and/or solar powered lighting;
d) installation of Energy Star roofs, furnaces, and appliances;

e) use of water-based paint on exterior surfaces
f) use of solar-assisted water heating for swimming pools and tankless hot water on demand systems if their energy efficiency is demonstrated to exceed that of a central storage tank water heating system;
g) use of passive solar cooling/heating;
h) use of natural lighting in lieu of artificial lighting;
i) installation of energy efficient lighting;
j) use of water-efficient landscapes; water-efficient irrigation systems and devices; and use of reclaimed water (if available);
k) installation of cool pavements
l) provision of segregated waste bins for recyclable materials;
m) zero waste/high recycling standards.

Timing: These requirements shall must be shown on plans before the City issues a prior to LUP and/or for any commercial or residential building permit issuance.

Monitoring: The Staff Planning and Environmental Services Director, or designee, mustshall verify compliance with this mitigation measure before prior to finalthe City issues a certificate of occupancy inspection.

4.6.6 Residual Impacts

With implementation of the above recommended mitigation measure, GHG impacts would be reduced to the extent feasible, however, based on the most current CalEEMod emissions estimation, as the project's transportation emissions alone would exceed this threshold, mitigation measures would not reduce impacts to a less than significant level. Therefore, the project's GHG impacts would be considered less than significant without the application of mitigations (**Class III**) significant and unavoidable (Class I).