3.5 CLIMATE CHANGE

3.5.1 INTRODUCTION

This section covers the topic of global climate change and greenhouse gas emissions, describes existing conditions at and surrounding the project site, summarizes relevant regulations and policies, and analyzes the potential impacts of implementing the Proposed Action and its alternatives on global climate.

Sources of information used in this analysis include:

- Sierra Vista Specific Plan EIR prepared by the City of Roseville (City of Roseville 2010);
- Sierra Vista Specific Plan Air Quality/Greenhouse Gas Technical Report prepared by Rimpo and Associates (Rimpo and Associates 2009);
- Draft National Environmental Policy Act (NEPA) Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions prepared by the Council on Environmental Quality (February 2010); and
- Bay Area Air Quality Management District California Environmental Quality Act (*CEQA) Air Quality Guidelines.*

3.5.2 AFFECTED ENVIRONMENT

3.5.2.1 Background

Global climate change refers to any significant change in climate measurements, such as temperature, precipitation, or wind, lasting for an extended period (i.e., decades or longer) (US EPA 2008a). Climate change may result from:

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

According to scientists, human activities have resulted in a change in global climate. The primary manifestation of global climate change has been a rise in the average global tropospheric temperature of 0.2 degree Celsius (°C) per decade, determined from meteorological measurements worldwide between 1990 and 2005. Climate change modeling using 2000 emission rates shows that further warming is likely to occur, which would induce further changes in the global climate system during the current century (IPCC 2007). Changes to the global climate system, ecosystems, and to California, could include:

- summer warming projections in the first 30 years of the 21st century ranging from about 0.5 to 2 °C (0.9 to 3.6 °F) and by the last 30 years of the 21st century, from about 1.5 to 5.8 °C (2.7 to 10.5 °F) (Cal EPA 2006);

- declining sea ice and mountain snowpack levels, thereby increasing sea levels and sea surface evaporation rates with a corresponding increase in tropospheric water vapor due to the atmosphere's ability to hold more water vapor at higher temperatures (IPCC 2007);
- rising average global sea levels primarily due to thermal expansion and the melting of glaciers, ice caps, and the Greenland and Antarctic ice sheets (model-based projections of global average sea level rise at the end of the 21st century range from 0.18 meter to 0.59 meter or 0.59 foot to 1.94 feet) (IPCC 2007);
- changing weather patterns, including changes to precipitation, ocean salinity, and wind patterns, and more energetic aspects of extreme weather including droughts, heavy precipitation, heat waves, extreme cold, and the intensity of tropical cyclones (IPCC 2007);
- declining Sierra snowpack levels, which account for approximately half of the surface water storage in California, by 70 percent to as much as 90 percent over the next 100 years (Cal EPA 2006);
- increasing the number of days conducive to ozone formation by 25 to 85 percent (depending on the future temperature scenario) in high ozone areas located in the Southern California area and the San Joaquin Valley by the end of the 21st century (Cal EPA 2006);
- increasing the potential for erosion of California's coastlines and sea water intrusion into the Sacramento and San Joaquin Delta and associated levee systems due to the rise in sea level (Cal EPA 2006);
- increasing pest infestation, making California more susceptible to forest fires (Cal EPA 2006); and
- increasing the demand for electricity by 1 to 3 percent by 2020 due to rising temperatures resulting in hundreds of millions of dollars in extra expenditures (Cal EPA 2006).

The natural process through which heat is retained in the troposphere[1] is called the greenhouse effect. The greenhouse effect traps heat in the troposphere through a threefold process as follows: (1) short-wave radiation in the form of visible light emitted by the Sun is absorbed by the Earth as heat; (2) long-wave radiation is re-emitted by the Earth; and (3) GHGs in the upper atmosphere absorb or trap the long-wave radiation and re-emit it back towards the Earth and into space. This third process is the focus of current climate change actions because increased quantities of GHGs in the earth's atmosphere result in more of the long-wave radiation being trapped in the atmosphere.

While water vapor and carbon dioxide (CO_2) are the most abundant GHGs, other trace GHGs have a greater ability to absorb and re-radiate long-wave radiation. To gauge the potency of GHGs, scientists have established a Global Warming Potential (GWP) for each GHG based on its ability to absorb and re-emit long-wave radiation over a specific period. The GWP of a gas is determined using CO_2 as the reference gas, which has a GWP of 1 over 100 years (IPCC 1996).[2] For example, a gas with a GWP of 10 is 10 times more potent than CO_2 over 100 years. The use of GWP allows GHG emissions to be reported using CO_2 as a baseline. The sum of each GHG multiplied by its associated GWP is referred to as "carbon

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

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

dioxide equivalents" (CO_2e). This essentially means that 1 metric ton of a GHG with a GWP of 10 has the same climate change impacts as 10 metric tons of CO_2.

Greenhouse Gases

GHGs of most concern include the following compounds:

- Carbon Dioxide (CO_2). Anthropogenic CO_2 emissions are primarily generated by fossil fuel combustion from stationary and mobile sources. Due to the emergence of industrial facilities and mobile sources over the past 250 years, the concentration of CO_2 in the atmosphere has increased 35 percent (US EPA 2008b). Carbon dioxide is also generated by natural sources such as cellular respiration, volcanic activity, decomposition of organisms, and forest fires. Carbon dioxide is the most widely emitted GHG and is the reference gas (GWP of 1) for determining the GWP of other GHGs. In 2004, 82.8 percent of California's GHG emissions were CO_2 (California Energy Commission 2007).
- Methane (CH_4). Methane is emitted from biogenic sources (i.e., resulting from the activity of living organisms), incomplete combustion in forest fires, landfills, manure management, and leaks in natural gas pipelines. In the US, the top three sources of CH_4 are landfills, natural gas systems, and enteric fermentation (US EPA n.d.[a]). Methane is the primary component of natural gas, which is used for space and water heating, steam production, and power generation. The GWP of CH_4 is 21.
- Nitrous Oxide (N_2O). Nitrous oxide is produced by natural and human-related sources. Primary human-related sources include agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic acid production, and nitric acid production. The GWP of N_2O is 310.
- Hydrofluorocarbons (HFCs). HFCs typically are used as refrigerants in both stationary refrigeration and mobile air conditioning. The use of HFCs for cooling and foam blowing is growing particularly as the continued phase-out of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) gains momentum. The GWP of HFCs ranges from 140 for HFC-152a to 6,300 for HFC-236fa.
- Perfluorocarbons (PFCs). Perfluorocarbons are compounds consisting of carbon and fluorine. They are primarily created as a byproduct of aluminum production and semiconductor manufacturing. Perfluorocarbons are potent GHGs with a GWP several thousand times that of carbon dioxide, depending on the specific PFC. Another area of concern regarding PFCs is their long atmospheric lifetime of up to 50,000 years (Energy Information Administration 2007). The global warming potentials (GWPs) of PFCs range from 5,700 to 11,900.
- Sulfur Hexafluoride (SF_6). Sulfur hexafluoride is a colorless, odorless, nontoxic, nonflammable gas. It is most commonly used as an electrical insulator in high voltage equipment that transmits and distributes electricity. Sulfur hexafluoride is the most potent GHG that has been evaluated by the Intergovernmental Panel on Climate Change with a GWP of 23,900. However, its global warming contribution is not as high as the GWP would indicate due to its low mixing ratio, as compared to CO_2 (4 parts per trillion [ppt] in 1990 versus 365 parts per million [ppm] of CO_2) (US EPA n.d.[b]).

Contributions to Greenhouse Gas Emissions

Global

Worldwide anthropogenic GHG emissions are tracked for industrialized nations (referred to as Annex I) and developing nations (referred to as Non-Annex I). Man-made GHG emissions for Annex I nations are

available through 2007. Man-made GHG emissions for Non-Annex I nations are available through 2005. The sum of these emissions totaled approximately 42,133 million metric tons of CO_2 equivalents ($MMTCO_2e$).[3] It should be noted that global emissions inventory data are not all from the same year and may vary depending on the source of the emissions inventory data.[4] The top five countries and the European Union accounted for approximately 55 percent of the total global GHG emissions according to the most recently available data (see **Table 3.5-1, Top Five GHG Producer Countries and the European Union [Annual]**). The GHG emissions in more recent years may differ from the inventories presented in **Table 3.5-1**; however, the data is representative of currently available global inventory data.

Table 3.5-1
Top Five GHG Producer Countries and the European Union (Annual)

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

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

United States

As noted in **Table 3.5-1**, the US was the number two producer of global GHG emissions. The primary GHG emitted by human activities in the US was CO_2, representing approximately 84 percent of total GHG emissions (US EPA 2008a). Carbon dioxide from fossil fuel combustion, the largest source of GHG emissions, accounted for approximately 80 percent of US GHG emissions.[5]

3 The CO_2 equivalent emissions commonly are expressed as "million metric tons of carbon dioxide equivalent ($MMTCO_2E$)." The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP, such that $MMTCO_2E$ = (million metric tons of a GHG) x (GWP of the GHG). For example, the GWP for methane is 21. This means that the emission of one million metric tons of methane is equivalent to the emission of 21 million metric tons of CO_2.

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

5 *Supra* no. 4.

State of California

CARB compiles GHG inventories for the State of California. Based on the 2008 GHG inventory data (i.e., the latest year for which data are available), California emitted 474 $MMTCO_2e$ ***including*** emissions resulting from imported electrical power in 2008 (CARB 2010). Based on the CARB inventory data and GHG inventories compiled by the World Resources Institute, California's total statewide GHG emissions rank second in the US (Texas is number one) with emissions of 417 $MMTCO_2e$ ***excluding*** emissions related to imported power (CARB 2010).

The primary contributors to GHG emissions in California are transportation, electric power production from both in-state and out-of-state sources, industry, agriculture and forestry, and other sources, which include commercial and residential activities. **Table 3.5-2, GHG Emissions in California**, provides a summary of GHG emissions reported in California in 1990 and 2008 separated by categories defined by the United Nations Intergovernmental Panel on Climate Change (IPCC).

Between 1990 and 2008, the population of California grew by approximately 7.3 million, from 29.8 to 37.9 million (US Census Bureau 2010). This represents an increase of approximately 27.2 percent from 1990 population levels. In addition, the California economy, measured as gross state product, grew from $788 billion in 1990 to $1.8 trillion in 2008 representing an increase of approximately 128 percent, over twice the 1990 gross state product (California Department of Finance 2009). Despite the population and economic growth, California's net GHG emissions only grew by approximately 11 percent. The California Energy Commission (CEC) attributes the slow rate of growth to the success of California's renewable energy programs and its commitment to clean air and clean energy (California Energy Commission 2006).

Global Ambient CO_2 Concentrations

Air trapped by ice has been extracted from core samples taken from polar ice sheets to determine the global atmospheric variation of CO_2, CH_4, and N_2O from before the start of industrialization, around 1750, to over 650,000 years ago. For that period, CO_2 concentrations ranged from 180 ppm to 300 ppm. For the period from around 1750 to the present, global CO_2 concentrations increased from a pre-industrialization period concentration of 280 ppm to 379 ppm in 2005, with the 2005 value far exceeding the upper end of the pre-industrial period range (California Energy Commission 2006a). Global CH_4 and N_2O concentrations show similar increases for the same period (see **Table 3.5-3, Comparison of Global Pre-Industrial and Current GHG Concentrations**).

Table 3.5-2
GHG Emissions in California

Source Category	1990 ($MMTCO_2e$)	Percent of Total	2008 ($MMTCO_2e$)	Percent of Total
ENERGY	**386.41**	**89.2%**	**413.80**	**86.6%**
Energy Industries	157.33	36.3%	171.23	35.8%
Manufacturing Industries & Construction	24.24	5.6%	16.67	3.5%
Transport	150.02	34.6%	173.94	36.4%
Other (Residential/Commercial/Institutional)	48.19	11.1%	46.59	9.8%
Non-Specified	1.38	0.3%	0.00	0.0%
Fugitive Emissions from Oil & Natural Gas	2.94	0.7%	3.28	0.7%
Fugitive Emissions from Other Energy Production	2.31	0.5%	2.09	0.4%
INDUSTRIAL PROCESSES & PRODUCT USE	**18.34**	**4.2%**	**30.11**	**6.3%**
Mineral Industry	4.85	1.1%	5.35	1.1%
Chemical Industry	2.34	0.5%	0.06	0.0%
Non-Energy Products from Fuels & Solvent Use	2.29	0.5%	1.97	0.4%
Electronics Industry	0.59	0.1%	0.80	0.2%
Substitutes for Ozone Depleting Substances	0.04	0.0%	13.89	2.9%
Other Product Manufacture and Use	3.18	0.7%	1.66	0.3%
Other	5.05	1.2%	6.39	1.3%
AGRICULTURE, FORESTRY, & OTHER LAND USE	**19.11**	**4.4%**	**24.42**	**5.1%**
Livestock	11.67	2.7%	16.28	3.4%
Land	0.19	0.0%	0.19	0.0%
Aggregate Sources & Non-CO_2 Sources on Land	7.26	1.7%	7.95	1.7%
WASTE	**9.42**	**2.2%**	**9.41**	**2.0%**
Solid Waste Disposal	6.26	1.4%	6.71	1.4%
Wastewater Treatment & Discharge	3.17	0.7%	2.70	0.6%
EMISSIONS SUMMARY				
Gross California Emissions	433.29		477.74	
Sinks from Forests and Rangelands	-6.69		-3.98	
Net California Emissions	426.60		473.76	

Sources:

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

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

Table 3.5-3
Comparison of Global Pre-Industrial and Current GHG Concentrations

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

Source: Intergovernmental Panel on Climate Change, Climate Change 2007: The Physical Science Basis, Summary for Policymakers, *(2007).*
ppm=parts per million
ppb=parts per billion

3.5.3 REGULATORY FRAMEWORK – APPLICABLE LAWS, REGULATIONS, PLANS, AND POLICIES

3.5.3.1 Intergovernmental Panel on Climate Change

The World Meteorological Organization (WMO) and United Nations Environmental Program (UNEP) established the IPCC in 1988. The goal of the IPCC is to evaluate the risk of climate change caused by human activities. Rather than performing research or monitoring climate, the IPCC relies on peer-reviewed and published scientific literature to make its assessment. While not a regulatory body, the IPCC assesses information (i.e., scientific literature) regarding human-induced climate change and the impacts of human-induced climate change, and recommends options to policy makers for the adaptation and mitigation of climate change. The IPCC reports its evaluations in special reports called assessment reports. The latest assessment report (i.e., Fourth Assessment Report, consisting of three working group reports and a synthesis report based on the first three reports) was published in 2007. In its 2007 report, the IPCC stated that global temperature increases since the mid-20th century were very likely attributable to man-made activities (greater than 90 percent certainty) (IPCC 2007).

3.5.3.2 Federal

The US EPA adopted a mandatory GHG reporting rule in September 2009. The rule would require suppliers of fossil fuels or entities that emit industrial greenhouse gases, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions to submit annual reports to the US EPA beginning in 2011 (covering the 2010 calendar year emission). Vehicle and engine manufacturers would begin reporting GHG emissions for model year 2011.

On September 15, 2009, the US EPA and the Department of Transportation's (DOT) National Highway Traffic Safety Administration (NHTSA) issued a joint proposal to establish a national program consisting of new standards for model year 2012 through 2016 light-duty vehicles that will reduce GHG emissions and improve fuel economy. The proposed standards would be phased in and would require passenger

cars and light-duty trucks to comply with a declining emissions standard. In 2012, passenger cars and light-duty trucks would have to meet an average emissions standard of 295 grams of CO_2 per mile and 30.1 miles per gallon. By 2016, the vehicles would have to meet an average standard of 250 grams of CO_2 per mile and 35.5 miles per gallon (US EPA 2009). The final standards were adopted by the US EPA and DOT on April 1, 2010.

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

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

While these findings do not impose additional requirements on industry or other entities, this action is a prerequisite to finalizing the US EPA's proposed GHG emissions standards for light-duty vehicles, which were jointly proposed by the US EPA and the NHTSA. On April 1, 2010, the US EPA and NHTSA issued final rules requiring that by the 2016 model-year, manufacturers must achieve a combined average vehicle emission level of 250 grams CO_2 per mile, which is equivalent to 35.5 miles per gallon as measured by US EPA standards.

3.5.3.3 State

The State of California has implemented legislation targeting GHG emissions. Chief among these is the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32). AB 32 represents the first enforceable statewide program to limit GHG emissions from all major industries with penalties for noncompliance. The Act requires the State of California to reduce its emissions to 1990 levels by 2020. The Act establishes key deadlines for certain actions the state must take in order to achieve the reduction target. The first action under AB 32 resulted in California Air Resources Board's (CARB) adoption of a report listing three specific early action GHG reduction measures on June 21, 2007. On October 25, 2007, CARB approved an additional six early action GHG reduction measures under AB 32.

As required under AB 32, on December 6, 2007, CARB approved the 1990 GHG emissions inventory, thereby establishing the emissions limit for 2020. The 2020 emissions limit was set at 427 million metric tons of CO_2 equivalents ($MMTCO_2e$). The inventory revealed that in 1990, transportation, with 35 percent of the state's total emissions, was the largest single sector generating carbon dioxide; followed by industrial emissions, 24 percent; imported electricity, 14 percent; in-state electricity generation, 11 percent; residential use, 7 percent; agriculture, 5 percent; and commercial uses, 3 percent (figures are based on the 1990 inventory). AB 32 does not require individual sectors to meet their individual 1990 GHG emissions inventory; the total statewide emissions are required to meet the 1990 threshold by 2020.

In addition to the 1990 emissions inventory, CARB also adopted regulations requiring the mandatory reporting of GHG emissions for large facilities on December 6, 2007. The mandatory reporting regulations require annual reporting from the largest facilities in the state, which account for approximately 94 percent of greenhouse gas emissions from industrial and commercial stationary sources in California. About 800 separate sources fall under the new reporting rules and include electricity generating facilities, electricity retail providers and power marketers, oil refineries, hydrogen plants, cement plants, cogeneration facilities, and industrial sources that emit over 25,000 tons of CO_2 each year from on-site stationary combustion sources. Transportation sources, which account for 38 percent of California's total GHG emissions as of the 2002-2004 GHG inventory conducted by CARB, are not covered by these regulations but will continue to be tracked through existing means (CARB 2009). Affected facilities began tracking their emissions in 2008, and reported them beginning in 2009, with a phase-in process to allowed facilities to develop reporting systems and train personnel in data collection. Emissions for 2008 could be based on best available emission data. Beginning in 2010, however, emissions reporting requirements became more rigorous and are subject to third-party verification. Verification will take place annually or every three years, depending on the type of facility.

In December 2008, CARB adopted a Climate Change Scoping Plan indicating how emission reductions will be achieved from significant sources of GHGs via regulations, market mechanism, and other actions. The Climate Change Scoping Plan identifies 18 recommended strategies the state should implement to achieve AB 32. As of October 2010, CARB has identified ongoing programs and has adopted regulations for 29 individual measures to reduce GHG emissions in accordance with the *Climate Change Scoping Plan* strategies. CARB will continue to draft additional rule language, conduct public workshops and rulemaking procedures through 2011, and is scheduled to finalize regulations by January 1, 2012.

3.5.3.4 Regional Programs

Placer County Air Pollution Control District

The Placer County Air Pollution Control District (PCAPCD) is the primary authority for regulating GHG emissions in the project area. The PCAPCD has adopted thresholds of significance for determining the potential impact for criteria pollutants and other air quality issues but not for GHG. However, guidance from the PCAPCD[6] indicated that thresholds adopted by other air districts within California would be acceptable. The PCAPCD must also ensure compliance with AB 32 reduction targets, and therefore has GHG reporting requirements similar to other air districts within California.

City of Roseville

The *City of Roseville General Plan* includes policies to preserve air quality. The *General Plan* was updated to include GHG emissions in 2008, and provides policies that address both direct and indirect GHG emissions and their potential impact through climate change. Policies related to GHG emissions and climate change are provided in **Appendix 3.5**. The City-owned utility, Roseville Electric, is also a member of the California Climate Action Registry (CCAR).

6 Personal communication with Angel Rinker, Associate Planner at the PCAPCD, on February 10, 2011.

Sierra Vista Specific Plan

The Sierra Vista Specific Plan (SVSP) includes policies and guidelines that would have an impact on GHG emissions from the Proposed Action. Generally these are measures meant to increase energy efficiency and alternative transportation (e.g., bicycles, walking, and mass transit). Both would mitigate the increase in GHG emissions through reducing fossil fuel consumption for electricity production, personal transportation, and heating. Specific elements contained in the SVSP that address these issues are:

- Mixed-use development, providing commercial services within close proximity to residences and thereby reducing vehicle traffic;
- Including Class I bicycle facilities, encouraging bicycle use and avoidance of vehicle use; and
- Installation of transit facilities along transit corridors and right of way provisions for transit along Watt Avenue.

3.5.4 SIGNIFICANCE THRESHOLDS AND ANALYSIS METHODOLOGY

3.5.4.1 Significance Thresholds

NEPA does not specify significance thresholds that may be used to evaluate the effects of a proposed action on global climate. The appropriate approach to evaluating a project's impact on global climate under NEPA is still under development. In February 2010, the Council on Environmental Quality (CEQ), the agency responsible for administering NEPA, released draft NEPA guidance on the consideration of the effects of greenhouse gas emissions and climate change in NEPA documents. The CEQ guidance states:

> *CEQ proposes to advise Federal agencies to consider, in scoping their NEPA analysis, whether analysis of the direct and indirect GHG emissions from their proposed actions may provide meaningful information to decision makers and the public. Specifically, if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO_2-equivalent GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public." The guidance further notes that "CEQ does not proposes this as an indicator of a threshold of significant effects, but rather as an indicator of a minimum level of GHG emissions that may warrant some description in the appropriate NEPA analysis for agency actions involving direct emissions of GHGs.*

The guidance recommends 25,000 million tons CO_2 equivalent ($MTCO_2e$) of direct emissions[7] as a presumptive threshold for analysis and disclosure within NEPA documents. The guidance suggests that if a proposed action would result in direct emissions below this threshold, the emissions would not be relevant to and would not need to be discussed within a NEPA analysis. The guidance further notes:

[7] The CEQ guidance does not define direct emissions. However, in other Clean Air Act legislation, direct emissions are defined to include all sources that are within the organizational control of the property/facility owner, and often comprise sources such as onsite stationary sources, fleet, and fugitive and process emissions.

> *When a proposed federal action meets an applicable threshold for quantification and reporting, CEQ proposes that the agency should also consider mitigation measures and reasonable alternatives to reduce action related GHG emissions.*

As the Proposed Action is expected to result in direct emissions that exceed 25,000 $MTCO_2e$ on an annual basis, the direct and indirect emissions associated with the Proposed Action are quantified and reported below and mitigation measures and reasonable alternatives are evaluated to reduce the GHG emissions.

The CEQ guidance also notes that land management techniques, including land use changes (such as those involved in the Proposed Action) lack any established federal protocol for assessing the effect of their GHG emissions at a landscape scale. In these instances, the guidance suggests that the federal agency should use NEPA's provisions for inter-agency consultation with available expertise to identify and follow the best available protocols for evaluating comparable activities. Consistent with this guidance, the US Army Corps of Engineers (USACE) examined State of California and local guidance and protocols related to the effects of GHG emissions to select a threshold of significance to use to evaluate the effect.

At the state level, CARB has not yet put forth significance thresholds for use to evaluate projects in California. However, CARB has commenced the implementation of a mandatory GHG reporting program that requires large industrial GHG emitters to report their GHG emissions. Large stationary combustion facilities that emit greater than or equal to 25,000 $MTCO_2e$ per year are subject to the reporting requirements. While the California Air Resource Board's (CARB's) reporting program and the CEQ's draft NEPA guidance do not provide significance thresholds, the 25,000 $MTCO_2e$ reporting threshold can be seen as a dividing line for major GHG emitters, which could have the potential to result in an significant effect on the environment.

At the local level, as noted above, the PCAPCD has not adopted any numeric thresholds of significance for determining the significance of the effect of a project's GHG emissions. However, the PCAPCD has indicated that thresholds adopted by other air districts within California would be acceptable. The following four air districts have put forth thresholds of significance:

- The San Joaquin Valley Air Pollution Control District (SJVAPCD) adopted the Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA in late 2009. According to the guidance, the SJVAPCD recommends the use of best performance standards to assess the significance of GHG emissions. The SJVAPCD expects that compliance with the recommended best performance standards would reduce a project's GHG emissions by a target of 29 percent or more, compared to 'business as usual' (BAU) conditions. The 29 percent reduction target is based on the goal of AB 32, which is to reduce the State's GHG emissions to 1990 levels by 2020.
- The Sacramento Metropolitan Air Quality Management District (SMAQMD) has also adopted guidance recommending that a project achieve a 29 percent reduction from BAU conditions.
- The Bay Area Air Quality Management District (BAAQMD) has adopted thresholds for both land use and stationary source projects. The land use threshold is further divided into three metrics: compliance with a qualified GHG Reduction Strategy; annual emissions less than 1,100 metric tons of CO_2e ($MTCO_2e$); or annual emissions less than 4.6 metric tons CO_2e per service population (i.e., project residents plus employees). At present there are no qualified GHG reduction strategies

applicable to the Proposed Action or alternatives. The 1,100 MT CO_2e is intended for smaller projects with limited emissions, whereas the 4.6 MT CO_2e per service person is an efficiency metric intended for large projects such as the Proposed Action.

- The South Coast Air Quality Management District (SCAQMD) recommends a tiered approach. The Tier 3 threshold requires that a project's incremental increase in GHG emissions should be below or mitigated to less than the significance screening level (10,000 $MTCO_2e$ per year for industrial projects; 3,500 $MTCO_2e$ for residential projects; 1,400 $MTCO_2e$ for commercial projects; 3,000 $MTCO_2e$ for mixed-use or all land use projects). The Tier 4 threshold requires that projects achieve a 29 percent reduction from a base case scenario, including land use sector reductions from AB 32 (total emissions not to exceed 25,000 $MTCO_2e$) or achieve a project-level efficiency target of 4.8 $MTCO_2e$ per service population per year (total emissions not to exceed 25,000 $MTCO_2e$ per year). The proposed plan-level significance threshold is an efficiency target of 6.6 $MTCO_2e$ per service population per year by 2020.

None of the air districts provide a significance threshold for evaluating the effect of a project's construction-phase emissions, but the BAAQMD guidance does state that "the Lead Agency should quantify and disclose GHG emissions that would occur during construction."

3.5.4.2 Analysis Methodology

The analysis presented below is based primarily on a technical study prepared by Rimpo and Associates for the Sierra Vista Specific Plan EIR and included in **Appendix 3.3**. The USACE independently reviewed this study, and found it to be accurate in its analytical approach and results. The methodology used in the technical study is summarized below.

The study used the URBEMIS2007 Environmental Management Software version 9.2.4 to estimate construction emissions and operational emissions from area and mobile sources associated with the Proposed Action. Construction was assumed to occur over a period of 12 years, beginning in 2013 and completing by 2025. Specific assumptions about construction equipment and scheduling are provided in the technical study, included in **Appendix 3.3**.

Mobile emissions during operation were estimated using default URBEMIS2007 values and trip generation rates provided by a traffic study performed by DKS Associates. Emissions from area sources were also estimated using default URBEMIS2007 values. These emissions are primarily associated with combustion of natural gas and operation of landscape maintenance equipment.

The technical study also estimated emissions from indirect sources, including electricity use, water use, solid waste disposal, and wastewater treatment. Residential electricity use was estimated based on the utilities study performed for the project. Commercial electricity use was estimated using California Energy Commission (CEC) rates for square foot of commercial space. Both water use and wastewater treatment produce emissions due to energy consumption during treatment and transport. Electricity use for both was based on reports to the CEC. Solid waste emissions were estimated based on methane generation at landfills during decomposition of the waste. GHG emissions rates for solid waste are estimates developed by CARB for landfills in California. Further details on methodology are available in the technical study, included in **Appendix 3.3**.

As noted earlier, Clean Air legislation defines direct emissions as those emitted by sources that are within the organizational control of the property/facility owner. The GHG emissions that would be produced following the occupancy of the Proposed Action would not be under the organizational control of the USACE or the Applicants. Therefore, none of the emissions produced by the Proposed Action would be defined as direct emissions. However, for purposes of analysis, all GHG emissions generated by the homes and other land uses built on the site, such as area sources and mobile sources, are categorized as direct emissions or Scope 1 emissions. All other emissions such as those from generation of electricity, solid waste, etc., are categorized as indirect emissions or Scope 2 and 3 emissions.

3.5.5 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

Impact GHG-1 GHG Emissions due to Construction

Proposed Action

Construction of the Proposed Action would generate GHG emissions that would exceed significance thresholds and therefore are likely to result in a **significant** effect. Mitigation would reduce emissions, but not to less than significant. A residual **significant** effect would remain after mitigation.

Construction of the Proposed Action would result in one-time emissions of GHGs. The primary GHGs generated during construction are CO_2, CH_4, and N_2O. These emissions are the result of fuel combustion by construction equipment and motor vehicles. The other GHGs such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are typically associated with specific industrial sources and processes and would not be emitted during construction of the Proposed Action. The URBEMIS2007 Environmental Management Software was used to estimate the construction-related CO_2 emissions. The default construction equipment and vehicle mixes generated by URBEMIS2007 were assumed for grading and building construction.

Construction activities associated with the Proposed Action would occur over a number of years, with portions of the area being developed in phases. However, the exact timing and duration of these phases is not currently known as they will be determined by market conditions and other factors that are unpredictable over the course of development. The shortest period over which construction of the full Proposed Action would occur is 12 years, from 2013 to 2025. Depending on conditions, construction may be delayed or reduced so that the year of full buildout could be well past 2025.

The total estimated construction emissions are reported in **Table 3.5-4, Estimated Construction Greenhouse Gas Emissions – Proposed Action.** No federal, state, or local agency has developed a quantitative threshold of significance for evaluating a project's construction-related GHG emissions. However, annual emissions would exceed 25,000 metric tons in several of the 12 years of construction, and the aggregate emissions of approximately 268,000 metric tons would be **significant**.

Table 3.5-4
Estimated Construction GHG Emissions – Proposed Action

Construction Year	Emissions (Metric Tons CO_2e)
2013	19,566.5
2014	18,141.4
2015	18,092.3
2016	13,289.9
2017	29,310.9
2018	24,668.7
2019	24,960.7
2020	27,432.6
2021	22,683.8
2022	22,683.8
2023	22,683.8
2024	24,324.2
Total GHG Emissions	**267,858**
Threshold	**None**

Source: Rimpo and Associates, Inc.
*Emissions calculations are provided in **Appendix 3.3**.*

The proposed development would implement **Mitigation Measure AQ-1,** which includes a number of measures that would reduce GHG emissions during construction. Specific measures are detailed in **Section 3.3, Air Quality**. Implementation of this mitigation measure would reduce emissions during construction, but would be insufficient to reduce the emissions substantially. A residual **significant** effect would remain after mitigation.

All Alts. Construction of all of the alternatives would generate GHG emissions that would exceed significance thresholds and therefore are likely to result in a **significant** effect. Mitigation would reduce emissions, but not to less than significant. A residual **significant** effect would remain after mitigation.

Construction emissions are roughly proportional to the land area to be graded as well as the total building area. Consequently, construction emissions for the alternatives were calculated as a ratio of the emissions for the Proposed Action equal to the ratio of the relative areas of development under the Proposed Action and under each alternative. CO_2 emissions have a long residence period in the atmosphere, and effects from GHGs are typically understood as taking place over a long period of time. Consequently, the total emissions from the Proposed Action and alternatives are more relevant to a discussion of effects from GHG than emissions in any specific year. Therefore the total emissions from each alternative are shown in **Table**

3.5-5, Estimated Construction GHG Emissions – Alternatives. As the table shows, GHG emissions would be **significant** under all alternatives based on the significance criteria listed above.

Table 3.5-5
Estimated Construction GHG Emissions - Alternatives

Alternative	Total Emissions (Metric Tons CO_2e)
Alt 1	198,269
Alt 2	225,128
Alt 3	236,604
Alt 4	265,661
Alt 5 (No Action)	169,456
Threshold	**None**

*Source: Impact Sciences, Inc. Emissions calculations are provided in **Appendix 3.5***

The USACE assumes that the City of Roseville would impose **Mitigation Measure AQ-1** on all of the on-site alternatives to address this effect, and that Placer County would impose a similar mitigation measure on Alternative 4. Specific measures are detailed in **Section 3.3**. Implementation of this mitigation measure would reduce emissions during construction, but would be insufficient to reduce emission rates substantially. A residual **significant** effect would remain after mitigation. The USACE acknowledges that it has no authority to require **Mitigation Measure AQ-1** and cannot guarantee that the County will impose this measure.

Impact GHG-2 GHG Emissions due to Operation/Occupancy

Proposed Action

Operation of the Proposed Action would generate GHG emissions that would exceed the significance threshold and therefore would result in a **significant** effect. Mitigation would reduce emissions, but not to level below the significance threshold. A residual **significant** effect would remain after mitigation.

Upon occupancy, the Proposed Action would generate GHG emissions - primarily CO_2, CH_4, and N_2O - from a number of sources that include (1) area sources (natural gas consumption), (2) motor vehicles, (3) indirect sources (electricity consumption, water, and wastewater), and (4) stationary sources.

Table 3.5-6, Estimated Operational GHG Emissions (Direct and Indirect Sources) – Proposed Action, shows a summary of the total estimated GHG emissions from operation of the Proposed Action. The Proposed Action's direct (Scope 1) emissions of 365,577 $MTCO_2e$ would exceed the presumptive threshold of 25,000 $MTCO_2e$ proposed by the CEQ. As noted earlier, the CEQ has not proposed this threshold to evaluate whether the effect of a project would be significant; however,

the proposed threshold suggests that a project that generates emissions below this number does not represent a major emitter of GHGs. The CEQ guidance also notes that land uses of this type do not currently have any established federal protocol for assessing their effect on global climate change. Effects on carbon sequestration from the Proposed Action are assumed to be negligible as the site is primarily grassland, with no significant sources of sequestration.

Table 3.5-6 also presents the indirect emissions that would be produced as a result of the occupancy of the Proposed Action. As the table shows, the Proposed Action's total emissions (Scope 1, 2, and 3) would exceed the CEQ threshold of 25,000 $MTCO_2e$.

Table 3.5-6
Estimated Operational GHG Emissions – Proposed Action

Scope	GHG Emissions Source	Emissions (Metric Tons CO_2e/year)
Scope 1	Transportation (Mobile Sources)	320,061
	Area Sources	45,516
Scope 2	Electricity	65,965
Scope 3	Solid Waste	2,873
	Water	1,751
	Wastewater	696
	Total Scope 1/Direct Emissions	**365,577**
	CEQ Threshold	**25,000**
	Exceeds Threshold?	YES
	Total Operational GHG Emissions	**436,862**
	Exceeds Threshold?	YES

*Source: Impact Sciences, Inc. Emissions calculations are provided in **Appendix 3.5**.*

The basis for GHG emissions thresholds in California is AB 32, which requires a general statewide reduction in emissions of 29 percent from BAU. The operational emissions shown in **Table 3.5-6** do not include any GHG reductions or other efficiency or sustainability measures and would therefore be considered BAU. Given the magnitude of these emissions and the fact that they result from BAU, the Proposed Action's effect on global climate would be **significant**. **Mitigation Measures GHG-2a** and **GHG-2b** are proposed to address the effects related to operational GHG emissions. These measures are the same as Mitigation Measures 4.5-1 and 4.5-2 in the Sierra Vista Specific Plan EIR and were adopted by the City of Roseville at the time of project approval and will be enforced by the City. However, because the Sierra Vista Specific Plan would contribute a cumulatively considerable, incremental contribution to global GHG emissions, the Sierra Vista Specific Plan EIR determined that these mitigation measures would not reduce the effect to less than significant (City of Roseville 2010). The USACE agrees with the conclusion in the Sierra Vista

Specific Plan EIR and finds that a residual **significant** effect would remain after mitigation.

All Alts. Operation of all of the alternatives would generate GHG emissions that would exceed significance thresholds and therefore would result in a **significant** effect. Mitigation would reduce emissions, but not to less than significant. A residual **significant** effect would remain after mitigation**.**

The alternatives vary in the amount of residential, public, commercial, and other buildings that would be constructed. Emissions from both area and mobile sources are proportional to the level of development, specifically the number of residential units constructed and the total amount of commercial or other space built on the site. Consequently, emissions from the various alternatives were estimated by modifying the emission rates calculated for the Proposed Action according to the number of residential units and acreage of commercial or other buildings proposed under each alternative. The results are shown in **Table 3.5-7**, **Estimated Operational Emissions – Alternatives**.

Table 3.5-7
Estimated Operational GHG Emissions – Alternatives

Alternative	Scope 1 (MT CO_2e/year)	Scope 2 (MT CO_2e/year)	Scope 3 (MT CO_2e/year)	Total Emissions (MT CO_2e/year)
Proposed Action	365,577	65,965	5,320	436,862
Alt 1	327,441	59,084	4,765	391,290
Alt 2	352,641	63,631	5,132	421,404
Alt 3	329,734	59,497	4,798	394,030
Alt 4	294,346	53,112	4,283	351,741
No Action	237,776	42,904	3,460	284,140
CEQ Threshold	**25,000**	**--**	**--**	**--**

Source: Impact Sciences, Inc.
*Emissions calculations are provided in **Appendix 3.5**.*

As shown, all alternatives would result in GHG emissions that would be substantially over the threshold suggested by CEQ. Furthermore, the operational emissions shown in **Table 3.5-7** do not include any GHG reductions or other efficiency or sustainability measures and would therefore be considered BAU. Given the magnitude of these emissions and the fact that they result from BAU, the effect of the alternatives on global climate would be **significant**. **Mitigation Measures GHG-2a** and **GHG-2b** are proposed to address the effects related to operational GHG emissions. As noted above, these measures are the same as Mitigation Measures 4.5-1 and 4.5-2 in the Sierra Vista Specific Plan EIR and were adopted by the City of Roseville at the time of project approval and will be enforced by the City. The USACE assumes that the City of Roseville would impose the same mitigation measures on all of the on-site alternatives to address this effect, and that Placer County would impose similar mitigation measures on Alternative 4. However, these mitigation measures would not reduce the effect to less than significant. The USACE finds that a residual **significant**

effect would remain after mitigation. Furthermore, the USACE acknowledges that it has no authority to require **Mitigation Measures GHG-2a** and **GHG-2b** and cannot guarantee that the County will impose these measures.

Mitigation Measure GHG-2a **Air Quality Measures**
(Applicability – Proposed Action and All Alternatives)

Implement Mitigation Measure 4.4-1 from the Sierra Vista Specific Plan EIR prepared by the City of Roseville. Implementation of the Air Quality Mitigation Measure 4.4-1, listed in Section 4.4 Air Quality, would reduce operational and construction-related emissions of criteria air pollutants and precursors, and would also act to reduce GHG emissions associated with project construction and operation. Mitigation Measure 4.4-1 is relevant to Impact 4.5-1 because both criteria air pollutant and GHG emissions are frequently associated with combustion byproducts. In addition, the City shall implement the following measures to reduce direct and indirect GHG emissions associated with the SVSP. Certain measures are already components of the project (i.e., Specific Plan policies, design guidelines, and standards) and/or would be applied consistent with the City's General Plan Policies, addressing GHG emissions and climate change, but are provided here for purposes of completeness.

Mitigation Measure GHG-2b **Additional Measures to Reduce GHG Emissions**
(Applicability – Proposed Action and All Alternatives)

Each increment of new development within the project site requiring a discretionary approval (e.g., proposed tentative subdivision map, conditional use permit), shall demonstrate that GHG emissions from project construction and operation will be reduced by 30% from business-as- usual emissions levels projected for 2025.

For each increment of new development, the City shall submit to the developer, a list of potentially feasible GHG reduction measures to be considered in the construction and design of that portion of the project. The City's list of potentially feasible GHG reduction measures shall reflect the then-current state of the regulation of GHG emissions and climate change, which is expected to continue to evolve under the mandate of AB 32. The developer shall then submit to the City a mitigation plan that lists the measures selected to be implemented as part of the project and contains an analysis demonstrating the associated reduction in GHG emissions. The report shall also demonstrate why measures not selected are considered infeasible. The City shall review the mitigation report for the applicable increment of development and approve the report (with modifications, if considered necessary and feasible) prior to granting any requested discretionary approval for that increment of development. In determining what sort of measures should appropriately be imposed by a local government under the circumstances, the City shall consider the following factors:

- *The extent to which rates of GHG emissions generated by motor vehicles traveling to, from, and within the project site are projected to decrease over time as a result of regulations, policies, and/or plans that have already been adopted or may be adopted in the future by the Air Resources Board (ARB) or other public agency pursuant to AB 32, or by EPA;*
- *The extent to which mobile-source GHG emissions, which at the time of writing this EIR comprise a substantial portion of the state's GHG inventory, can also be reduced through design measures that result in trip reductions and reductions in trip length;*

- *The extent to which GHG emissions emitted by the mix of power generation operated by Roseville Electric, that will serve the project site, are projected to decrease pursuant to the Renewable Portfolio Standard required by SB 1078 and SB 107, as well as any future regulations, policies, and/or plans adopted by the federal and state governments that reduce GHG emissions from power generation;*
- *The extent to which replacement of CCR Title 24 with the California Green Building Standards Code or other similar requirements will result in new buildings being more energy efficient and consequently more GHG efficient;*
- *The extent to which any stationary sources of GHG emissions that would be operated on a proposed land use (e.g., industrial) are already subject to regulations, policies, and/or plans that reduce GHG emissions, particularly any future regulations that will be developed as part of ARB's implementation of AB 32, or other pertinent regulations on stationary sources that have the indirect effect of reducing GHG emissions;*
- *The extent to which the feasibility of existing GHG reduction technologies may change in the future, and to which innovation in GHG reduction technologies will continue, affecting cost-benefit analyses that determine economic feasibility; and*
- *Whether the total costs of proposed mitigation for GHG emissions, together with other mitigation measures, required for the proposed development, are so great that a reasonably prudent property owner would not proceed with the project in the face of such costs.*

In considering how much, and what kind of, mitigation is necessary in light of these factors, the City shall consider the following list of options, though the list is not intended to be exhaustive, as GHG reduction strategies and their respective feasibility are likely to evolve over time. These measures are derived from multiple sources including the Mitigation Measure Summary in Appendix B of the California Air Pollution Control Officer's Association (CAPCOA) white paper, CEQA & Climate Change (CAPCOA 2008), and the California Attorney General's Office (2008).

Energy Efficiency

- *Include clean alternative energy features to promote energy self-sufficiency (e.g., photovoltaic cells, solar thermal electricity systems, small wind turbines).*
- *Design buildings to meet CEC Tier II requirements (e.g., exceeding the requirements of the Title 24 (as of 2007) by 35 percent).*
- *Site buildings to take advantage of shade and prevailing winds and design landscaping and sun screens to reduce energy use.*
- *Install efficient lighting in all buildings (including residential). Also install lighting control systems, where practical. Use daylight as an integral part of lighting systems in all buildings.*
- *Install light-colored "cool" pavements, and strategically located shade trees along all bicycle and pedestrian routes.*

SVSP developers shall be encouraged incorporate "green building" points into the construction and design of all (additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area) projects that incorporate "green building" points in construction. Such points may be achieved through checklists identified by New Home Construction Green Building Guidelines available at www.builditgreen.org, or through a similar list that distinguishes specific measures targeting efficiencies in energy, resource use, or other measures that would also directly or indirectly result in GHG emission reductions. Specific efficiencies that would reduce GHG emissions

shall be implemented where feasible, for all project areas including site design, landscaping, foundation, structural frame and building envelope, exterior finishing, plumbing, appliance use, insulation, heating, venting and air conditioning, building performance, use of renewable energy, finishes, and flooring.

SVSP developers shall be encouraged to incorporate any combination of the following strategies to reduce heat gain for 50 percent of the non-roof impervious site landscape (including roads, sidewalks, courtyards, parking lots, and driveways) into the construction and design of all new (additions of 25,000 square feet of office/retail commercial) projects:

- *Shaded (Within five years of occupancy)*
- *Paving materials with a Solar Reflective Index (SRI) of at least 29*
- *Open grid pavement system (pavement that is less than 50 percent impervious and contains vegetation in the open cells)*
- *Parking spaces under cover (defined as underground, under deck, under roof, or under building.) Any roof used to shade or cover parking should have an SRI of at least 29.*
- *Optional level of LEED certification, such as silver or gold which can allow for further reductions in energy consumption and GHG emissions.*

Water Conservation and Efficiency

The SVSP project includes water conservation as part of the project. In addition, the following should be considered:

- *With the exception of ornamental shade trees, use water-efficient landscapes with native, drought-resistant species in all public area and commercial landscaping. Use water-efficient turf in parks and other turf dependent spaces.*
- *Install the infrastructure to use recycled water for landscape irrigation (part of the project).*
- *Install water-efficient irrigation systems and devices, such as soil moisture-based irrigation controls. (Water Efficient Landscaping Ordinance)*
- *Design buildings and lots to be water-efficient. Only install water-efficient fixtures and appliances (e.g., Ultra low-flow toilets, no flow urinals etc.).*
- *Restrict watering methods (e.g., prohibit systems that apply water to non-vegetated surfaces) and control runoff. Prohibit businesses from using pressure washers for cleaning driveways, parking lots, sidewalks, and street surfaces unless required to mitigate health and safety concerns. These restrictions should be included in the Covenants, Conditions, and Restrictions of the community.*

Solid Waste Measures

- *Reuse and recycle construction and demolition waste (including, but not limited to soil, vegetation, concrete, lumber, metal, and cardboard).*
- *Provide interior and exterior storage areas for recyclables and green waste at all buildings.*
- *Provide adequate recycling containers in public areas, including parks, school grounds, paseos, and pedestrian zones in areas of mixed-use development.*
- *Provide education and publicity about reducing waste and available recycling services.*

Transportation and Motor Vehicles

- *Promote ride sharing programs and employment centers (e.g., by designating a certain percentage of parking spaces for ride sharing vehicles, designating adequate passenger loading and unloading zones and waiting areas for ride share vehicles, and providing a web site or message board for coordinating ride sharing).*
- *Provide the necessary facilities and infrastructure in all land use types to encourage the use of low or zero emission vehicles (e.g., electric vehicle charging facilities and conveniently located alternative fueling stations).*
- *At commercial land uses, all forklifts, "yard trucks," or vehicles that are predominately used on site at non-residential land uses shall be electric-powered or powered by biofuels (such as biodiesel [B100]) that are produced from waste products, or shall use other technologies that do not rely on direct fossil fuel consumption.*
- *Implement roundabouts. (30 percent intersection emissions reduction)*
- *Provide the necessary facilities and infrastructure to encourage the use of low or zero-emission vehicles (e.g., electric vehicle charging facilities and conveniently located alternative fueling stations) (0.5 to 1.5 percent emissions reduction).*
- *Prioritized parking within new commercial and retail areas shall be given to electric vehicles, hybrid vehicles, and alternative fuel vehicles.*
- *Incorporate bicycle lanes, routes, and intersection improvements into street systems within the Specific Plan (1 percent emissions reduction).*
- *For commercial land uses, provide adequate bicycle parking near building entrances to promote cyclist safety, security, and convenience (1 percent emissions reduction).*
- *Create Class II bicycle lanes and walking paths directed to the location of schools, parks and other destination points (1 percent emissions reduction).*
- *Encourage the public school districts to serve the project site with a student busing system, and/or enable students residing in the project to safely walk to or bicycle to school without encountering barriers such as large arterial roadways or sound walls.*
- *Construction of transit facility/amenity (bus shelters, bicycle lockers/racks, etc.) for existing public and private transit (0.5 percent emissions reduction).*
- *Provide secure bicycle storage at public parking facilities.*

3.5.6 RESIDUAL SIGNIFICANT IMPACTS

Mitigation Measure AQ-1 would reduce construction-phase GHG emissions, but would be insufficient to reduce the emissions substantially. The Proposed Action and the alternatives would have a residual significant effect due to GHG emissions during construction.

Mitigation Measures GHG-2a and 2b would reduce emissions, but a quantitative analysis of actual reductions that would be achieved is not possible as it depends entirely on actual practices or suite of practices implemented by not only the Applicants, but also future residents and businesses within the development. Furthermore, the mitigation measure is not enforceable by the federal lead agency. Since the exact reductions that could be achieved cannot be predicted at this time, the Proposed Action and the alternatives are conservatively expected to have an adverse impact due to GHG emissions during operation.

3.5.7 REFERENCES

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