5.3 GREENHOUSE GAS EMISSIONS

This section of the DSEIR compares the impacts of the Modified Project's greenhouse gas ("GHG") emissions to the impacts of the Approved Project's GHG emissions. The analysis in this section is based, in part, on the Greenhouse Gas and Climate Change Technical Report prepared by ENVIRON International Corporation (April 2011) and included in Appendix H to this DSEIR.

In addition, the analysis in this section is based in part on the following studies:

- *Final Statement of Reasons for Regulatory Action, Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB97,* California Natural Resources Agency, December 2009[1]

- *CEQA and Climate Change, Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act,* California Air Pollution Control Officers Association ("CAPCOA"), January 2008[2]

- *Climate Change Scoping Plan*, California Air Resources Board ("CARB"), December 2008[3,4]

- *Compass Blueprint 2% Strategy Opportunity Areas Maps*, Southern California Association of Governments ("SCAG"), 2008[5]

- *The California Environmental Quality Act – Addressing Global Warming Impacts at the Local Agency Level*, Office of the California Attorney General, 2008[6]

- *Technical Advisory, CEQA and Climate Change – Addressing Climate Change Through California Environmental Quality Act ("CEQA") Review*, Governor's Office Of Planning And Research, June 2008[7]

5.3.1 Environmental Setting

Greenhouse Gases and Climate Change

Climate change is a term that refers to the variation of Earth's climate over time, whether due to natural variability or as a result of human activities. The climate system is interactive, consisting of five major components: the atmosphere, the hydrosphere (ocean, rivers, and lakes), the cryosphere (sea ice, ice sheets, and glaciers), the land surface, and the biosphere (flora and fauna). The atmosphere is the most unstable and rapidly changing part of the system. It is made up of 78.1 percent nitrogen ("N_2"), 20.9 percent oxygen ("O_2"), and 0.93 percent argon ("Ar"). These gases have only limited interaction with the incoming solar radiation and do not interact with infrared (long-wave) radiation emitted by the Earth. However, there are a number of

[1] This document can be found at: http://www.ceres.ca.gov/ceqa/guidelines/
[2] This document can be found at: http://www.capcoa.org/
[3] The San Francisco County Superior Court has recently issued a Judgment in *Association of Irritated Residents v. California Air Resources Board*, San Francisco County Superior Court Case No. CPF-09-509562 that enjoins implementation of the Scoping Plan's cap and trade program. A copy of this Judgment can be found at: http://stream.loe.org/images/110520/final%20writ-1.pdf .
[4] This document can be found at: http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm
[5] This document can be found at: http://www.compassblueprint.org/
[6] This document can be found at: http://ag.ca.gov/globalwarming/
[7] This document can be found at: http://ag.ca.gov/globalwarming/

trace gases, such as carbon dioxide ("CO_2"), methane ("CH_4"), nitrous oxide ("N_2O"), and ozone ("O_3"), that absorb and emit infrared radiation and therefore have an effect on climate. These are GHGs, and while they comprise less than 0.1 percent of the total volume mixing ratio in dry air, they play an essential role in influencing climate (IPCC 2001).

Non-CO_2 GHGs are those listed in the Kyoto Protocol[8] (CH_4, N_2O, hydrofluorocarbons [“HFC”], perfluorocarbons ["PFC"], and sulfur hexafluoride ["SF_6"])and those listed under the Montreal Protocol and its Amendments[9] (chlorofluorocarbons ["CFC"], hydrochlorofluorocarbons ["HCFC"], and halons). Table 5.3-1, *Greenhouse Gases and Their Relative Global Warming Potential Compared to CO_2*, lists a selection of some of the GHGs and their relative global warming potentials ("GWP") as compared to CO_2. Although not included in this table, water vapor ("H_2O") is the strongest GHG, but is also the most variable in its phases (vapor, cloud droplets, ice crystals). However, water vapor is not considered a pollutant in the atmosphere (IPCC 2001). The major GHGs are briefly described below the table.

Carbon dioxide (CO_2) enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, respiration, and also as a result of other chemical reactions (e.g., manufacture of cement). Carbon dioxide is also removed from the atmosphere (sequestered) when it is absorbed by plants as part of the biological carbon cycle.

Methane (CH_4) is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.

Nitrous oxide (N_2O) is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.

[8] Kyoto Protocol: Established by the United Nations Framework Convention on Climate Change (UNFCC) and signed by more than 160 countries (excluding the United States) stating that they commit to reduce their GHG emissions by 55 percent or engage in emissions trading.

[9] Montreal Protocol and Amendments: International Treaty signed in 1987 and subsequently amended in 1990 and 1992. Stipulates that the production and consumption of compounds that deplete ozone in the stratosphere (CFC, halons, carbon tetrachloride, and methyl chloroform) are to be phased out by 2000 (2005 for methyl chloroform).

Table 5.3-1
Greenhouse Gases and Their Relative Global Warming Potential Compared to CO_2

GHG	Atmospheric Lifetime (years)	Global Warming Potential Relative to CO_2[1]
Carbon Dioxide (CO_2)	50 to 200	1
Methane (CH_4)[2]	12 (±3)	21
Nitrous Oxide (N_2O)	120	310
Hydrofluorocarbons:		
HFC-23	264	11,700
HFC-32	5.6	650
HFC-125	32.6	2,800
HFC-134a	14.6	1,300
HFC-143a	48.3	3,800
HFC-152a	1.5	140
HFC-227ea	36.5	2,900
HFC-236fa	209	6,300
HFC-4310mee	17.1	1,300
Perfluoromethane: CF_4	50,000	6,500
Perfluoroethane: C_2F_6	10,000	9,200
Perfluorobutane: C_4F_{10}	2,600	7,000
Perfluoro-2-methylpentane: C_6F_{14}	3,200	7,400
Sulfur Hexafluoride (SF_6)	3,200	23,900

Source: USEPA
[1] Based on 100-Year Time Horizon of the Global Warming Potential (GWP) of the air pollutant relative to CO_2.
[2] The methane GWP includes the direct effects and those indirect effects due to the production of tropospheric ozone and stratospheric water vapor. The indirect effect due to the production of CO_2 is not included.

Fluorinated gases are synthetic, strong greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances. These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High Global Warming Potential gases.

- ***Chlorofluorocarbons ("CFCs")*** are greenhouse gases covered under the 1987 Montreal Protocol and used for refrigeration, air conditioning, packaging, insulation, solvents, or aerosol propellants. Since they are not destroyed in the lower atmosphere (troposphere, stratosphere), CFCs drift into the upper atmosphere where, given suitable conditions, they break down ozone. These gases are also ozone depleting gases and are therefore being replaced by other compounds that are GHGs covered under the Kyoto Protocol.

- ***Perfluorocarbons ("PFCs")*** are a group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly perfluoromethane ["CF_4"] and perfluoroethane ["C_2F_6"]) were introduced as alternatives, along with HFCs, to the ozone-depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are also used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they have a high global warming potential.

- ***Sulfur Hexafluoride ("SF_6")*** is a colorless gas soluble in alcohol and ether, slightly soluble in water. SF_6 is a strong greenhouse gas used primarily in electrical transmission and distribution systems as an insulator.

- ***Hydrochlorofluorocarbons ("HCFCs")*** contain hydrogen, fluorine, chlorine, and carbon atoms. Although ozone-depleting substances, they are less potent at destroying stratospheric ozone than CFCs. They have been introduced as temporary replacements for CFCs and are also greenhouse gases.

- ***Hydrofluorocarbons ("HFCs")*** contain only hydrogen, fluorine, and carbon atoms. They were introduced as alternatives to ozone-depleting substances in serving many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are strong greenhouse gases (USEPA 2008a).

California's GHG Sources and Relative Contribution

California is the second largest emitter of GHG in the United States, only surpassed by Texas, and the tenth largest GHG emitter in the world (CEC 2005). However, because of more stringent air emission regulations, in 2001 California ranked fourth lowest in carbon emissions per capita and fifth lowest among states in CO_2 emissions from fossil fuel consumption per unit of Gross State Product (total economic output of goods and services) (CEC 2006). In 2004, California produced 492 million metric tons ("MMTons") of CO_2-equivalent ("CO_2e") GHG emissions,[10] of which 81 percent were CO_2 from the combustion of fossil fuels, 2.8 percent were from other sources of CO_2, 5.7 percent were from methane, and 6.8 percent were from N_2O (CEC 2006). The remaining 2.9 percent of GHG emissions were from High Global Warming Potential gases, which include hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (CEC 2006).

CO_2 emissions from human activities make up 84 percent of the total GHG emissions (CEC 2006). California's transportation sector is the single largest generator of GHG emissions, producing 40.7 percent of the state's total emissions (CEC 2006). Electricity consumption is the second largest source, comprising 22.2 percent. While out-of-state electricity generation comprises 22 to 32 percent of California's total electricity supply, it contributes 39 to 57 percent of the GHG emissions associated with electricity consumption in the state (CEC 2006). Industrial activities are California's third largest source of GHG emissions, comprising 20.5 percent of state's total emissions (CEC 2006). Other major sources of GHG emissions include mineral production, waste combustion and land use, and forestry changes. Agriculture, forestry, commercial, and residential activities comprise the balance of California's greenhouse gas emissions (CEC 2006).

Human Influence on Climate Change

For approximately 1,000 years before the Industrial Revolution, the amount of GHG in the atmosphere remained relatively constant (IPCC 2007). During the 20th century, however, scientists observed a rapid change in the climate and climate change pollutants that are attributable to human activities. The amount of CO_2 has increased by more than 35 percent since pre-industrial times, and has increased at an average rate of 1.4 parts per million ("ppm") per year since 1960, mainly due to combustion of fossil fuels and deforestation (IPCC 2007). These recent changes in climate change pollutants far exceed the extremes of the ice ages, and the global mean temperature is warming at a rate that cannot be explained by natural causes alone. Human activities are directly altering the chemical composition of the atmosphere through the buildup of climate change pollutants (CAT 2006).

[10] CO_2-equivalence is used to show the relative potential that different GHG have to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. The global warming potential of a GHG is also dependent on the lifetime, or persistence, of the gas molecule in the atmosphere.

Climate-change scenarios are affected by varying degrees of uncertainty (IPCC 2007). The Intergovernmental Panel on Climate Change's ("IPCC") *2007 IPCC Fourth Assessment Report* projects that the range of global mean temperature increase from 1990 to 2100, under different climate-change scenarios, will range from 1.4 to 5.8 °C (2.5 to 10.4°F). In the past, gradual changes in the earth's temperature changed the distribution of species, availability of water, etc. However, human activities are accelerating this process so that environmental impacts associated with climate change no longer occur in a geologic timeframe but within a human lifetime (IPCC 2007).

Potential Climate Change Impacts for California

Climate change is not a local environmental impact; it is a global impact.[11] Unlike criteria pollutants, CO_2 emissions cannot be attributed to a direct health effect. However, human-caused increases in GHG have been shown to be highly correlated with increases in the surface and ocean temperatures on Earth (IPCC 2007). What is not clear is the extent of the impact on environmental systems.

Like the variability in the projections of the expected increase in global surface temperatures, the environmental consequences of gradual changes in the Earth's temperature are also hard to predict. Likewise, there are varying degrees of uncertainty in environmental impact scenarios. Because of this uncertainty, the IPCC uses five different confidence levels to quantify climate change impacts on the environment: Very High Confidence (95 percent or greater), High Confidence (67 to 95 percent), Medium Confidence (33 to 67 percent), Low Confidence (5 to 33 percent), and Very Low Confidence (5 percent or less).

In California and western North America, 1) observations in the climate have showed a trend toward warmer winter and spring temperatures, 2) a smaller fraction of precipitation is falling as snow, 3) there is a decrease in the amount of spring snow accumulation in the lower and middle elevation mountain zones, 4) there is an advance snowmelt of 5 to 30 days earlier in the springs, and 5) there is a similar shift (5 to 30 days earlier) in the timing of spring flower blooms (CAT 2006). According to the California Climate Action Team ("CAT"), even if actions could be taken to immediately curtail climate change emissions, the potency of emissions that have already built up, their long atmospheric lifetimes (see Table 5.3-1), and the inertia of the Earth's climate system could produce as much as 0.6°C (1.1°F) of additional warming. Consequently, some impacts from climate change are now considered to be unavoidable.

CAT and the California Environmental Protection Agency ("Cal/EPA") use the results from the recent analysis of global climate change impacts for California under three IPCC scenarios: lower emissions ("B1"), medium-high emissions ("A2"), and high emissions ("A1F1"); each is associated with an increasing rise in average global surface temperatures. According to the California Energy Commission ("CEC") in its 2006 report, *Our Changing Climate, Assessing the Risks to California*, global climate change risks to California include public health impacts (poor air quality made worse and more severe heat), water resources impacts (decreasing Sierra Nevada snow pack, challenges in securing adequate water supply, potential reduction in hydropower, and loss of winter recreation), agricultural impacts (increasing temperatures, increasing threats from pests and pathogens, expanded ranges of agricultural weeds, and declining productivity), coast sea level impacts (rising coastal sea levels, increasing coastal floods, and shrinking beaches), forest and biological resource impacts (increasing wildfires, increasing threats from pest and pathogens, declining forest productivity, and shifting vegetation and species distribution), and electricity impacts (increased energy demand).

[11] See Final Statement of Reasons, pp. 11-12; Bay Area Air Quality Management District Air Quality Guidelines, p. 2-4.

Regulatory Setting

Regulation of GHG Emissions on a National Level

Currently there are no adopted regulations to combat global climate change on a national level. However, recent statutory authority has been granted to the United States Environmental Protection Agency ("USEPA") that may change the voluntary approach taken under our current administration to address this issue. On April 2, 2007, the United States Supreme Court ruled that the USEPA has the authority to regulate CO_2 emissions under the Federal Clean Air Act. Consequently, the regulation of GHG emissions by the USEPA with regard to global climate change on a national level is anticipated to be forthcoming.

After a thorough examination of the scientific evidence and careful consideration of public comments, the USEPA announced on December 7, 2009 that GHG emissions threaten the public health and welfare of the American people. USEPA also finds that GHG emissions from on-road vehicles contribute to that threat. USEPA's final findings respond to the 2007 U.S. Supreme Court decision that GHG emissions fit within the Clean Air Act definition of air pollutants. The findings do not in and of themselves impose any emission reduction requirements but rather allow USEPA to finalize the GHG standards proposed in 2009 for new light-duty vehicles as part of the joint rulemaking with the Department of Transportation.

USEPA's endangerment finding covers emissions of six key greenhouse gases – carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride – that have been the subject of scrutiny and intense analysis for decades by scientists in the United States and around the world.

Regulation of GHG Emissions on a State Level

Assembly Bill 32 ("AB 32"), the Global Warming Solutions Act, was passed by the California state legislature on August 31, 2006, to place the state on a course toward reducing its contribution of GHG emissions. AB 32 follows the first tier of emissions reduction targets established in Executive Order S-3-05, signed on June 1, 2005. Executive Order S-3-05 requires the state's global warming emissions to be reduced to 1990 levels by the year 2020 and by 80 percent of 1990 levels by the year 2050. AB 32 sets a 2020 target at the emissions levels that were generated in the state in year 1990. It is projected that GHG emissions in California by 2020 will be approximately 596 MMTons of CO_{2e} by 2020 (CARB 2008). In December 2007, CARB approved a 2020 emissions limit of 427 MMTons (471 million tons) of CO_{2e} for the state (CARB 2008). The 2020 target requires emissions reductions of 169 MMTons, 28.5 percent of the projected emissions compared to business-as-usual ("BAU") in year 2020 (i.e., 28.5 percent of 596 MMTons) (CARB 2008). CARB defines BAU in its Scoping Plan as emissions levels that would occur if California continued to grow and add new GHG emissions but did not adopt any measures to reduce emissions. Projections for each emission-generating sector were compiled and used to estimate emissions for 2020 based on 2002–2004 emissions intensities. Under CARB's definition of BAU, new growth is assumed to have the same carbon intensities as was typical practice in 2002 through 2004.

In order to effectively implement the cap, AB 32 directed CARB to establish a mandatory reporting system to track and monitor global warming emissions levels for large stationary sources that generate more than 25,000 metric tons ("MTons") per year, prepare a plan demonstrating how the 2020 deadline can be met, and develop appropriate regulations and programs to implement the plan by 2012. The Climate Action Registry Reporting Online Tool was established through the Climate Action Registry to track GHG emissions. In June 2008, CARB released a draft of the *Climate Change Scoping Plan*, which was revised in October 2008. The final

Scoping Plan was adopted by CARB on December 11, 2008. Key elements of CARB's GHG reduction plan are:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a mix of 33 percent for energy generation from renewable sources;
- Developing a California cap-and-trade program that links with other Western Climate Initiate partner programs to create a regional market system for large stationary sources (however, as of the date of this DSEIR, implementation of this cap-and-trade portion of the Scoping Plan has been enjoined);[12]
- Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
- Creating target fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the state's long-term commitment to AB 32 implementation.

Table 5.3-2, *Scoping Plan Greenhouse Gas Reduction Measures and Reductions toward 2020 Targets*, shows the proposed reductions from regulations and programs outlined in the Scoping Plan. While local government operations were not accounted for in achieving the 2020 emissions reduction, CARB estimates that land use changes implemented by local governments that integrate jobs, housing, and services are estimated to result in a reduction of 5 MMTons of CO_2e, which is approximately 3 percent of the 2020 GHG emissions reduction goal. In recognition of the critical role local government plays in successful implementation of AB 32, CARB is recommending GHG reduction goals of 15 percent of today's levels by 2020 to ensure that municipal and community-wide emissions match the state's reduction target. Measures that local governments take to support shifts in land use patterns are anticipated to emphasize compact, low-impact growth over development in greenfields, resulting in fewer vehicle miles traveled. According to the Measure Documentation Supplement to the Scoping Plan, local government actions and targets are anticipated to reduce vehicle miles travelled by approximately 2 percent through land use planning, resulting in a potential GHG reduction of 2 MMTons of CO_2e (or approximately 1.2 percent of the GHG reduction target).

In addition to the requirements under AB 32 to address GHG emission and global climate change in general plans and CEQA documents, Senate Bill 97 (Chapter 185, 2007) required the Governor's Office of Planning and Research (OPR) to develop CEQA guidelines for addressing global warming emissions and mitigating project-generated GHG emissions. OPR transmitted the proposed guidelines to the California Natural Resources Agency ("CNRA") and the guidelines were adopted on December 30, 2009. The amended CEQA Guidelines became effective on March 18, 2010.

The new CEQA Guidelines concerning GHG emissions do not include or recommend any particular threshold of significance; instead, they leave that decision to the discretion of the lead agency. However, with respect to adopting thresholds of significance, newly added CEQA Guidelines section 15064.7 subdivision (c) provides:[A] lead agency may consider thresholds of significance previously adopted or recommended by

other public agencies or recommended by experts, provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence. The new CEQA Guidelines also do not suggest or recommend the use of any specific GHG emission mitigation measures. Instead, newly added CEQA Guidelines section 15126.4 subdivision (c) provides that lead agencies shall consider feasible means, supported by substantial evidence and subject to monitoring or reporting, of mitigating the significant effects of greenhouse gas emissions.

Table 5.3-2
CARB Scoping Plan Greenhouse Gas Reduction Measures and Reductions toward 2020 Target

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

Source: CARB 2008. Note: the percentages in the right-hand column add up to more than 100 percent because the emissions reduction goal is 169 MMTons and the Scoping Plan identifies 174 MMTons of emissions reductions strategies.
$MMTCO_{2e}$: million metric tons of CO_{2e}
[1] Reductions represent an estimate of what may be achieved from local land use changes. It is not the SB 375 regional target.
[2] According to the Measure Documentation Supplement to the Scoping Plan, local government actions and targets are anticipated to reduce vehicle miles traveled by approximately 2 percent through land use planning, resulting in a potential GHG reduction of 2 MMTons of CO_{2e} (or approximately 1.2 percent of the GHG reduction target). However, these reductions were not included in the Scoping Plan reductions to achieve the 2020 target.

Among other things, CNRA noted in its Public Notice for these changes to the CEQA Guidelines that the impacts of GHG emissions should be considered in the context of a cumulative impact, rather than a project impact. The Public Notice states:

"While the Proposed Amendments do not foreclose the possibility that a single project may result in greenhouse gas emissions with a direct impact on the environment, the evidence before [CNRA] indicates that in most cases, the impact will be cumulative. Therefore, the Proposed Amendments emphasize that the analysis of greenhouse gas emissions should center on whether a project's incremental contribution of greenhouse gas emissions is cumulatively considerable."

Executive Order S-03-05

In summary, current State of California guidance and goals for reductions in GHG emissions are generally embodied in AB-32 and Executive Order S-03-05. AB 32 establishes a goal of reaching 1990 levels by 2020 and describes a process for achieving that goal. Executive Order S- 03-05 sets a goal for the following for reduction of GHG emissions:

- 2000 levels by 2010
- 1990 levels by 2020
- 80 percent below 1990 levels by 2050.

Energy Conservation Standards

Energy Conservation Standards for new residential and non-residential buildings were adopted by California Energy Resources Conservation and Development Commission in June 1977 and most recently revised in 2008 (Title 24, Part 6 of the California Code of Regulations ["CCR"]).[13] Title 24 requires the design of building shells and building components to conserve energy. The standards are updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods. The 2006 Appliance Efficiency Regulations (Title 20, CCR Sections 1601 through 1608) were adopted by the California Energy Commission on October 11, 2006, and approved by the California Office of Administrative Law on December 14, 2006. The regulations include standards for both federally-regulated appliances and non-federally regulated appliances. While these regulations are now often viewed as "business-as-usual," they exceed the standards imposed by all other states and they reduce GHG emissions by reducing energy demand.

On July 17, 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (proposed Part 11, Title 24) was adopted as part of the California Building Standards Code (Title 24, California Code of Regulations). The green building standards that became mandatory in the 2010 edition of the Code established voluntary standards on planning and design for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants The mandatory provisions of the California Green Building Code Standards became effective January 1, 2011 .

Renewable Power Requirements

A major component of California's Renewable Energy Program is the renewable portfolio standard ("RPS") established under Senate Bills ("SBs") 1078 (Sher) and 107 (Simitian). Under the RPS, certain retail sellers of electricity are required to increase the amount of renewable energy each year by at least 1 percent in order to

[13] Although new building energy efficiency standards were adopted in April 2008, these standards did not go into effect until 2009.

reach at least 20 percent by December 30, 2010.[14] CARB has now approved an even higher goal of 33 percent by 2020. Renewable sources of electricity include wind, small hydropower, solar, geothermal, biomass, and biogas. The increase in renewable sources for electricity production will decrease indirect GHG emissions from development projects because electricity production from renewable sources is generally considered "carbon neutral" (ENVIRON 2011).

Vehicle Emission Standards/Improved Fuel Economy

Vehicle GHG emission standards were enacted under AB 1493 ("Pavley I") and the Low Carbon Fuel Standard ("LCFS"). Pavley I is a clean-car standard that reduces GHG emissions from new passenger vehicles (light duty auto – medium duty vehicles) from 2009 through 2016 and is anticipated to reduce GHG emissions from new passenger vehicles by 30 percent in 2016. The LCFS requires a reduction of 2.5 percent in the carbon intensity of California's transportation fuels by 2015 and a reduction of at least 10 percent by 2020.[15]

Regulation of GHG Emissions on a Regional Level

In 2008, SB 375 was adopted to connect the GHG emissions reductions targets in the Scoping Plan for the transportation sector to local land use decisions that affect travel behavior. Its intent is to reduce GHG emissions from light-duty trucks and automobiles (excluding emissions associated with goods movement) by aligning regional long-range transportation plans, investments, and housing allocations to local land use planning to reduce vehicle miles traveled and vehicle trips. Specifically, SB 375 requires CARB to establish GHG emissions reduction targets for each of the 18 regions in California managed by a metropolitan planning organization ("MPO"). SCAG is the MPO for the southern California region, which includes the counties of Los Angeles, Orange, San Bernardino County, Riverside, Ventura, and Imperial.

The GHG emissions reduction targets for each region were established by CARB in September 2010, and each MPO, under SB 375, is now required to prepare a Sustainable Communities Strategy ("SCS") in its Regional Transportation Plan that achieves the established target. While there is no deadline for adoption of the SCS, it is anticipated that SCAG will complete its SCS in 2012. The SCS sets forth a development pattern for the region, which, when integrated with the transportation network and other transportation measures and policies, would reduce GHG emissions from transportation (excluding goods movement). The SCS is meant to provide individual jurisdictions with growth strategies that, when taken together, achieve the regional GHG emissions reduction targets. However, the SCS does not require that local general plans, specific plans, or zoning be consistent with the SCS but provides incentives for consistency for governments and developers. If the SCS is unable to achieve the regional GHG emissions reduction targets, the MPO is required to prepare an alternative planning strategy that shows how the GHG emissions reduction target could be achieved through alternative development patterns, infrastructure, and/or transportation measures.

5.3.2 Thresholds of Significance

Based on Appendix G of the CEQA Guidelines, the City has determined that a project would normally have a significant effect on the environment if the project would:

GHG-1 Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

[14] 2002 Senate Bill 1078 and 2006 Senate Bill 107.
[15] CARB's user guide for the Pavley I + Low Carbon Fuel Standard Postprocessor provides more detail. Available at: http://www.arb.ca.gov/cc/sb375/tools/pavleylcfs-userguide.pdf, accessed August 2010.

GHG-2 Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Neither SCAQMD nor the City has adopted a significance threshold for the GHG emissions from residential/commercial projects. Consequently, the City has determined, pursuant to the discretion afforded by CEQA Guidelines section 15064.4(a) and (b), respectively, for this DSEIR, to quantify the GHG emissions from the Modified Project and the Approved Project based on the methodologies proposed by SCAQMD. In addition, as outlined below, the City has determined to assess the significance of the Modified Project's GHG emissions using the SCAQMD's draft target efficiency threshold of 4.8 MTons per service population ("MTons/SP") per year, and an analysis of the Modified Project's consistency with plans, policies and regulations adopted for the purpose of reducing GHG emissions.

South Coast Air Quality Management District

On December 5, 2008, the SCAQMD Governing Board adopted its staff proposal for an interim CEQA GHG significance threshold for projects where the SCAQMD is the lead agency. As to all projects where SCAQMD is not the lead agency, the Board has only adopted thresholds for industrial (stationary source) projects, and has not yet adopted CEQA GHG thresholds for new residential/commercial development projects.[16] To achieve a policy objective of capturing 90 percent of GHG emissions from new residential/commercial development projects and implement a "fair share" approach to reducing emission increases from each sector, SCAQMD staff has proposed combining performance standards and screening thresholds. To assist interested parties in assessing the significance of GHG emissions from new residential/commercial development projects under CEQA, SCAQMD has been working on developing thresholds together with its GHG CEQA Significance Thresholds Working Group.

At this time, the SCAQMD has not adopted any significance thresholds for new residential/commercial development projects. However, over the last few years SCAQMD has proposed several draft thresholds. According to a presentation given at the September 28, 2010 GHG CEQA Significance Working Group meeting, the last Working Group meeting prior to the date that the ENVIRON GHG Technical Report was prepared for the Modified Project, SCAQMD proposed a draft threshold for 2020 of 4.8 MTons of CO_2e per "service population" per year for mixed use developments such as the Modified Project. In other words, the most recently proposed SCAQMD threshold requires dividing a development project's total GHG emissions by its total service population; if the resulting number exceeds 4.8 MTons of CO_2e per service person per year, the development's GHG emissions would be significant.

5.3.3 The Approved Project

GHG emissions were not studied in the 2003 EIR since CEQA and the CEQA Guidelines did not have any related requirements at the time the 2003 EIR was prepared. The Approved Project's GHG emissions are quantified and compared to those of the Modified Project in the following discussion, and in the supporting technical report (Appendix H).

[16] The current proposed threshold criteria and adopted industrial permitted project threshold criteria can be found on SCAQMD's website at: http://www.aqmd.gov/ceqa/handbook/GHG/GHG.html

5.3.4 Environmental Impacts of the Modified Project

Modeling Methodology

The California Emissions Estimator Model ("CalEEMod") version 2011.1.1 was used to assist in quantifying the GHG emissions inventories, including both direct and indirect emissions sources, for the Approved Project and the Modified Project. These inventories include the following emission sources (see Appendix H for additional details regarding modeling methodology and assumptions):

- Construction: one-time emissions associated with construction equipment, construction-related vehicle trips, and off-gas emissions from painting and paving. There are four major construction phases for an urban redevelopment: demolition, site preparation, grading, and building construction. The building construction phase can be broken down into three subphases: building construction, architectural painting, and asphalt paving. GHG emissions from these construction phases are largely attributable to fuel use from construction equipment and worker commuting. The construction emissions would be the same for the Modified Project as for the Approved Project, since merely changing the location of certain of the buildings within the same development envelope would not change the amount of time and resources required for construction. Construction emissions were based on the construction and equipment information provided by the Applicant. The emissions have been adjusted from the CalEEMod output to account for the 33 percent reduction attributable to overestimation of load factors as indicated by CARB, as appropriate. To be conservative, no specific mitigation measures related to GHG emissions associated with construction were assumed in this model. However, it should be noted that mitigation measures such as requiring the use of newer model engines and higher Tier (i.e., lower emitting) off-road equipment would reduce the GHG emissions. The exceptions are the use of compressed natural gas vehicles, which could increase the GHG emissions from off-road vehicles slightly, and the use of diesel particulate filters, which have a small energy penalty associated with them.

- Vegetation Changes: one-time net carbon sequestration from 22,340 new trees planted in the Vesting Tentative Tract Map areas and from the approximately 48,000 new trees in the Orange County Great Park. Permanent vegetation changes that occur as a result of project development constitute a one-time change in the carbon sequestration capacity of a project site. In this case, some developed land will be changed into a large natural park. This will result in an overall net sequestration of carbon once the vegetation in the new park reaches a steady state (i.e., new vegetation replaces dying vegetation). In addition, vegetation changes result in a net increase in carbon sequestration capacity because of the net new trees that will be planted at the Proposed Project Site outside of the park. Consequently, vegetation change results in a GHG emissions offset. The change in vegetation at the Proposed Project Site results in a one-time net sequestration of 55,332 MTons of GHG emissions.

- Area Sources: annual emissions associated with landscape maintenance-related fuel combustion sources, such as lawn mowers, and from natural gas fireplaces. No substantial direct GHG emissions would result from consumer products and architectural coating. Based on information provided by the Applicant, 4,350 dwelling units were assumed to contain natural gas fireplaces for the Approved Project and for the Modified Project.[17] Based on information provided by the Applicant, the

[17] Electrical fireplaces, if incorporated instead of natural gas fireplaces, would result in decreased GHG emissions compared to a similar sized natural gas fireplace.

landscape-related emissions for the Modified Project were reduced by 28 percent as compared to the Approved Project to account for the decrease in landscaped areas in the Modified Project.

- Building Energy Use: annual emissions associated with energy use (electricity and natural gas) in residential and non-residential buildings. These emissions have been calculated using a Southern California Edison (SCE) emission factor that accounts for the 33 percent renewable portfolio standard (RPS) required by 2020. Building energy intensity was calibrated to account for updates in building energy efficiency requirements since the 2001 Title 24 (California Building Code) standards (e.g., 2008 Building and Energy Efficiency Standards). The Modified Project's GHG emissions also reflect the Applicant's commitment to build homes and non-residential buildings that are 15 percent more energy efficient than the standards set forth in the 2008 California Building and Energy Efficiency Standards (California Code of Regulations, Title 24, Part 6). In addition, the Great Park would have a net zero increase in energy use, as stated in various marketing materials, which will be accomplished, in part, through installation of solar energy.

- Water Supply, Treatment, and Distribution: annual emissions associated with energy used to pump, convey, treat, deliver, and re-treat water (embodied energy of water). Professionally managed landscaped areas, commercial landscaping, and residential landscaping that is under the control of a home owner's association will utilize recycled water. Wastewater treatment plant emissions are based on 100 percent aerobic, consistent with the types of treatment utilized in the Irvine Ranch Water District ("IRWD") plants.

- Solid waste: annual emissions associated with the anaerobic breakdown of materials from residential and commercial waste streams. CalEEMod defaults were used since they represent waste disposed to the landfill instead of waste generated, as quantified in Section 5.12, *Utilities and Service Systems*, of this DSEIR. GHG emissions associated with other waste diversion are not considered, because it is generally assumed that these diversions do not result in any appreciable amounts of GHG emissions when operated effectively.

- Mobile Sources: annual emissions associated with daily operation of vehicles generated by each project in the post-2030 scenario. Mobile-source emissions are based on the trip rates utilized in the traffic study for the Modified Project prepared by Urban Crossroads (Appendix M), which are based on the ITAM, a travel-demand estimator. Fleet mix for the land uses is derived from SCAG's traffic model validation and ITE truck trip information. Passenger vehicle fleet mix is based on the Orange County fleet mix; however, the fleet mix for truck trips was assigned according to the SCAG model validation, where available. Reductions in vehicle miles traveled ("VMT") are based on CAPCOA's Quantifying Greenhouse Gas Mitigation Measures for "compact infill" and urban trip lengths since the Proposed Project Site is located near an urban center and transit. Reductions are based on a density of 9.63 dwelling units per acre, more than 216 intersections per square mile, location no more than two miles from downtown or job center, four miles from a transit center, inclusion of 544 below-market-rate units, and connecting pedestrian and bike paths within the Proposed Project Site and offsite. As a result, the Modified Project and Approved Projects could result in an over 30 percent reduction in vehicle miles traveled ("VMT"). However, according to the CAPCOA Manual, a limited number of case studies in Southern California described as compact infill show slightly lower levels of reductions. Therefore, to be conservative, it was assumed that there would be only a 25 percent reduction in VMT, which is within the range observed in Southern California.

Existing Plans, Programs, and Policies

The following measures are existing plans, programs, or policies ("PPPs") that apply to both the Approved Project and the Modified Project, and will help to reduce and avoid their respective potential impacts related to GHG emissions. The PPPs have been separated between Citywide GHG reduction strategies and Statewide and Federal GHG reduction strategies.

Citywide Construction Strategies

PPP 3-1 **City of Irvine Construction and Demolition ("C&D") Debris Recycling and Reuse Ordinance:** The C&D ordinance requires that 1) all residential projects of more than one unit, 2) nonresidential developments on 5,000 square feet or larger, and 3) nonresidential demolition/renovations with more than 10,000 square feet of building, recycle or reuse a minimum of 75 percent of concrete and asphalt and 50 percent of nonhazardous debris generated.

Regional Operational Strategies

PPP 3-2 **SCAQMD Rule 445 – Wood-Burning Devices:** SCAQMD prohibits installation of wood-burning devices such as fireplaces and wood-burning stoves in new development unless the development is located at an elevation above 3,000 feet or if existing infrastructure for natural gas service is not available within 150-feet of the development. All fireplaces installed within the Proposed Project Site will be natural gas fueled fireplaces.

Statewide and Federal Operational Strategies

PPP 3-3 **2008 Building and Energy Efficiency Standards (CCR Title 24):** Prior to the issuance of a building permit for residential, commercial, or office structures in the Proposed Project Site, development plans for these structures shall be required to demonstrate that the project meets the 2008 Building and Energy Efficiency Standards. Commonly known as Title 24, these standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The 2008 standards are approximately 15 percent more energy efficient than the 2005 Building and Energy Efficiency Standards. Plans submitted for building permits shall include written notes demonstrating compliance with the 2008 energy standards and shall be reviewed and approved by the Public Utilities Department prior to issuance of building permits. Design strategies to meet this standard may include maximizing solar orientation for daylighting and passive heating/cooling, installing appropriate shading devices and landscaping, utilizing natural ventilation, and installing cool roofs. Other techniques include installing insulation (high R value) and radiant heat barriers, low-e window glazing, or double-paned windows.

PPP 3-4 **Title 24 Code Cycles: Net-Zero Buildings (Residential & Non-Residential):** The California Public Utilities Commission adopted its Long-Term Energy Efficiency Strategic Plan on September 18, 2008, presenting a roadmap for all new residential and commercial construction to achieve a zero-net energy standard. This Plan outlines the goal of reaching zero net energy in residential construction by 2020 and in commercial construction by 2030. Achieving this goal will require increased stringency in each code cycle of California's Energy Code (Title 24).

PPP 3-5 **California Renewable Portfolio Standard:** CARB's Renewable Portfolio Standard (RPS) is a foundational element of the State's emissions reduction plan. In 2002, Senate Bill 1078 established the California RPS program, requiring 20 percent renewable energy by 2017. In 2006, Senate Bill 107 advanced the 20 percent deadline to 2010, a goal which was expanded to 33 percent by 2020 in the 2005 Energy Action Plan II. On September 15, 2009, Governor Arnold Schwarzenegger signed Executive Order S-21-09 directing CARB to adopt regulations increasing RPS to 33 percent by 2020. These mandates apply directly to investor-owned utilities, which in the case of the Modified Project is Southern California Edison ("SCE").

PPP 3-6 **California Low Carbon Fuel Standard:** On January 18, 2007, Governor Arnold Schwarzenegger issued Executive Order S-1-07 requiring the establishment of a Low Carbon Fuel Standard ("LCFS") for transportation fuels. This statewide goal requires that California's transportation fuels reduce their carbon intensity by at least 10 percent by 2020. Regulatory proceedings and implementation of the LCFS have been directed to CARB. The LCFS has been identified by CARB as a discrete early action item in the Scoping Plan. CARB expects the LCFS to achieve the minimum 10 percent reduction goal; however, many of the early action items outlined in the Scoping Plan work in tandem with one another. To avoid the potential for double-counting emission reductions associated with AB 1493 (Pavley), the Scoping Plan has modified the aggregate reduction expected from the LCFS to 9.1 percent.

PPP 3-7 **Federal Corporate Average Fuel Economy ("CAFE") Standards:** The 2007 Energy Bill creates new federal requirements for increases in fleetwide fuel economy for passenger vehicles and light trucks. The federal legislation requires a fleetwide average of 35 miles per gallon (mpg) to be achieved by 2020. The National Highway Traffic Safety Administration is directed to phase in requirements to achieve this goal. Analysis by CARB suggests that this will require an annual improvement of approximately 3.4 percent between 2008 and 2020.

PPP 3-8 **California Assembly Bill 1493 – Pavley Standards:** On July 22, 2002, Governor Gray Davis signed Assembly Bill 1493 requiring CARB to develop and adopt regulations designed to reduce greenhouse gases emitted by passenger vehicles and light-duty trucks beginning with the 2009 model year. The standards set within the Pavley regulations are expected to reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016. California had petitioned the USEPA in December 2005 to allow these more stringent standards and California executive agencies have repeated their commitment to higher mileage standards. On July 1, 2009, the USEPA granted California a waiver that will enable the state to enforce stricter tailpipe emissions on new motor vehicles.

PPP 3-9 **SB 375:** SB 375 requires the reduction of GHG emissions from light trucks and automobiles through land use and transportation efforts that will reduce vehicle miles traveled ("VMT"). In essence, SB 375's goal is to control GHGs by curbing urban sprawl and through better land use planning. SB 375 essentially becomes the land use contribution to the GHG reduction requirements of AB 32, California's global warming bill enacted in 2006. The Modified Project is consistent with SB 375 strategies to reduce VMT and associated GHG emissions in that it represents a compact, mixed-use development, improves the jobs/housing balance in the city of Irvine and the Orange County Council of Governments Subregion, and provides access to mass transit. According to SCAG's 2008 Regional Comprehensive Plan, SCAG's Land Use and Housing Action Plan can be expected to result in a 10 percent reduction in VMT in 2035 when compared to current trends.

Citywide Operational Strategies

PPP 3-10 **Transit Service to LAX:** Although the City of Irvine is largely serviced by John Wayne Airport, Los Angeles International Airport ("LAX") is the regional air transportation hub. Providing direct transit service from the City to LAX can reduce single passenger trips to this destination. The Los Angeles World Airports operates three Flyaway shuttles that provide nonstop airport service to and from Westwood, Van Nuys, and Downtown Los Angeles via the Flyaway program. Since November 16, 2009, a Flyaway shuttle from the Irvine Metrolink Station to LAX provides nonstop service.

PPP 3-11 **Comprehensive Signal Retiming and Coordination Program:** Emissions are highest at the lowest travel speeds. The City is currently retiming and coordinating signals throughout Irvine under its ITEMS (Irvine Traffic Engineering System) program. A program to retime and coordinate traffic signals would produce more even traffic flows, so that vehicles are not starting and stopping constantly. These types of programs can improve vehicular level of service ("LOS"), thereby decreasing emissions for the same volume of vehicles.

PPP 3-12 **Waste Reduction:** The City adopted a Zero Waste program in 2007 to approach waste management. The City recovers approximately 66 percent of its waste for recycling and composting, which exceeds the state's AB 939 waste diversion goals. Furthermore, waste haulers establish rate schedules according to bin size and frequency of collection. Commercial customers that subscribe to smaller bins (e.g., 2 cubic-yard bins) are routinely charged less by haulers. This pricing structure encourages waste reduction and recycling, and tends to minimize hauler pickups.

Project Design Features

The following project design features apply to the Modified Project to help to reduce and avoid potential impacts related to GHG emissions.

PDF 3-1 **Compact/Mixed-Use Development:** The California Energy Commission ("CEC") considers compact development forms beneficial for minimizing energy consumption that leads to greenhouse gas emissions. In fact, the CEC's report on the connections between land use and climate change identifies density as the project feature most predictive of the number of vehicle trips and vehicle miles traveled ("VMT") by project occupants. The Modified Project intensified the residential development on the Proposed Project Site as compared to the Approved Project, and locates additional housing opportunities near major employment and transportation centers. Doing so will tend to reduce VMT on a local and regional basis.

PDF 3-2 **High Rate of Internal Trip Capture:** With the inclusion of a mix of land uses including office, commercial, industrial, and residential in the Proposed Project Site, the Modified Project significantly reduces trips outside the Proposed Project Site. This reduces trip length and congestion on the local circulation system outside the Proposed Project Site.

PDF 3-3 **Ultra-Low-Flow Fixtures:** The Modified Project incorporates ultra-low-flow water fixtures that will meet the requirements of the Uniform Plumbing Code standards. Prior to issuance of building permit, the Applicant or its successor shall submit evidence to the satisfaction of the Director of Community Development that toilets, urinals, sinks, showers, and other water fixtures

installed on-site are ultra-low-flow water fixtures that exceed the Uniform Plumbing Code standards.

PDF 3-4 **Landscaping and Irrigation Systems:** The Modified Project incorporates automated, high-efficiency landscaping irrigation systems on all master landscaped areas that reduce water use, such as evapotranspiration "smart" weather-based irrigation controllers, and bubbler irrigation; low-angle, low-flow spray heads; moisture sensors; and use of a California-friendly landscape palette. Prior to approval of landscape plans, the Applicant or its successor shall submit evidence to the satisfaction of the City's Director of Community Development that such landscaping irrigation systems will be installed so as to make the Modified Project consistent with the intent of the California Water Conservation in Landscaping Act of 2006 ("AB 1881"), including provisions to reduce the wasteful, uneconomic, inefficient, and unnecessary consumption of water.

PDF 3-5 **Use of Reclaimed Water on All Master Landscaped Areas:** Prior to approval of landscape plans, the Applicant or its successor shall submit evidence to the satisfaction of the City's Director of Community Development and the Irvine Ranch Water District ("IRWD") that the landscape plans incorporate the use of reclaimed water in all master landscaped areas, including master landscaped commercial, multifamily, common, roadways, and park areas. Master landscapes shall also incorporate weather-based controllers and efficient irrigation system designs to reduce overwatering, combined with the application of a California-friendly landscape palette.

PDF 3-6 **Material Recovery:** The Modified Project incorporates measures to reduce waste generated by Proposed Project Site residents, occupants and visitors, and to encourage recycling of solid wastes, utilizing the Orange County Integrated Waste Management Department's material recovery facilities to recycle glass, plastic, cans, junk mail, paper, cardboard, greenwaste (e.g., grass, weeds, leaves, branches, yard trimmings, and scrap wood), and scrap metal. Future employees, residents, and customers would participate in these programs. These measures include the requirement to include on-site recycling facilities at all commercial, retail, industrial, and multi-family residential developments. In addition, educational materials identifying available recycling programs shall be distributed to all land uses, including single-family residential.

PDF 3-7 **Energy Star Appliances:** EnergyStar appliances (excluding refrigerators), such as dishwashers, clothes washers, clothes dryers, air conditions, furnaces, and water heaters, shall be offered or installed in all residential dwelling units.

PDF 3-8 **Building Energy Efficiency:** Residential dwellings and non-residential buildings will be constructed so that they achieve 15 percent higher energy efficiency than the applicable standards set forth in the 2008 California Building and Energy Efficiency Standards (Title 24, Part 6 of the California Building Code) require.

PDF 3-9 **Carbon Sequestration:** The Modified Project incorporates 22,340 new trees in the Vesting Tentative Tract Map areas that, together with the approximately 48,000 new trees in the Orange County Great Park, would be planted within the Proposed Project Site.

PDF 3-10 **Reduction in Softscape Landscaped Areas:** The Modified Project reduces softscape (e.g., plants/horticultural elements of landscape design) landscaped areas by 28 percent as compared to the Approved Project.

PDF 3-11 **The Great Park Net Zero Energy Use**: The Great Park will achieve a net zero increase in energy use. This will be accomplished through installation of solar energy and other alternative energy use.

Impact Threshold Analysis

The following analysis compares the potential GHG emissions associated with implementation of the Modified Project to the GHG emissions associated with implementation of the Approved Project, and assesses the significance of the Modified Project's emissions.

IMPACT 5.3-1: THE MODIFIED PROJECT WOULD NOT GENERATE GHG EMISSIONS, EITHER DIRECTLY OR INDIRECTLY, THAT WOULD HAVE A SIGNIFICANT IMPACT ON THE ENVIRONMENT; THE MODIFIED PROJECT'S GHG EMISSIONS WOULD BE LOWER THAN THE APPROVED PROJECT'S EMISSIONS. [IMPACT GHG-1]

Impact Analysis: In accordance with the amendments to the CEQA Guidelines, emissions inventories were compiled to identify GHG emissions generated by the Approved Project and Modified Project. The significance of the Modified Project's emissions was assessed using the SCAQMD's draft target efficiency threshold of 4.8 MTons of CO_2e per service population ("SP") per year, discussed above. In addition, the Modified Project's GHG emissions were compared to the Approved Project's emissions, which constitute the CEQA baseline.

The Significance of the Modified Project's GHG Emissions Based on SCAQMD's Efficiency Threshold

As discussed above, since no numeric threshold for determining the significance of construction or operational GHG emissions from a residential/commercial development project has been adopted by any state agency or by the SCAQMD, the City has determined that it will evaluate the significance of the GHG emissions resulting from the Modified Project by using the SCAQMD's draft target efficiency metric threshold for 2020 of 4.8 MTons of CO_2e per SP per year. This efficiency metric is derived from average reductions in GHG emissions needed in order to be consistent with AB 32. Table 5.3-3, *The Modified Project GHG Emissions Inventory – Efficiency Metric*, reports the efficiency of the Modified Project in terms of its GHG emissions for two scenarios: one scenario includes its annual operational emissions only, and the other scenario includes both operational and construction emissions together. For the second scenario, one-time emissions, such as vegetation changes and construction emissions, were amortized over 30 years and then combined with annual operational emissions. The estimated service population total for the Modified Project has been calculated to be 36,656 persons. This includes an employment population of 16,510, a resident population of 12,405 (see Section 5.8, *Population and Housing*), and a higher education (adult) student population of 7,741 (see Section 5.11, *Transportation and Traffic*).

As shown in Table 5.3-3, dividing the total operational GHG emissions for the Modified Project by the service population results in an efficiency metric of 4.69 MTons/SP per year for the Modified Project, meaning the Modified Project would have a less than significant impact on GHG emissions.

Taking in to account the annualized construction emissions and vegetation changes for the Modified Project, the Modified Project's annualized construction and operational emissions together yields an efficiency metric for the Modified Project of 4.79 MTons/SP per year, which is also below the SCAQMD's efficiency metric of 4.8 MTons/SP per year.

Therefore, under both scenarios, the Modified Project's efficiency metrics are below the SCAQMD's draft threshold, meaning that the Modified Project would have a less than significant impact on GHG emissions.

Table 5.3-3
The Modified Project GHG Emissions Inventory – Efficiency Metric

Category	*Modified Project MTons/Year*
Service Population	36,656
Total Annual Emissions (without Amortized One-Time Emissions)	**172,070**
Emissions Per Service Population (SP) – Operational Only	4.69
Draft SCAQMD Efficiency Threshold	4.8
Exceeds SCAQMD's Draft Efficiency Threshold	No
Total Annual w/Amortized One-Time Emissions	**175,651**
Emissions Per Service Population (SP) – Construction and Operational	4.79

Source: ENVIRON 2011.

Comparison of the GHG Emissions Inventories for the Approved Project and the Modified Project

Annual GHG emissions that would be generated by the Approved Project and by the Modified Project are compared in Table 5.3-4, *The Approved Project and Modified Project GHG Emissions Inventories – Total Emissions*. The GHG emissions identified include emissions reductions from applicable plans, programs and policies (see PPPs 3-1 through 3-12 above) and Project Design Features (see PDFs 3-1 through 3-10 above), but only to the extent that their effects can be quantified (see Appendix H for a detailed discussion of the features that were quantified). In addition, one-time emissions, such as vegetation changes and construction emissions, were amortized over 30 years and then combined with annual operational emissions. As reported in Table 5.3-4, the operational GHG emissions for the Approved Project with amortized one-time emissions total 179,161 MTons per year, and for the Modified Project total 175,651 MTons per year. Therefore, the Modified Project's GHG emissions are lower than the GHG emissions of the Approved Project.

Conclusion

As demonstrated above, based on SCAQMD's most recent draft target efficiency threshold, the Modified Project's GHG emissions would result in less than significant impacts looking at either operational emissions alone or construction and operational emissions together. In addition, the Modified Project's GHG emissions would be lower than those of the Approved Project, demonstrating that the Modified Project represents an improvement in GHG emissions impacts over the Approved Project. For all of these reasons, the Modified Project's GHG emissions impacts would be less than significant.

Table 5.3-4
The Approved Project and Modified Project GHG Emissions Inventories – Total Emissions

Category	Approved Project MTons/Year	Modified Project MTons/Year
Area	3,277	3,242
Energy	35,675	33,164
Water Use	5,332	4,368
Waste Disposal	4,582	4,582
Traffic	126,714	126,714
Total Annual Emissions (without Amortized One-Time Emissions)	**175,580**	**172,070**
Amortized Construction	5,425	5,425
Amortized Vegetation	-1,844	-1,844
Total Annual w/Amortized One-Time Emissions	**179,161**	**175,651**

Source: ENVIRON 2011.

IMPACT 5.3-2: THE MODIFIED PROJECT WOULD NOT CONFLICT WITH AN APPLICABLE PLAN, POLICY OR REGULATION ADOPTED FOR THE PURPOSE OF REDUCING GHG EMISSIONS. [IMPACT GHG-2]

Impact Analysis: A project would normally have a significant effect on the environment if it would conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. While actions taken in California alone cannot stabilize the climate, the state's actions set an example and help to drive the global progress toward reduction of GHG. If the industrialized world were to follow the emission reduction targets established by California, and industrializing nations reduced emissions according to the lower emissions path (lower emissions IPPC scenario B1), medium or higher warming ranges of global temperature increases might be avoided, along with the most severe consequences of global warming (IPCC 2007). In 2007, the CEC published The Role of Land Use in Meeting California's Energy and Climate Change Goals (CEC 2007). In this publication, the CEC acknowledged that California's land use patterns shape energy use and the production of GHG. Transportation contributes a large percentage of the state's GHG emissions, and research shows that increasing a community or development's density and accessibility to job centers are the two most significant factors for reducing VMT through design (CEC 2007).

In accordance with AB 32, CARB developed the Scoping Plan to outline the state's strategy to achieve 1990 level emissions by year 2020. To estimate the reductions necessary, CARB projected statewide year 2020 BAU GHG emissions (i.e., GHG emissions in the absence of statewide emission reduction measures). CARB identified that the state as a whole would be required to reduce GHG emissions by 28.5 percent from year 2020 BAU. The SCAQMD's most recent draft efficiency threshold for 2020 of 4.8 MTons of CO_2e per SP per year is derived from average reductions needed to be consistent with AB 32; therefore, this efficiency metric also serves to indicate whether a development project would or would not conflict with AB 32's reduction mandate and the plans, policies and regulations adopted to achieve that reduction. As shown previously in Table 5.3-3, the Modified Project's annual operational GHG emissions and its aggregated annualized construction and annual operational emissions result in efficiency metrics that are lower than the SCAQMD's draft efficiency threshold. Accordingly, the Modified Project would be consistent with plans, policies, and regulations concerning GHG emissions.

Additionally, compliance with the federal and statewide GHG emissions reduction measures that are being implemented over the next 10 years would reduce the Modified Project's GHG emissions (see PPPs 3-3

through 3-9). Table 5.3-5, *Consistency with Existing Plans, Policies, and Programs*, includes a consistency analysis with existing PPPs. As Table 5.3-5 demonstrates, the Modified Project would not conflict with any applicable plan, policy or regulation adopted for the purpose of reducing GHG emissions, and for this reason the Modified Project would have a less than significant impact under this second threshold.

Table 5.3-5
Consistency with Existing Plans, Policies, and Programs

PPP	Description
PPP 3-1	City of Irvine C&D Debris Recycling and Reuse Ordinance requires that 1) all residential projects of more than one unit, 2) nonresidential developments on 5,000 square feet or larger, and 3) nonresidential demolition/renovations with more than 10,000 square feet of building recycle or reuse a minimum of 75 percent of concrete and asphalt and 50 percent of nonhazardous debris generated. The Modified Project's adherence to this ordinance would reduce GHG emissions associated with waste disposal.
PPP 3-2	SCAQMD Rule 445 prohibits installation of wood-burning devices such as fire places and wood-burning stoves in new development, with few exceptions. All fireplaces installed within the Proposed Project Site under the Modified Project will be natural gas fueled fireplaces and, therefore, its GHG emissions would be reduced.
PPP 3-3	2008 Building and Energy Efficiency Standards (CCR Title 24) applicable to the Modified Project require that new structures meet the 2008 Building and Energy Efficiency Standards. PDF 3-8 identifies that the Modified Project would exceed these requirements as residential dwellings and non-residential buildings will be constructed so that they achieve 15 percent higher energy efficiency than the 2008 Building and Energy Efficiency Standards.
PPP 3-4	Title 24 Code Cycles identify a goal of reaching zero net energy in residential construction by 2020 and in commercial construction by 2030. Achieving this goal will require increased stringency in each code cycle of California's Energy Code (Title 24). As specified above, PDF 3-8 ensures that residential dwellings and non-residential buildings will be constructed so that they achieve 15 percent higher energy efficiency than the 2008 Building and Energy Efficiency Standards. Consequently, the Modified Project would exceed the existing statewide requirements for new construction. The planting of trees in accordance with PDF 3-9 would also result in a one-time carbon sequestration. In addition, water conservation and reduction measures implemented by the Modified Project (see PDFs 3-3, 3-4, 3-5, and 3-10) will reduce GHG emissions from energy associated with water use.
PPP 3-5	Executive Order S-21-09 directs CARB to adopt regulations increasing California's RPS to 33 percent by 2020. These mandates apply directly to investor-owned utilities, which in this case for the Modified Project is SCE. Energy purchased by residential and non-residential customers within the Proposed Project Site, which is within the service area for SCE, would meet these standards. GHG emissions associated with the Modified Project would be reduced as a result of 33 percent of energy purchased coming from renewable sources.
PPP 3-6	CARB's LCFS requires California's transportation fuels to reduce their carbon intensity by at least 10 percent by 2020. CARB expects the LCFS to achieve the minimum 10 percent reduction goal; however, many of the early action items outlined in the Scoping Plan work in tandem with one another. To avoid the potential for double-counting emission reductions associated with AB 1493, the Scoping Plan has modified the aggregate reduction expected from the LCFS to 9.1 percent. Fuels used by construction equipment and fuel associated with the operational phase of the Approved Project and Modified Project would comply with the LCFS.
PPP 3-7	Federal CAFE Standards require increases in fleetwide fuel economy for passenger vehicles and light trucks. The federal legislation requires a fleetwide average of 35 miles per gallon (mpg) to be achieved by 2020. The National Highway Traffic Safety Administration is directed to phase in requirements to achieve this goal. Analysis by CARB suggests that this will require an annual improvement of approximately 3.4 percent between 2008 and 2020. Passenger cars associated with trips generated by the Approved Project and Modified Project have been assumed to comply with the CAFE standards for the model year. Based on the estimated vehicle turnover at buildout in post-2030, GHG emissions would be reduced as a result of improved fuel efficiency in future model years.

Table 5.3-5
Consistency with Existing Plans, Policies, and Programs

PPP 3-8	California Assembly Bill 1493 – Pavley Standards are expected to reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016. Passenger cars associated with trips generated by the Approved Project and Modified Project have been assumed to comply with the Pavley Standards for the model year. Based on the estimated vehicle turnover at buildout in post-2030, GHG emissions would be reduced as a result of improved fuel efficiency in future model years.
PPP 3-9	SB 375 requires the reduction of GHG emissions from light trucks and automobiles through land use and transportation efforts that will reduce VMT. In essence, SB 375's goal is to control GHGs by curbing urban sprawl and through better land use planning. The Modified Project is consistent with SB 375 strategies to reduce VMT and associated GHG emissions in that it represents a compact, mixed-use development, it improves the jobs/housing balance in the City and Orange County Council of Governments Subregion, and it provides close access to mass transit. According to the 2008 Regional Comprehensive Plan, SCAG's Land Use and Housing Action Plan can be expected to result in a 10 percent reduction in VMT in 2035 when compared to current trends. PDFs 3-1 and 3-2 of the Modified Project identify GHG reductions associated with compact/mixed-use development and high rate of internal trip capture.
PPP 3-10	Transit Service to LAX: Although the City of Irvine is largely serviced by John Wayne Airport, LAX is the regional air transportation hub. Providing direct transit service from the City to LAX can reduce single passenger trips to this destination. The Los Angeles World Airports operates three Flyaway shuttles that provide nonstop airport service to and from Westwood, Van Nuys, and Downtown Los Angeles via the Flyaway program. Since November 16, 2009, a Flyaway shuttle provides nonstop service to LAX from the Irvine Station. With the Proposed Project Site located adjacent to the Irvine Station, the Modified Project would afford easy access to the Flyaway shuttle service, resulting in reduced single-passenger trips to LAX.
PPP 3-11	Comprehensive Signal Retiming and Coordination Program: Emissions are highest at the lowest travel speeds. The City is currently retiming and coordinating signals throughout Irvine under its ITEMS (Irvine Traffic Engineering System) program. A program to retime and coordinate traffic signals would produce more even traffic flows, so that vehicles are not staring and stopping constantly. These types of programs can improve the vehicular level of service, thereby decreasing emissions for the same volume of vehicles. The Modified Project would benefit from this program and would not impede it.
PPP 3-12	Waste Reduction: The City adopted a Zero Waste program in 2007 to approach waste management. The City recovers approximately 66 percent of its waste for recycling and composting, which exceeds the state's AB 939 waste diversion goals. Furthermore, waste haulers establish rate schedules according to bin size and frequency of collection. Commercial customers that subscribe to smaller bins (e.g., 2 cubic-yard bins) are routinely charged less by haulers. This pricing structure encourages waste reduction and recycling, and tends to minimize hauler pickups. Commercial and residential customers within the Proposed Project Site would be able to take advantage of the incentives offered, which would reduce waste and associated GHG emissions. In addition, PDF 3-6 requires onsite recycling facilities at multi-family residential and nonresidential land uses to encourage recycling and further reduce GHG emissions from waste disposal.

5.3.5 Level of Significance Before Mitigation

Upon implementation of regulatory requirements and standard conditions of approval, the following impacts would be less than significant for both the Approved Project and the Modified Project: 5.3-1 and 5.3-2.

5.3.6 Mitigation Measures

Applicable Mitigation Measures from the Certified EIR

Because CEQA and the CEQA Guidelines did not contain any requirements related to GHG emissions at the time the 2003 EIR was prepared and certified, the 2003 EIR did not analyze GHG emissions. Accordingly, no mitigation measures relating to greenhouse gas emissions were included in the Certified EIR.

Additional Mitigation Measures for the Modified Project

No significant impacts related to GHG emissions have been identified for the Modified Project, and therefore, no mitigation measures are required.

5.3.7 Level of Significance After Mitigation

The Modified Project's impacts concerning GHG emissions are less than significant without mitigation.

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