

Appendix N.2008 Climate Change Analysis

Appendix

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Appendix L: Climate Change

L.1 - Climate Change Analysis
Prepared by MBA - May 22, 2008

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**Climate Change Analysis
Edgewater Communities
Chino, California**

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ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
ARB	California Air Resources Control Board
CAT	Climate Action Team (Report)
CEQA	California Environmental Quality Act
CFC	Chlorofluorocarbons
CH ₄	Methane
CO ₂	Carbon Dioxide
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
GCC	Global Climate Change
gpd	gallons per day
HCFC	Hydrochlorofluorocarbons
HFC	Hydrofluorocarbons
kWh	Kilowatt-hours
LEED	Leadership in Energy and Environmental Design
MTCO ₂ E	Metric Tons of Carbon Dioxide Equivalent
MMTCO ₂ e	Million Metric Tons of Carbon Dioxide Equivalent
MWh	megawatt-hour
NO _x	Nitrogen Oxides
N ₂ O	Nitrous Oxide
PFC	perfluorocarbons
ppm	Parts per Million
ppt	Parts per Trillion
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
U.S.	United States
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound

SECTION 1: EXECUTIVE SUMMARY AND MITIGATION MEASURES

This document assesses the impact of the Edgewater Communities Project (Project) on climate change. The conclusions and findings that may be reached based on the technical information and analyses contained in this report represent the independent judgment of the City of Chino as the CEQA Lead Agency. In 2006, Governor Schwarzenegger signed AB 32, which charged the California Air Resources Board (ARB) with developing regulations on how the State would address climate change (also known as “global warming”). The ARB, the California Environmental Protection Agency, the U.S. Environmental Protection Agency (EPA), or other appropriate governmental organizations have not yet developed guidelines on how to prepare a California Environmental Quality Act (CEQA) assessment for climate change. Nevertheless, in absence of published CEQA thresholds, this analysis contains CEQA-level discussions that include thresholds of significance and determine the potential impact of the Project’s greenhouse gases to conflict with the intent of AB 32.

1.1 - Executive Summary

During construction of the Project, approximately 8,541 metric tons of carbon dioxide equivalents (MTCO₂e) would be emitted. One metric ton of carbon dioxide equivalent is the mass emissions of an individual greenhouse gas multiplied by its global warming potential. During operation, the Project is anticipated to result in approximately 33,484 MTCO₂e per year prior to mitigation. Existing emissions from the dairy operation are approximately 2,720 MTCO₂e per year. After mitigation and after a reduction for the existing emissions, the Project would emit 30,764 MTCO₂e per year.

The Project-level analysis indicated that the Project would implement most feasible and applicable measures and strategies to reduce its contribution to greenhouse gas emissions. However, as noted in the analysis, the Project does not comply with the “Smart Land Use” preliminary Climate Action Team strategy to reduce greenhouse gas emissions to 1990 levels by 2020. The Project complies with most of the State strategies to reduce greenhouse gas emissions and also implements feasible measures to reduce its contribution of greenhouse gases. Therefore, Project-level impacts are less than significant. Cumulative-level impacts are also less than significant.

The Project would not be impacted by rising sea levels or other secondary effects of climate change.

1.2 - Mitigation Measures

The following mitigation measures would reduce direct and indirect greenhouse gas emissions from the Project.

GCC-1 To increase energy efficiency, the Project shall implement the following measures.

- a) Consistent with the California Climate Action Team strategies for reducing greenhouse gas emissions to 1990 levels by 2020 (Green Buildings Initiative), all buildings/units shall be designed to meet 2008 Title 24 requirements. If Project building permits are obtained when post-2008 Title 24 requirements are in place, the Project shall be designed to meet those requirements.
- b) Consistent with the California Air Resources Board, AB 32 Early Action Measures: all buildings within the Project shall use cool paints; the Project shall incorporate cool pavements in the driveway areas; and the Project shall incorporate a minimum of two shade trees on the south and west sides of each of the low-density residential units.
- c) Consistent with the California Climate Action Team strategies for reducing greenhouse gas emissions to 1990 levels by 2020 (California Solar Initiative), the Project developer shall offer photovoltaic cells (solar panels) to the single-family residential units. The Project shall install solar panels to generate a minimum of 500,000 kilowatt-hours per year on the roofs of any structures within the Project.
- d) Consistent with the California Climate Action Team strategies for reducing greenhouse gas emissions to 1990 levels by 2020 (Appliance Energy Efficiency Standards in Place and in Progress), the Project shall incorporate energy efficient appliances (i.e., dishwashers, washer, dryer, refrigerator, stoves, etc.) where they are provided by the developer. The Project shall also incorporate energy efficient exterior lighting and compact fluorescent lights in residential units.

GCC-2 Consistent with the California Climate Action Team strategies for reducing greenhouse gas emissions to 1990 levels by 2020 (Zero Waste - High Recycling and Achieve 50 percent Statewide Recycling Goal), the Project shall do the following

- a) The applicant shall prepare a Waste Management Plan with the goal of reducing waste during construction by 50 percent.
- b) The soil removed from the Project during demolition shall be used for some other purpose and shall not be placed in a landfill.
- c) Recycling shall be mandated at the multiple family housing residential areas. Appropriate collection and storage space for recycling shall be allocated at the multiple family housing areas.

GCC-3 Consistent with the California Climate Action Team strategies for reducing greenhouse gas emissions to 1990 levels by 2020 (Water Use Efficiency), a comprehensive water conservation strategy shall be prepared. The strategy shall

include the specific items that follow, plus other innovative measures that are appropriate for the location.

- a) Tankless water heaters shall be installed in all of the residential units.
- b) The landscaping in the open space areas shall use drought-resistant plants. The residential areas shall have a limit on the amount of turf (grass) of a maximum of 25 percent of the total yard.
- c) Water efficient design shall be used for buildings.
- d) Homeowner's Association(s) shall be audited for their water use to promote efficient water use.

GCC-4

To reduce vehicle miles traveled and emissions associated with trucks and vehicles, the following measures shall be implemented:

- a) Onsite bicycle storage parking shall be provided where designated by the City of Chino Community Development Department in areas that are non-residential land uses.
- b) The applicant shall pay its fair share contribution in traffic impact fees and coordinate with the City regarding intersections within the Project vicinity, such that traffic passes more efficiently through congested areas. If signals are installed as part of the Project, the applicant shall install the use of Light Emitting Diode traffic lights.
- c) Landscape equipment used to maintain the public areas in the development shall be electric. This measure would be applicable to the Homeowner's Association.
- d) Information regarding public transit shall be displayed at the church and school.

GCC-5

The Project shall either plant 500 canopy-type trees onsite or contribute to an organization that plants trees sufficient funds to plant a minimum of 500 trees in California. Information regarding the area that the trees are to be planted, the organization (if applicable), and the date the trees will be planted shall be provided to the City prior to complete buildout of the Project.

SECTION 2: PROJECT DESCRIPTION

2.1 - Project Information

2.1.1 - Location

The Project site for the Edgewater Communities Project is located in the City of Chino in the extreme southwestern corner of San Bernardino County, approximately 37 miles east of the City of Los Angeles and 20 miles southwest of the City of San Bernardino. The Project site, approximately 273 acres in size, is within the southerly portion of The Preserve Specific Plan area, a 5,435-acre area annexed by the City of Chino in July 2003. The portion of the City of Chino in which the Project site is contained is adjacent to the City of Ontario on the north and the unincorporated community of Eastvale in Riverside County on the east, and is in the vicinity of Chino Hills, Norco, Corona, and the Prado Flood Control Basin. The Santa Ana River is located to the south of the Project site, and a portion of the Chino Hills State Park is to the west. The precise Project location is southeast of the intersection of Chino Corona Road and Cucamonga Avenue in the City of Chino. Exhibits 1 and 2 illustrate the Project location.

The topography at the site is variable, ranging from essentially flat in the northern portion, to gently rolling hills in the southern portion. The southern portion consists of a small north-south trending ridge, bounded by smaller knobs or rounded hills and gently graded low areas. Slopes become steeper along the eastern boundary near Mill Creek. Elevation within the Project site ranges from approximately 508 to 579 feet above mean sea level.

2.1.2 - Existing Uses

The Project site is currently occupied by an active dairy operation known as the Steuve Dairy (with a cow population generally ranging from 600 to 800 cows), supporting agricultural cropland, and vacant property. The dairy portion of the site consists of several residences, barns, and associated structures. Cattle holding pens make up the majority of the dairy area. Multiple small waste discharge ponds are located in the southwestern portion of the dairy area. The agricultural portion of the site, previously cultivating oat hay within certain acreage, has several structures, including a residence and a barn, several dirt access roads, and irrigation pipelines.

2.1.3 - Existing Land Use Designations

The current land use designations for the Edgewater Project site are as follows: Open Space Recreational (14.59 acres), Agricultural and Open Space Natural, (197.14 acres), Open Space Natural (57.55 acres), and Estate Residential (3.65 acres). The Estate Residential land use designation provides for a maximum of two dwelling units per acre. Therefore, a maximum of seven units total is permitted within this area. Existing rural/agricultural residences within The Preserve that are within these open space and agricultural land use designations are acceptable.

2.1.4 - Proposed Uses

The Project contains residential land use areas that include a range of residential densities and are planned to contain a church, school, and museum/retail uses, five man-made lakes, and open space areas. The acreage and densities that the Project is proposing are summarized below in Table 1. Exhibit 3 shows the Project Land Use Plan.

Table 1: Proposed Land Use Summary

Land Use Type	Dwelling Units	Parcel Acreage (Gross Acres)	Average Density (du/acre)	Percent of Total (acres)
Low Density	537	97.76	5.5	36%
Medium Density	287	28.70	10.0	11%
High Density	250	15.63	16.0	6%
Open Space/Recreation	—	71.39	—	26%
Open Space/Water	—	39.22	—	14%
Open Space/Natural	—	20.23	—	7%
Total	1074	272.93	—	100%

Source: Edgewater EIR Project Description

2.1.5 - Water Features

The Project includes five lakes. The five lakes are planned to offer varying degrees of open space or recreational opportunities. No swimming will be allowed, but the lakes are suitable for fishing. Two of the lakes could support non-motorized boating. Edges of the same lake can be utilized for different purposes depending on adjacent uses. Lake edges adjacent to residences have a greater likelihood of disruption. Habitat and wildlife conservation areas are planned for areas adjacent to more complementary open space uses.

2.1.6 - Phasing

The opening year for occupation of the first phases of planned development in the Edgewater Communities Project is anticipated to be 2010. Development phasing is anticipated to occur in three phases. Although the actual rate of development will be dependent on market conditions, buildout of the community is anticipated to occur over a 10-year period, as shown in Table 2.

Table 2: Proposed Project Phasing

Land Use	Phase 1 (2010-2011)	Phase 2 (2012-2014)	Phase 3 (2015-2019)	Total Units
Low Density Residential	172	270	95	537
Medium Density Residential	180	107	—	287
High Density Residential	250	—	—	250

Land Use	Phase 1 (2010-2011)	Phase 2 (2012-2014)	Phase 3 (2015-2019)	Total Units
Total	602	377	95	1074
Source: WSA 2007				

2.1.7 - Surrounding Land Uses

Surrounding land uses are as follows.

East

The eastern boundary of the Project site is formed in part by Mill Creek. Across Mill Creek to the east, there is an equestrian facility, a recycling/fertilizer plant, and limited plant nursery operations. To the east of the northern portion of the Project site just south of Chino Corona Road lies a rural residence and property owned by US Army Corps of Engineers (USACE).

North

Land uses immediately north of the Project site are the Land O'Lakes Dairy, two dairy residences and a mobile home, and other dairy operations. Further north lie developed residential neighborhoods within The Preserve above Pine Avenue, Chino Municipal Airport, and the California Institution for Men.

West

Immediately west of the Project site at the intersection of Chino Corona Road and Cucamonga Avenue is property owned by the Orange County Flood Control District, currently occupied by an active dairy operation with onsite residences. West of Cucamonga Avenue is another active dairy operation. These two dairies together are called GH Dairies #1 and #2. The California Institution for Women lies northwest of the intersection of Chino Corona Road and Cucamonga Avenue. Prado Regional Park lies directly to the west, accessible from Euclid Avenue.

South

To the south of the Project site is property owned by USACE. Other uses include Hunting Clubs (duck and pheasant), a remote-operated airplane facility operated by the San Bernardino Park and Recreation Department, and a paint ball facility.

2.1.8 - Project Design Features that Reduce Emissions

The following Project design features will reduce air emissions emitted from the Project.

Community Paseo and Open Space System

A community paseo and open space system within the Edgewater Project is planned as a system of trails and linear open spaces that connect the major features of the Project with the approved features of The Preserve, providing pedestrian and bicycling opportunities within the Project site and

surrounding area. The Project paseo and open space system would link the existing and planned neighborhoods within The Preserve with the open space, water, and natural features within the Project site.

The Project has been planned to be linked via paseos and local collector roads with The Preserve Community Core, approved as part of The Preserve Specific Plan, and envisioned as a multi-purpose “promenade” to serve as the backbone of The Preserve community. The Community Core is planned to provide a mixture of entertainment, commercial, civic, cultural, educational, religious, and residential uses. The Project is planned to include a concentration of residential densities oriented toward the lake/open space features, and additional church/school and museum/retail facilities planned to be contained within the low-, medium-, and high-density residential areas.

The recreational opportunities provided within the Project reduce the number of vehicle trips to locations outside of the Project for those uses. A reduction in the vehicle trips or vehicle miles traveled corresponds to a decrease in emissions from those vehicles.

Transit Mobility

The transit system planned for The Preserve is two-tiered, consisting of a local, on-site transit system and regional bus service. The Project will be linked to The Preserve’s Community Core via paseos and local collector roads. Pedestrian access to transit opportunity at the Community Core will be possible via the trail system contained within the paseos.

The center of the Project is approximately one mile from the community center transit stops. The residents on the Project site may bicycle to the transit site, which would reduce emissions associated with trips made in single-occupancy vehicles.

Bicycle Mobility

The Project bicycle system is planned to connect major features of the Project with the approved features of The Preserve, and to connect with the regional bicycle system. The area bicycle system is composed of on-street (Class II) and off-street (Class I) pathways. In many instances, the Class I facilities are incorporated into the community paseo and open space system.

The inclusion of bicycle lanes and pathways encourage residents to use bicycles to travel to areas within and outside of the Project.

Recycling

During operation of the Project, the tenants of the residential units will generate waste. To minimize the waste, recycling and yard waste pickup for single-family homes is provided by the City of Chino via Waste Management.

Recycling would help to decrease emissions associated with mineral extraction.

Water

The Project will have a dual (potable and recycled) water system. An isolated potable system will be developed for the Project. This system will obtain water from a well drilled along Schaefer Avenue between Euclid and Bon View Avenues in the City of Ontario, planned to be piped to the Edgewater Project site.

The Project will utilize recycled water for irrigation of all open space areas within the Project site, including common landscaping along the street rights-of-way, as well as other public spaces. The lakes will be filled with recycled water.

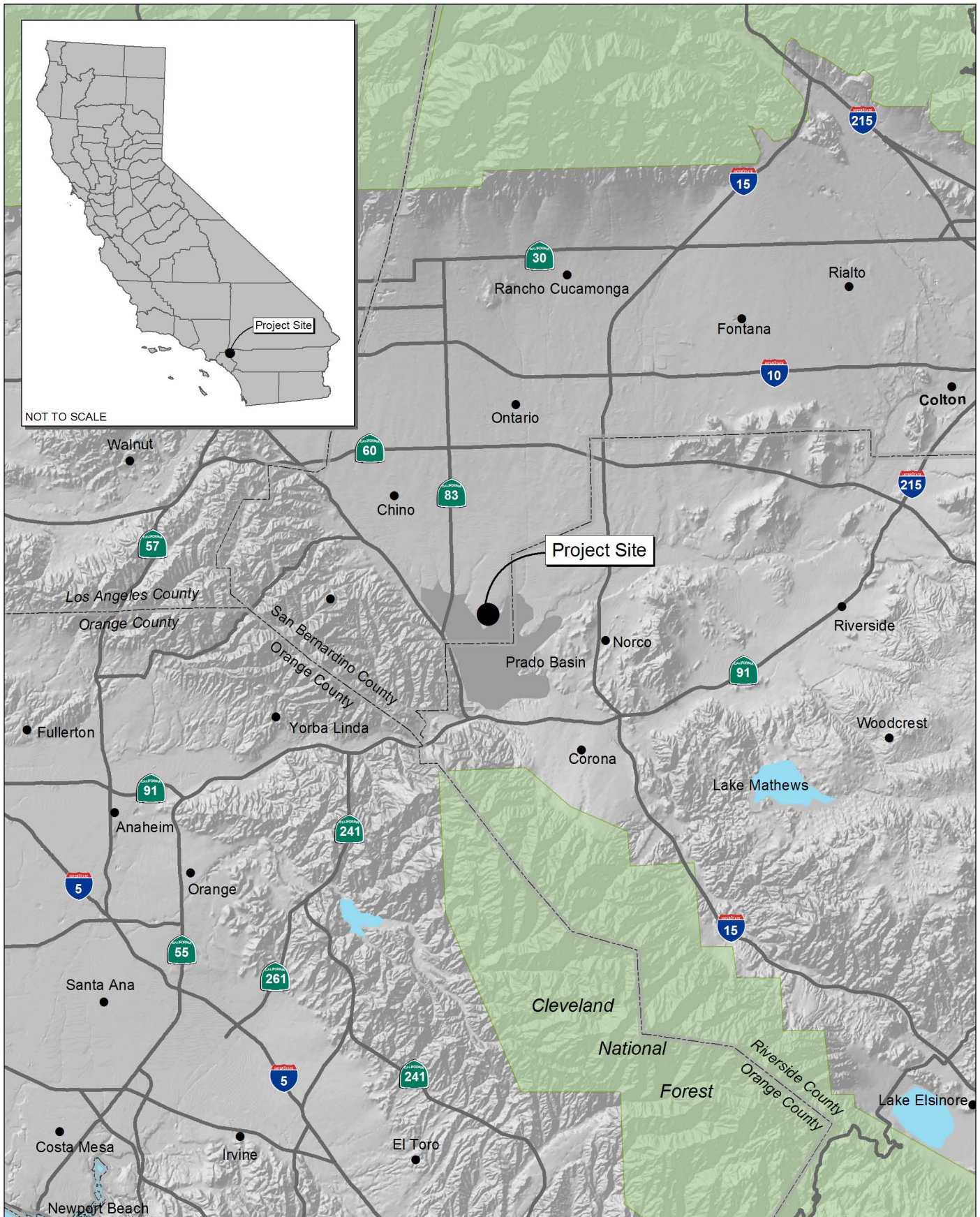
Currently, the City's average total water demand is approximately 21,000 acre-feet per year (AFY). At build-out, the Project will increase water demand by approximately 1,094 AFY of water (484 AFY of potable water and 610 AFY of recycled water) yielding a total Projected City demand of 31,048 AFY by 2021 (WSA 2007).

The use of recycled water reduces indirect air emissions associated with electricity required to the transport of the water to the Project.

2.1.9 - Sensitive Receptors

Those who are sensitive to air pollution include children, the elderly, and persons with preexisting respiratory or cardiovascular illness. For purposes of CEQA, the SCAQMD considers a sensitive receptor to be a location where a sensitive individual could remain for 24 hours, such as residences, hospitals, schools, prisons, or convalescent facilities. Commercial and industrial facilities are not included in the definition because employees do not typically remain onsite for 24 hours. However, when assessing the impact of pollutants with 1-hour or 8-hour standards (such as nitrogen dioxide and carbon monoxide), commercial and/or industrial facilities would be considered worker receptors for those purposes and the typical sensitive receptors would also be included in the 1-hour or 8-hour assessments.

Because the Project is planned to be built in three phases with final buildout in 2019, the nearest sensitive receptors would be the residences and the church/school on the Project site. The closest offsite sensitive receptor is an agricultural residence located on Chino Corona Road approximately 50 meters west of the Project. There are also residences located approximately 100 meters east of the Project site on Chino Corona Road. This Air Quality assessment identifies the nearest sensitive receptors because they would receive the greatest impact from the onsite Project emissions. Although there are other sensitive receptors more distant from the Project, such as in The Preserve, the impact to those receptors would be less than the impact at the nearest sensitive receptors located closest to the Project. The prison population (California Institution for Women) is located approximately 400 meters northwest of the Project boundary.



Source: Census 2000 Data, The CaSIL, MBA GIS 2006.



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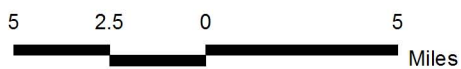
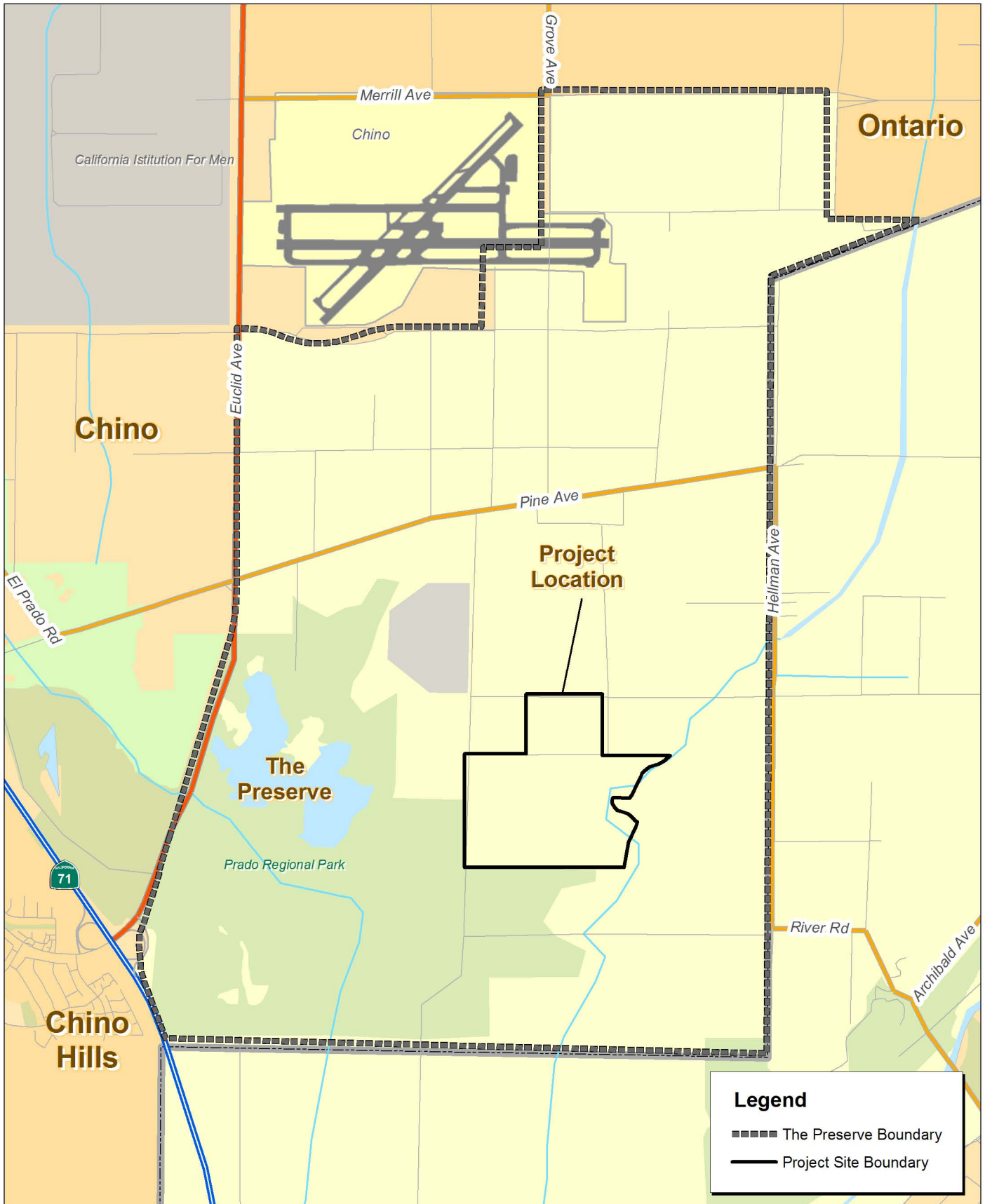


Exhibit 1 Regional Location Map

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Source: Street Map USA, 2007.



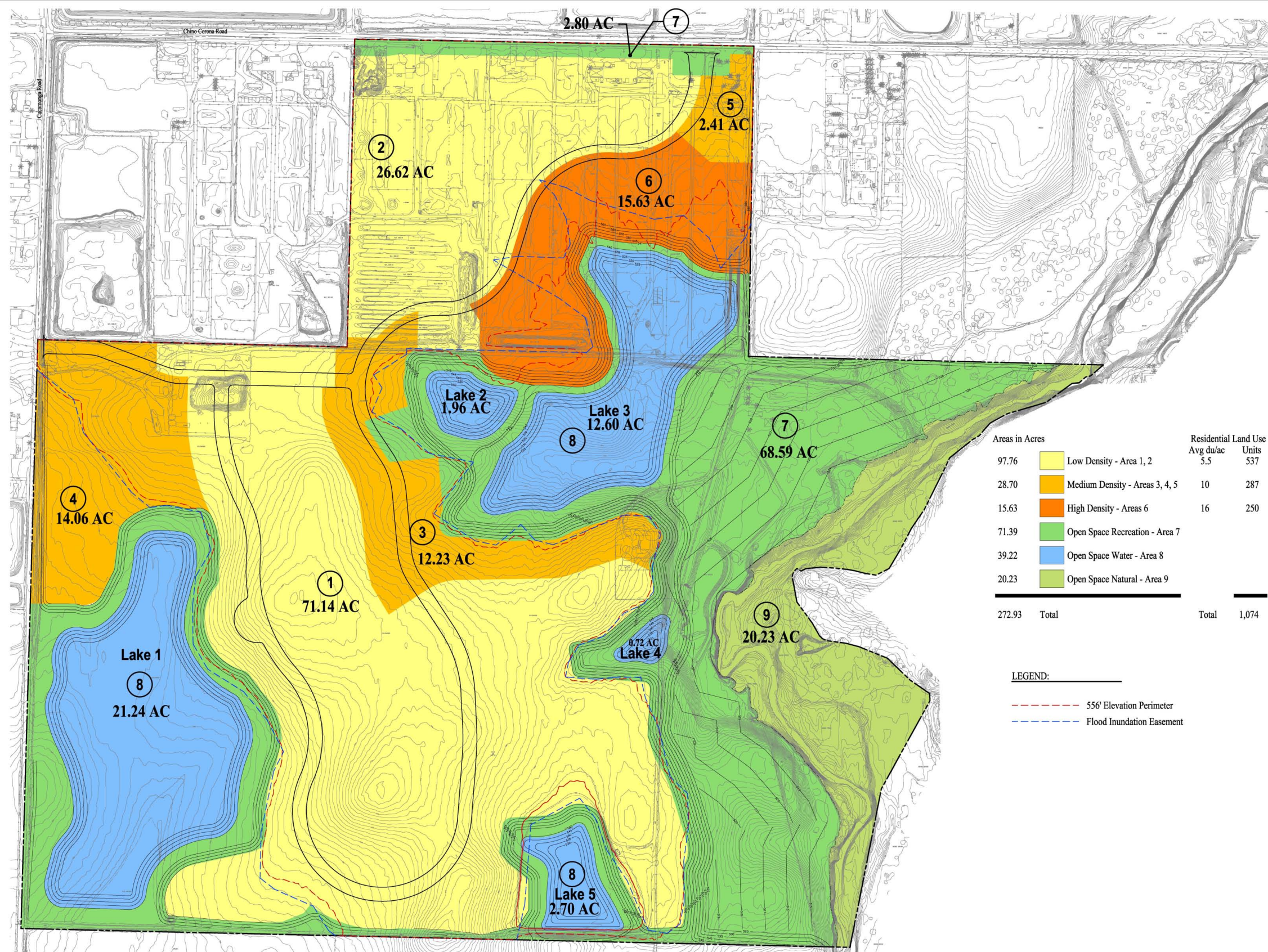
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Legend

- ▬▬▬▬ The Preserve Boundary
- ▬▬▬▬ Project Site Boundary

Exhibit 2 Project Location Map



Source: Huitt-Zollars, Inc., PBR Planning, December 8, 2006.



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Exhibit 3
Project Plan / Land Use

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2.2 - Mitigation Measures in the Air Quality Analysis

The following are mitigation measures that would reduce greenhouse gases contained in the Air Quality Analysis for the Edgewater Communities prepared by Michael Brandman Associates in 2007 (MBA 2008). Only the mitigation measures that pertain to greenhouse gas emissions are shown. An analysis of the mitigation measures in respect to greenhouse gases is shown below each measure.

AQ-2 During Project construction, construction equipment shall be properly maintained at an offsite location; maintenance shall include proper tuning and timing of engines. Equipment maintenance records and equipment design specification data sheets shall be kept onsite during construction.

Analysis: Implementation of mitigation measure AQ-2 reduces greenhouse gas emissions because equipment in disrepair typically emits more exhaust and therefore more greenhouse gases.

AQ-3 During Project construction, the developer shall require all contractors to turn off all construction equipment when not in use.

Analysis: Implementation of mitigation measure AQ-3 reduces greenhouse gases because running construction equipment emits greenhouse gas emissions. Shutting off the equipment when not in use reduces emissions.

AQ-4 Prior to Project construction, the Project proponent shall provide a traffic control plan that would describe in detail safe detours around the Project construction site and provide temporary traffic control (i.e., flag person) during demolition debris transport and other construction related truck hauling activities.

Analysis: Mitigation Measure AQ-4 would help to reduce traffic on the roadways surrounding the Project site. If construction activities were to occur during peak hour traffic, it could result in increased traffic and congestion on the existing roadways. This would mean that the normal number of vehicles on the roadway could be there for a longer period of time, thereby emitting more greenhouse gases.

AQ-5 During mass grading activities, off-road construction vehicles shall: 1) be Tier II equipment; 2) be Tier III equipment; 3) utilize lean NO_x catalysts; and/or 4) utilize oxidized-diesel catalysts.

Analysis: Implementation of mitigation measure AQ-5 would reduce greenhouse gases through the utilization of equipment with lower emission levels.

AQ-6 During Project construction, onsite electrical hook ups shall be provided for electric construction tools including saws, drills and compressors, to eliminate the need for diesel powered electric generators.

Analysis: Implementation of mitigation measure AQ-6 reduces greenhouse gas emissions by eliminating the need for diesel powered electric generators.

SECTION 3: CLIMATE CHANGE

Briefly stated, climate change is a change in the average weather of the earth that may be measured by changes in wind patterns, storms, precipitation, and temperature. These changes are measured using historical records of temperature changes that have occurred in the past, such as during previous ice ages. Many of the recent concerns over climate change use this data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

The United Nations Intergovernmental Panel on Climate Change (IPCC) constructed several emission trajectories of greenhouse gases needed to stabilize global temperatures and climate change impacts. The IPCC predicted that global mean temperature change from 1990 to 2100, given six scenarios, could range from 1.1 degrees Centigrade (°C) to 6.4°C (IPCC 2007). Regardless of analytical methodology, global average temperature and sea level are expected to rise under all scenarios (IPCC 2007).

3.1 - Greenhouse Gases

Gases that trap heat in the atmosphere are called greenhouse gases. The effect is analogous to the way a greenhouse retains heat. Common greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxides, chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, ozone, and aerosols. Natural processes and human activities emit greenhouse gas. The accumulation of greenhouse gases in the atmosphere regulates the earth's temperature. Without the natural heat-trapping effect of greenhouse gas, the earth's surface would be about 34°C cooler (CAT 2006). However, it is believed that emissions from human activities, such as electricity production and vehicle use, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations.

Climate change is driven by forcings and feedbacks. Radiative forcing is the difference between the incoming energy and outgoing energy in the climate system. A feedback is "an internal climate process that amplifies or dampens the climate response to a specific forcing" (NRC 2005). The global warming potential is the potential of a gas or aerosol to trap heat in the atmosphere; it is the "cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas" (EPA 2006a).

Individual greenhouse gas compounds have varying warming potentials and atmospheric lifetimes. The reference gas for the global warming potential is carbon dioxide; as shown in Table 2, carbon dioxide has a global warming potential of one. The calculation of the carbon dioxide equivalent is a consistent methodology for comparing greenhouse gas emissions since it normalizes various greenhouse gas emissions to a consistent metric. Methane's warming potential of 21 indicates that methane has a 21 times greater global warming effect than carbon dioxide on a molecule per

molecule basis (EPA 2006b). One million metric tons of carbon dioxide equivalent (MMTCO_{2e}) is the mass emissions of an individual greenhouse gas multiplied by its global warming potential.

The atmospheric lifetime and global warming potentials of selected greenhouse gases are summarized in Table 3. As shown in the table, global warming potentials range from 1 (carbon dioxide) to 23,900 (sulfur hexafluoride).

Table 3: Global Warming Potentials and Atmospheric Lifetimes of Select Greenhouse Gases

Greenhouse Gas	Atmospheric Lifetime (years)	Global Warming Potential (100-year time horizon)
Carbon Dioxide (CO ₂)	50 – 200	1
Methane (CH ₄)	12 ± 3	21
Nitrous Oxide (N ₂ O)	120	310
HFC-23	264	11,700
HFC-134a	14.6	1,300
HFC-152a	1.5	140
PFC: Tetrafluoromethane	50,000	6,500
PFC: Hexafluoroethane	10,000	9,200
Sulfur Hexafluoride	3,200	23,900
Source: EPA 2006b		

Water Vapor

Description: Of all greenhouse gases in the atmosphere, water vapor is the most abundant, important, and variable. It is not considered a pollutant; in the atmosphere, it maintains a climate necessary for life.

Health Effects: There are no health effects from water vapor. When some pollutants are exposed to water vapor, they can dissolve and then the water vapor can be a transport mechanism to enter the human body.

Sources: The main source of water vapor is evaporation from the oceans (JAC 2002). Other sources include evaporation from other water bodies, sublimation (change from solid to gas) from sea ice and snow, and transpiration from plant leaves.

Ozone

Description: Ozone (O₃) is known as a photochemical pollutant. Ozone is a greenhouse gas; however, unlike other greenhouse gases, ozone in the troposphere is relatively short-lived and therefore is not global in nature. It is difficult to make an accurate determination of the contribution of ozone precursors (nitrogen oxides [NO_x] and volatile organic compounds [VOC]) to climate

change (ARB 2004b). Ozone is not emitted directly into the atmosphere, but is formed by a complex series of chemical reactions between VOC, NO_x, and sunlight. VOC and NO_x are emitted from automobiles, solvents and fuel combustion, the sources of which are widespread throughout the South Coast Air Basin. In order to reduce ozone, it is necessary to control emissions of these ozone precursors such as NO_x. Significant ozone formation generally requires an adequate amount of precursors in the atmosphere and several hours in a stable atmosphere with strong sunlight. A reduction of ozone precursors reduces ozone. The conditions conducive to the formation of ozone include extended periods of daylight (solar radiation) and hot temperatures. These conditions are prevalent during the summer when thermal inversions are most likely to occur. As a result, summertime conditions of long periods of daylight and hot temperatures form ozone in the greatest quantities. During the summer, thermal inversions trap ozone from dispersing vertically, and high concentrations of this pollutant are prevalent.

Health Effects: Health effects of ozone can include the following: respiratory system irritation, reduction of lung capacity, asthma aggravation, inflammation of and damage to lung cells, aggravated cardiovascular disease, and permanent lung damage. The greatest health risk is to those who are more active outdoors during smoggy periods, such as children, athletes, and outdoor workers. Ozone also damages natural ecosystems such as forests and foothill communities, and damages agricultural crops (EPA 2003).

Sources: Ozone is a secondary pollutant, thus it is not emitted directly into the lower level of the atmosphere. The sources of ozone precursors (VOC and NO_x) are discussed above in the description of ozone.

Aerosols

Description: Aerosols are suspensions of particulate matter in a gas emitted into the air through burning biomass (plant material) and fossil fuels. Aerosols can warm the atmosphere by absorbing and emitting heat and can cool the atmosphere by reflecting light. Cloud formation can also be affected by aerosols. Sulfate aerosols are emitted when fuel containing sulfur is burned. Black carbon (or soot) is emitted during biomass burning and incomplete combustion of fossil fuels.

Health Effects: Particulate matter can be inhaled directly into the lungs where it can be absorbed into the bloodstream. It is a respiratory irritant and can cause direct pulmonary effects such as coughing, bronchitis, lung disease, respiratory illnesses, increased airway reactivity, and exacerbation of asthma (EPA 2003b). Particulate matter is also thought to have direct effects on the health, capacity, and productivity of the heart (EPA 2003b). Relatively recent mortality studies have shown a statistically significant direct association between mortality and daily concentrations of particulate matter in the air (EPA 2003b). Non-health effects include reduced visibility and soiling of property.

Sources: Sulfate aerosols are emitted when fuel containing sulfur is burned. Black carbon (or soot) is emitted during biomass burning and incomplete combustion of fossil fuels. The regulation of

particulate matter has been lowering aerosol concentrations in the United States; however, global concentrations are likely increasing.

Carbon Dioxide

Description: Carbon dioxide (CO₂) is an odorless, colorless natural greenhouse gas. According to the IPCC, “carbon dioxide is the most important anthropogenic greenhouse gas. Global increases in carbon dioxide concentrations are due primarily to fossil fuel use, with land-use change providing another significant but smaller contribution” (IPCC 2007b).

Health Effects: Outdoor levels of carbon dioxide are not high enough to result in negative health effects. The National Institute for Occupational Safety and Health reference exposure level is 5,000 ppm, averaged over 10 hours in a 40-hour workweek. The short-term reference exposure level is 30,000 ppm, averaged over 15 minutes. At those levels, potential health problems are as follows: headache, dizziness, restlessness, paresthesia (skin tingling, prickling, or numbness); dyspnea (breathing difficulty); sweating, malaise (vague feeling of discomfort); increased heart rate, cardiac output, blood pressure; coma; asphyxia; and/or convulsions (NIOSH 2005).

Sources: Carbon dioxide is emitted from natural and anthropogenic sources. Natural sources include the following: decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood. Concentrations of carbon dioxide were 379 ppm in 2005, which is an increase of 1.4 ppm per year since 1960 (IPCC 2007). The concentration of carbon dioxide in the atmosphere is projected to increase to a minimum of 540 ppm by 2100 as a direct result of anthropogenic sources (IPCC 2001).

Sinks: Sinks are mechanisms by which a gas or aerosol is taken out of the atmosphere. Carbon dioxide is removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and mineral sequestration into solid carbonate salts (surface limestone or calcium carbonate).

Methane

Description: Methane (CH₄) is a flammable gas and is the main component of natural gas. When one molecule of methane is burned in the presence of oxygen, one molecule of carbon dioxide and two molecules of water are released.

Health Effects: There are no ill health effects from methane. The immediate health hazard is that it may cause burns if it ignites. It is highly flammable and may form explosive mixtures with air. Methane is violently reactive with oxidizers, halogens, and some halogen-containing compounds. Methane is also an asphyxiant and may displace oxygen in an enclosed space (OSHA 2003).

Sources: A natural source of methane is from the anaerobic decay of organic matter. Geological deposits, known as natural gas fields, also contain methane, which is extracted for fuel. Other sources are from landfills, fermentation of manure, and ruminants such as cattle.

Nitrous Oxide

Description: Nitrous oxide (N₂O), also known as laughing gas, is a colorless greenhouse gas.

Health Effects: Higher concentrations can cause dizziness, euphoria, and sometimes-mild hallucinations.

Sources: Nitrous oxide is produced by microbial processes in soil and water, including those reactions that occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used in rocket engines, racecars, and as an aerosol spray propellant.

Chlorofluorocarbons

Description: Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (the level of air at the earth's surface).

Health Effects: CFCs are no longer being used; therefore, it is not likely that health effects would be experienced. Nonetheless, in confined indoor locations, working with CFC-113 or other CFCs are thought to result in death by cardiac arrhythmia (heart frequency too high or too low) or asphyxiation (NIOSH 1989).

Sources: CFCs were first synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents. They destroy stratospheric ozone; therefore, their production was stopped as required by the Montreal Protocol in 1987.

Hydrofluorocarbons

Description: Hydrofluorocarbons (HFCs) are synthetic man-made chemicals that are used as a substitute for CFCs. Of all the greenhouse gases, they are one of three groups with the highest global warming potential. The HFCs with the largest measured atmospheric abundances are (in order), HFC-23 (CHF₃), HFC-134a (CF₃CH₂F), and HFC-152a (CH₃CHF₂) (EPA 2006c). Prior to 1990, the only significant emissions were HFC-23. HFC-134a use is increasing due to its use as a refrigerant. Concentrations of HFC-23 and HFC-134a are now about 10 parts per trillion (ppt) each (EPA 2006c). Concentrations of HFC-152a are about 1 ppt.

Health Effects: Most HFCs do not have health effects associated with them. For example, 1, 1-difluoroethane (HCFC-152A) does not have any adverse health effects (EPA 1995). However,

HFC-134a has a chronic inhalation exposure of 80 mg/m³; the critical effect is Leydig cell hyperplasia (EPA 1995).

Sources: HFCs are man made for applications such as automobile air conditioners and refrigerants.

Perfluorocarbons

Description: Perfluorocarbons (PFCs) have stable molecular structures and do not break down through the chemical processes in the lower atmosphere. High-energy ultraviolet rays about 60 kilometers above Earth's surface are able to destroy the compounds. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane (CF₄) and hexafluoroethane (C₂F₆). Concentrations of CF₄ in the atmosphere are over 70 ppt (EPA 2006c).

Health Effects: High concentrations of CF₄ can cause confusion, dizziness, or headache and may cause effects on the cardiovascular system, resulting in cardiac disorders (NIOSH 1997).

Sources: The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

Sulfur Hexafluoride

Description: Sulfur hexafluoride is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest global warming potential of any gas evaluated, 23,900. Concentrations in the 1990s were about 4 ppt (EPA 2006c).

Health Effects: In high concentrations in confined areas, the gas presents the hazard of suffocation because it displaces the oxygen needed for breathing.

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

3.1.1 - Federal Inventory

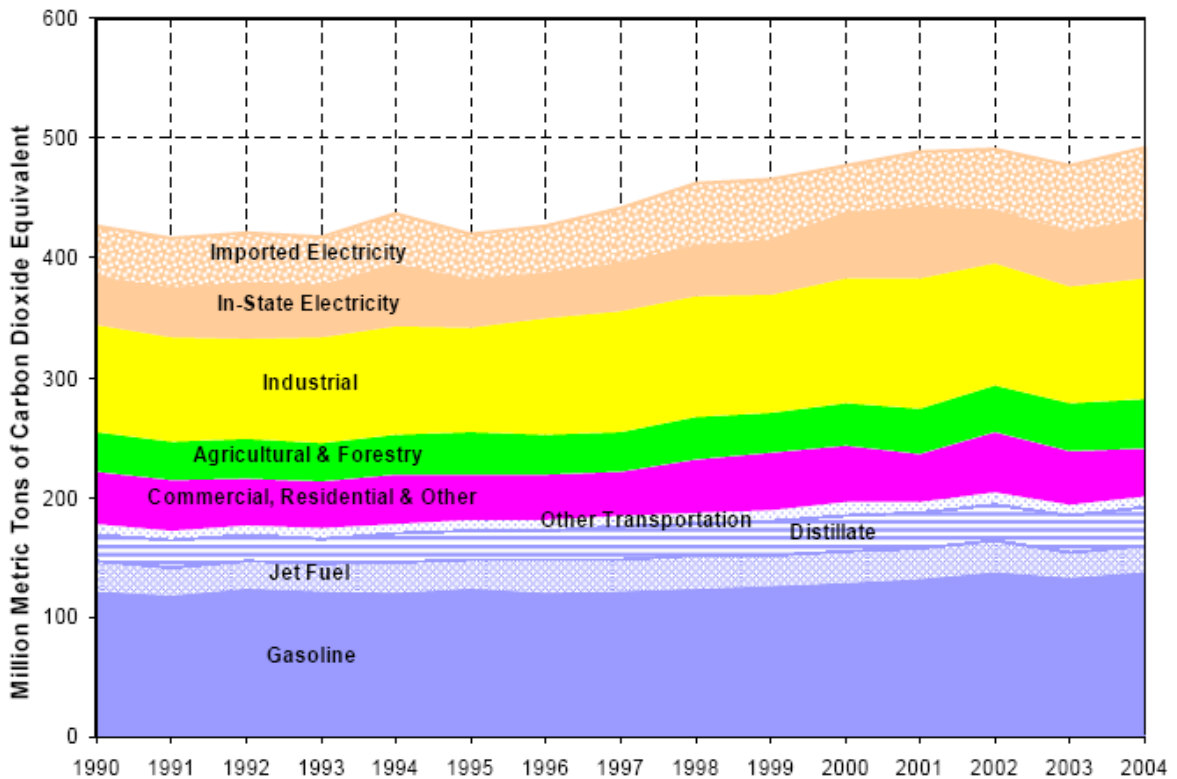
In 2004, total worldwide greenhouse gas emissions were estimated to be 20,135 million metric tons of carbon dioxide equivalents (MMTCO₂e), excluding emissions/removals from land use, land use change, and forestry (UNFCCC 2006). (Note that sinks, or greenhouse gas removal processes, play an important role in the greenhouse gas inventory as forest and other land uses absorb carbon.) In 2004, greenhouse gas emissions in the U.S. were 7,074.4 MMTCO₂e (EPA 2006a). In 2005, total U.S. greenhouse gas emissions were 7,260.4 MMTCO₂e, a 16.3 percent increase from 1990 emissions, while U.S. gross domestic product has increased by 55 percent over the same period (EPA 2007a). Emissions rose from 2004 to 2005, increasing by 0.8 percent. The main causes of the increase are believed to be: (1) strong economic growth in 2005, leading to increased demand for electricity, and (2) an increase in the demand for electricity due to warmer summer conditions (EPA

2007a). However, a decrease in demand for fuels due to warmer winter conditions and higher fuel prices moderated the increase in emissions (EPA 2007a).

3.1.2 - State Inventory

California is a substantial contributor of greenhouse gases as it is the second largest contributor in the U.S. and the sixteenth largest in the world (CEC 2006). In 2004, California produced 500 MMTCO₂e (CEC 2007), including imported electricity and excluding combustion of international fuels and carbon sinks or storage, which is approximately 7 percent of U.S. emissions. The major source of greenhouse gases in California is transportation, contributing 41 percent of the State’s total greenhouse gas emissions (CEC 2006). Electricity generation is the second largest source, contributing 22 percent of the State’s greenhouse gas emissions (CEC 2006). Exhibit 4 shows that emissions for the major energy sectors vary over time.

Exhibit 4: California’s Gross Greenhouse Gas Emission Trends



Source: California Energy Commission. December 2006. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004. Staff Final Report. (CEC 2006)

3.1.3 - Local Inventory

The local agencies (i.e., the South Coast Air Quality Management District or the City) have not developed a local inventory of greenhouse gases.

3.2 - Regulatory Environment

3.2.1 - International and Federal

International and Federal agreements have been enacted to deal with climate change issues. The Montreal Protocol was originally signed in 1987 and substantially amended in 1990 and 1992. The Montreal Protocol governs compounds that deplete ozone in the stratosphere—chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform. The Protocol provided that these compounds were to be phased out by 2000 (2005 for methyl chloroform).

In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change to assess “the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation” (IPCC 2004).

On March 21, 1994, the United States joined a number of countries around the world in signing the United Nations Framework Convention on Climate Change. Under the Convention, governments do the following: gather and share information on greenhouse gas emissions, national policies, and best practices; launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change (UNFCCC 2007).

A particularly notable result of the United Nations Framework Convention on Climate Change efforts was a treaty known as the Kyoto Protocol. When countries sign the treaty, they demonstrate their commitment to reduce their emissions of greenhouse gases or engage in emissions trading. More than 160 countries—representing 55 percent of global emissions—are currently participating in the protocol. In 1998, United States Vice President Al Gore symbolically signed the Protocol; however, in order for the Protocol to be formally ratified, it must be ratified by the United States Congress. This was not done by the Congress during the Clinton Administration, and the current US President, George W. Bush, has indicated that he does not intend to submit the treaty for ratification.

In October 1993, President Clinton announced his Climate Change Action Plan, which had a goal to return greenhouse gas emissions to 1990 levels by the year 2000. This was to be accomplished through 50 initiatives that relied on innovative voluntary partnerships between the private sector and government aimed at producing cost-effective reductions in greenhouse gas emissions.

The U.S. EPA currently does not regulate greenhouse gas emissions from motor vehicles. *Massachusetts v. EPA* (Supreme Court Case 05-1120) was argued before the United States Supreme Court on November 29, 2006, in which it was petitioned that EPA regulate four greenhouse gases, including carbon dioxide, under Section 202(a)(1) of the Clean Air Act. A decision was made on

April 2, 2007, in which the Court held that petitioners have a standing to challenge the EPA and that the EPA has statutory authority to regulate emissions of greenhouse gases from new motor vehicles.

3.2.2 - California

There has been legislative and regulatory activity regarding climate change and greenhouse gases in California. Although it was not originally intended to reduce greenhouse gases, California Code of Regulations Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy-efficient technologies and methods. The latest amendments were made in October 2005 and currently require new homes to use half the energy they used only a decade ago. Energy efficient buildings require less electricity, and electricity production by fossil fuels results in greenhouse gas emissions. Therefore, increased energy efficiency results in decreased greenhouse gas emissions.

California Assembly Bill 1493 (Pavley), enacted on July 22, 2002, required the ARB to develop and adopt regulations that reduce greenhouse gases emitted by passenger vehicles and light duty trucks. Regulations adopted by the ARB would apply to 2009 and later model year vehicles. The ARB estimates that the regulation would reduce climate change emissions from the light-duty passenger vehicle fleet by an estimated 18 percent in 2020 and by 27 percent in 2030 (ARB 2004).

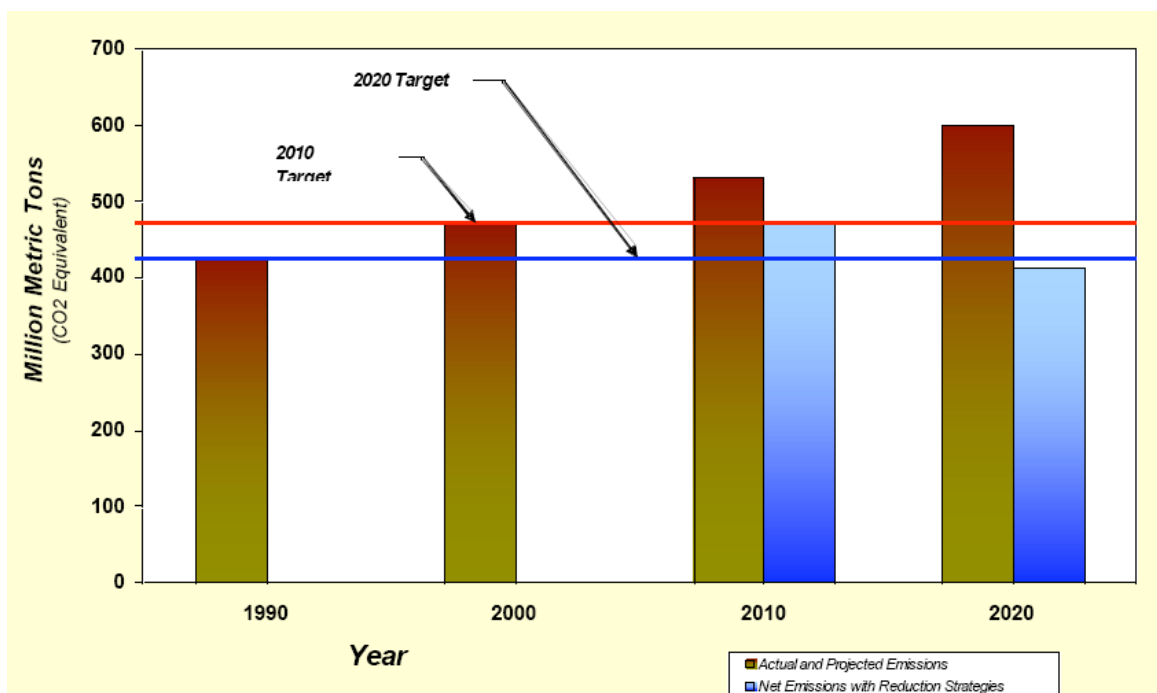
California Governor Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following greenhouse gas emission reduction targets:

- by 2010, reduce greenhouse gas emissions to 2000 levels;
- by 2020, reduce greenhouse gas emissions to 1990 levels; and
- by 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels (CA 2005).

To meet these targets, the Governor directed the Secretary of the California EPA to lead a Climate Action Team (CAT) made up of representatives from the Business, Transportation and Housing Agency; the Department of Food and Agriculture; the Resources Agency; the Air Resources Board; the Energy Commission; and the Public Utilities Commission. The CAT's Report to the Governor in 2006 contains recommendations and strategies to help ensure the targets in Executive Order S-3-05 are met (CAT 2006).

The CAT report (2006) contains baseline emissions as estimated by the ARB and the California Energy Commission, as shown in Exhibit 5 below.

Exhibit 5: California Greenhouse Gas Emissions



Source: State of California, Environmental Protection Agency, Climate Action Team. March 2006. Climate Action Team Report to Governor Schwarzenegger and the California Legislature (CAT 2006).

Executive Order S-01-07 was signed by Governor Schwarzenegger on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. It also requires that a Low Carbon Fuel Standard for transportation fuels be established for California.

The Western Climate Initiative was signed on February 26, 2007 by five states: Washington, Oregon, Arizona, New Mexico, and California. British Columbia, Canada joined on April 20, 2007. Members of the Initiative plan on collaborating to identify, evaluate, and implement ways to reduce greenhouse gas emissions in the states collectively and to achieve related co-benefits. Members also plan to design a regional market-based multi-sector mechanism, such as a load-based cap and trade program, by August 2008. In addition, a multi-state registry will track, manage, and credit entities that reduce greenhouse gas emissions. The Initiative published its regional greenhouse gas reduction goals on August 22, 2007, which include a reduction of 15 percent below 2005 levels by 2020 (WCI 2007).

California is also exploring the possibility of cap and trade systems for greenhouse gases. The Market Advisory Committee to the ARB published draft recommendations for designing a greenhouse gas cap and trade system for California (MAC 2007).

In 2006, the State Legislature adopted Senate Bill 1368 ("SB 1368"), which was subsequently signed into law by the Governor. SB 1368 directs the California Public Utilities Commission to adopt a greenhouse gas emission performance standard for the future power purchases of California utilities. SB 1368 seeks to limit carbon emissions associated with electrical energy consumed in California by forbidding procurement arrangements for energy longer than five years from resources that exceed the emissions of a relatively clean, combined cycle natural gas power plant. Due to the carbon content of its fuel source, a coal-fired plant cannot meet this standard because such plants emit roughly twice as much carbon as combined cycle natural gas power plants. Accordingly, the new law will effectively prevent California's utilities from investing in, otherwise financially supporting, or purchasing power from new coal plants located in or out of the State. Thus, SB 1368 will lead to dramatically lower greenhouse gas emissions associated with California energy demand, as SB 1368 will effectively prohibit California utilities from purchasing power from out of state producers that cannot satisfy the greenhouse gas emission performance standard required by SB 1368.

SB 97 was passed in August 2007 and added Section 21083.05 to the Public Resources Code, "(a) On or before July 1, 2009, the Office of Planning and Research shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the Office of Planning and Research pursuant to subdivision (a)." Section 21097 was also added to the Public Resources Code and indicates that the failure to analyze adequately the effects of greenhouse gases in a document related to the environmental review of a transportation Project funded under the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 does not create a cause of action for a violation. However, SB 97 does not safeguard non-transportation funded Projects from being challenged in court for omitting a climate change analysis.

AB 32

In 2006, the California State Legislature adopted AB 32, the California Global Warming Solutions Act of 2006. AB 32 focuses on reducing greenhouse gas emissions in California. Greenhouse gases, as defined under AB 32, include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. AB 32 requires that greenhouse gases emitted in California be reduced to 1990 levels by the year 2020. ARB is the state agency charged with monitoring and regulating sources of emissions of greenhouse gases that cause global warming in order to reduce emissions of greenhouse gases. AB 32 requires that by January 1, 2008, ARB must determine what the statewide greenhouse gas emissions level was in 1990, and it must approve a statewide greenhouse gas emissions limit so it may be applied to the 2020 benchmark.

The ARB Board approved the 1990 greenhouse gas emissions level of 427 million metric tons of carbon dioxide equivalent (MMTCO₂e) on December 6, 2007. Therefore, in 2020, emissions in California are required to be at or below 427 MMTCO₂e.

Under AB 32, the ARB published its Final Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California (ARB 2007). Discrete early action measures are currently underway or are enforceable by January 1, 2010. Early action measures are regulatory or non-regulatory and are currently underway or to be initiated by the ARB in the 2007 to 2012 timeframe. The ARB has 44 early action measures that apply to the transportation, commercial, forestry, agriculture, cement, oil and gas, fire suppression, fuels, education, energy efficiency, electricity, and waste sectors. Of those early action measures, nine are considered discrete early action measures, as they are regulatory and enforceable by January 1, 2010. The ARB estimates that the 44 recommendations are expected to result in reductions of at least 42 MMTCO₂e by 2020, representing approximately 25 percent of the 2020 target. CEQA is only mentioned once in the Early Action Measures report. The California Air Pollution Control Officer's Association (CAPCOA) suggested that ARB work with local air districts on approaches for the review of greenhouse gas impacts under the CEQA process, including greenhouse gas significance thresholds for projects, and to develop a process for the capturing of reductions that result from CEQA mitigations. ARB's response to this recommendation in the report is as follows: "the Governor's Office of Planning and Research is charged with providing statewide guidance on CEQA implementation. With respect to quantifying any reductions that result from project level mitigation of greenhouse gas emissions, we would like to see air districts take a lead role in tracking such reductions in their regions" (ARB 2007).

Under AB 32, the ARB has the primary responsibility for reducing greenhouse gas emissions. However, the CAT Report contains strategies that many other California agencies can take. The CAT published a public review draft of Proposed Early Actions to Mitigate Climate Change in California (CAT 2007). Most of the strategies were in the 2006 CAT Report or are similar to the 2006 CAT strategies.

3.2.3 - Local Public Agencies

Local agencies such as the South Coast Air Quality Management District and the City do not currently have formal reduction plans or legislation regarding greenhouse gases. However, the SCAQMD has a section on greenhouse gases in its 2007 Air Quality Management Plan (AQMP) in Chapter 10, Looking Beyond. The AQMP indicates the following:

The Final 2007 AQMP proposes to quantify the concurrent emission reductions associated with Statewide greenhouse gas programs targeted at stationary and mobile sources in the Basin working with various state agencies. Emission reductions from these programs will be applied toward the long-term reduction targets proposed in the Final 2007 AQMP for meeting the federal ozone standard by 2021 (or 2024). Any greenhouse gas impacts from the control strategies contained in the Final AQMP will be assessed in the Plan's CEQA document. The

District will continue to collaborate with various local and State agencies in implementing the proposed greenhouse gas strategies and quantifying the concurrent combustion emission reductions.

3.3 - Emissions Trading and Carbon Offset Programs

Current and future emissions trading programs as well as carbon offset programs are discussed below.

3.3.1 - Emissions Trading Programs

An emissions trading (or cap and trade) program is an approach for controlling emissions by providing economic incentives for reducing emissions. Typically, a limit (or cap) is placed on the quantity of greenhouse gas emissions that can be emitted per year. The source emitters are then issued permits by the governing authority for a certain allowance of emissions. Source emitters can reduce their own emissions and sell the excess or they can continue to emit high levels and purchase credits from another facility (a trade). There are several uncertainties regarding trading programs. Allowances need to be set at proper levels when a cap and trade program is initialized. Another uncertainty is deciding who is regulated (i.e., power plants, transportation sector, etc.).

Existing Carbon Trading Program

The European Union Greenhouse Gas Emission Trading Scheme (EU ETS) is one of three mechanisms under the Kyoto Protocol to reduce emissions in the European Union. The other two mechanisms are called Joint Implementation and the Clean Development Mechanism. The EU ETS is examined herein to provide background information on how a trading system in California or the United States may work or end up over time. Note that the EU ETS does not apply to or reduce emissions generated in the United States.

The EU ETS commenced operation in 2005 as the largest multi-country, multi-sector greenhouse gas emission trading program world-wide. The mandatory trading system covers over 11,500 facilities in Europe (EUETS 2007). The EU ETS covers half of the European Union's emissions of carbon dioxide and 40 percent of its total greenhouse gas emissions.

The National Allocation Plans determine the total quantity of carbon dioxide emissions that Member States grant to their companies, which can then be sold or bought by the companies themselves. This means each Member State must decide how many allowances to allocate in total for a trading period and how to distribute those allowances. The first trading period runs from 2005-2007, the second one from 2008-2012, and the third one will start in 2013 (EUETS 2007). The first trading period covered only carbon dioxide emissions from large emitters in the power and heat generation industry and in selected energy-intensive industrial sectors: combustion plants, oil refineries, coke ovens, iron and steel plants and factories making cement, glass, lime, bricks, ceramics, pulp, and paper. The second period will also include nitrous oxide emissions.

The transportation sector and direct emissions from the commercial and residential sector are not included in the cap (MAC 2007). The EU relies on policies and measures apart from the emissions trading system to reduce emissions from uncovered sectors. For example, taxes on gasoline are considerably higher than those in California, leading to prices over \$6 per gallon (MAC 2007).

The number of second period allowances is less than the first phase period. In the United Kingdom, the reduction in allowances for Phase II is to be borne by Large Electricity Producers, as in Phase I, because the public can carry the cost by increased energy rates (DEFRA 2007).

The allowances allotted through the EU ETS can be traded at Carbon Trading Exchanges, including but not limited to the following: European Climate Exchange; European Energy Exchange; Energy Exchange Austria; Nord Pool; and Bluenext. The price per metric ton in the European markets is currently around 20 Euros (\pm \$29).

Future Carbon Trading Programs

Future trading programs currently being developed include the Western Climate Initiative, the Regional Greenhouse Gas Initiative, and a cap and trade system for California.

Western Climate Initiative

The Western Climate Initiative was signed on February 26, 2007 by five states: Washington, Oregon, Arizona, New Mexico, and California. British Columbia, Canada joined on April 20, 2007.

Members of the Initiative plan on collaborating to identify, evaluate, and implement ways to reduce greenhouse gas emissions in the states collectively and to achieve related co-benefits. Members also plan to design a regional market-based multi-sector mechanism, such as a load-based cap and trade program, by August 2008. In addition, a multi-state registry will track, manage, and credit entities that reduce greenhouse gas emissions. The Initiative published its regional greenhouse gas reduction goals on August 22, 2007, which include a reduction of 15 percent below 2005 levels by 2020 (WCI 2007).

The WCI has prepared documents on the variety of approaches that can be used within the trading program. They explored the feasibility of utilizing carbon offsets by listing the advantages and disadvantages of an offset program (WCI 2008).

Regional Greenhouse Gas Initiative

The Regional Greenhouse Gas Initiative (RGGI) is an agreement between nine northeastern states to institute a mandatory carbon dioxide reduction program. The goal of the RGGI is to reduce the member states carbon dioxide production from the power sector by 10 percent between 2009 and 2018. The program will cover fossil fuel electricity generation stations larger than 25 megawatts. (RGGI 2008)

Cap-and-Trade Program in California

California is exploring the possibility of a cap-and-trade system for greenhouse gases. The Market Advisory Committee to the ARB published recommendations for designing a mandatory greenhouse gas cap-and-trade system for California (MAC 2007), as follows:

- The program should eventually include all major greenhouse gas-emitting sectors of the economy in the cap-and-trade program.
- To address emissions associated with imported electricity within a state-based cap-and-trade program, the Committee recommends a “first-seller approach.” Under this approach, the entity that first sells electricity in the State is responsible to meet the compliance obligation established under the greenhouse gas cap-and-trade program.
- The Committee recommends a combined approach in which some share of allowances is allocated free of charge initially, while the remaining allowances are auctioned. The percentage of allowances auctioned should then increase over time.
- The Committee recommends that California’s cap-and-trade program recognize offsets generated both within and outside the State’s borders.
- California should encourage linkages with other mandatory greenhouse gas cap-and-trade systems.
- The Committee recommends the use of very stringent criteria for determining whether activities qualify as offsets. (MAC 2007)

The program could include the upstream transportation sector, which would regulate petroleum refiners and importers of refined products. It could also cover the distribution of natural gas.

3.3.2 - Carbon Offset Programs

Carbon offset programs allow entities to purchase carbon offsets. Carbon offsets are designed to fund programs that reduce greenhouse gas emissions, such as digesters on dairy farms that capture and reuse methane gas. There are different sources for purchasing carbon offsets, as discussed below.

Chicago Climate Exchange

The Chicago Climate Exchange (CCX) is currently North America’s only marketplace for integrating voluntary legally binding emissions reductions with emissions trading and offsets (CCX 2008). The commodity traded at CCX is the CFI contract, each of which represents one MTCO₂e. Trading volumes have increased since the CCX was established in 2003. The price of a CFI has ranged from \$1 to \$4.50 per MTCO₂e. The price on February 13, 2008 was \$4.45.

Entities can also become members of the CCX. Members agree to reduce their direct emissions by 2010 by 6 percent. Direct emissions result from the on-site combustion of fossil fuels, such as natural gas to power industrial operations and gasoline to operate vehicle fleets. Indirect emissions result from energy purchases, such as electricity, and their corresponding emissions.

The offsets available through the CCX are verified by a third party annually. The types of offsets available through the CCX include the following:

- Agricultural methane
- Coal mine methane
- Landfill methane
- Agricultural soil carbon
- Rangeland soil carbon management
- Forestry
- Renewable energy
- Ozone depleting substance destruction

Carbon Finance at the World Bank

The World Bank is facilitating the development of a carbon market through managing carbon funds to finance sustainable development in developing countries (WB 2006). One of the funds is called the Prototype Carbon Fund, which promotes sustainable development and has 29.8 million metric tons of carbon dioxide equivalents under contract.

Other Offset Providers

There are a variety of carbon offset providers, including but not limited to the following.

- TerraPass funds clean energy produced by wind power, farm power, and landfill gas capture. An independent third party verifies the projects. The cost to offset is approximately \$10 to \$11 per ton.
- Carbonfund.org has a current price per ton of \$5.50. It funds renewable energy, energy efficiency, and reforestation projects. Carbonfund.org indicates that it has third party verification of the offsets.
- Climate Care is based in the United Kingdom. It focuses on small-scale renewable energy and efficiency projects in developing countries. It addresses additionality in its project selection criteria and implementation procedures.
- Climate Trust is based out of Portland, Oregon. Its projects include energy efficiency, renewable energy, sequestration (reforestation), fuel replacement, cogeneration, material substitution, and transportation efficiency (i.e., truck stop electrification, internet-based carpool matching, traffic signals optimization). The cost per ton is currently \$11 per metric ton.
- AgCert International funds anaerobic digestion projects in Brazil, Mexico, Argentina, and Chile.

Independent Offset Acquisition

A company can choose to obtain its own offsets independently, either by developing its own emission reduction projects or by securing long-term rights from another emitter. The benefits of acquiring offsets independently could mean that any economic benefits that arise from the projects could

potentially be shared with the purchaser. However, there could be long lead times for the offset projects, which could mean that the benefits may not be available until after 2011 or later. Also, offset developers may not be interested in selling or may request an unreasonably large price for such offsets. The administrative costs of independent offset acquisition may also be higher than obtaining them directly from an offset provider. There is also risk because the offset project may reduce fewer emissions than anticipated.

The types of projects that the developer can obtain are similar to those offered by the offset providers, and include renewable energy projects (solar or wind), agricultural projects (installation of biodigesters, which trap methane released and convert it to electricity), or landfill gas recovery.

Uncertainties Regarding Offsets

Discussion regarding the uncertainties regarding carbon offsets purchased in the United States is contained in Section 4.3.

SECTION 4: IMPACT ANALYSIS

By definition, climate change is cumulative in nature. However, CEQA requires both a Project level and a cumulative level approach when addressing potential impacts. Therefore, both analyses are contained herein and are described below.

An inventory of greenhouse gas emissions from existing uses, construction of the Project, and operation of the Project is also shown. There are numerous resources available to Project applicants that provide strategies for reducing greenhouse gas emissions. Although not required by law, compliance with these strategies provide guidance in this new area of environmental protection. For this reason, they are discussed below. Impacts to the Project from climate change are also addressed.

4.1 - Project-Level Analysis

4.1.1 - Threshold of Significance

CEQA requires that Lead Agencies inform decision makers and the public regarding potential significant environmental effects of Projects and feasible ways that environmental damage can be avoided or reduced, through the use of feasible mitigation measures and/or Project alternatives, and disclose the reasons why the Lead Agency approved a Project if significant environmental effects are involved (CEQA Guidelines Section 15002). CEQA also requires Lead Agencies to evaluate potential environmental effects based on, to the fullest extent possible, scientific and factual data (CEQA Guidelines Section 15064[b]). Significance conclusions must be based on substantial evidence, which includes facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts (CEQA Guidelines Section 15064f[5]).

There are currently no published thresholds of significance established by any state or regional regulatory agency for measuring the impact of climate change on or from a Project. CEQA Guidelines Section 15064.7 indicates, “each public agency is encouraged to develop and publish thresholds of significance that the agency uses in the determination of the significance of environmental effects.”

The thresholds to be used for this Project are as follows:

- Would the project significantly impact the environment through its emissions of greenhouse gases as such gases are defined in AB 32?
- Would the proposed project cumulatively impact the environment through its emissions of greenhouse gases as such gases are defined in AB 32?

Note that the threshold and the analysis contained in this report may not be relevant to other Projects. Therefore, this analysis does not establish thresholds in the City or set precedence for the type of assessment in a climate change analysis.

4.1.2 - Project Level Analysis Approach

There are no Project-level thresholds to measure the significance of a Project's impact on climate change. Thus, a standard CEQA "significance" determination is difficult to make in this context. Nevertheless, according to a paper presented by the Association of Environmental Professionals (AEP 2007), the following approach may be used to address greenhouse gas thresholds and assess the significance of the Project's contribution to climate change:

Compliance with Strategies: Assess Project compliance with the current California emission reduction strategies to reduce greenhouse gases.

4.1.3 - Compliance with State Strategies

To assess compliance with California strategies to reduce greenhouse gas emissions, two main documents are used. The first is the 2006 Climate Action Team Report to Governor Schwarzenegger (2006 CAT Report) and the second is the ARB's early action measures for AB 32.

2006 CAT Report and AB 32

As discussed previously in Section 3.2, California Governor Schwarzenegger announced on June 1, 2005 through Executive Order S-3-05, greenhouse gas emission reduction targets as follows:

- By 2010, reduce greenhouse gas emissions to 2000 levels;
- By 2020, reduce greenhouse gas emissions to 1990 levels;
- By 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels. (CA 2005)

Similar to Executive Order S-3-05, AB 32 requires that by January 1, 2008, the ARB shall determine what the statewide greenhouse gas emissions level was in 1990, and approve a statewide greenhouse gas emissions limit that is equivalent to that level, to be achieved by 2020.

The 2006 CAT Report is not in response to AB 32; however, the 2006 CAT Report introduces strategies that can be implemented by the ARB and other California agencies to reduce California's emissions to 1990 levels by 2020, which is the same target for AB 32. In addition, the 2006 CAT Report is consistent with the intent of AB 32. AB 32 contains a timeline for development and approval of strategies to reduce state emissions. The bulk of the strategies are not yet developed. Therefore, in the absence of climate change thresholds and standards, the strategies published for Executive Order S-3-05 are used for this analysis because it contains the most complete list of strategies as of the date of this analysis.

An assessment of Project consistency with the 2006 CAT Report strategies is contained in Table 4. As shown in the table, with mitigation, the Project is consistent the applicable strategies.

Table 4: California Greenhouse Gas Emission Reduction Strategies

Strategy	Project Design/Mitigation to Comply with Strategy
<p>Vehicle Climate Change Standards: AB 1493 (Pavley) required the state to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of climate change emissions emitted by passenger vehicles and light duty trucks. Regulations were adopted by the ARB in September 2004.</p>	<p>These are ARB enforced standards; vehicles that access the Project that are required to comply with the standards would comply with these strategies.</p>
<p>Other Light-Duty Vehicle Technology: New standards would be adopted to phase in beginning in the 2017 model.</p>	
<p>Heavy-Duty Vehicle Emission Reduction Measures: Increased efficiency in the design of heavy-duty vehicles and an education program for the heavy-duty vehicle sector.</p>	
<p>Diesel Anti-Idling: In July 2004, the ARB adopted a measure to limit diesel-fueled commercial motor vehicle idling.</p>	<p>Consistent. The diesel anti-idling rule is already in place; it is not anticipated that the Project would attract a substantial quantity of heavy-duty diesel trucks.</p>
<p>Hydrofluorocarbon Reduction: 1) Ban retail sale of HFC in small cans; 2) Require that only low global warming potential refrigerants be used in new vehicular systems; 3) Adopt specifications for new commercial refrigeration; 4) Add refrigerant leak-tightness to the pass criteria for vehicular Inspection and Maintenance programs; 5) Enforce federal ban on releasing HFCs.</p>	<p>Consistent. Products that may contain HFC in small cans will be phased out when required by statute, code, or regulation.</p>
<p>Transportation Refrigeration Units (TRU), Off-Road Electrification, Port Electrification: Strategies to reduce emissions from TRUs, increase off-road electrification, and increase use of shore-side/port electrification.</p>	<p>Not applicable. It is not anticipated that the Project would attract transportation refrigeration units.</p>
<p>Manure Management: The proposed San Joaquin Valley Rule 4570 will reduce volatile organic compounds from confined animal facilities through implementation of control options.</p>	<p>Not applicable because the Project is not located within the San Joaquin Valley and does not contain animal facilities. The existing onsite dairies would be phased out if the Project is adopted.</p>
<p>Alternative Fuels - Biodiesel Blends: ARB would develop regulations to require the use of 1 to 4 percent biodiesel displacement of California diesel fuel.</p>	<p>Not applicable because the Project objective does not contain the development of fuels.</p>
<p>Alternative Fuels - Ethanol: Increased use of ethanol fuel.</p>	<p>Not applicable because the Project objective does not contain the development of fuels.</p>
<p>Achieve 50 percent Statewide Recycling Goal: Achieving the State's 50 percent waste diversion mandate as established by the Integrated Waste Management Act of 1989, (AB 939, Sher, Chapter 1095, Statutes of 1989), will reduce climate change emissions associated with energy intensive material extraction and production as well as methane emission from landfills. A diversion rate of 48 percent has been achieved on a statewide basis. Therefore, a 2 percent additional reduction is needed.</p>	<p>Consistent with mitigation measure GCC-2 and Project design features.</p>
<p>Zero Waste - High Recycling: Additional recycling beyond the State's 50 percent recycling goal.</p>	

Strategy	Project Design/Mitigation to Comply with Strategy
Landfill Methane Capture: Install direct gas use or electricity Projects at landfills to capture and use emitted methane.	Not applicable because the Project does not involve the construction or amendment of a landfill.
Urban Forestry: A new statewide goal of planting 5 million trees in urban areas by 2020 would be achieved through the expansion of local urban forestry programs.	Consistent with mitigation. Mitigation requires that shade trees be provided.
Afforestation/Reforestation Projects: Reforestation Projects focus on restoring native tree cover on lands that were previously forested and are now covered with other vegetative types.	Not applicable. The Project area was not forested in recent times.
Water Use Efficiency: Approximately 19 percent of all electricity, 30 percent of all natural gas, and 88 million gallons of diesel are used to convey, treat, distribute and use water and wastewater. Increasing the efficiency of water transport and reducing water use would reduce greenhouse gas emissions.	Consistent. The Project is going to use recycled water for the lakes and the open space landscaping. Additional mitigation (GCC-3) would require a landscape palette that minimizes water consumption.
Building Energy Efficiency Standards in Place and in Progress: Public Resources Code 25402 authorizes the CEC to adopt and periodically update its building energy efficiency standards (that apply to newly constructed buildings and additions to and alterations to existing buildings).	Consistent with mitigation. See discussion below table.
Appliance Energy Efficiency Standards in Place and in Progress: Public Resources Code 25402 authorizes the Energy Commission to adopt and periodically update its appliance energy efficiency standards (that apply to devices and equipment using energy that are sold or offered for sale in California).	Consistent with mitigation measure GCC-1.
Cement Manufacturing: Cost-effective reductions to reduce energy consumption and to lower carbon dioxide emissions in the cement industry.	Not applicable because although the Project uses cement, the Project does not directly influence decisions made in the cement industry.
Smart Land Use and Intelligent Transportation Systems (ITS): Smart land use, demand management, ITS, and value pricing are critical elements for improving mobility and transportation efficiency. Specific strategies include: promoting jobs/housing proximity and transit-oriented development; encouraging high density residential/commercial development along transit/rail corridor; valuing and congestion pricing; implementing intelligent transportation systems, traveler information/traffic control, incident management; accelerating the development of broadband infrastructure; and comprehensive, integrated, multimodal/intermodal transportation planning.	Not consistent. See discussion below table.
Enteric Fermentation: Cattle emit methane from digestion processes. Changes in diet could result in a reduction in emissions.	Not applicable because the Project does not contain cattle.
Green Buildings Initiative: Green Building Executive Order, S-20-04 (CA 2004), sets a goal of reducing energy use in public and private buildings by 20 percent by the year 2015, as compared with 2003 levels.	Consistent with mitigation; see discussion below table.

Strategy	Project Design/Mitigation to Comply with Strategy
<p>California Solar Initiative: Installation of 1 million solar roofs or an equivalent 3,000 MW by 2017 on homes and businesses; increased use of solar thermal systems to offset the increasing demand for natural gas; use of advanced metering in solar applications; and creation of a funding source that can provide rebates over 10 years through a declining incentive schedule.</p>	<p>Consistent with mitigation measure GCC-1.</p>
<p>Source: State of California, Environmental Protection Agency, Climate Action Team, 2006.</p>	

Green Buildings Initiative and Energy Efficiency Standards

The Project would be required to comply with the most recent Title 24 standards for building construction. If the Project were to obtain permits in 2008, it would be required to comply with the 2005 Title 24 standards. As the Project is currently scheduled, it is possible that it would obtain permits in 2008 and therefore be required to comply with 2005 Title 24 standards. The 2005 Title 24 standards for residential construction provide an 18.3 percent reduction in electrical demand compared with the 2001 standards (CEC 2005). The 2005 Title 24 standards for residential construction provide an 8.3 percent reduction in natural gas demand compared with the 2001 standards (CEC 2005).

The California Energy Commission is in the process of adopting 2008 Title 24 standards which will go into effect in 2009. The 2008 standards reduce electricity use in low-rise single family residential detached homes by 22.7 percent compared with 2005 standards, peak demand is reduced by 10 percent, and gas is reduced by 10 percent (CEC 2007b).

Mitigation measure GCC-1 requires that the Project use 2008 Title 24 requirements for building the new homes, which would be consistent with the Green Buildings Initiative and increased energy efficiency standards.

Smart Land Use

There are numerous ways to reduce greenhouse gas emissions in California. As discussed above, pursuant to Executive Order S-3-05, the California Climate Action Team prepared strategies for reducing greenhouse gases. In addition, pursuant AB 32, the State of California is in the process of compiling its own strategies. Planning and land use decisions play an important role in reducing emissions related to energy consumption and transportation. One of the strategies in Executive Order S-3-05 is “smart land use,” also known as smart growth.

Smart growth is also known as “walkable communities,” “new urbanist neighborhoods,” “compact development,” and “transit-oriented developments” (Ewing et al. 2007). Smart growth advocates for better access and less traffic by mixing land uses, clustering development, and providing transit options. It creates safe, convenient, attractive, and affordable neighborhoods. Because smart growth

is typically denser, it leaves room for open space, which conserves our natural resources and provides communities with more parks and recreation.

Urban sprawl is the opposite of smart growth. It is the dispersion of a city over rural land and the fringes of the urban land. Sprawl is typically lower density single-family residential units, with a lack of activity centers and a lack of connectedness of the street network. The main differences between smart growth and sprawl are displayed in Table 5. People who live in sprawling communities typically have to drive more miles to get to work, school, and shopping centers. For example, in sprawling Atlanta, vehicles drove an average of 34 miles each day for every person living in the region. In condensed Portland, Oregon, vehicles drive fewer than 24 miles per person per day (Ewing et al. 2007). Another study found that residents of most walkable neighborhoods drive 26 percent fewer miles per day compared with those living in sprawling areas (Ewing et al. 2007).

Table 5: Nature of Smart Growth versus Sprawl

Smart Growth	Sprawl
Medium to high density	Low density
Mixed uses	Single uses
Centered development	Strip development
Interconnected streets	Poorly connected streets
Pedestrian and transit friendly design	Auto-oriented design
Source: Ewing et al. 2007.	

During 1992 and 1997, 1.2 million acres per year, or 7 million acres, of farm and ranch land was lost in the U.S. (AFT 2007). However, during 1982 through 1997, urbanized land grew by 47 percent but the U.S. population only grew by 17 percent (AFT 2007). This would indicate that the U.S. is losing potential farmland to development. The economic benefits of retaining open space, parks, and agriculture can strengthen existing communities, attract businesses, and avoid the costs of sprawl.

The Project is incorporating high- and medium-density residential uses “to support needed infrastructure improvements” (from Edgewater Communities EIR Project description). Additionally, the Project is incorporating pedestrian design and open space. As shown in Table 1 previously, the low density residential occupies the greatest percent of the total acreage at 36 percent. High density residential occupies the least percent of the total acreage at 6 percent. One of the Project objectives is to provide a mix of high quality, low-, medium-, and high-density residential neighborhoods that all have access to the open space and water features of the development and are complemented by private recreational facilities, church/school, and museum/retail uses, but with an emphasis on low-density single-family, large-lot homes. The Project emphasizes “private” recreational activities and low-density single-family, large-lot homes.

The northern boundary of the Project is 0.31 miles away from the Community Core. The center of the Project is 0.69 miles from the boundary of the Community Core. According to The Preserve Final EIR, the Community Core is planned to include an elementary and/or junior high school and learning center. The uses allowed in the Community Core are commercial, retail, office, entertainment, and residential uses. In theory, because the Project is approximately one mile from the Community Core, people could walk or bicycle to the Core, which would reduce trips.

The Project plans to change existing land use designations for the Project site from limited estate residential, open space, and agricultural uses to accommodate a lake-oriented, primarily low-density residential community. This cannot be considered smart growth based on descriptions contained within this Smart Land Use subsection. The Project objective is not seeking to comply with the “Smart Land Use” strategy to reduce California’s greenhouse gas emissions to 1990 levels by 2020.

Compliance with ARB Early Action Measures for AB 32

Under AB 32, the ARB has the primary responsibility to reduce greenhouse gas emissions in California. The ARB published a list of early action measures to reduce greenhouse gases in California (ARB 2007). The ARB anticipates that these early action measures will reduce emissions by 25 percent of the 2020 target. Other measures will follow in the coming years. A review of the ARB’s reduction measures underway or to be initiated by the ARB in the 2007 to 2012 timeframe indicates that only a few measures would be applicable to the Project. Some of the measures are regulatory and some are non-regulatory. Many of the measures have not been considered by the ARB as of yet. Therefore, if the Project voluntarily chooses to be consistent with the strategies, then it would be consistent with the State’s strategies to reduce climate change ahead of schedule.

Cool Communities Program

The Cool Communities Program is anticipated to have an ARB hearing date in the third quarter of 2008. This program is recommended to be a non-regulatory voluntary program with guidelines to foster the establishment or transition to cool communities in California. The Cool Communities Program Guidelines would include the following strategies:

- **Cool Roofs.** Cool roof programs as part of the Building Energy Efficiency standards (Title 24) can save as much as 15 percent of cooling energy use during hot months of the year. The per-house cost premium is estimated at about \$500 (ARB 2007). The Project is in climate zone 11 (CEC 2001). The new 2008 Title 24 requirements require cool roofs on low-rise residential newly constructed buildings (CEC 2007b). Therefore, the Project would comply with this requirement.
- **Cool Pavements.** Cool pavements can reduce the ambient air temperature by 1 degree Fahrenheit, thereby reducing energy cooling demand (ARB 2007). The Project is consistent with this measure through mitigation.

- **Shade Trees and Urban Forest.** Shade trees would reduce potential heat island effects and reduce heating and cooling needs. The Project is consistent with this measure through mitigation.

In summary, the Project, through the implementation of mitigation, will be compliant with the Cool Communities Program.

4.1.4 - Level of Significance before Mitigation

Less than significant.

4.1.5 - Mitigation Measures

Although the impact is less than significant before mitigation, Mitigation Measures GCC-1 through GCC-5 are offered to further reduce impacts.

4.1.6 - Level of Significance after Mitigation

Less than significant.

With the Project design features, mitigation measures in this analysis, and the mitigation measures in the Air Quality Analysis, the Project would comply with most of the applicable state strategies in the 2006 CAT Report and applicable ARB early action AB 32 reduction strategies to reduce greenhouse gases to levels proposed under Executive Order S-3-05. The Project would increase its energy efficiency to levels greater than residences built prior to the use of the 2005 Title 24 standards. However, new communities have an opportunity to create developments where residents can drive less and help to achieve a balanced jobs/housing ratio. Although the Project does contain some high density uses, the Project is not considered smart land use; therefore, the Project objective does not seek to carry out one of the strategies in the 2006 CAT Report and will result in a significant Project-level impact.

In summary, the Project-level analysis indicates that the Project would have a less than significant impact to climate change.

4.2 - Cumulative Level Analysis

Section 15130(b) of the CEQA Guidelines states the following:

The following elements are necessary to an adequate discussion of significant cumulative impacts: Either: (A) A list of past, present, and probable future Projects producing related or cumulative impacts, including, if necessary, those Projects outside the control of the agency, or (B) A summary of Projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or areawide conditions contributing to the cumulative impact.

Even a very large individual project cannot generate enough greenhouse gas emissions to measurably influence climate change. It is a project's incremental contribution combined with the cumulative increase of all other sources of greenhouse gases that together form anthropogenic climate change impacts. However, the theory that an increase of one molecule of an air pollutant constitutes significant increase (one-molecule theory) should not be the basis of a de-facto significance threshold, as discussed in the decision for *Community for a Better Environment v. California Resources Agency* (103 Cal. App. 4th 98 (2002): "this does not mean, however, that any additional effect in a nonattainment area for that effect necessarily creates a significant cumulative impact; the 'one [additional] molecule rule' is not the law."

A cumulative greenhouse gas threshold has not been established by the SCAQMD, ARB, or other public agency. An individual project contributes to cumulative greenhouse gas emissions through construction, increased vehicular travel, and increased energy consumption. Each project can reduce its own greenhouse gas emissions through project-level review and mitigation. However, the cumulative impact of greenhouse gas emissions, and therefore climate change, cannot be mitigated on a piecemeal, case-by-case basis. It is the regional development pattern, land use, and transportation policies that determine the cumulative impact in which a project participates.

Large-scale assessments and emission reduction strategies must be formulated to evenly address greenhouse gas emissions on a regional level that includes land use patterns, energy generation and consumption, transportation, water transport, waste disposal, and the other major sources of greenhouse gas emissions. A region-specific plan would create the basis of a cumulative threshold and provide a platform for cumulative analysis on the project level.

The Project is applying various mitigation measures, design features, and is consistent with most of the applicable State strategies to reduce greenhouse gas emissions; therefore, the Project would result in a less than significant cumulative-level impact.

4.3 - Inventory of Greenhouse Gases and Reduction Options

An active dairy is currently located within the Project site. The operational air emissions associated with the dairy are subtracted from the Project's operational emissions to result in the net increase in operational emissions. It is subtracted from operational emissions because the dairy emissions generally occur all year. Sporadic construction projects potentially associated with the dairy are not included in this analysis to provide a worst-case scenario.

An inventory of construction and operation-related greenhouse gas emissions generated by the Project is presented below. Greenhouse gas reduction options are also explored.

4.3.1 - Existing Inventory

The number of cows associated with the active onsite dairy has fluctuated between 600 and 800 cows. To provide a conservative analysis, it is assumed that the lesser number or 600 cows are onsite. This is conservative because the existing emissions are subtracted from the Project emissions to provide the net emissions. For purposes of this analysis, the following is assumed; 75 percent milk cows, 10 percent dry cows, and 15 percent calves. Sources of greenhouse gas emissions associated with the dairy are as follows:

- Methane and nitrous oxide from manure decomposition;
- Methane generated during digestion in multi-chamber cattle stomachs;
- Equipment exhaust used in dairy operations (i.e., tractors, etc.); and
- On-road vehicle exhaust from dairy-related traffic (feed, milk, and cattle support trucks; dairy worker commuting).

Emissions from equipment and on-road vehicle exhaust were estimated using URBEMIS2007. The other emissions were estimated using a variety of emission factors as identified in the spreadsheets attached. The resulting emissions are shown in Table 6.

Table 6: Existing Emissions

Source	Emissions (MTCO ₂ e per year)	Emissions (MMTCO ₂ e per year)
Dairy cow enteric fermentation and manure management	2,466	0.0025
Equipment exhaust	172	0.0002
Landscape, natural gas	2	<0.0001
On-road vehicle exhaust (summer)	80	0.0001
Total	2,720	0.0028
Source: URBEMIS and spreadsheets contained in Climate Change Analysis Appendix C.		

Methane from Soil

The Phase I Geotechnical Investigation indicated: “given the high organic content and the historical uses of the site, methane gas production will likely be an issue affecting the design of the structures. In this regard, it is highly recommended that the Project environmental consultant perform a methane gas study as soon as possible” (GMU 2004). The concentration of methane on the Project site is currently unknown.

4.3.2 - Project Inventory

Construction

The Project would emit greenhouse gases from the combustion of fuels from worker vehicles and construction equipment. The Project emissions of carbon dioxide from Project construction are shown in Table 7 below. The emissions were estimated using the URBEMIS2007 model as explained in the Air Quality Analysis Report (MBA 2008). Emissions of nitrous oxide and methane are negligible.

The total of all phases of construction would result in 9,414 tons of carbon dioxide emissions (8,541 metric tons of carbon dioxide equivalents [MTCO_{2e}], or 0.009 million metric tons of carbon dioxide equivalent [MMTCO_{2e}]).

Table 7: Construction Exhaust Greenhouse Gas Emissions (Unmitigated)

Phase	Time Period	Carbon Dioxide Emissions (tons)	Emissions (MTCO _{2e})
Phase I			
Demolition	2/2009	26	24
Mass grading	2/2009-6/2009	974	884
Trenching	6/2009-7/2009	30	27
Asphalt	8/2009	69	63
Building	9/2009-12/2009	983	892
Fine grading	9/2009-12/2009	105	95
Building	1/2010-12/2010	2,914	2,644
Fine grading	1/2010-5/2010	127	115
Coating	6/2010-12/2010	20	18
Phase II			
Asphalt	1/2011	49	44
Building	2/2011-12/2011	2,303	2,089
Fine grading	2/2011-5/2011	102	93
Coating	6/2011-12/2011	17	15
Phase III			
Building	1/2015-12/2015	1,537	1,394
Fine grading	1/2015-6/2015	153	139
Coating	7/2015-12/2015	5	5
Total		9,414	8,541
Source: URBEMIS2007 output; Climate Change Analysis Appendix A. Note: MTCO _{2e} = metric tons of carbon dioxide equivalents, which is tons of carbon dioxide multiplied by 0.9072 multiplied by 1 - the global warming potential of carbon dioxide.			

There are also a number of “upstream” emissions from sources such as cement/concrete and steel manufacturing. The quantity of concrete, steel, and other products to be used for construction of the Project is unknown at this time.

Operation

During operation of the Project, greenhouse gas emissions would result from motor vehicles (cars and trucks visiting the Project site), natural gas consumption, indirect emissions from electricity generation, indirect emissions from electricity required to transport water to the Project, landscape, fugitive refrigerants (air conditioning and refrigerator). A summary of the anticipated greenhouse gas emissions from operation of the Project is presented in Table 8. The emissions at buildout are shown. Emissions in the earlier years will be less because not all of the residential units will be constructed and operational.

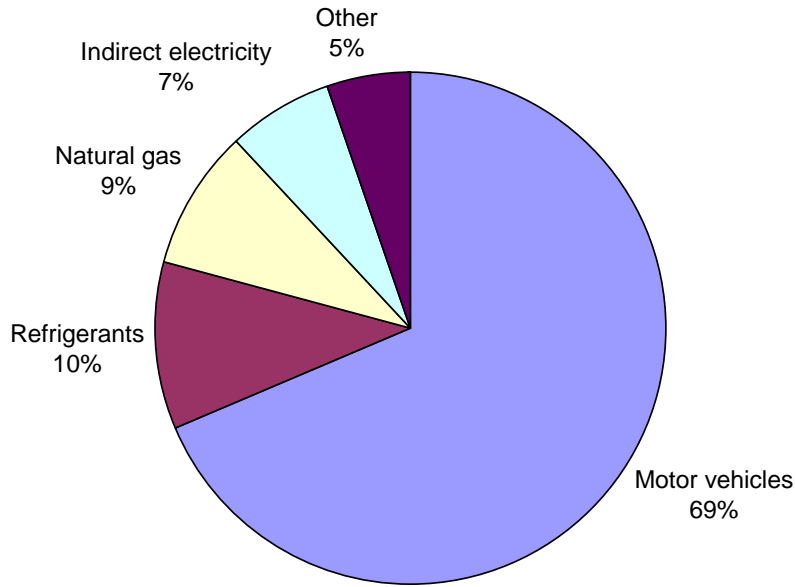
Table 8: Project Operational Greenhouse Gas Emissions at Buildout (Unmitigated)

Source	Emissions (MTCO ₂ e per year)	Emissions (MMTCO ₂ e per year)
Motor vehicles	23,010	0.023
Refrigerants	3,467	0.003
Natural gas	3,008	0.003
Indirect electricity	2,209	0.002
Water transport	1,655	0.002
Hearth	126	<0.001
Landscape	8	<0.001
Subtotal	33,484	0.033
Existing*	-2,720	-0.003
Total	30,764	0.030

Source: URBEMIS2007 output and spreadsheets in Climate Change Analysis Appendix B
* Table 6
MTCO₂e = metric tons of carbon dioxide equivalent
MMTCO₂e = million metric tons of carbon dioxide equivalent, converted from MTCO₂e by dividing by 1,000,000.

Project operational emissions of carbon dioxide equivalents are displayed in Exhibit 6. As shown in Exhibit 6, the major sources of operational greenhouse gases are from motor vehicles, contributing approximately 69 percent of the total carbon dioxide equivalents.

Exhibit 6: Project Operational Greenhouse Gas Emissions at Buildout (Unmitigated)



At buildout, total unmitigated carbon dioxide equivalents would be approximately 30,764 MTCO₂E per year, or 0.03 million metric tons of carbon dioxide equivalents (MMTCO₂e) per year, which is 0.006 percent of California’s 2004 emissions (0.03 MMTCO₂e divided by 500 MMTCO₂e = 0.00006 x 100 = 0.006 percent). The Project inventory is 0.0005 percent of 2005 U.S. emissions (7,260.4 MMTCO₂e) and 0.0002 percent of reported 2004 global emissions (20,135 MMTCO₂e).

Note that emissions models such as URBEMIS evaluate aggregate emissions and do not demonstrate, with respect to a global impact, how much of these emissions are “new” emissions specifically attributable to the Project.

Operational Emission Estimation Assumptions

Carbon dioxide emissions from motor vehicles were generated using URBEMIS2007 as discussed in the Air Quality Analysis Report (MBA 2008); the URBEMIS2007 output is contained in Appendix A of this Climate Change Analysis. Methane and nitrous oxide emissions were estimated using the spreadsheets in this Appendix A.

Carbon dioxide emissions from natural gas combustion were also generated using URBEMIS2007. Nitrous oxide and methane emissions from natural gas consumption were estimated using emission factors as described in the attached spreadsheets.

According to emission factors from the South Coast Air Quality Management Handbook (SCAQMD 1993), the Project would consume an estimated 6,043,589 kilowatt-hours (kWh) of electricity per year after complete buildout.

Refrigerant emissions would be emitted from air conditioning units. It is unknown what air refrigerant would be used in the Project; therefore, it was assumed that they would use a refrigerant with a global warming potential of 1,300.

Other Greenhouse Gas Emissions

The Project does not contribute substantially to water vapor because water vapor concentrations in the upper atmosphere are primarily due to climate feedbacks rather than emissions from Project-related activities.

Ozone is a greenhouse gas; however, unlike other greenhouse gases, ozone in the troposphere is relatively short-lived and therefore is not global in nature. According to the ARB, it is difficult to make an accurate determination of the contribution of ozone precursors (NO_x and VOCs) to global warming (ARB 2004b). Therefore, it is assumed that Project emissions of ozone precursors would not significantly contribute to climate change.

As mentioned previously, there is a ban on chlorofluorocarbons; therefore, the Project would not generate emissions of these greenhouse gases and they are not considered any further in this analysis.

Perfluorocarbons and sulfur hexafluoride are typically used in industrial applications, none of which would be used by the Project. Therefore, it is not anticipated that the Project would emit any of these greenhouse gases.

4.3.3 - Reduction Options

Although not required by statute or regulation, there are voluntary greenhouse gas reduction strategies available for Projects to reduce greenhouse gas emissions. The Chino General Plan includes air quality policies that potentially reduce energy use and vehicle miles traveled. The California Attorney General has commented on other Projects and provided suggestions on ways to reduce overall impacts. These policies and measures are assessed below to determine the applicability and feasibility of such reduction measures.

General Plan Compliance

The City of Chino General Plan does not presently contain greenhouse gas or climate change policies or goals. The City is in the process of updating the General Plan. The air quality goals in the Air Quality Element of the General Plan at present have the potential to reduce indirect emissions from vehicle miles traveled and energy use. Therefore, compliance with the applicable goals would reduce greenhouse gas emissions from the Project.

Review of the Air Quality Element of the General Plan revealed goals that reduce greenhouse gas emissions, as presented in Table 9. Project consistency with the feasible policies is determined. As shown in the table, with mitigation, the Project is consistent with the applicable goals.

Table 9: Consistency with General Plan Air Quality Goals

General Plan Air Quality Element Goal	Project Consistency
Goal G8.1 To achieve coordination of air quality improvement within the portion of the South Coast Air Basin in San Bernardino County and improved air quality through reductions in pollutants from Orange, Riverside and Los Angeles Counties.	Consistent. The Project includes features that are intended to reduce vehicular trips. The Project provides access to transit and would tie into an extensive system of pedestrian/bicycle trails. These options provide a viable alternative to the automobile and promote reduced vehicle usage, which will also promote air quality improvement. During construction, the Project will employ standard mitigation measures, such as dust control measures mandated by the SCAQMD and energy efficient design practices required by Title 24 of the California Code of Regulations.
Goal G8.2 To achieve a diverse and efficient ground transportation system which generates the minimum feasible pollutants.	Consistent. The Project provides a mixture of vehicular and pedestrian/bicycle systems to help reduce dependency on the automobile. The Project includes a system of trails that provide convenient access between residences, services, and recreation.
Goal G8.3 To encourage the minimum feasible emissions from Chino Airport.	Not applicable because the Project does not involve the operation of the airport.
Goal G8.4 To achieve a pattern of land uses which can be efficiently served by a diversified transportation system and development Projects which directly and indirectly generate the minimum feasible air pollutants.	Consistent. The Project is designed in a manner to allow convenient access to transit, pedestrian/bicycle paths, employment, shopping, and recreation. This will help to reduce the need to utilize the automobile and help reduce mobile source air pollutants.
Goal G8.5 Reduce to a minimum particulate emissions from such uses as construction, operation of roads, and buildings.	Consistent. The Project includes mitigation measures that reduce the amount of particulate emissions during construction and operation of the Project.
Goal G8.6 To reduce emissions through reduced energy consumption.	Consistent. The Project includes mitigation measures that promote energy conservation.
Source: City of Chino General Plan, Air Quality Element, 1991, Michael Brandman Associates 2007.	

Attorney General Measure Analysis

The Office of the California Attorney General has distributed voluntary Mitigation Measures and Global Warming Resources (AG 2007). A feasibility analysis of the mitigation measures is presented below. Some of the measures are not applicable to the Project, some are not feasible, and some are feasible. The feasible mitigation measures are included in Section 1.2.

Table 10: Office of the California Attorney General Mitigation Measure Feasibility Analysis

Mitigation Measure	Consistency and Feasibility
Transportation	
Coordinate controlled intersections so that traffic passes more efficiently through congested areas.	Consistent with mitigation measure GCC-4.
Set specific limits on idling time for commercial vehicles, including delivery and construction vehicles.	Not applicable because it is anticipated that there would not be a large quantity of commercial vehicles that would access the Project site.
Promote ride sharing programs e.g., by designating a certain percentage of parking spaces for high-occupancy vehicles, providing larger parking spaces to accommodate vans used for ride-sharing, designating adequate passenger loading and unloading and waiting areas, and providing electronic message board space for coordinating rides.	Not applicable because the Project does not contain commercial uses that would benefit from the suggestions.
Create car-sharing programs. Accommodations for such programs include providing parking spaces for the car-share vehicles at convenient locations accessible by public transportation.	Not applicable because the Project does not contain commercial uses that would benefit from the suggestions.
Create and/or expand existing vehicle buy-back programs to include vehicles with high greenhouse gas emissions.	The measure is not feasible for the Project because the applicant would not be involved in a vehicle buy-back program.
Require clean alternative fuels and electric vehicles.	Consistent with mitigation measure GCC-4 that requires landscape equipment to be electric.
Develop the necessary infrastructure to encourage the use of alternative fuel vehicles (e.g., electric vehicle charging facilities and conveniently located alternative fueling stations).	Not applicable because the Project does not influence the type of fuel that is going to be used by the residents.
Increase the cost of driving and parking private vehicles by imposing tolls, parking fees, and residential parking permit limits.	Not feasible because the imposition of parking fees is not current practice for low-density residential developments.
Develop transportation policies that give funding preference to public transit.	Not applicable because the Project is not developing transportation policies.
Design transportation center where public transportation of various modes intersects.	Not applicable because the objective of the Project is not to create a public transportation center.
Assess transportation impact fees on new development in order to facilitate and increase public transit service.	Mitigation GCC-4 requires that the Project pay transportation impact fees. Such fees typically fund roadway system improvements, but could be evaluated for potential partial use to facilitate and increase public transit service.
Provide shuttle service to public transit.	Not practical as the Project is primarily low-density residential.
Offer public transit incentives.	Not applicable; this measure would be applicable to commercial/industrial development.
Incorporate bicycle lanes into street systems in regional transportation plans, new subdivisions, and large developments.	Consistent through Project design features.

Mitigation Measure	Consistency and Feasibility
Create bicycle lanes and walking paths directed to the location of schools and other logical points of destination and provide adequate bicycle parking. Ensure that non-motorized transportation systems are connected and not interrupted by impassable barriers, such as freeways.	Consistent through Project design features.
Restore and/or expand school bus services. Where possible, use an alternative fuel school bus fleet.	Not applicable to the Project because it is anticipated that the school will be a private school and be part of the church.
Require commercial Projects to include facilities on-site to encourage employees to bicycle or walk to work.	Consistent. The non-residential uses would have bicycle storage and the streets would have bicycle lanes.
Provide public education about public transportation services.	Consistent with mitigation measure GCC-4.
Conduct a public information campaign on all options for individuals to reduce transportation emissions.	It is not feasible for the Project to conduct a public information campaign.
Organize and lead a formal telecommute work program involving public agencies and private businesses. Provide information, training, and incentives to encourage participation. Provide incentives for equipment purchases to allow high-quality teleconferences.	Not feasible for the Project. The technology exists to have personal webcams that would allow teleconferencing at residences.
Energy Efficiency and Renewable Energy	
Require energy efficient design for buildings. This may include strengthening local building codes for new construction and renovation to require a higher level of energy efficiency.	Consistent with mitigation measure GCC-1.
Adopt a "Green Building Program" to promote green building standards.	Not applicable because the Project would not be involved in promoting green building standards. This is applicable to the City directly.
Provide permitting incentives for energy efficient building Projects, e.g., by giving green Projects priority in plan review, processing and field inspection services.	Not feasible for the Project applicant as the City is responsible for reviewing the plan, etc.
Fund and schedule energy efficiency "tune-ups" of existing buildings by checking, repairing, and readjusting heating, ventilation, air conditioning, lighting, hot water equipment, insulation and weatherization. (Facilitating or funding the improvement of energy efficiency in existing buildings could offset in part the global warming impacts of new development.) Offer financial incentives for adoption of identified efficiency measures.	Not applicable to the Project no existing residential units are being retained.
Provide individualized energy management services for large energy users.	Not feasible because this measure is not a Project objective.
Require the use of energy efficient heating and cooling systems, appliances, and office equipment.	Consistent through mitigation measure GCC-1.
Fund incentives and technical assistance for lighting efficiency.	Not feasible because this measure is not a Project objective.

Mitigation Measure	Consistency and Feasibility
Require that Projects use efficient lighting. (Fluorescent lighting uses approximately 75 percent less energy than incandescent lighting to deliver the same amount of light.)	Consistent with mitigation measure GCC-1.
Require the use of Light Emitting Diode (LED) for traffic and street.	Consistent with mitigation measure GCC-4.
Incorporate on-site renewable energy production (through, e.g., participation in the California Energy Commission's New Solar Homes Partnership). Require Project proponents to install solar panels, water reuse systems, and/or other systems to capture energy sources that would otherwise be wasted.	Consistent with mitigation measure GCC-1.
Streamline permitting and provide public information to facilitate accelerated construction of solar and wind power systems, solar and tankless hot water heaters, and energy-efficient heating, ventilation, and air conditioning systems in existing buildings.	Not applicable because the Project will not retain any existing buildings.
Provide innovative financing for energy efficiency and alternative energy Projects. For example, allow property owners to pay for energy efficiency improvements and solar system installation through long-term assessments on individual property tax bills.	This measure would be implemented by the City through its own procedures and is not applicable at the individual Project level.
Fund incentives to encourage the use of energy efficient equipment and vehicles.	Not feasible because this measure is not a Project objective.
Provide public education and publicity about energy efficiency programs and incentives.	Not feasible because this measure is not a Project objective.
Land Use Measures	
Encourage mixed-use, infill, and higher density development to reduce vehicle trips, promote alternatives to individual vehicle travel, and promote efficient delivery of services and goods. Infill development generates fewer vehicle miles traveled per capita and reduced emissions of greenhouse gases, and denser development is associated with increased public transit use. For example, a city or county could promote "smart" development by reducing developer fees or granting property tax credits for qualifying Projects.	Not consistent because the Project is not considered mixed-use, though it does have a small component of museum/retail and church/school.
Discourage development that will increase passenger vehicle miles traveled (VMT). Enact ordinances and programs to limit or prohibit sprawl – development that requires additional or longer passenger vehicle commutes between workplaces and residences.	Not consistent because the Project could be considered “sprawl,” as discussed previously.
Incorporate public transit into Project design.	Not consistent. There is public transit approximately one mile from the center of the Project.
Require measures that take advantage of shade, prevailing winds, landscaping and sun screens to reduce energy use.	Mitigation measure GCC-1 encourages the incorporation of shade trees, which will reduce energy use.

Mitigation Measure	Consistency and Feasibility
Preserve and create open space and parks. Preserve existing trees and require the planting of replacement trees for those removed in construction.	Consistent through Project design features that preserve some open space. There are limited existing trees onsite.
Impose measures to address this “urban heat island” effect by, e.g., requiring light-colored and reflective roofing materials and paint; light-colored roads and parking lots; shade trees in parking lots; and shade trees on the south and west sides of new or renovated buildings. Darker colored roofs, pavement, and lack of trees may cause temperatures in urban environments to increase by as much as 6-8 degrees Fahrenheit as compared to surrounding areas.	Consistent with mitigation measure GCC-1.
Facilitate “brownfield” development. (Brownfields are more likely to be located near existing public transportation and jobs.)	Brownfields are contaminated land. Although a portion of the Project site contains liquid and solid dairy waste, the Project site does not meet the definition of a brownfield.
Require pedestrian-only streets and plazas within developments, and destinations that may be reached conveniently by public transportation, walking, or bicycling.	Not feasible because the Project is not designed to create pedestrian-only streets.
Water Conservation and Efficiency	
Design and implement a comprehensive water conservation strategy. The strategy may include many of the specific items that follow, plus other innovative measures that are appropriate for the location.	Consistent with mitigation measure GCC-3.
Require water efficient landscapes. Adopt a strong landscape ordinance with water budgets to assure efficient landscape design, installation, and maintenance in new construction.	Consistent with mitigation measure GCC-3 as the Project would incorporate drought-resistant plants. However, it is not applicable for the Project to adopt landscape ordinances.
Encourage the use of reclaimed water for landscape irrigation in new developments and on public property. Provide necessary infrastructure to deliver and use reclaimed water.	The Project utilizes recycled water for irrigation of all open space areas within the Project site, including common landscaping along the street rights-of-way, as well as other public spaces and the lakes.
Require water efficient design for buildings. This may include strengthening local building codes for new construction and implementing a program to renovate existing buildings to require a higher level of water efficiency.	Not applicable. This measure is not applicable to the Project.
Adopt a retrofit ordinance that will require installation of water-efficient fixtures upon the sale of homes.	Not applicable to the Project because the Project involves the construction of new homes.
Adopt and enforce restrictions on watering methods (e.g., prohibiting systems that apply water to non-vegetated surfaces) and controls on runoff.	Not feasible for the Project.
Require water efficiency training and certification for irrigation designers, installers, and managers.	Not feasible for the Project.
Provide individualized water audits for large water users to identify conservation opportunities. Offer financial incentives for adoption of identified efficiency measures.	Not applicable. Reclaimed water is already being used for the public open spaces and lakes.

Mitigation Measure	Consistency and Feasibility
Provide water audits for large landscape accounts. Offer financial incentives for efficient irrigation controls and other efficiency measures.	Consistent with mitigation measure GCC-3.
Fund incentives and technical assistance for water efficiency.	It is not feasible for the Project to fund incentives for water efficiency.
Adopt standards that prescribe the maximum allowable effective impervious area.	This measure would need to be adopted by the City according to its normal procedures/ordinances.
Solid Waste Measures	
Require Projects to reuse and recycle construction and demolition waste.	Consistent with mitigation measure GCC-2
Implement or expand city or county-wide recycling and composting programs for residents and businesses.	Consistent with mitigation measure GCC-2. Additionally, the single-family residential units will have recycling and yard waste pickups as part of Project design and City waste procedures.
Increase areas served by recycling programs	Consistent with mitigation measure GCC-2. Additionally, the single-family residential units will have recycling and yard waste pickups as part of the Project design and City waste procedures.
Extend the types of recycling services offered (e.g., to include food and green waste recycling).	The Project is going to have yard waste recycling. Composting is not feasible at this time.
Establish methane recovery in local landfills and wastewater treatment plants to generate electricity.	Not applicable because the Project is not directly involved with the management of local landfills and wastewater treatment plans.
Provide public education about recycling services.	Not feasible for the Project.
Source: California Attorney General's Office 2007, Appendix D.	

Offsite Greenhouse Gas Reduction Options

The Attorney General's Office list of mitigation measures also indicates that a lead agency may consider whether carbon offsets would be appropriate (AG 2007). The Project could fund offsite projects that would reduce carbon emissions or could purchase credits from another entity that would fund such projects. However, there are a number of uncertainties associated with purchasing offsets, including the permanence, price fluctuations, ownership, verification, and additionality.

The permanence of the offsets refers to how long the offset is valid: 1) Are the offsets only good for a year, or are they good as long as the offset project is running? 2) What if the offset is used to purchase land and plant trees? 3) Would the trees be cut or burned down?

Another uncertainty is regarding price fluctuations. The current carbon offset market in the United States varies in price from \$4.50 to \$11 per metric ton. As discussed in Section 3.2, the price in the European market is currently as high as \$30 per metric ton. One of the reasons for the variation in pricing could be because there is a mandatory cap-and-trade system in the European Union. Some indicate "considerable uncertainty exists regarding the long-term outlook for carbon and energy markets, driven by the dynamic and the complex relationships between these markets" (PC 2008). Additionally, it is unknown if the CCX is going to allow for trading beyond the year 2010.

Ownership of the offsets is important, so that the offsets are not re-sold. Registration of the offsets is a method to ensure that the offsets are not sold more than once.

Verification is an important step to make sure the offsets are real. However, there is no universally accepted standard for verification, which has led to various verification methodologies. Many third party verification companies use their own internal methods (that are often proprietary) to verify offsets. This can lead to uncertainty regarding the validity of the offsets.

Additionality refers to additional steps taken to reducing greenhouse gas emissions beyond business as usual. For example, was a solar powered farm going to be constructed anyway, or is the carbon market providing the funding necessary to build it? Determining additionality can be highly speculative and uncertain. There are “additionality tests,” which attempt to determine if an offset project is additional:

- Regulatory Test: Does the project go beyond legal requirements?
- Financial Test: Is the project economically viable without offset revenues?
- Barriers Test: Are there significant non-financial barriers that a project needs to overcome?
- Common Practice Test: Does the project go beyond common business practice?
- Timing Test: Was the project started after a certain date? (CC 2006.)

There is also some uncertainty associated with the benefits realized by carbon offsets, or the quantification of the offsets. Similarly, there is uncertainty associated with the quantification of the emissions that are to be offset.

A recent investigation into the carbon offset market yielded the following results:

- Widespread instances of people and organizations buying worthless credits that do not yield any reductions in carbon emissions.
- Industrial companies profiting from doing very little—or from gaining carbon credits on the basis of efficiency gains from which they have already benefited substantially.
- Brokers providing services of questionable or no value.
- Questionable verification, making it difficult for buyers to assess the true value of carbon credits.
- Companies and individuals being over charged for the private purchase of European Union carbon permits that have plummeted in value because they do not result in emissions cuts. (FT 2007.)

Another source that documents the concerns about the offset market is AB 1851, a bill introduced on January 29, 2008, by Assembly Member Nava. AB 1851 has not passed and still has to go through the legislative process. As it is currently written, AB 1851 would, “...express legislative intent to create a process for ensuring that voluntary greenhouse gas emissions offsets sold in California meet clear and consistent standards, and assist local governments and others in the state in generating and

marking qualifying project for the voluntary offsets market.” AB 1851 also states that, “...concerns have been raised about instances of potential fraud or misrepresentation in the voluntary offset market, which is difficult to address in the absence of clear standards for retail offsets.” It is unknown if the legislature will pass this bill.

The Washington Post reported that offsets purchased by the U.S. House through CCX might not have met the additionality test (WP 2008). For example, some of the funds went to the North Dakota Farmers Union to pay farmers for “no-till” farming. This practice increases the amount of carbon dioxide trapped in the soil compared with farming that uses conventional plows. Reportedly, some farmers were already utilizing no-till farming because the practice saves fuel.

Also, AB 32 requires the State of California to reduce its greenhouse gas emissions. It is unclear if offsets purchased through the CCX or another exchange would reduce emissions in California.

There are a number of opportunities to offset greenhouse gas emissions. However, there are also serious uncertainties and criticisms associated with the current offset market. It is not recommended that the Project offset its contribution to construction and operational emissions because of the uncertainty of the carbon offset market.

As discussed in Section 3.2, in the near future the ARB may instigate a cap-and-trade program for emissions associated with electricity generation and natural gas distribution. If that occurs, the prices for those commodities would likely increase. The cap-and-trade system for those emissions would likely lead to either improvements in the methods for electricity generation and natural gas distribution, or the purchase of offsets.

It is not feasible to offset the “upstream” emissions, which includes emissions from cement manufacturing, because the Project is not responsible for the methodologies used in the cement manufacturing and, therefore, does not have the opportunity to reduce those emissions. Additionally, the quantification of emissions from the cement manufacturing is a rough estimate and does not take into account site-specific activities or emission factors.

In view of AB 32’s assignment of dealing with greenhouse gas emissions to the ARB, there is a substantial legal question (which is beyond the scope of this analysis) whether the City has the authority to impose conditions—such as the purchase of carbon offsets—to mitigate direct and indirect emissions.

In summary, it is currently not feasible to purchase carbon offsets to reduce Project emissions.

4.3.4 - Inventory after Mitigation

Construction

Construction related mitigation measures (see Section 2.2) would reduce emissions of carbon dioxide during construction from worker trips and the construction equipment by at least five percent, bringing the total to 8,114 MTCO₂e.

Operation

Mitigation measures contained in the Air Quality Analysis (see Section 2.2), Project design features (see Section 2.1.8), and the climate change mitigation measures contained in Section 1.2 would reduce greenhouse gases by at least the following percentages.

- The community core is approximately 0.31 miles from the northern boundary of the Project site and 0.69 miles from the center of the Project site. The default mitigation reduction in URBEMIS2007 for the inclusion of retail uses near the Project site of a 2 percent reduction is only allowable if the retail is 0.5 miles from the center of the Project site. Therefore, the Project cannot be assigned this reduction.
- Bicycle and pedestrian friendly features would reduce motor vehicle emissions by 0.5 percent.
- The electricity demand for the Project was based on the 1993 SCAQMD handbook, which does not take into account the updated Title 24 standards. Therefore, the inclusion of 2008 Title 24 standards as stated in mitigation measure GCC-1 would result in at least a 40 percent decrease in electricity demand and a 20 percent decrease in natural gas usage (CEC 2007b).
- Incorporation of solar panels to provide 500,000 kWh per year would reduce indirect emissions of greenhouse gases by 182 MTCO₂e per year.
- The incorporation of onsite trees would offset the Project's carbon contribution. A Tree Benefit Estimator (SM 2007) indicated that trees have varying carbon sequestration depending on the age. A one year old tree would sequester 0.003 tons of carbon dioxide per year, a 5-year-old tree would sequester 0.02 tons of carbon dioxide per year, and a mature tree would sequester 0.161 tons of carbon dioxide per year. It is assumed that all the low-density residential units would have two trees onsite due to mitigation measure GCC-1. Therefore, the trees associated with the low-density residential units would equal 1,074 (2 x 537 du). Additionally, the medium and high density residential as well as the open space recreational areas would have at least one tree per acre. As shown in Table 1, there is approximately 116 acres of those uses, which would equal 116 trees. Therefore, there would be at least 1,190 trees (1,074 plus 116), rounded up to 1,200 trees, yielding a carbon dioxide reduction of 193 tons, or 174 metric tons per year.
- Mitigation measure GCC-5 would require additional trees to be planted within the State of California, which is reflected as "offsite trees" in Table 11 below.
- The reduction of water use through mitigation and Project design features could reduce water use by more than 5 percent. Landscaping uses approximately 30 percent of total water use in the United States (EPA 2002). In California, where it is much drier than average, the uses are

even higher. Therefore, a 5 percent reduction is conservative and the savings may be even more.

Project operational greenhouse gas emissions with mitigation reductions incorporated are shown in Table 11. The mitigation results in at least a five percent collective reduction of operational greenhouse gases at buildout.

Table 11: Project Operational Greenhouse Gas Emissions (Mitigated)

Source	Emissions (MTCO ₂ e)	Emissions (MMTCO ₂ e)
Motor vehicles	22,895	0.0229
Refrigerants	3,467	0.0035
Natural gas	2,407	0.0024
Indirect electricity	1,325	0.0013
Water transport	1,572	0.0016
Hearth	1	0.0000
Landscape	8	0.0000
Solar panels	-182	-0.0002
Onsite trees	-175	-0.0002
Offsite trees	-73	-0.0001
Subtotal	31,245	0.0312
Existing	-2,720	-0.0030
Total	28,525	0.0282
Source: See Appendix B of Climate Change Analysis MTCO ₂ e = metric tons of carbon dioxide equivalent MMTCO ₂ e = million metric tons of carbon dioxide equivalent, converted from MTCO ₂ e by dividing by 1,000,000.		

4.4 - Climate Change Impacts on the Project

AB 32 indicates that “the potential effects of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snow pack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidence of infections, disease, asthma, and other health-related problems” (AB 32, section 38501(a)).

The California Climate Change Center (CCCC 2006) published a report that assesses the risks of climate change to California. The following is a summary of the potential risks to California from that report:

- A reduction in the Sierra snow pack could result a reduction in hydropower, which comprises about 15 percent of California’s in-state electricity production.

- A reduction in the Sierra snow pack could result in a loss of winter recreation from insufficient snow for skiing and snowboarding.
- A decrease in water supply could also negatively impact the food supply that depends on that water for use.
- Climate change could also increase temperatures, leading to decreased supply of certain agricultural products such as wine, fruit, nuts, and milk. California farmers may also have to face increasing threats from pests and pathogens.
- Climate change could also result in increasing wildfires. If temperatures rise into the medium range, the risk of fires in California could increase as much as 55 percent.
- Climate change could result in plant and animal species relocating to cooler more habitable “up slope” locations.
- Climate change could negatively affect the health and productivity of California’s forests. The productivity of mixed conifer forests is expected to diminish as much as 18 percent by the end of the century.
- A rise in sea levels could result in increased coastal floods and shrinking beaches.

Analysis of Potential Impacts

The following is an analysis of the potential of climate change to impact the Project:

- Air quality problems could increase due to increased use of electricity to cool, which may result in increased indirect emissions. The Project would not significantly be impacted by this effect as mitigation and Project design features increase energy efficiency of the Project.
- Although it is not anticipated that the Project would directly obtain its water from the Sierra snow pack but from underground wells, the Project attempts to incorporate all feasible water efficiency measures thereby reducing the use of water.
- The elevation of the Project site ranges from approximately 508 to 579 feet above mean sea level, which would likely not be threatened by rising sea waters.
- The Chino Valley Independent Fire District indicated that Project site is in the vicinity of a “wildland-interface area” (personal communication 2007). There are no significant wildland fire impacts anticipated for the Project, however.

In summary, climate change impacts to the Project are anticipated to be less than significant.

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Appendix A: URBEMIS 2007 Model Output - Project Construction

Detail Report for Annual Construction Unmitigated Emissions (Tons/Year)

File Name: S:\Client\0576 City of Chino\0031 Edgewater\Air Quality\URBEMIS\Edgewater Construction Phase I and Grading.urb924

Project Name: Edgewater Unmitigated Construction

Project Location: South Coast AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

	<u>CO2</u>
2009	2,186.67
Demolition 02/01/2009-02/15/2009	26.14
Fugitive Dust	0.00
Demo Off Road Diesel	20.66
Demo On Road Diesel	4.42
Demo Worker Trips	1.07
Mass Grading 02/16/2009-06/17/2009	973.90
Mass Grading Dust	0.00
Mass Grading Off Road Diesel	724.41
Mass Grading On Road Diesel	211.92
Mass Grading Worker Trips	37.57
Trenching 06/18/2009-07/31/2009	30.17
Trenching Off Road Diesel	27.43
Trenching Worker Trips	2.73

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Asphalt 08/01/2009-08/31/2009	69.08
Paving Off-Gas	0.00
Paving Off Road Diesel	24.37
Paving On Road Diesel	41.12
Paving Worker Trips	3.59
Building 09/01/2009-12/31/2010	982.79
Building Off Road Diesel	168.57
Building Vendor Trips	178.89
Building Worker Trips	635.33
Fine Grading 09/01/2009-05/31/2010	104.59
Fine Grading Dust	0.00
Fine Grading Off Road Diesel	97.08
Fine Grading On Road Diesel	0.00
Fine Grading Worker Trips	7.51
2010	3,061.46
Building 09/01/2009-12/31/2010	2,914.38
Building Off Road Diesel	499.97
Building Vendor Trips	530.58
Building Worker Trips	1,883.82
Fine Grading 09/01/2009-05/31/2010	127.17
Fine Grading Dust	0.00
Fine Grading Off Road Diesel	118.04
Fine Grading On Road Diesel	0.00
Fine Grading Worker Trips	9.13
Coating 06/01/2010-12/31/2010	19.91
Architectural Coating	0.00
Coating Worker Trips	19.91

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Phase Assumptions

Phase: Demolition 2/1/2009 - 2/15/2009 - Demolition of Houses and Barns

Building Volume Total (cubic feet): 148800

Building Volume Daily (cubic feet): 15000

On Road Truck Travel (VMT): 208.33

Off-Road Equipment:

3 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

Phase: Fine Grading 9/1/2009 - 5/31/2010 - Type Your Description Here

Total Acres Disturbed: 100.21

Maximum Daily Acreage Disturbed: 10

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 2/16/2009 - 6/17/2009 - Mass Grading

Total Acres Disturbed: 273

Maximum Daily Acreage Disturbed: 70

Fugitive Dust Level of Detail: Medium

Onsite Scraper Use: 54 hr/day; Offsite Haulage: 0 hrs/day

On Road Truck Travel (VMT): 1136.36

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

9 Scrapers (313 hp) operating at a 0.72 load factor for 6 hours per day

6 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

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Phase: Trenching 6/18/2009 - 7/31/2009 - Default Trenching Description

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 0 hours per day

Phase: Paving 8/1/2009 - 8/31/2009 - Default Paving Description

Acres to be Paved: 40

Off-Road Equipment:

2 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

3 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day

3 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 9/1/2009 - 12/31/2010 - Phase I Building

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day

4 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

5 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

5 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 6/1/2010 - 12/31/2010 - Phase I Coating

Rule: Residential Interior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 100

Rule: Residential Interior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 50

Rule: Residential Exterior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 100

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Detail Report for Annual Construction Unmitigated Emissions (Tons/Year)

File Name: S:\Client\0576 City of Chino\0031 Edgewater\Air Quality\Edgewater Construction Phase II.urb9

Project Name: Edgewater Unmitigated Construction

Project Location: South Coast AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

	<u>CO2</u>
2011	2,470.91
Asphalt 01/01/2011-01/31/2011	48.51
Paving Off-Gas	0.00
Paving Off Road Diesel	24.37
Paving On Road Diesel	20.56
Paving Worker Trips	3.58
Building 02/01/2011-12/31/2011	2,303.10
Building Off Road Diesel	457.83
Building Vendor Trips	307.08
Building Worker Trips	1,538.19
Fine Grading 02/01/2011-05/31/2011	102.21
Fine Grading Dust	0.00
Fine Grading Off Road Diesel	94.87
Fine Grading On Road Diesel	0.00
Fine Grading Worker Trips	7.34
Coating 06/01/2011-12/31/2011	17.08
Architectural Coating	0.00
Coating Worker Trips	17.08

Phase Assumptions

Phase: Fine Grading 2/1/2011 - 5/31/2011 - Phase II Fine Grading

Total Acres Disturbed: 100.21

Maximum Daily Acreage Disturbed: 5

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 1/1/2011 - 1/31/2011 - Phase II Paving

Acres to be Paved: 20

Off-Road Equipment:

2 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

3 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day

3 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 2/1/2011 - 12/31/2011 - Phase II Building

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day

4 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

5 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

5 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 6/1/2011 - 12/31/2011 - Phase II Coating

Rule: Residential Interior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 100

Rule: Residential Interior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 50

Rule: Residential Exterior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 100

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

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Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Detail Report for Annual Construction Unmitigated Emissions (Tons/Year)

File Name: S:\Client\0576 City of Chino\0031 Edgewater\Air Quality\Edgewater Construction Phase III.urb9

Project Name: Edgewater Construction Phase III

Project Location: South Coast AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

	<u>CO2</u>
2015	1,695.83
Building 01/01/2015-12/31/2015	1,537.12
Building Off Road Diesel	499.97
Building Vendor Trips	90.66
Building Worker Trips	946.50
Fine Grading 01/01/2015-06/30/2015	153.32
Fine Grading Dust	0.00
Fine Grading Off Road Diesel	142.31
Fine Grading On Road Diesel	0.00
Fine Grading Worker Trips	11.00
Coating 07/01/2015-12/31/2015	5.39
Architectural Coating	0.00
Coating Worker Trips	5.39

Phase Assumptions

Phase: Fine Grading 1/1/2015 - 6/30/2015 - Phase III Fine Grading

Total Acres Disturbed: 100.21

Maximum Daily Acreage Disturbed: 5

Fugitive Dust Level of Detail: Default

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20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

- 1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day
- 1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day
- 1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day
- 1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Building Construction 1/1/2015 - 12/31/2015 - Phase III Building

Off-Road Equipment:

- 1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
- 4 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
- 5 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day
- 3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
- 5 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 7/1/2015 - 12/31/2015 - Phase III Coating

Rule: Residential Interior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 100

Rule: Residential Interior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 50

Rule: Residential Exterior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 100

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Appendix B: Emissions Spreadsheets and URBEMIS2007 Output - Project Operation

Summary of Operational Greenhouse Gases

Unmitigated

Edgewater Communities

Prepared by Michael Brandman Associates

Buildout Year 2019

Source	Carbon Dioxide	Nitrous Oxide	Methane	Hydro- fluorocarbons	Units	Metric Tons CO ₂ e	MMTCO ₂ e
Motor vehicles	24,177	3.36	6.92		tons per year	23010	0.023
Refrigerants				2.96	tons per year	3467	0.003
Natural gas	3,306	0.01	0.38		tons per year	3008	0.003
Indirect electricity	2,431	0.01	0.02		tons per year	2209	0.002
Water transport	1,821	0.01	0.02		tons per year	1655	0.002
Hearth	139				tons per year	126	0.000
Landscape	9				tons per year	8	0.000
Total	31,884	3.39	7.33	2.96	tons per year	33484	0.033
Total	28,925	3.07	6.65	2.67	metric tons per year		
GWP	1	310	21				
Total	28,925	953	140	3,467	MTCO ₂ E per year		
Total	0.0289	0.0010	0.0001	0.0035	MMTCO ₂ E per year		

Total - all gases
33,484 MTCO₂E per year
0.0335 MMTCO₂E per year

California emissions in 2004
Project percent of emissions 500 MMTCO₂ Eq. per year
0.006697%

U.S. emissions in 2005
Project percent of emissions 7,260.4
0.0005%

Global emissions in 2004
Project percent of emissions 20135
0.0002%

Emissions converted from tons per year to metric tons of carbon dioxide equivalents (MTCO₂E) per year by using the formula: (tons of gas) x (global warming potential) x (0.9072 metric tons)

Emissions converted to million metric tons of carbon dioxide equivalents (MMTCO₂E) using the formula: MMTCO₂E = (metric tons of gas) / (1,000,000).

Summary of Operational Greenhouse Gases

Mitigated

Edgewater Communities

Prepared by Michael Brandman Associates

Buildout Year 2019

Source	<i>Unmitigated</i>	Mitigation Reduction %	<i>Mitigated</i>	
	Metric Tons CO2e		Metric Tons CO2e	MMTCO2e
Motor vehicles	23010	0.5%	22895	0.0229
Refrigerants	3467		3467	0.0035
Natural gas	3008	20%	2407	0.0024
Indirect electricity	2209	40%	1325	0.0013
Water transport	1655	5%	1572	0.0016
Hearth	126	99%	1	0.0000
Landscape	8		8	0.0000
		Solar panels	-182	-0.0002
		Onsite trees 1200	-175	-0.0002
		Offsite trees 500	-73	-0.0001
Total	33484		31246	0.0312
Reduction	2238			
Percent reduction	7%			

Vehicle Miles Traveled 132,334

Starting Emissions	0.94 lbs/day	0.0005 tons/day	0.17 tons/year
Running Emissions	36.97 lbs/day	0.0185 tons/day	6.75 tons/year
Total	37.91 lbs/day	0.0190 tons/day	6.92 tons/year

Vehicle Percentages

Vehicle Type	Percent	Non-Catalyst	Catalyst	Diesel
Light Auto	54.7%	1.1%	98.7%	0.2%
Light Truck < 3,750 lbs	15.2%	2.0%	96.0%	2.0%
Light Truck 3,751- 5,750	16.2%	1.2%	98.1%	0.7%
Med Truck 5,751- 8,500	7.3%	1.4%	95.9%	2.7%
Lite-Heavy 8,501-10,000	1.1%	0.0%	81.8%	18.2%
Lite-Heavy 10,001-14,000	0.3%	0.0%	66.7%	33.3%
Med-Heavy 14,001-33,000	1.0%	0.0%	20.0%	80.0%
Heavy-Heavy 33,001-60,000	0.9%	0.0%	11.1%	88.9%
Line Haul > 60,000 lbs	0.0%	0.0%	0.0%	100.0%
Urban Bus	0.2%	0.0%	50.0%	50.0%
Motorcycle	1.6%	68.8%	31.2%	0.0%
School Bus	0.1%	0.0%	0.0%	100.0%
Motor Home	1.4%	7.1%	85.7%	7.2%

Running Emission Factors (g/mile)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.1931	0.1127	0.0161
Light Truck < 3,750 lbs	LDT1	0.2253	0.1448	0.0161
Light Truck 3,751- 5,750	LDT2	0.2253	0.1448	0.0161
Med Truck 5,751- 8,500	MDV	0.2253	0.1448	0.0161
Lite-Heavy 8,501-10,000	LHDT1	0.2012	0.1448	0.0805
Lite-Heavy 10,001-14,000	LHDT2	0.2012	0.1448	0.0805
Med-Heavy 14,001-33,000	MHDT	0.2012	0.1448	0.0805
Heavy-Heavy 33,001-60,000	HHDT	0.2012	0.1448	0.0805
Line Haul > 60,000 lbs	LHV	0.2012	0.1448	0.0805
Urban Bus	UB	0.2012	0.1448	0.0805
Motorcycle	MCY	0.2092	0.2092	0.2092
School Bus	SBUS	0.2012	0.1448	0.0805
Motor Home	MH	0.2012	0.1448	0.0805

Running Emissions (pounds per day)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Light Auto	0.34	17.71	0.01
Light Truck < 3,750 lbs	0.20	6.15	0.01
Light Truck 3,751- 5,750	0.13	6.70	0.01
Med Truck 5,751- 8,500	0.07	2.95	0.01
Lite-Heavy 8,501-10,000	0.00	0.38	0.05
Lite-Heavy 10,001-14,000	0.00	0.08	0.02
Med-Heavy 14,001-33,000	0.00	0.08	0.19
Heavy-Heavy 33,001-60,000	0.00	0.04	0.19
Line Haul > 60,000 lbs	0.00	0.00	0.00
Urban Bus	0.00	0.04	0.02
Motorcycle	0.67	0.30	0.00
School Bus	0.00	0.00	0.02
Motor Home	0.06	0.51	0.02
Total	1.46	34.96	0.55

Mobile Emissions - Methane

Edgewater Communities
 Prepared by Michael Brandman Associates
 Buildout Year 2019

Total Trips 8736

Starting Emission Factors (g/start)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.059	0.009	-0.003
Light Truck < 3,750 lbs	LDT1	0.067	0.099	-0.004
Light Truck 3,751- 5,750	LDT2	0.067	0.099	-0.004
Med Truck 5,751- 8,500	MDV	0.067	0.099	-0.004
Lite-Heavy 8,501-10,000	LHDT1	0.147	0.215	-0.004
Lite-Heavy 10,001-14,000	LHDT2	0.147	0.215	-0.004
Med-Heavy 14,001-33,000	MHDT	0.147	0.215	-0.004
Heavy-Heavy 33,001-60,000	HHDT	0.147	0.215	-0.004
Line Haul > 60,000 lbs	LHV	0.147	0.215	-0.004
Urban Bus	UB	0.147	0.215	-0.004
Motorcycle	MCY	0.024	0.024	0.033
School Bus	SBUS	0.147	0.215	-0.004
Motor Home	MH	0.147	0.215	-0.004

Trip Distribution

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	52.6	4716.5	9.6
Light Truck < 3,750 lbs	LDT1	26.6	1274.8	26.6
Light Truck 3,751- 5,750	LDT2	17.0	1388.3	9.9
Med Truck 5,751- 8,500	MDV	8.9	611.6	17.2
Lite-Heavy 8,501-10,000	LHDT1	0.0	78.6	17.5
Lite-Heavy 10,001-14,000	LHDT2	0.0	17.5	8.7
Med-Heavy 14,001-33,000	MHDT	0.0	17.5	69.9
Heavy-Heavy 33,001-60,000	HHDT	0.0	8.7	69.9
Line Haul > 60,000 lbs	LHV	0.0	0.0	0.0
Urban Bus	UB	0.0	8.7	8.7
Motorcycle	MCY	96.2	43.6	0.0
School Bus	SBUS	0.0	0.0	8.7
Motor Home	MH	8.7	104.8	8.8
Total		209.9	8270.6	255.5

Starting Emissions (pounds per day)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.0068	0.0934	-0.0001
Light Truck < 3,750 lbs	LDT1	0.0039	0.2776	-0.0002
Light Truck 3,751- 5,750	LDT2	0.0025	0.3024	-0.0001
Med Truck 5,751- 8,500	MDV	0.0013	0.1332	-0.0002
Lite-Heavy 8,501-10,000	LHDT1	0.0000	0.0372	-0.0002
Lite-Heavy 10,001-14,000	LHDT2	0.0000	0.0083	-0.0001
Med-Heavy 14,001-33,000	MHDT	0.0000	0.0083	-0.0006
Heavy-Heavy 33,001-60,000	HHDT	0.0000	0.0041	-0.0006
Line Haul > 60,000 lbs	LHV	0.0000	0.0000	0.0000
Urban Bus	UB	0.0000	0.0041	-0.0001
Motorcycle	MCY	0.0051	0.0023	0.0000
School Bus	SBUS	0.0000	0.0000	-0.0001
Motor Home	MH	0.0028	0.0496	-0.0001
Total		0.0224	0.9205	-0.0022

- Source of running emission factors: U.S. Environmental Protection Agency. Climate Leaders Greenhouse Gas Inventory Protocol, Core Module Guidance. Direct Emissions from Mobile Combustion Sources. October 2004.

- Source of vehicle percentages: URBEMIS2002 default values.

- Source of starting emissions: U.S. Environmental Protection Agency. Prepared by ICF Consulting. EPA420-P-04-016. Update of Methane and Nitrous Oxide Emission Factors for On-Highway Vehicles. November 2004.

Vehicle Miles Traveled 132,334

Starting Emissions	1.53 lbs/day	0.0008 tons/day	0.28 tons/year
Running Emissions	16.89 lbs/day	0.0084 tons/day	3.08 tons/year
Total	18.42 lbs/day	0.0092 tons/day	3.36 tons/year

Vehicle Percentages

Vehicle Type	Percent	Non-Catalyst	Catalyst	Diesel
Light Auto	54.7%	1.1%	98.7%	0.2%
Light Truck < 3,750 lbs	15.2%	2.0%	96.0%	2.0%
Light Truck 3,751- 5,750	16.2%	1.2%	98.1%	0.7%
Med Truck 5,751- 8,500	7.3%	1.4%	95.9%	2.7%
Lite-Heavy 8,501-10,000	1.1%	0.0%	81.8%	18.2%
Lite-Heavy 10,001-14,000	0.3%	0.0%	66.7%	33.3%
Med-Heavy 14,001-33,000	1.0%	0.0%	20.0%	80.0%
Heavy-Heavy 33,001-60,000	0.9%	0.0%	11.1%	88.9%
Line Haul > 60,000 lbs	0.0%	0.0%	0.0%	100.0%
Urban Bus	0.2%	0.0%	50.0%	50.0%
Motorcycle	1.6%	68.8%	31.2%	0.0%
School Bus	0.1%	0.0%	0.0%	100.0%
Motor Home	1.4%	7.1%	85.7%	7.2%

Running Emission Factors (g/mile)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.0166	0.0518	0.0161
Light Truck < 3,750 lbs	LDT1	0.0208	0.0649	0.0322
Light Truck 3,751- 5,750	LDT2	0.0208	0.0649	0.0322
Med Truck 5,751- 8,500	MDV	0.0208	0.0649	0.0322
Lite-Heavy 8,501-10,000	LHDT1	0.0480	0.1499	0.0483
Lite-Heavy 10,001-14,000	LHDT2	0.0480	0.1499	0.0483
Med-Heavy 14,001-33,000	MHDT	0.0480	0.1499	0.0483
Heavy-Heavy 33,001-60,000	HHDT	0.0480	0.1499	0.0483
Line Haul > 60,000 lbs	LHV	0.0480	0.1499	0.0483
Urban Bus	UB	0.0480	0.1499	0.0483
Motorcycle	MCY	0.0073	0.0073	0.0073
School Bus	SBUS	0.0480	0.1499	0.0483
Motor Home	MH	0.0480	0.1499	0.0483

Running Emissions (pounds per day)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Light Auto	0.03	8.14	0.01
Light Truck < 3,750 lbs	0.02	2.76	0.03
Light Truck 3,751- 5,750	0.01	3.00	0.01
Med Truck 5,751- 8,500	0.01	1.32	0.02
Lite-Heavy 8,501-10,000	0.00	0.39	0.03
Lite-Heavy 10,001-14,000	0.00	0.09	0.01
Med-Heavy 14,001-33,000	0.00	0.09	0.11
Heavy-Heavy 33,001-60,000	0.00	0.04	0.11
Line Haul > 60,000 lbs	0.00	0.00	0.00
Urban Bus	0.00	0.04	0.01
Motorcycle	0.02	0.01	0.00
School Bus	0.00	0.00	0.01
Motor Home	0.01	0.52	0.01
Total	0.10	16.41	0.37

Mobile Emissions - Nitrous Oxide

Edgewater Communities

Prepared by Michael Brandman Associates

Buildout Year 2019

Total Trips

8736

Starting Emission Factors (g/start)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.028	0.072	0.000
Light Truck < 3,750 lbs	LDT1	0.032	0.093	-0.001
Light Truck 3,751- 5,750	LDT2	0.032	0.093	-0.001
Med Truck 5,751- 8,500	MDV	0.032	0.093	-0.001
Lite-Heavy 8,501-10,000	LHDT1	0.070	0.194	-0.002
Lite-Heavy 10,001-14,000	LHDT2	0.070	0.194	-0.002
Med-Heavy 14,001-33,000	MHDT	0.070	0.194	-0.002
Heavy-Heavy 33,001-60,000	HHDT	0.070	0.194	-0.002
Line Haul > 60,000 lbs	LHV	0.070	0.194	-0.002
Urban Bus	UB	0.070	0.194	-0.002
Motorcycle	MCY	0.012	0.012	0.012
School Bus	SBUS	0.070	0.194	-0.002
Motor Home	MH	0.070	0.194	-0.002

Trip Distribution

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	52.6	4716.5	9.6
Light Truck < 3,750 lbs	LDT1	26.6	1274.8	26.6
Light Truck 3,751- 5,750	LDT2	17.0	1388.3	9.9
Med Truck 5,751- 8,500	MDV	8.9	611.6	17.2
Lite-Heavy 8,501-10,000	LHDT1	0.0	78.6	17.5
Lite-Heavy 10,001-14,000	LHDT2	0.0	17.5	8.7
Med-Heavy 14,001-33,000	MHDT	0.0	17.5	69.9
Heavy-Heavy 33,001-60,000	HHDT	0.0	8.7	69.9
Line Haul > 60,000 lbs	LHV	0.0	0.0	0.0
Urban Bus	UB	0.0	8.7	8.7
Motorcycle	MCY	96.2	43.6	0.0
School Bus	SBUS	0.0	0.0	8.7
Motor Home	MH	8.7	104.8	8.8
Total		209.9	8270.6	255.5

Starting Emissions (pounds per day)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.0032	0.7471	0.0000
Light Truck < 3,750 lbs	LDT1	0.0019	0.2608	-0.0001
Light Truck 3,751- 5,750	LDT2	0.0012	0.2841	0.0000
Med Truck 5,751- 8,500	MDV	0.0006	0.1251	0.0000
Lite-Heavy 8,501-10,000	LHDT1	0.0000	0.0335	-0.0001
Lite-Heavy 10,001-14,000	LHDT2	0.0000	0.0075	0.0000
Med-Heavy 14,001-33,000	MHDT	0.0000	0.0075	-0.0003
Heavy-Heavy 33,001-60,000	HHDT	0.0000	0.0037	-0.0003
Line Haul > 60,000 lbs	LHV	0.0000	0.0000	0.0000
Urban Bus	UB	0.0000	0.0037	0.0000
Motorcycle	MCY	0.0025	0.0012	0.0000
School Bus	SBUS	0.0000	0.0000	0.0000
Motor Home	MH	0.0013	0.0447	0.0000
Total		0.0108	1.5189	-0.0010

- Source of running emission factors: U.S. Environmental Protection Agency. Climate Leaders Greenhouse Gas Inventory Protocol, Core Module Guidance. Direct Emissions from Mobile Combustion Sources. October 2004.

- Source of vehicle percentages: URBEMIS2002 default values.

- Source of starting emissions: U.S. Environmental Protection Agency. Prepared by ICF Consulting. EPA420-P-04-016. Update of Methane and Nitrous Oxide Emission Factors for On-Highway Vehicles. November 2004.

Electricity - Indirect Emissions

Project: Edgewater Communities
 Prepared by: Michael Brandman Associates
 Prepared on: 12/16/2007

Other uses electricity use 728 KWh/year (13.63 kWh/ft2, all commercial)
 Residential Electricity Use 6,042,861 KWh/year
 Total Electricity Use 6044 MWh/year

Greenhouse Gas	Emission Factor		
	(pounds per MWh/year)	Emissions (pounds/year)	Emissions (tons/year)
Carbon dioxide	804.54	4,862,309	2,431
Methane	0.0067	40	0.020
Nitrous oxide	0.0037	22	0.011

Emission factor source:

California Climate Action Registry. General Reporting Protocol. Reporting Entity-Wide Greenhouse Gas Emissions. Version 2.2, March 2007. www.climateregistry.org

Residential electricity usage rate: 5626.50 kwh/unit/year, from South Coast Air Quality Management 1993 CEQA Handbook, Table 9-11-A

Table E-1 from California Energy Commission. California Commercial End-Use Survey. Consultant Report. March 2006. CEC-400-2006-005

Table E-1: Overview of Energy Usage in the Statewide Service Area

Building Type	Floor Stock (kft ²)	Annual Energy Intensities			Total Annual Usage	
		Electricity (kWh/ft ²)	Natural Gas (therm/ft ²)	Natural Gas (kBtu/ft ²)	Electricity (GWh)	Natural Gas (Mtherms)
All Commercial	4,920,114	13.63	0.26	25.99	67077	1278.60
Small Office (<=30k ft ²)	361,584	13.10	0.11	10.54	4738	38.10
Large Office (>=30k ft ²)	660,429	17.70	0.22	21.93	11691	144.80
Restaurant	148,892	40.20	2.10	209.98	5986	312.60
Retail	702,053	14.06	0.05	4.62	9671	32.50
Food Store	144,209	40.99	0.26	27.60	5911	39.80
Refrigerated Warehouse	95,540	20.02	0.06	5.60	1913	5.30
Unrefrigerated Warehouse	554,166	4.45	0.03	3.07	2467	17.00
School	445,106	7.46	0.16	15.97	3322	71.10
College	205,942	12.26	0.34	34.24	2524	70.50
Health	232,606	19.61	0.76	75.53	4561	175.70
Lodging	270,044	12.13	0.42	42.40	3275	114.50
Miscellaneous	1,099,544	9.84	0.23	23.34	10617	256.60
All Offices	1,022,012	16.08	0.18	17.90	16430	182.90
All Warehouses	649,705	6.74	0.03	3.44	4380	22.40

Reduction in Electricity from Solar Panels

Project: Edgewater Communities
 Prepared by: Michael Brandman Associates
 Prepared on: 12/16/2007

Powered by solar panels 500,000 KWh/year
 Total Electricity Use 500 MWh/year

Greenhouse Gas	Emission Factor (pounds per MWh/year)	Emissions (pounds/year)	Emissions (tons/year)	MTCO2e
Carbon dioxide	804.54	402,270	201	181.4
Methane	0.0067	3	0.002	0.0
Nitrous oxide	0.0037	2	0.001	0.3

Emission factor source:

California Climate Action Registry. General Reporting Protocol. Reporting Entity-Wide Greenhouse Gas Emissions. Version 2.2, March 2007. www.climateregistry.org

Residential electricity usage rate: 5626.50 kwh/unit/year, from South Coast Air Quality Management 1993 CEQA Handbook, Table 9-11-A

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All Commercial	4,920,114	13.63	0.26	25.99	67077	1278.60
Small Office (<=30k ft ²)	361,584	13.10	0.11	10.54	4738	38.10
Large Office (>=30k ft ²)	660,429	17.70	0.22	21.93	11691	144.80
Restaurant	148,892	40.20	2.10	209.98	5986	312.60
Retail	702,053	14.06	0.05	4.62	9671	32.50
Food Store	144,209	40.99	0.26	27.60	5911	39.80
Refrigerated Warehouse	95,540	20.02	0.06	5.60	1913	5.30
Unrefrigerated Warehouse	554,166	4.45	0.03	3.07	2467	17.00
School	445,106	7.46	0.16	15.97	3322	71.10
College	205,942	12.26	0.34	34.24	2524	70.50
Health	232,606	19.61	0.76	75.53	4561	175.70
Lodging	270,044	12.13	0.42	42.40	3275	114.50
Miscellaneous	1,099,544	9.84	0.23	23.34	10617	256.60
All Offices	1,022,012	16.08	0.18	17.90	16430	182.90
All Warehouses	649,705	6.74	0.03	3.44	4380	22.40

Electricity Use in Typical Urban Water Systems

Project: Edgewater Communities
 Prepared by: Michael Brandman Associates
 Prepared on: 12/16/2007

	kWh/MG	
	Northern California	Southern California
Water Supply and Conveyance	150	8,900
Water Treatment	100	100
Water Distribution	1,200	1,200
Wastewater Treatment	2,500	2,500
Totals	3,950	12,700

From California's Water Energy Relationship, CEC 2005

	Millions Gallons (MG) per year	kWh	MWh
Water Usage	356.5346		
Energy Usage		4,527,989	4,528

Greenhouse Gas	Indirect Electricity Emission Factor		
	(pounds per MWh/year)	Emissions (pounds/year)	Emissions (tons/year)
Carbon dioxide	804.54	3,642,949	1,821
Methane	0.0067	30.34	0.015
Nitrous oxide	0.0037	16.75	0.008

Emission factor for electricity source:
 California Climate Action Registry. General Reporting Protocol. Reporting Entity-Wide
 Greenhouse Gas Emissions. Version 2.2, March 2007. www.climateregistry.org

CEC 2005: California Energy Commission. California's Energy-Water Relationship.
 Final Staff Report. November 2005. CEC-700-2005-011-SF

Natural Gas Combustion

Edgewater Communities

Prepared by Michael Brandman Associates

12/16/2007

Gas	Type of Land Use	Square Feet or Units	Natural Gas Usage Factor* (SCF/square foot or unit/month)	Natural Gas Usage for Project (SCF/month)	Natural Gas usage for Project (SCF/year)	Emission Factor (g CO2/SCF)**	Emission Factor (g/MMBTU)**	Heating Value of Natural Gas (BTU/SCF)**	Emissions (tons per year)	Emissions (pounds per day)
Methane	Office	0	2.0	0	0	N/A	4.75	1020	0.00	0.00
	Retail/Shopping	53400	2.9	154860	1858320	N/A	4.75	1020	0.01	0.05
	Residential	537	6665	3579105	42949260	N/A	4.75	1020	0.23	1.25
	Multi-family	537	4011.5	2154175.5	25850106	N/A	4.75	1020	0.14	0.75
Nitrous Oxide	Office	0	2.0	0	0	N/A	0.095	1020	0.00	0.00
	Retail/Shopping	53400	2.9	154860	1858320	N/A	0.095	1020	0.00	0.00
	Residential	537	6665	3579105	42949260	N/A	0.095	1020	0.00	0.03
	Multi-family	537	4011.5	2154175.5	25850106	N/A	0.095	1020	0.00	0.02
Total										
Units		Mitigation Reduction		Nitrous Oxide		Methane				
pounds per day		0%		0.04		2.06				
tons per year				0.01		0.38				
GWP				310		21				
Tg CO2 Eq/year				0.000002		0.000008				

* Natural gas usage factor from URBEMIS2002 default; Industrial is based on number of buildings

** USEPA, 2004: Direct Emissions from Stationary Combustion Sources, Climate Leaders Greenhouse Inventory Protocol, Core Model Guidance, October 2004
Emissions of CH₄, N₂O = Emission Factor x Heating Value of Natural Gas x Natural Gas Usage x Number of Units/Square Feet

Air Conditioning and Refrigeration Fugitive Emissions

Project: Edgewater Communities
 Prepared by: Michael Brandman Associates
 Prepared on: 12/16/2007

Type of Unit	Units	Capacity of Unit (kg)	Annual Leak Rate in percent of capacity	Emissions (kg/year)	Emissions (tons/year)	Global Warming Potential	Metric Tons CO2 Equiv./year
Domestic Refrigeration	1074	0.5	0.5%	2.685	0.003	1300	3
Residential A/C	1074	50	5%	2685	2.9535	1300	3,463
Total					2.956		3,467

Source:

EPA 2004c U.S. Environmental Protection Agency, Climate Leaders. October 2004. Direct HFC and PFC Emissions from Use of Refrigeration and Air Conditioning Equipment. EPA430-K-03-004. www.epa.gov/climateleaders/docs/refrige_acequipuseguidance.pdf

Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: S:\Client\0576 City of Chino\0031 Edgewater\Air Quality\URBEMIS\Edgewater Operation and Area Buildout.urb924

Project Name: Edgewater - Operation Buildout

Project Location: South Coast AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

AREA SOURCE EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	13.82	2.75	12.64	0.02	0.92	0.88	3,453.85

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	10.40	13.86	122.42	0.24	41.70	8.10	24,177.52

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	24.22	16.61	135.06	0.26	42.62	8.98	27,631.37

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Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

<u>Source</u>	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
Natural Gas	0.20	2.59	1.12	0.00	0.00	0.00	3,306.20
Hearth	2.10	0.10	5.80	0.02	0.90	0.86	138.66
Landscape	0.92	0.06	5.72	0.00	0.02	0.02	8.99
Consumer Products	10.06						
Architectural Coatings	0.54						
TOTALS (tons/year, unmitigated)	13.82	2.75	12.64	0.02	0.92	0.88	3,453.85

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

<u>Source</u>	<u>ROG</u>	<u>NOX</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM25</u>	<u>CO2</u>
Single family housing	6.08	8.23	72.74	0.14	24.75	4.81	14,353.92
Condo/townhouse general	3.88	5.04	44.54	0.09	15.15	2.94	8,789.34
Place of worship	0.14	0.18	1.58	0.00	0.55	0.11	318.17
City park	0.03	0.03	0.27	0.00	0.10	0.02	54.93
Museum/Retail	0.27	0.38	3.29	0.01	1.15	0.22	661.16
TOTALS (tons/year, unmitigated)	10.40	13.86	122.42	0.24	41.70	8.10	24,177.52

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2019 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Single family housing	179.00	9.57	dwelling units	537.00	5,139.09	78,547.39
Condo/townhouse general	33.56	5.86	dwelling units	537.00	3,146.82	48,096.94
Place of worship		9.11	1000 sq ft	15.20	138.47	1,750.15
City park		1.59	acres	15.00	23.85	302.06
Museum/Retail		44.32	1000 sq ft	6.50	288.08	3,637.30
					8,736.31	132,333.84

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	50.6	0.0	100.0	0.0
Light Truck < 3750 lbs	7.2	0.0	98.6	1.4
Light Truck 3751-5750 lbs	23.3	0.0	100.0	0.0
Med Truck 5751-8500 lbs	11.0	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	1.7	0.0	82.4	17.6
Lite-Heavy Truck 10,001-14,000 lbs	0.5	0.0	60.0	40.0
Med-Heavy Truck 14,001-33,000 lbs	1.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.6	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.9	41.4	58.6	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.9	0.0	88.9	11.1

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commuter	Non-Work	Customer
Urban Trip Length (miles)	12.7	7.0	9.5	13.3	7.4	8.9
Rural Trip Length (miles)	17.6	12.1	14.9	15.4	9.6	12.6
Trip speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Place of worship				3.0	1.5	95.5
City park				5.0	2.5	92.5
Museum/Retail				2.0	1.0	97.0

Appendix C: Existing Emissions Calculations

Existing Dairy Greenhouse Gas Emissions

Edgewater Communities

3/10/2008

Prepared by Michael Brandman Associates

Methane

Type	Number	Emission Factor (Kg/head/year)	Emissions (Kg/year)	Emissions (tons/year)	Emissions (metric tons/year)	Global Warming Potential	MMTCO2e per year
Dairy Cow Enteric Fermentation	600	121	72600	80	72	21	0.002
Dairy Cow Manure Management	600	68	40800	45	41	21	0.001

Nitrous Oxide

Type	Number	N Excretion Rate (kg/1000 kg animal mass/day)	Animal Mass (kg/animal)	N Excretion (kg/year)	Emission Factor (kg N2O/kg N Excreted)	Emissions (kg N2O/year)	Emissions (tons/year)	Emissions (metric tons/year)	Global Warming Potential	MMTCO2e per year
Dairy Cow Manure Management	600	0.44	604	58201.44	0.005	291	0.32	0.29	310	0.00009

Total

	Nitrous Oxide	Methane	Total
metric tons per year	0.29	113	
MTCO2e	90	2376	2466
MMTCO2e	0.00009	0.0024	0.0025

Source of emission factors and methodology: 2006 International Panel on Climate Change Guidelines for National Greenhouse Gas Inventories. Chapter 10, Emissions from Livestock and Manure Management.
http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_10_Ch10_Livestock.pdf
 - Based on average mean temperature of Upland, CA of 62 degrees F (17 degrees C) pursuant to the Western Regional Climate Center

Source of cow numbers: Donald Rosier, Alliance Commercial Partners, personal communication, 11/26/07.

Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: S:\Client\0576 City of Chino\0031 Edgewater\Air Quality\URBEMIS\Edgewater Existing.urb924

Project Name: Edgewater - Existing Dairy

Project Location: South Coast AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	<u>CO2</u>
2007 TOTALS (tons/year unmitigated)	189.59
2007 TOTALS (tons/year mitigated)	189.59
Percent Reduction	0.00

AREA SOURCE EMISSION ESTIMATES

	<u>CO2</u>
TOTALS (tons/year, unmitigated)	1.96

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	<u>CO2</u>
TOTALS (tons/year, unmitigated)	88.29

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	<u>CO2</u>
TOTALS (tons/year, unmitigated)	90.25

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	<u>CO2</u>
2007	189.59
Mass Grading 01/01/2007-12/31/2007	189.59
Mass Grading Dust	0.00
Mass Grading Off Road Diesel	167.28
Mass Grading On Road Diesel	0.00
Mass Grading Worker Trips	22.31

Phase Assumptions

- Phase: Mass Grading 1/1/2007 - 12/31/2007 - Dairy Operations
- Total Acres Disturbed: 0.05
- Maximum Daily Acreage Disturbed: 0.01
- Fugitive Dust Level of Detail: Medium
- Onsite Scraper Use: 1 hr/day; Offsite Haulage: 0 hrs/day
- On Road Truck Travel (VMT): 0
- Off-Road Equipment:
 - 1 Generator Sets (549 hp) operating at a 0.74 load factor for 2 hours per day
 - 1 Scrapers (313 hp) operating at a 0.72 load factor for 1 hours per day
 - 1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 3 hours per day
 - 1 Water Trucks (189 hp) operating at a 0.5 load factor for 3 hours per day

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Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

<u>Source</u>	<u>CO2</u>
Natural Gas	1.46
Hearth	0.00
Landscape	0.50
Consumer Products	
Architectural Coatings	
TOTALS (tons/year, unmitigated)	1.96

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

<u>Source</u>	<u>CO2</u>
Dairy Operation	88.29
TOTALS (tons/year, unmitigated)	88.29

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2009 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Dairy Operation		30.00	1000 sq ft	1.00	30.00	378.78
					30.00	378.78

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	30.0	2.0	97.6	0.4
Light Truck < 3750 lbs	11.0	3.7	90.8	5.5
Light Truck 3751-5750 lbs	20.0	0.9	98.6	0.5
Med Truck 5751-8500 lbs	15.0	1.1	98.9	0.0
Lite-Heavy Truck 8501-10,000 lbs	5.0	0.0	75.0	25.0
Lite-Heavy Truck 10,001-14,000 lbs	5.0	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	5.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	5.0	0.0	0.0	100.0
Other Bus	0.0	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	100.0
Motorcycle	3.0	77.1	22.9	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	1.0	10.0	80.0	10.0

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	12.7	7.0	9.5	13.3	7.4	8.9
Rural Trip Length (miles)	17.6	12.1	14.9	15.4	9.6	12.6
Trip speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Dairy Operation				2.0	1.0	97.0

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Appendix D: California Office of the Attorney General Mitigation Measure

Mitigation Measures and Global Warming Resources
California Attorney General's Office

(1) Global Warming Mitigation Measures

The following are some examples of the types mitigation that local agencies may consider under the California Environmental Quality Act (CEQA) to offset or reduce global warming impacts. The list, which is by no means exhaustive or obligatory, includes measures and policies that could be undertaken directly by the local agency, incorporated into the agency's own "Climate Action Plan,"¹ or funded by "fair share" mitigation fees; measures that could be incorporated as a condition of approval of an individual project; and measures that may be outside the jurisdiction of the local agency to impose or require but still appropriate for consideration in an agency's environmental document.

While the lead agency must determine which particular mitigation measures, or suite of measures, is appropriate and feasible for a particular project, proponents of individual private projects are encouraged to take an active role in developing and presenting to lead agencies new and innovative ways to address the impacts of global warming.

Transportation

- Coordinate controlled intersections so that traffic passes more efficiently through congested areas.
- Set specific limits on idling time for commercial vehicles, including delivery and construction vehicles.
- Promote ride sharing programs *e.g.*, by designating a certain percentage of parking spaces for high-occupancy vehicles, providing larger parking spaces to accommodate vans used for ride-sharing, designating adequate passenger loading and unloading and waiting areas, and providing electronic message board space for coordinating rides.
- Create car-sharing programs. Accommodations for such programs include providing parking spaces for the car-share vehicles at convenient locations accessible by public transportation.²
- Create and/or expand existing vehicle buy-back programs to include vehicles with high greenhouse gas emissions.
- Require clean alternative fuels and electric vehicles.
- Develop the necessary infrastructure to encourage the use of alternative fuel vehicles (*e.g.*, electric vehicle charging facilities and conveniently located alternative fueling stations).³
- Increase the cost of driving and parking private vehicles by imposing tolls, parking fees, and residential parking permit limits.

- Develop transportation policies that give funding preference to public transit.⁴
- Design transportation centers where various public transportation modes intersect.
- Encourage the use of public transit systems by enhancing safety and cleanliness on vehicles and in and around stations.
- Assess transportation impact fees on new development in order to facilitate and increase public transit service.⁵
- Provide shuttle service to public transit.
- Offer public transit incentives.
- Incorporate bicycle lanes into street systems in regional transportation plans, new subdivisions, and large developments.
- Create bicycle lanes and walking paths directed to the location of schools and other logical points of destination and provide adequate bicycle parking.⁶ Ensure that non-motorized transportation systems are connected and not interrupted by impassable barriers, such as freeways.⁷
- Restore and/or expand school bus services. Where possible, use an alternative fuel school bus fleet.
- Require commercial projects to include facilities on-site to encourage employees to bicycle or walk to work.
- Provide public education and publicity about public transportation services.⁸
- Conduct a public information campaign on all options for individuals to reduce transportation emissions.
- Organize and lead a formal telecommute work program involving public agencies and private businesses. Provide information, training, and incentives to encourage participation. Provide incentives for equipment purchases to allow high-quality teleconferences

Energy Efficiency and Renewable Energy

- Require energy efficient design for buildings.⁹ This may include strengthening local building codes for new construction and renovation to require a higher level of energy efficiency.¹⁰
- Adopt a “Green Building Program” to promote green building standards.¹¹
- Provide permitting incentives for energy efficient building projects, *e.g.*, by giving green projects priority in plan review, processing and field inspection services.¹²
- Fund and schedule energy efficiency audits of existing buildings by checking, repairing, and readjusting heating, ventilation, air conditioning, lighting, hot

water equipment, insulation and weatherization. (Facilitating or funding the improvement of energy efficiency in existing buildings could offset in part the global warming impacts of new development.) Offer financial incentives for adoption of identified efficiency measures.¹³

- Provide individualized energy management services for large energy users.
- Require the use of energy efficient heating and cooling systems, appliances and office equipment.¹⁴
- Fund incentives and technical assistance for lighting efficiency.¹⁵
- Require that projects use efficient lighting. (Fluorescent lighting uses approximately 75% less energy than incandescent lighting to deliver the same amount of light.)
- Require the use of Light Emitting Diode (LED) for traffic and street lighting.¹⁶
- Incorporate on-site renewable energy production (through, *e.g.*, participation in the California Energy Commission's New Solar Homes Partnership). Require project proponents to install solar panels, water reuse systems, and/or other systems to capture energy sources that would otherwise be wasted.¹⁷
- Streamline permitting and provide public information to facilitate accelerated construction of solar and wind power systems, solar and tankless hot water heaters, and energy-efficient heating, ventilation and air conditioning systems in existing buildings.¹⁸
- Provide innovative financing for energy efficiency and alternative energy projects. For example, allow property owners to pay for energy efficiency improvements and solar system installation through long-term assessments on individual property tax bills.¹⁹
- Fund incentives to encourage the use of energy efficient equipment and vehicles.
- Provide public education and publicity about energy efficiency and available programs and incentives.²⁰

Land Use Measures

- Encourage mixed-use, infill, and higher density development to reduce vehicle trips, promote alternatives to individual vehicle travel and promote efficient delivery of services and goods. Infill development generates fewer vehicle miles traveled (VMT) per capita and reduced emissions of greenhouse gases, and denser development is associated with increased public transit use.²¹ For example, a city or county could promote "smart" development by reducing developer fees or granting property tax credits for qualifying projects.²²
- Discourage development that will increase passenger vehicle VMT. Enact ordinances and programs to limit or prohibit sprawl – development that requires additional or longer passenger vehicle commutes between workplaces and residences.²³
- Incorporate public transit into project design.²⁴

- Require measures that take advantage of shade, prevailing winds, landscaping and sun screens to reduce energy use.
- Preserve and create open space and parks. Preserve existing trees and require the planting of replacement trees for those removed in construction.
- Impose measures to address this “urban heat island” effect by, *e.g.*, requiring light-colored and reflective roofing materials and paint; light-colored roads and parking lots; shade trees in parking lots; and shade trees on the south and west sides of new or renovated buildings.²⁵ Darker colored roofs, pavement, and lack of trees may cause temperatures in urban environments to increase by as much as 6-8 degrees Fahrenheit as compared to surrounding areas.²⁶
- Facilitate “brownfield” development located near existing public transportation and jobs.
- Require pedestrian-only streets and plazas within developments, and destinations that may be reached conveniently by public transportation, walking, or bicycling.²⁷

Water Conservation and Efficiency²⁸

- Design and implement a comprehensive water conservation strategy. The strategy may include many of the specific items that follow, plus other innovative measures that are appropriate for the location.
- Require water efficient landscapes.²⁹ Adopt a strong landscape ordinance with water budgets to assure efficient landscape design, installation, and maintenance in new construction.
- Encourage the use of reclaimed water for landscape irrigation in new developments and on public property. Provide necessary infrastructure to deliver and use reclaimed water.
- Require water efficient design for buildings. This may include strengthening local building codes for new construction and implementing a program to renovate existing buildings to require a higher level of water efficiency.
- Adopt a retrofit ordinance that will require installation of water-efficient fixtures upon the sale of homes.³⁰
- Adopt and enforce restrictions on watering methods (*e.g.*, prohibiting systems that apply water to non-vegetated surfaces) and controls on runoff.
- Require water efficiency training and certification for irrigation designers, installers and managers.
- Provide individualized water audits for large water users to identify conservation opportunities. Offer financial incentives for adoption of identified efficiency measures.
- Provide water audits for large landscape accounts. Offer financial incentives for efficient irrigation controls and other efficiency measures.
- Fund incentives and technical assistance for water efficiency.
- Adopt standards that prescribe the maximum allowable effective impervious area

for all new development and redevelopment projects. Require preservation of the existing hydrologic character of developed sites to manage storm water and protect the environment. (Retaining storm water runoff onsite can drastically reduce the need for energy-intensive imported water at the site.)

- Adopt conservation pricing to encourage efficient water use.³¹

Solid Waste Measures

- Require projects to reuse and recycle construction and demolition waste.
- Implement or expand city or county-wide recycling and composting programs for residents and businesses.
- Increase areas served by recycling programs
- Extend the types of recycling services offered (*e.g.*, to include food and green waste recycling).
- Establish methane recovery in local landfills, wastewater treatment and animal operations plants to generate electricity.³²
- Provide public education and publicity about recycling services.

Carbon Offsets

- In some instances, a lead agency may find that measures that will directly reduce a project's emissions are insufficient. A lead agency may consider whether carbon offsets would be appropriate. The project proponent could, for example, fund off-site projects (*e.g.*, alternative energy projects) that will reduce carbon emissions, or could purchase "credits" from another entity that will fund such projects. The lead agency should ensure that any mitigation taking the form of carbon offsets is specifically identified and that such mitigation will in fact occur.

(2) General Resources

The following web sites and organizations provide general information about mitigating global warming impacts at the local level. These sites represent only a small fraction of the available resources. Local agencies are encouraged to conduct their own research in order to obtain the most current and relevant materials.

- The U.S. Conference of Mayors' Climate Protection Agreement contains valuable information for the many local agencies that are joining the fight against global warming. The Agreement is available here:
http://www.coolcities.us/resources/bestPracticeGuides/USM_ClimateActionHB.pdf.
Nearly one hundred California cities have joined the "Cool Cities" campaign, which means they have signed the U.S. Mayor' Climate Protection Agreement and are taking concrete steps toward addressing global warming. These steps include preparing a city-wide greenhouse gas emissions inventory and creating and implementing a local Climate

Action Plan. Additional resources, including various cities' Climate Action Plans, are located at the Cool Cities website: <http://www.coolcities.us/resources.php>.

- In July 2007, Alameda County became one of twelve charter members of the “Cool Counties” initiative. Participating counties sign a Climate Stabilization Declaration, which is available at the website for King County (Washington State): <http://www.metrokc.gov/exec/news/2007/0716dec.aspx>. Participating counties agree to work with local, state, and federal governments and other leaders to reduce county geographical greenhouse gas emissions to 80% below current levels by 2050 by developing a greenhouse gas emissions inventory and regional reduction plan. Current member counties are recruiting new members and are committed to sharing information. Cool Counties contact information is available at: <http://www.kingcounty.gov/exec/coolcounties/Joinus.aspx>.
- Local Governments for Sustainability, a program of International Cities for Local Environmental Initiatives (ICLEI), has initiated a campaign called Cities for Climate Protection (CCP). The membership program is designed to empower local governments worldwide to take action on climate change. Many California cities have joined ICLEI. More information is available at the organization's website: <http://www.iclei.org/>.
- The Institute for Local Government, an affiliate of the California State Association of Counties and the League of California Cities, recently launched a program called the California Climate Action Network (CaliforniaCAN!). The program will provide information about the latest climate action resources, best practices, and case studies. More information is available at the CaliforniaCAN! website: <http://www.cacities.org/index.jsp?displaytype=§ion=climate&zone=ilsg>.
- The Governor's Office of Planning and Research provides valuable resources for lead agencies related to CEQA and global warming at <http://opr.ca.gov/index.php?a=ceqa/index.html>. Among the materials available are a list of environmental documents addressing climate change and greenhouse gas emissions and a list of local plans and policies addressing climate change.

(3) Notes

1. For example, the County of Marin adopted a Greenhouse Gas Reduction Plan in October, 2006 that sets reduction targets for government operations and for the County as a whole. See http://www.co.marin.ca.us/depts/CD/main/pdf/final_ghg_red_plan.pdf.
2. There are a number of car sharing programs operating in California, including City CarShare <http://www.citycarshare.org/>, Zip Car <http://www.zipcar.com/> and Flexcar <http://www.flexcar.com/>.

3. See the City of Santa Monica's Green Building Program at <http://www.greenbuildings.santa-monica.org/transportation/parkingcharging.html>.
4. San Francisco's "Transit First" Policy is listed in its Climate Action Plan, available at <http://www.sfenvironment.org/downloads/library/climateactionplan.pdf>.
5. San Francisco assesses a Downtown Transportation Impact Fee on new office construction and commercial office space renovation within a designated district. The fee is discussed in the City's Climate Action plan. See Note 4.
6. See Marin County's Safe Routes to Schools program at <http://www.saferoutestoschools.org/>.
7. The City of La Mesa has a Sidewalk Master Plan and an associated map that the City uses to prioritize funding. As the City states, "The most important concept for sidewalks is connectivity. For people to want to use a sidewalk, it must conveniently connect them to their intended destination." See <http://www.ci.la-mesa.ca.us/index.asp?NID=699>.
8. The U.S. Conference of Mayors' Climate Action Handbook, cited above, lists education and outreach as key components to taking action against global warming.
9. Leadership in Energy and Environmental Design (LEED) administers a Green Building Ratings program that provides benchmarks for the design, construction, and operation of high-performance green buildings. More information about the LEED ratings system is available at <http://www.usgbc.org/DisplayPage.aspx?CategoryID=19>. Build it Green is a non-profit, membership organization that promotes green building practices in California. The organization offers a point-based, green building rating system for various types of projects. See <http://www.builditgreen.org/guidelines-rating-systems>.
10. Public Resources Code Section 25402.1(h)2 and Section 10-106 of the Building Energy Efficiency Standards establish a process which allows local adoption of energy standards that are more stringent than the statewide Standards. More information is available at the California Energy Commission's website. See http://www.energy.ca.gov/title24/2005standards/ordinances_exceeding_2005_building_standards.html.
11. The City of Santa Monica, for example, has instituted a Green Building Program. See Note 4 and <http://www.greenbuildings.santa-monica.org/>. The City of Pasadena also has a green building ordinance that applies to public and private buildings. See <http://www.ci.pasadena.ca.us/permitcenter/greencity/building/gbprogram.asp> and http://ordlink.com/codes/pasadena/index.htm?Search_Code=Begin+Searching+Municipal+Code. The City of San Francisco is considering adopting green building performance requirements that would apply to public and private buildings. See <http://www.sfenvironment.org/downloads/library/gbtfrrreleasev1.3.pdf>.

12. See “Green County San Bernardino,” <http://www.greencountysb.com/> at p. 6.
13. Under Southern California Gas Company’s Energy Efficiency Program for Commercial/Industrial Large Business Customers, participants are eligible to receive an incentive based upon 50% of the equipment cost, or \$0.50 per therm saved, whichever is lower, up to a maximum amount of \$1,000,000 per customer, per year. Eligible projects require an energy savings of at least 200,000 therms per year. See <http://www.socalgas.com/business/efficiency/grants/>.
14. Energy Star is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy that certifies energy efficient products and provides guidelines for energy efficient practices for homes and businesses. More information about Energy Star certified products is available at <http://www.energystar.gov/>. The Electronic Product Environmental Assessment Tool (EPEAT) is a system that ranks computer products based on their conformance to a set of environmental criteria, including energy efficiency. More information about EPEAT is available at <http://www.epeat.net/AboutEPEAT.aspx>.
15. As described in its Climate Action Plan, the City of San Francisco uses a combination of incentives and technical assistance to reduce lighting energy use in small businesses such as grocery stores, small retail outlets, and restaurants. The program offers free energy audits and coordinated lighting retrofit installation. In addition, the City offers residents the opportunity to turn in their incandescent lamps for coupons to buy fluorescent units. See Note 4.
16. For a discussion of the use of LED traffic lights, see the City of Berkeley’s Resource Conservation and Global Warming Abatement Plan at <http://www.baaqmd.gov/pln/GlobalWarming/BerkeleyClimateActionPlan.pdf>.
17. At the direction of Governor Schwarzenegger, the California Public Utilities Commission (CPUC) approved the California Solar Initiative on January 12, 2006. The initiative creates a \$3.3 billion, ten-year program to install solar panels on one million roofs in the State. See <http://www.gosolarcalifornia.ca.gov/nshp/index.html>.
18. As part of its “Green County San Bernardino” program, the County is waiving permit fees for alternative energy systems and efficient heating and air conditioning systems. See <http://www.greencountysb.com/> at p. 3.
19. The City of Berkeley is in the process of instituting a “Sustainable Energy Financing District.” See <http://www.cityofberkeley.info/Mayor/PR/pressrelease2007-1023.htm>.
20. See “Green County San Bernardino,” <http://www.greencountysb.com/> at pp. 4-6.

21. See US EPA, Our Built and Natural Environments, A Technical Review of the Interactions between Land Use, Transportation, and Environmental Quality (Jan. 2001) at pp. 46-48 <http://www.epa.gov/dced/pdf/built.pdf>.
22. The City of Berkeley has endorsed this strategy in its Resource Conservation and Global Warming Abatement Plan. See Note 16.
23. Samples of local legislation to reduce sprawl are set forth in the U.S. Conference of Mayors' Climate Action Handbook, cited above.
24. The U.S. Conference of Mayors cites Sacramento's Transit Village Redevelopment as a model of transit-oriented development. More information about this project is available at <http://www.cityofsacramento.org/planning/projects/65th-street-village/>.
25. See the website for Lawrence Berkeley National Laboratory's Urban Heat Island Group at <http://eetd.lbl.gov/HeatIsland/LEARN/> and U.S. EPA's Heat Island website at www.epa.gov/heatisland/. To learn about the effectiveness of various heat island mitigation strategies, see the Mitigation Impact Screening Tool, available at <http://www.epa.gov/heatisld/resources/tools.html>.
26. Some local agencies have implemented a cool surfaces programs in conjunction with measures to address storm water run off and water quality. See, for example, The City of Irvine's Sustainable Travelways/Green Streets program at http://www.cityofirvine.org/depts/redevelopment/sustainable_travelways.asp; The City of Los Angeles's Green Streets LA program at http://water.lgc.org/water-workshops/la-workshop/Green_Streets_Daniels.pdf/view; see also The Chicago Green Alley Handbook at http://egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/GreenAlleyHandbook_Jan.pdf.
27. Palo Alto's Green Ribbon Task Force Report on Climate Protection recommends pedestrian streets under its proposed actions. See <http://www.city.palo-alto.ca.us/knowzone/agendas/grtf.asp>.
28. The California Energy Commission has found that the State's water-related energy use – which includes the conveyance, storage, treatment, distribution, wastewater collection, treatment, and discharge – consumes about 19 percent of the State's electricity, 30 percent of its natural gas, and 88 billion gallons of diesel fuel every year, and this demand is growing. See <http://www.energy.ca.gov/2007publications/CEC-999-2007-008/CEC-999-2007-008.PDF>. Accordingly, reducing water use and improving water efficiency can help reduce energy use and associated greenhouse gas emissions.

29. The Water Conservation in Landscaping Act of 2006 (AB 1881) requires the Department of Water Resources (DWR), not later than January 1, 2009, to update the Model Water Efficient Landscape Ordinance. The draft of the entire updated Model Water Efficient Landscape Ordinance will be made available to the public in December 2007. See <http://www.owue.water.ca.gov/landscape/ord/updatedOrd.cfm>.
30. See the City of San Diego's plumbing retrofit ordinance at <http://www.sandiego.gov/water/conservation/selling.shtml>.
31. The Irvine Ranch Water District in Southern California uses a five-tiered rate structure that rewards conservation. The water district has a baseline charge for necessary water use. Water use that exceeds the baseline amount costs incrementally more money. While "low volume" water use costs \$.082 per hundred cubic feet (ccf), "wasteful" water use costs \$7.84 per ccf. See http://www.irwd.com/AboutIRWD/rates_residential.php.
32. San Diego's Metropolitan Wastewater Department installed eight "digesters" at one of its wastewater treatment plants. Digesters use heat and bacteria to break down the organic solids removed from the wastewater to create methane. See <http://www.sandiego.gov/mwwd/facilities/ptloma.shtml>.