

# **Global Climate Change Evaluation**

for

## **Sierra Meadows Project**

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## **List of Acronyms**

APCD	Air Pollution Control District
AB	Assembly Bill
AB 32	Assembly Bill 32, Global Warming Solutions Act of 2006
ARB	Air Resources Board
ASTM	American Society of Testing and Materials
CAPCOA	California Air Pollution Control Officers Association
CAT	Climate Action Team
CCAP	Center for Clean Air Policy
CCAR	California Climate Action Registry
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH <sub>4</sub>	Methane
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide Equivalent
DWR	Department of Water Resources
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
EV	Electric Vehicles
GCC	Global Climate Change
GHG	Greenhouse Gas
GGEP	Greenhouse Gas Emissions Policy
GGRP	Greenhouse Gas Reduction Plan
GP	General Plan
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
LCFS	Low Carbon Fuel Standard
LEED	Leadership in Energy and Environmental Design
MMT	Million Metric Tons
MW	Megawatts
N <sub>2</sub> O	Nitrous Oxide
NO <sub>x</sub>	Oxides of Nitrogen
OPR	State Office of Planning and Research
PDFs	Project Design Features
PFCs	Perfluorocarbons
PM	Particulate Matter
ROG	Reactive Organic Gas
RPS	Renewable Portfolio Standards
S-3-05	Executive Order S-3-05
SB	Senate Bill
SJVAPCD	San Joaquin Valley Air Pollution Control District
SRI	Solar Reflective Index
THC	Total Hydrocarbon

UNFCCC	United Nations Framework Convention on Climate Change
URBEMIS	Urban Emissions Model
USBGC	U.S. Green Building Council
VMT	Vehicle Miles Traveled

## Executive Summary

This report presents an assessment of potential greenhouse gas impacts associated with the construction and operations associated with the proposed Sierra Meadows project in the City of Clovis, California. The project involves construction and operation of an animal adoption facility, which is 15,650 square feet with a future 6,850 square foot expansion for a total of 22,500 square feet. The project also involves the master planning of the park site, including a wildlife rehabilitation and education center that is approximately 40,000 square feet.

The evaluation addresses the potential for greenhouse gas (GHG) emissions during construction and after full buildout of the proposed Project. GHG emissions have been calculated for “business as usual” conditions and for conditions with implementation of GHG emission reduction project design features proposed by the Project applicants. A summary of the emission calculations is provided in Table ES-1. As shown in Table ES-1, with implementation of GHG emission reduction project design features, the proposed Project would meet the goals of AB 32. Because the Project would reduce GHG emissions by more than 29% below business as usual, and Project emissions with GHG reduction measures are less than 900 metric tons of CO<sub>2</sub>e, the proposed Project conforms with the goals of AB 32. The proposed Project would therefore not result in any direct impacts to the global climate, and cumulative impacts would be less than significant.

<b>Table ES-1</b>			
<b>SUMMARY OF ESTIMATED OPERATIONAL GREENHOUSE GAS EMISSIONS WITH GHG REDUCTION MEASURES SCENARIO</b>			
<b>Emission Source</b>	<b>Annual Emissions (Metric tons/year)</b>		
	<b>CO<sub>2</sub></b>	<b>CH<sub>4</sub></b>	<b>N<sub>2</sub>O</b>
<b>Operational Emissions</b>			
Electricity Use Emissions	207	0.0016	0.0009
Natural Gas Use Emissions	66	0.0073	0.0001
Water Consumption Emissions	8	0.00006	0.00003
Vehicle Emissions	223	0.0168	0.0435
Amortized Construction Emissions	21	-	-
<b>Total</b>	<b>525</b>	<b>0.026</b>	<b>0.044</b>
Global Warming Potential Factor	<b>1</b>	<b>21</b>	<b>310</b>
CO <sub>2</sub> Equivalent Emissions	525	0.55	14
<b>TOTAL CO<sub>2</sub> Equivalent Emissions</b>	<b>540</b>		
<b>Business as Usual CO<sub>2</sub> Equivalent Emissions</b>	<b>760</b>		
<b>Percent Reduction from Business as Usual</b>	<b>29%</b>		

## 1.0 INTRODUCTION

This report presents an assessment of potential greenhouse gas impacts associated with the construction and operations associated with the proposed Sierra Meadows project in the City of Clovis, California. The project involves construction and operation of an animal adoption facility, which is 15,650 square feet with a future 6,850 square foot expansion. The project also involves the master planning of the park site, including a wildlife rehabilitation and education center that is approximately 40,000 square feet.

The project is located on Temperance Avenue at Sierra Avenue. The project site plan is shown in Figure 1. The site is currently undeveloped and will be constructed on a disturbed area. The project will include construction of the buildings on the site, along with internal streets, parking areas, and landscaping.



### SIERRA MEADOWS PARK MASTER PLAN

Incorporating the Clovis Animal Services & Pet Adoption Center and Nature Education & Rehabilitation Center  
Clovis, California



**Figure 1. Sierra Meadows Master Plan Site Plan**

## 1.1 General Principles and Existing Conditions

GCC refers to changes in average climatic conditions on Earth as a whole, including temperature, wind patterns, precipitation and storms. Global temperatures are moderated by naturally occurring atmospheric gases, including water vapor, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O), which are known as greenhouse gases (GHGs). These gases allow solar radiation (sunlight) into the Earth's atmosphere, but prevent radiative heat from escaping, thus warming the Earth's atmosphere. Gases that trap heat in the atmosphere are often called greenhouse gases, analogous to a greenhouse. GHGs are emitted by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the Earth's temperature. Without these natural GHGs, the Earth's temperature would be about 61° Fahrenheit cooler (California Environmental Protection Agency 2006). Emissions from human activities, such as electricity production and vehicle use, have elevated the concentration of these gases in the atmosphere.

GHGs have been at the center of a widely contested political, economic, and scientific debate surrounding GCC. Although the conceptual existence of GCC is generally accepted, the extent to which GHGs contribute to it remains a source of debate. The State of California has been at the forefront of developing solutions to address GCC. GCC refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. GCC may result from natural factors, natural processes, and/or human activities that change the composition of the atmosphere and alter the surface and features of land.

Global climate change attributable to anthropogenic (human) emissions of GHGs (mainly CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O) is currently one of the most important and widely debated scientific, economic and political issues in the United States. Historical records indicate that global climate changes have occurred in the past due to natural phenomena (such as during previous ice ages). Some data indicate that the current global conditions differ from past climate changes in rate and magnitude.

The United Nations Intergovernmental Panel (Panel) on Climate Change constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. The Panel concluded that a stabilization of GHGs at 400 to 450 ppm CO<sub>2</sub> equivalent concentration is required to keep global mean warming below 35.6° Fahrenheit (2° Celsius), which is assumed to be necessary to avoid dangerous climate change (Association of Environmental Professionals 2007).

State law defines greenhouse gases as any of the following compounds: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF<sub>6</sub>) (California Health and Safety Code Section 38505(g).) CO<sub>2</sub>, followed by CH<sub>4</sub> and N<sub>2</sub>O, are the most common GHGs that result from human activity.

## **1.2 Sources and Global Warming Potentials of GHG**

The State of California GHG Inventory performed by the California Air Resources Board (ARB), compiled statewide anthropogenic GHG emissions and sinks. It includes estimates for CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, SF<sub>6</sub>, HFCs, and PFCs. The current inventory covers the years 1990 to 2008, and is summarized in Table 1. Data sources used to calculate this GHG inventory include California and federal agencies, international organizations, and industry associations. The calculation methodologies are consistent with guidance from the Intergovernmental Panel on Climate Change (IPCC). The 1990 emissions level is the sum total of sources and sinks from all sectors and categories in the inventory. The inventory is divided into seven broad sectors and categories in the inventory. These sectors include: Agriculture; Commercial; Electricity Generation; Forestry; Industrial; Residential; and Transportation.

When accounting for GHGs, all types of GHG emissions are expressed in terms of CO<sub>2</sub> equivalents (CO<sub>2</sub>e) and are typically quantified in metric tons (MT) or millions of metric tons (MMT).

Sector	Total 1990 Emissions (MMTCO <sub>2</sub> e)	Percent of Total 1990 Emissions	Total 2008 Emissions (MMTCO <sub>2</sub> e)	Percent of Total 2008 Emissions
Agriculture	23.4	5%	28.06	6%
Commercial	14.4	3%	14.68	3%
Electricity Generation	110.6	26%	116.35	25%
Forestry (excluding sinks)	0.2	<1%	0.19	<1%
Industrial	103.0	24%	92.66	20%
Residential	29.7	7%	28.45	6%
Transportation	150.7	35%	174.99	37%
Recycling and Waste			6.71	1%
High GWP Gases			15.65	3%
Forestry Sinks	(6.7)		(3.98)	

GHGs have varying global warming potential (GWP). The GWP is the potential of a gas or aerosol to trap heat in the atmosphere; it is the “cumulative radiative forcing effect of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas” (USEPA 2006). The reference gas for GWP is CO<sub>2</sub>; therefore, CO<sub>2</sub> has a GWP of 1. The other main greenhouse gases that have been attributed to human activity include CH<sub>4</sub>, which has a GWP of 21, and N<sub>2</sub>O, which has a GWP of 310. Table 2 presents the GWP and atmospheric lifetimes of common GHGs.

GHG	Formula	100-Year Global Warming Potential	Atmospheric Lifetime (Years)
Carbon Dioxide	CO <sub>2</sub>	1	Variable
Methane	CH <sub>4</sub>	21	12 ± 3
Nitrous Oxide	N <sub>2</sub> O	310	120
Sulfur Hexafluoride	SF <sub>6</sub>	23,900	3,200

Human-caused sources of CO<sub>2</sub> include combustion of fossil fuels (coal, oil, natural gas, gasoline and wood). Data from ice cores indicate that CO<sub>2</sub> concentrations remained steady prior to the current period for approximately 10,000 years. Concentrations of CO<sub>2</sub> have increased in the atmosphere since the industrial revolution.

CH<sub>4</sub> is the main component of natural gas and also arises naturally from anaerobic decay of organic matter. Human-caused sources of natural gas include landfills, fermentation of manure and cattle farming. Human-caused sources of N<sub>2</sub>O include combustion of fossil fuels and industrial processes such as nylon production and production of nitric acid.

Other GHGs are present in trace amounts in the atmosphere and are generated from various industrial or other uses.

The sources of GHG emissions, GWP, and atmospheric lifetime of GHGs are all important variables to be considered in the process of calculating CO<sub>2</sub>e for discretionary land use projects that require a climate change analysis.

### **1.3 Regulatory Framework**

All levels of government have some responsibility for the protection of air quality, and each level (Federal, State, and regional/local) has specific responsibilities relating to air quality regulation. GHG emissions and the regulation of GHGs is a relatively new component of air quality.

#### 1.3.1 National and International Efforts

International and Federal legislation have been enacted to deal with GCC issues. In 1988, the United Nations and the World Meteorological Organization established the IPCC to assess the scientific, technical, and socioeconomic information relevant to understanding the scientific basis for human-induced climate change, its potential impacts, and options for adaptation and mitigation. The most recent reports of the IPCC have emphasized the scientific consensus that real and measurable changes to the climate are occurring, that they are caused by human activity, and that significant adverse impacts on the environment, the economy, and human health and welfare are unavoidable.

In October 1993, President Clinton announced his Climate Change Action Plan (CCAP), which had a goal of returning GHG 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 GHG emissions. 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 (UNFCCC). Under the Convention, governments agreed to gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing GHG 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 GCC. Recently, the United States Supreme Court declared in the court case of Massachusetts et al. vs. the Environmental Protection Agency et al., 549 C.S. 497 (2007) that the EPA does have the ability to regulate GHG emissions. In addition to the national and international efforts described above, many local jurisdictions have adopted climate change policies and programs.

**Endangerment Finding.** On April 17, 2009, EPA issued its proposed endangerment finding for GHG emissions. On December 7, 2009, the EPA Administrator signed two distinct findings regarding greenhouse gases under section 202(a) of the Clean Air Act:

**Endangerment Finding:** The Administrator finds that the current and projected concentrations of the six key well-mixed greenhouse gases--carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>)--in the atmosphere threaten the public health and welfare of current and future generations.

**Cause or Contribute Finding:** The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

The endangerment findings do not themselves impose any requirements on industry or other entities. However, this action is a prerequisite to finalizing the EPA's proposed greenhouse gas emission standards for light-duty vehicles, which were jointly proposed by EPA and the

Department of Transportation's National Highway Safety Administration on September 15, 2009.

**Mandatory GHG Reporting Rule.** On March 10, 2009, in response to the FY2008 Consolidated Appropriations Act (H.R. 2764; Public Law 110–161), EPA proposed a rule that requires mandatory reporting of greenhouse gas (GHG) emissions from large sources in the United States. The proposed rule would collect accurate and comprehensive emissions data to inform future policy decisions.

EPA is proposing that suppliers of fossil fuels or industrial greenhouse gases, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions submit annual reports to EPA. The gases covered by the proposed rule are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulfur hexafluoride (SF<sub>6</sub>), and other fluorinated gases including nitrogen trifluoride (NF<sub>3</sub>) and hydrofluorinated ethers (HFE).

**Corporate Average Fuel Economy Standards.** The federal Corporate Average Fuel Economy (CAFE) standard determines the fuel efficiency of certain vehicle classes in the United States. In 2007, as part of the Energy and Security Act of 2007, CAFE standards were increased for new light-duty vehicles to 35 miles per gallon by 2020. In May 2009, President Obama announced plans to increase CAFE standards to require light-duty vehicles to meet an average fuel economy of 35.5 miles per gallon by 2016. On April 1, 2010, the U.S. Department of Transportation and the EPA established historic new federal rules that set the first-ever national greenhouse gas emissions standards and will significantly increase the fuel economy of all new passenger cars and light trucks sold in the United States. The standards set a requirement to meet an average fuel economy of 34.1 miles per gallon by 2016.

### 1.3.2 State Regulations and Standards

The following subsections describe regulations and standards that have been adopted by the State of California to address GCC issues.

**Assembly Bill 32, the California Global Warming Solutions Act of 2006.** In September 2006, Governor Schwarzenegger signed California AB 32, the global warming bill, into law. AB 32 directs the ARB to do the following:

- Make publicly available a list of discrete early action GHG emission reduction measures that can be implemented prior to the adoption of the statewide GHG limit and the measures required to achieve compliance with the statewide limit.
- Make publicly available a GHG inventory for the year 1990 and determine target levels for 2020.
- On or before January 1, 2010, adopt regulations to implement the early action GHG emission reduction measures.
- On or before January 1, 2011, adopt quantifiable, verifiable, and enforceable emission reduction measures by regulation that will achieve the statewide GHG emissions limit by 2020, to become operative on January 1, 2012, at the latest. The emission reduction measures may include direct emission reduction measures, alternative compliance mechanisms, and potential monetary and non-monetary incentives that reduce GHG emissions from any sources or categories of sources that ARB finds necessary to achieve the statewide GHG emissions limit.
- Monitor compliance with and enforce any emission reduction measure adopted pursuant to AB 32.

AB 32 required that by January 1, 2008, ARB determine what the statewide GHG emissions level was in 1990, and approve a statewide GHG emissions limit that is equivalent to that level, to be achieved by 2020. ARB adopted its Scoping Plan in December 2008, which provided estimates of the 1990 GHG emissions level and identified sectors for the reduction of GHG emissions. The ARB has estimated that the 1990 GHG emissions level was 427 MMT net CO<sub>2</sub>e (ARB 2007b). The ARB estimates that a reduction of 173 MMT net CO<sub>2</sub>e emissions below business-as-usual would be required by 2020 to meet the 1990 levels (ARB 2007b). This amounts to a 15 percent reduction from today's levels, and a 30 percent reduction from projected business-as-usual levels in 2020 (ARB 2008a).

**Senate Bill 97.** Senate Bill 97, enacted in 2007, amends the CEQA statute to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. It directs OPR to develop draft CEQA guidelines “for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions” by July 1, 2009 and directs the Resources Agency to certify and adopt the CEQA guidelines by January 1, 2010.

The Governor’s Office of Planning and Research (OPR) published a technical advisory on CEQA and Climate Change on June 19, 2008. The guidance did not include a suggested threshold, but stated that the OPR has asked CARB to, “recommend a method for setting thresholds which will encourage consistency and uniformity in the CEQA analysis of greenhouse gas emissions throughout the state.” The OPR does recommend that CEQA analyses include the following components:

- Identify greenhouse gas emissions
- Determine Significance
- Mitigate Impacts

In April, the OPR published its proposed revisions to CEQA to address GHG emissions. The amendments to CEQA indicate the following:

- Climate action plans and other greenhouse gas reduction plans can be used to determine whether a project has significant impacts, based upon its compliance with the plan.
- Local governments are encouraged to quantify the greenhouse gas emissions of proposed projects, noting that they have the freedom to select the models and methodologies that best meet their needs and circumstances. The section also recommends consideration of several qualitative factors that may be used in the determination of significance, such as the extent to which the given project complies with state, regional, or local GHG reduction plans and policies. OPR does not set or dictate specific thresholds of significance. Consistent with existing CEQA Guidelines, OPR encourages local governments to develop and publish their own thresholds of significance for GHG impacts assessment.
- When creating their own thresholds of significance, local governments may consider the thresholds of significance adopted or recommended by other public agencies, or recommended by experts.
- New amendments include guidelines for determining methods to mitigate the effects of greenhouse gas emissions in Appendix F of the CEQA Guidelines.

- OPR is clear to state that “to qualify as mitigation, specific measures from an existing plan must be identified and incorporated into the project; general compliance with a plan, by itself, is not mitigation.”
- OPR’s emphasizes the advantages of analyzing GHG impacts on an institutional, programmatic level. OPR therefore approves tiering of environmental analyses and highlights some benefits of such an approach.
- Environmental impact reports (EIRs) must specifically consider a project's energy use and energy efficiency potential.

On July 3, 2009 the California Natural Resources Agency published proposed amendment of regulations based on OPR’s proposed revisions to CEQA to address GHG emissions. On that date, the Natural Resources Agency commenced the Administrative Procedure Act rulemaking process for certifying and adopting these amendments pursuant to Public Resources Code section 21083.05. Having reviewed and considered all comments received, on December 30, 2009, the Natural Resources Agency adopted the proposed amendments to the state CEQA guidelines in the California Code of Regulations. The amendments were formally adopted on March 18, 2010.

**Executive Order S-3-05.** Executive Order S-3-05, signed by Governor Schwarzenegger on June 1, 2005, calls for a reduction in GHG emissions to 1990 levels by 2020 and for an 80 percent reduction in GHG emissions by 2050. Executive Order S-3-05 also calls for the California EPA (CalEPA) to prepare biennial science reports on the potential impact of continued GCC on certain sectors of the California economy. The first of these reports, “Our Changing Climate: Assessing Risks to California”, and its supporting document “Scenarios of Climate Change in California: An Overview” were published by the California Climate Change Center in 2006.

**California Code of Regulations Title 24.** Although not originally intended to reduce greenhouse gas emissions, California Code of Regulations Title 24 Part 6: California’s Energy Efficiency Standards for Residential and Nonresidential Buildings were first established 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 efficiency technologies and methods. The GHG emission inventory was based on Title 24 standards as of October 2005; however, Title 24 has been updated as of 2008 and standards are

set to be phased in in summer 2009. Energy efficient buildings require less electricity, natural gas, and other fuels. Electricity production from fossil fuels and on-site fuel combustion (typically for water heating) results in greenhouse gas emissions. Therefore, increased energy efficiency results in decreased greenhouse gas emissions.

**State Standards Addressing Vehicular 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 ARB would apply to 2009 and later model year vehicles. ARB estimated that the regulation would reduce climate change emissions from light duty passenger vehicle fleet by an estimated 18% in 2020 and by 27% in 2030 (AEP 2007). In 2005, the ARB requested a waiver from EPA to enforce the regulation, as required under the Clean Air Act. The waiver was granted on June 30, 2009, and the state of California is implementing regulations to set forth greenhouse gas emission standards for vehicles. It is expected that the Pavley regulations will reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016, all while improving fuel efficiency and reducing motorists' costs.

Executive Order S-01-07 was enacted by the Governor on January 18, 2007. Essentially, the order mandates the following: 1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020; and 2) that a Low Carbon Fuel Standard ("LCFS") for transportation fuels be established for California. It is assumed that the effects of the LCFS would be a 10% reduction in GHG emissions from fuel use by 2020. On April 23, 2009, ARB adopted regulations to implement the LCFS.

**Senate Bill 375.** Senate Bill 375 requires that regions within the state which have a metropolitan planning organization must adopt a sustainable communities strategy as part of their regional transportation plans. The strategy must be designed to achieve certain goals for the reduction of GHG emissions. The bill finds that GHG from autos and light trucks can be substantially reduced by new vehicle technology, but even so "it will be necessary to achieve significant additional greenhouse gas reductions from changed land use patterns and improved transportation. Without improved land use and transportation policy, California will not be able

to achieve the goals of AB 32.” SB 375 provides that new CEQA provisions be enacted to “encourage developers to submit applications and local governments to make land use decisions that will help the state achieve its goals under AB 32,” and that “current planning models and analytical techniques used for making transportation infrastructure decisions and for air quality planning should be able to assess the effects of policy choices, such as residential development patterns, expanded transit service and accessibility, the walkability of communities, and the use of economic incentives and disincentives.”

### 1.3.3 Local Regulations and Standards

The San Joaquin Valley Air Pollution Control District (SJVAPCD) has adopted guidance for addressing GHG impacts in its *Guidance for Valley Land Use Agencies in Addressing GHG Impacts for New Projects Under CEQA*. (SJVAPCD 2009). The guidance relies on performance-based standards, otherwise known as Best Performance Standards (BPS), to assess significance of project-specific GHG emissions on global climate change during the environmental review process. Projects implementing a BPS would be determined to have a less than cumulatively significant impact. Projects can also demonstrate compliance with the requirements of AB 32 by demonstrating that their emissions achieve a 29% reduction below “business as usual” levels.

## **2.0 POTENTIAL CLIMATE CHANGE IMPACTS TO PROJECT SITE**

### **2.1 Existing Conditions**

The project site is currently vacant and is in a disturbed state. The site has little vegetation currently. Natural vegetation and soils temporarily store carbon as part of the terrestrial carbon cycle. Carbon is assimilated into plants and animals as they grow and then dispersed back into the environment when they die. There are two existing sources of carbon storage at the Project site: natural vegetation and soils. It is difficult to assess net changes in carbon storage associated with the project site, but carbon sequestration rates for grasses and soils are relatively low in comparison to heavily vegetated areas such as forests.

The majority of carbon within the site is stored in the soil. Soil carbon accumulates from inputs of plant and animal matter, roots, and other living components of the soil ecosystem (e.g., bacteria, worms, etc.). Soil carbon is lost through biological respiration, erosion, and other forms of disturbance. Overall, soil carbon moves more slowly through the carbon cycle, and it offers greater potential for long-term carbon storage. Field observations suggest that urban soils can sequester relatively large amounts of carbon. Observations from across the United States suggest that warmer and drier climates (such as central California) may have slightly higher soil organic matter levels when compared to equivalent areas before development.

### **2.2 Typical Adverse Effects**

The Climate Scenarios Report (CCCC 2006), uses a range of emissions scenarios developed by the IPCC to project a series of potential warming ranges (i.e., temperature increases) that may occur in California during the 21<sup>st</sup> century. Three warming ranges were identified: Lower warming range (3.0 to 5.5 degrees Fahrenheit (°F)); medium warming range (5.5 to 8.0 °F); and higher warming range (8.0 to 10.5 °F). The Climate Scenarios Report then presents an analysis of the future projected climate changes in California under each warming range scenario.

According to the report, substantial temperature increases would result in a variety of impacts to the people, economy, and environment of California. These impacts would result from a

projected increase in extreme conditions, with the severity of the impacts depending upon actual future emissions of GHGs and associated warming. These impacts are described below.

**Public Health.** Higher temperatures are expected to increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to O<sub>3</sub> formation are projected to increase by 25 to 35 percent under the lower warming range and 75 to 85 percent under the medium warming range. In addition, if global background O<sub>3</sub> levels increase as is predicted in some scenarios, it may become impossible to meet local air quality standards. An increase in wildfires could also occur, and the corresponding increase in the release of pollutants including PM<sub>2.5</sub> could further compromise air quality. The Climate Scenarios Report indicates that large wildfires could become up to 55 percent more frequent if GHG emissions are not significantly reduced.

Potential health effects from global climate change may arise from temperature increases, climate-sensitive diseases, extreme events, and air quality. There may be direct temperature effects through increases in average temperature leading to more extreme heat waves and less extreme cold spells. Those living in warmer climates are likely to experience more stress and heat-related problems (e.g., heat rash and heat stroke). In addition, climate sensitive diseases (such as malaria, dengue fever, yellow fever, and encephalitis) may increase, such as those spread by mosquitoes and other disease-carrying insects.

**Water Resources.** A vast network of reservoirs and aqueducts capture and transport water throughout the State from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada mountain snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages. In addition, if temperatures continue to rise more precipitation would fall as rain instead of snow, further reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. The State's water resources are also at risk from rising sea levels. An influx of seawater would degrade California's estuaries, wetlands, and groundwater aquifers.

**Agriculture.** Increased GHG and associated increases in temperature are expected to cause widespread changes to the agricultural industry, reducing the quantity and quality of agricultural products statewide. Significant reductions in available water supply to support agriculture would also impact production. Crop growth and development will change as will the intensity and frequency of pests and diseases.

**Ecosystems/Habitats.** Continued global warming will likely shift the ranges of existing invasive plants and weeds, thus alternating competition patterns with native plants. Range expansion is expected in many species while range contractions are less likely in rapidly evolving species with significant populations already established. Continued global warming is also likely to increase the populations of and types of pests. Continued global warming would also affect natural ecosystems and biological habitats throughout the State.

**Wildland Fires.** Global warming is expected to increase the risk of wildfire and alter the distribution and character of natural vegetation. If temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55 percent, which is almost twice the increase expected if temperatures stay in the lower warming range. However, since wildfire risk is determined by a combination of factors including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the State.

**Rising Sea Levels.** Rising sea levels, more intense coastal storms, and warmer water temperatures will increasingly threaten the State's coastal regions. Under the high warming scenario, sea level is anticipated to rise 22 to 35 inches by 2100. A sea level risk of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten levees and inland water systems, and disrupt wetlands and natural habitats.

### **3.0 CLIMATE CHANGE SIGNIFICANCE CRITERIA**

The SJVAPCD has adopted its *Guidance for Valley Land Use Agencies in Addressing GHG Impacts for New Projects Under CEQA*. (SJVAPCD 2009). The guidance provides initial screening criteria for GCC analyses, as well as draft guidance for the determination of significance.

The effects of project-specific GHG emissions are cumulative, and therefore GCC impacts are addressed as a cumulative, rather than a direct, impact. The guidance for determining significance of impacts has been developed from the requirements of AB 32. The guideline addresses the potential cumulative impacts that a project's GHG emissions could have on GCC. Since GCC is a global phenomenon, no direct impact would be identified for an individual land development project. The following criteria are used to evaluate whether a project would result in a significant impact for GCC impacts:

- Does the project comply with an adopted statewide, regional, or local plan for reduction or mitigation of GHG emissions? If no, then
- Does the project achieve 29% GHG reductions by using approved Best Performance Standards? If no, then
- Does the project achieve AB 32 targeted 29% GHG emission reductions compared with Business As Usual (BAU)?

Projects that meet one of these guidelines would have less than significant impact on the global climate.

Because BPS have not yet been adopted and identified for specific development projects, and because neither the ARB nor the City of Clovis has not yet adopted a plan for reduction of GHG with which the project can demonstrate compliance, the goal of 29% below BAU for emissions of GHG has been used as a threshold of significance for this analysis.

## **4.0 GREENHOUSE GAS INVENTORY**

GHG emissions associated with the Sierra Meadows Master Plan were estimated separately for four categories of emissions: (1) construction; (2) energy use, including electricity and natural gas usage; (3) water consumption; and (4) transportation. The analysis includes a baseline estimate assuming Title 24-compliant buildings based on 2005 Title 24 standards, which is considered business as usual for the proposed Project. Emissions were estimated based on emission factors from the California Climate Action Registry General Reporting Protocol (CCAP 2008). This inventory presents emissions based on “business as usual” assumptions.

The complete emissions inventory is summarized below and included in the Appendix.

### **4.1 Construction Greenhouse Gas Emissions**

The Sierra Meadows Master Plan will be constructed in two phases. The first phase involves construction of the Animal Adoption Center, a 15,650 square foot facility with associated infrastructure, with a 6,850 square foot expansion for a total of 22,500 square feet. The second phase will involve buildout of the Master Plan, which includes 40,000 square feet of buildings associated with the Nature Education and Wildlife Rehabilitation Center.

Construction GHG emissions include emissions from heavy construction equipment, truck traffic, and worker trips. Emissions from both phases of construction were calculated from the URBEMIS Model, Version 9.2.4 for construction activities, assuming that the development would commence construction in 2011 and be completed in by March 2012 for the Animal Adoption Center, and that construction of the remaining Master Plan elements would occur after the Animal Adoption Center is complete. The URBEMIS Model only provides estimates of emissions of CO<sub>2</sub>; it is assumed that, in comparison with CO<sub>2</sub> emissions, emissions of other GHGs (CH<sub>4</sub> and N<sub>2</sub>O) are negligible.

Total GHG emissions associated with construction are estimated at 219.37 tons (199 metric tons) in 2011, 68.07 tons (62 metric tons) in 2012, and 400.40 tons (363 metric tons) in 2013 for a total of 685.30 tons (624 metric tons) of GHG emissions for the duration of construction. These

emissions are below the 900 metric ton threshold proposed by the California Air Pollution Control Officers Association (CAPCOA 2008) as a threshold below which impacts to global climate change would not be anticipated. To evaluate the contribution of construction emissions to annual GHG impacts for construction emissions, some guidance recommends that the emissions be amortized over 30 years and added to operational emissions, as appropriate. Amortized over 30 years, construction would contribute 21 metric tons per year of CO<sub>2</sub> emissions.

## **4.2 Operational Greenhouse Gas Emissions**

**Energy Use Emissions.** As discussed above, energy use generates GHG through emissions from power plants that generate electricity as well as emissions from natural gas usage at the facility itself.

The Project proposes to develop a 15,650 square foot Animal Adoption Center with a 6,850 square foot expansion for a total of 22,500 square feet, and a 40,000 square foot Nature Education and Wildlife Rehabilitation Center with associated infrastructure. For business as usual conditions, total electricity and natural gas usage rates were estimated based on standard units without energy efficiency measures.

Business as usual electricity use was estimated based on assuming buildings at the Sierra Meadows Project would meet the requirements of Title 24 as of 2005. Emissions were calculated based on emission factors in the California Climate Action Registry General Reporting Protocol, Version 3.1 (CCAR 2009). Natural gas use was also estimated based on assuming the buildings would meet the requirements of Title 24 as of 2005. Emissions were calculated based on emission factors in the California Climate Action Registry General Reporting Protocol, Version 3.1 (CCAR 2009).

Electricity usage rates from the project were projected based on estimated annual rates of 13.63 kilowatt-hours (kWh) per square foot for miscellaneous general commercial uses (Itron 2006). Emissions of GHG were then calculated using emission factors from the California Climate

Action Registry General Reporting Protocol (CCAP 2009), which provide an estimate of pounds of emissions for a given amount of annual electricity usage. Likewise, natural gas usage was estimated based on estimated annual natural gas consumption of 0.26 therms per square foot for the project (Itron 2006).

**Water.** Water use and energy use are often closely linked. The provision of potable water to commercial users consumes large amounts of energy associated with five stages: source and conveyance, treatment, distribution, end use, and wastewater treatment. This inventory estimated that delivered water for the project will have an embodied energy of 12,700 kWh/gallon.

Water usage was estimated based on an estimated water usage of 35 gallons per year per square foot (Dziegielewski 2000). Business as usual water usage, without water management strategies implemented, is estimated at 560,000 gallons per year for the Animal Adoption Center, and 1,400,000 gallons per year for the Nature Education and Wildlife Rehabilitation Center. GHG emissions were then estimated based on the embodied energy of water, using the emission factors from the California Climate Action Registry General Reporting Protocol (CCAP 2009).

**Transportation.** As discussed in Section 1.2, on-road vehicle emissions account for 37% of existing GHG emissions in California. Traffic estimates of 192 average daily trips (ADT) for the Animal Adoption Center and 101 ADT for the Nature Education and Wildlife Rehabilitation Center are based on estimates provided in the traffic analysis (Peters Engineering 2010). Emissions from vehicles under “business as usual” conditions were calculated using the EMFAC2007 model. The EMFAC2007 model does not take into account any of the GHG reduction measures proposed by the state or federal government. Trip lengths from the URBEMIS Model, Version 9.2.4, were used to calculate vehicle miles traveled, and emissions were calculated using emission factors for Fresno County for the year 2012 (for conservative purposes) using the EMFAC2007 Model.

The results of the inventory for operational emissions for business as usual are presented in Table 4. These include GHG emissions associated with buildings (natural gas, purchased

electricity) and water consumption (energy embodied in potable water). Table 4 summarizes projected emissions for “business as usual” conditions using the methodologies noted above.

<b>Table 4</b>			
<b>SUMMARY OF ESTIMATED OPERATIONAL GREENHOUSE GAS EMISSIONS</b>			
<b>BUSINESS AS USUAL SCENARIO</b>			
<b>Emission Source</b>	<b>Annual Emissions (Metric tons/year)</b>		
	<b>CO<sub>2</sub></b>	<b>CH<sub>4</sub></b>	<b>N<sub>2</sub>O</b>
<b>Operational Emissions</b>			
Electricity Use Emissions	340	0.0026	0.0014
Natural Gas Use Emissions	86	0.0096	0.0002
Water Consumption Emissions	10	0.00008	0.00004
Vehicle Emissions	329	0.0247	0.0556
Amortized Construction Emissions	21	-	-
<b>Total</b>	<b>786</b>	<b>0.037</b>	<b>0.057</b>
Global Warming Potential Factor	<b>1</b>	<b>21</b>	<b>310</b>
CO <sub>2</sub> Equivalent Emissions	786	0.77	18
<b>TOTAL CO<sub>2</sub> Equivalent Emissions</b>	<b>805</b>		

As shown in Table 4, emissions are below the screening-level threshold of 900 metric tons of CO<sub>2</sub>e. Impacts would therefore not be significant. As the SJVAPCD has set a threshold of 29% below business as usual as a significance threshold under CEQA, the following section addresses GHG reduction measures and the reductions that will be achieved by the project.

## **5.0 SUMMARY OF PROJECT DESIGN FEATURES, IMPACTS, AND MITIGATION MEASURES**

As discussed in Section 3.0, a significance threshold of 29% below “business as usual” levels is considered to demonstrate that a project would be consistent with the goals of AB 32.

Business as usual electricity and natural gas usage is based on compliance with Title 24 as of 2005. To take into account energy efficiency measures that are included in the building design, which is compliant with Title 24 as of 2008, it was assumed that the buildings would be 15% more energy efficient based on studies that indicate that the current Title 24 standards are approximately that much more energy efficiency (Eden 2009).

In addition to energy efficiency measures, implementation of state and federal standards to reduce GHG emissions from vehicles would further reduce overall emissions from the project. The USEPA recently granted the waiver for California for its greenhouse gas emission standards for motor vehicles. Accordingly, the Pavley standards for vehicle emission reductions will be in effect in the future for the Sierra Meadows Park. The Pavley standards require GHG emission reductions from vehicles equivalent to approximately 30% by 2016 (ARB 2008). Although new vehicle emissions factors will be reduced by 30% in 2016, the fleet average emissions reduction in 2020 will be less than that, due to vehicle phase in. The Pavley standards are expected to reduce total emissions for automobiles and light trucks by 20% relative to the scenario without Pavley or CAFE by the year 2020. It was therefore assumed that the Pavley standards would reduce emissions from vehicles by 20%. The Low Carbon Fuel Standard is anticipated to reduce overall emissions from vehicles by an additional 10%, which was also taken into account in the emission calculations for vehicles.

In addition to the Pavley fuel efficiency standards and the LCFS, included in the ARB’s Scoping Plan (ARB 2008) are strategies to reduce emissions by increasing efficiency, optimizing aerodynamics, and converting combustion-only vehicles to hybrids. The Scoping Plan measures apply to both light-duty vehicles (Measure T-4) and medium and heavy-duty vehicles (Measures

T-7 and T-8). Measure T-4 includes such vehicle efficiency measures as implementation of a properly inflated tire program, use of low-friction engine oils, requiring solar-reflective automotive paints and window glazing, and implementing a tire tread program that develops and adopts tire rolling resistance standards. Measure T-7 would require existing trucks and trailers to be retrofitted with the best available technology and/or ARB approved technology. The retrofits would improve fuel efficiency of trucks by including devices that reduce aerodynamic drag and rolling resistance. Measure T-8 will require medium and heavy-duty vehicles to be converted to hybrid vehicles; these vehicles include parcel delivery trucks and vans, utility trucks, garbage trucks, buses, and other vocational work trucks.

According to the Scoping Plan, Measure T-4 would result in a reduction in GHG emissions from light-duty vehicles of 4.5 MMT CO<sub>2</sub>e by 2020 (a reduction of 2.0% from business as usual emissions); Measure T-7 would result in a reduction in GHG emissions from heavy-duty vehicles of 0.93 MMT CO<sub>2</sub>e by 2020 (a reduction of 0.4% from business as usual emissions); and Measure T-8 would result in a reduction in GHG emissions from medium- and heavy-duty vehicles of 0.5 MMT CO<sub>2</sub>e by 2020 (a reduction of 0.2% from business as usual emissions). Because the project would not generate substantial heavy-duty truck traffic, it is appropriate to include the reductions in GHG emissions associated with Measures T-4 and T-8, but not with Measure T-7. The associated GHG emission reductions would be 2.2% from business as usual.

The Renewable Portfolio Standard (RPS) was also considered in the analysis. Since 2002, power suppliers in California have been required to procure a certain percentage, known as the Renewables Portfolio Standard (RPS), of electricity from renewable sources. In 2002, Senate Bill 1078 set the RPS at 20% by 2017, meaning that by 2017 power suppliers were to procure at least 20% of their electricity from renewable sources. In 2003 the RPS was accelerated to 20% by 2010, and in 2008 the Governor issued an Executive Order setting a higher RPS standard at 33% by 2020. According to the SJVAPCD (SJVAPCD 2009), the use of the RPS is an achieved-in-practice Best Performance Standard for emissions associated with electricity consumption. For conservative purposes, it was assumed that 20% of electricity would be supplied by renewable resources, reducing emissions from electricity use by 20%.

The results of the GHG inventory for emissions with implementation of GHG reduction measures are presented in Table 6. As shown in Table 6, the proposed Project will meet the significance threshold to reduce operational GHG emissions by 29%. The proposed Project would therefore be consistent with the goals of AB 32, and would not result in a significant impact on global climate.

<b>Table 6</b>			
<b>SUMMARY OF ESTIMATED OPERATIONAL GREENHOUSE GAS EMISSIONS WITH GHG REDUCTION MEASURES SCENARIO</b>			
<b>Emission Source</b>	<b>Annual Emissions (Metric tons/year)</b>		
	<b>CO<sub>2</sub></b>	<b>CH<sub>4</sub></b>	<b>N<sub>2</sub>O</b>
<b>Operational Emissions</b>			
Electricity Use Emissions	231	0.0017	0.0010
Natural Gas Use Emissions	73	0.0081	0.0001
Water Consumption Emissions	8	0.00006	0.00003
Vehicle Emissions	223	0.0168	0.0435
Amortized Construction Emissions	21	-	-
<b>Total</b>	<b>556</b>	<b>0.027</b>	<b>0.045</b>
Global Warming Potential Factor	<b>1</b>	<b>21</b>	<b>310</b>
CO <sub>2</sub> Equivalent Emissions	556	0.56	14
<b>TOTAL CO<sub>2</sub> Equivalent Emissions</b>	<b>570</b>		
<b>Business as Usual CO<sub>2</sub> Equivalent Emissions</b>	<b>805</b>		
<b>Percent Reduction from Business as Usual</b>	<b>29%</b>		

Additional measures that are not quantifiable at this time will further reduce emissions from the project. With implementation of the measures listed above, the GHG emissions are both below the 900 metric ton threshold and reduce GHG emissions by 29% from business as usual conditions. The project will meet the goals of AB 32 and will therefore not result in a significant cumulative impact on global climate.

## **6.0 CONCLUSIONS**

Emissions of GHGs would result in a net increase in emissions from construction and operations. As discussed in Section 5.0, emissions would be reduced to below the level of significance adopted for this analysis through the implementation of PDFs and mitigation measures designed to reduce GHG to at least 29 percent below “business as usual” levels. Because the proposed Project would reduce GHG emissions by at least 29 percent below business as usual, it conforms with the goals of AB 32. The proposed Project would therefore not result in any direct impacts to the global climate, and cumulative impacts would be less than significant.

## 7.0 REFERENCES

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**Appendix A**  
**Greenhouse Gas Emission Calculations**

Table A-1  
 Electricity Greenhouse Gas Emissions  
 Business As Usual  
 Sierra Meadows Master Plan

**Electricity**

<u>Land Use</u>	<u>Square feet</u>	<u>Average Electricity Load</u>	<u>(KWh\year)</u>	<u>MWh\year</u>
<b>Project</b>				
Animal Adoption Cen	22500.0	13.63	306,675	306.68
Nature Center	40000.0	13.63	545,200	545.20
<b>Total Project</b>			<b>851,875</b>	<b>851.88</b>

<b>GHG</b>	<b>lbs/MWh<sup>b</sup></b>	<b>lbs</b>	<b>metric tons</b>	<b>CO<sub>2</sub>E</b>
<b>Project</b>				
<b>CO<sub>2</sub></b>	878.71	748551.0813	339.536782	339.536782
<b>CH<sub>4</sub></b>	0.0067	5.7075625	0.002588905	0.054366998
<b>N<sub>2</sub>O</b>	0.0037	3.1519375	0.001429694	0.443205027
				<b>340.03</b>

<sup>b</sup> Emission factors for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O were derived from the California Climate Action Registry General Reporting Protocol; Version 3.1, January 2009

Table A-2  
 Natural Gas Greenhouse Gas Emissions  
 Business As Usual  
 Sierra Meadows Master Plan

**Natural Gas**

<u>Land Use</u>	<u>Square feet</u>	<u>Average Usage Rate kBTU/unit/year</u>	<u>Total Natural Gas Usage (MMBTU/year)</u>
<b>Project</b>			
Animal Adoption C	22500.0	26.0	585
Nature Center	40000.0	26.0	1,040
<b>Total Project</b>			<b>1,624</b>

<b>GHG</b>	<b>Kg/MMBtu<sup>b</sup></b>	<b>Kg</b>	<b>metric tons</b>	<b>CO<sub>2</sub>E (Metric Tons)</b>
<b>Project</b>				
<b>CO<sub>2</sub></b>	53.06	86,189.34	86.19	86.19
<b>CH<sub>4</sub></b>	0.0059	9.58	0.0096	0.20
<b>N<sub>2</sub>O</b>	0.0001	0.16	0.0002	0.05

**86.44**

<sup>b</sup> Emission factors for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O were derived from the California Climate Action Registry General Reporting Protocol; Version 3.1, January 2009

Table A-3  
 Water Use Greenhouse Gas Emissions  
 Business As Usual  
 Sierra Meadows Master Plan

**Water - Business As Usual**

Land Use	Usage Rate			
	Gallons/yr total	(kWh\million gal)	(KWh\year)	MWh\year
Animal Adoption Cen	560000	12700	7,112	7.11
Nature Center	1400000	12700	17,780	17.78
<b>Total Project</b>			<b>24,892</b>	<b>24.89</b>

GHG	lbs/MWh <sup>b</sup>	lbs	metric tons	CO <sub>2</sub> E
<b>Project</b>				
<b>CO<sub>2</sub></b>	878.71	21872.84932	9.921349469	9.921349469
<b>CH<sub>4</sub></b>	0.0067	0.1667764	7.56484E-05	0.001588617
<b>N<sub>2</sub>O</b>	0.0037	0.0921004	4.1776E-05	0.012950561
				<b>9.94</b>

<sup>b</sup> Emission factors for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O were derived from the California Climate Action Registry General Reporting Protocol; Version 3.1, January 2009

Table A-4  
 Project-Related Traffic GHG Emissions - Business As Usual  
 Sierra Meadows Master Plan

Vehicle Class	Number of Daily Trips	Speed (mph)	VMT (mi/vehicle-day)	CO2			CH4		N2O		Emissions, metric tons/year		
				Running Exhaust (g/mi)	Start-Up (g/start) <sup>a</sup>		Running Exhaust (g/mi)	Start-Up (g/start) <sup>a</sup>	Running Exhaust (g/mi)	Start-Up (g/start) <sup>a</sup>	CO2	CH4	N2O
<b>ADT</b>	<b>293</b>												
Light Auto	124	30	7.39	918.0745	338.923	163.505	0.021	0.04	0.018	0.041	<b>114</b>	<b>0.01</b>	<b>0.01</b>
Light Truck 1	35	30	7.39	261.9977	420.633	194.855	0.025	0.041	0.029	0.039	<b>40</b>	<b>0.00</b>	<b>0.00</b>
Light Truck 2	62	30	7.39	456.872	424.406	203.803	0.032	0.056	0.042	0.079	<b>71</b>	<b>0.01</b>	<b>0.01</b>
Medium Truck	35	30	7.39	257.6671	580.281	279.5	0.04	0.072	0.053	0.093	<b>55</b>	<b>0.00</b>	<b>0.01</b>
Lite-Heavy Truck 1	7	30	7.39	51.96648	556.529	313.976	0.024	0.146	0.127	0.279	<b>11</b>	<b>0.00</b>	<b>0.00</b>
Lite-Heavy Truck 2	3	30	7.39	19.48743	548.32	250.6	0.018	0.113	0.224	0.235	<b>4</b>	<b>0.00</b>	<b>0.00</b>
Medium Heavy Truck	4	30	7.39	28.14851	1365.172	107.276	0.017	0.12	0.485	0.150	<b>14</b>	<b>0.00</b>	<b>0.01</b>
Heavy-Heavy Truck	8	30	7.39	60.62756	1907.427	50.205	0.038	0.112	1.088	0.188	<b>42</b>	<b>0.00</b>	<b>0.02</b>
Other Bus	0	30	7.39	2.16527	1147.764	215.209	0.038	0.233	0.396	0.450	<b>1</b>	<b>0.00</b>	<b>0.00</b>
Urban Bus	0	30	7.39	0	1900.934	132.559	0.038	0.14	1.103	0.347	<b>0</b>	<b>0.00</b>	<b>0.00</b>
Motorcycle	11	30	7.39	84.44553	135.153	79.703	0.194	0.209	0.116	0.035	<b>4</b>	<b>0.01</b>	<b>0.00</b>
School Bus	0	30	7.39	2.16527	1382.089	49.791	0.039	0.079	0.966	0.073	<b>1</b>	<b>0.00</b>	<b>0.00</b>
Motor Home	3	30	7.39	21.6527	690.105	319.659	0.058	0.227	0.238	0.347	<b>6</b>	<b>0.00</b>	<b>0.00</b>
All (metric tons)				2165.27							<b>329</b>	<b>0.0247</b>	<b>0.0556</b>

CO2e Emissions

**346**

2012 emission factors, EMFAC2007 Model, Fresno County  
 Assume 8 hours prior to start for startup emissions

Table A-5  
 Electricity Greenhouse Gas Emissions  
 with GHG Reductions  
 Sierra Meadows Master Plan

**Electricity**

<u>Land Use</u>	<u>Square feet</u>	<u>Average Electricity Load</u>	<u>(KWh\year)</u>	<u>MWh\year</u>
<b>Project</b>				
Animal Adoption Cen	22500.0	11.59	260,674	260.67
Nature Center	40000.0	11.59	463,420	463.42
<b>Total Project</b>			<b>724,094</b>	<b>724.09</b>

<b>GHG</b>	<b>lbs/MWh<sup>b</sup></b>	<b>lbs</b>	<b>metric tons</b>	<b>CO<sub>2</sub>E</b>
<b>Project</b>				
<b>CO<sub>2</sub></b>	702.968	509014.7353	230.8850118	230.8850118
<b>CH<sub>4</sub></b>	0.00536	3.8811425	0.001760455	0.036969559
<b>N<sub>2</sub>O</b>	0.00296	2.1433175	0.000972192	0.301379418
				<b>231.22</b>

<sup>b</sup> Emission factors for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O were derived from the California Climate Action Registry General Reporting Protocol; Version 3.1, January 2009

Table A-6  
 Natural Gas Greenhouse Gas Emissions  
 with GHG Reduction Measures  
 Sierra Meadows Master Plan

**Natural Gas**

<u>Land Use</u>	<u>Square feet</u>	<u>Average Usage Rate kBTU/unit/year</u>	<u>Total Natural Gas Usage (MMBTU/year)</u>
<b>Project</b>			
Animal Adoption C	22500.0	22.1	497
Nature Center	40000.0	22.1	884
<b>Total Project</b>			<b>1,381</b>

<b>GHG</b>	<b>Kg/MMBtu<sup>b</sup></b>	<b>Kg</b>	<b>metric tons</b>	<b>CO<sub>2</sub>E (Metric Tons)</b>
<b>Project</b>				
<b>CO<sub>2</sub></b>	53.06	73,260.94	73.26	73.26
<b>CH<sub>4</sub></b>	0.0059	8.15	0.0081	0.17
<b>N<sub>2</sub>O</b>	0.0001	0.14	0.0001	0.04

**73.47**

<sup>b</sup> Emission factors for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O were derived from the California Climate Action Registry General Reporting Protocol; Version 3.1, January 2009

Table A-7  
 Water Use Greenhouse Gas Emissions  
 with GHG Reduction Measures  
 Sierra Meadows Master Plan

**Water - Business As Usual**

Land Use	Usage Rate			
	Gallons/yr total	(kWh\million gal)	(KWh\year)	MWh\year
Animal Adoption Cen	560000	12700	7,112	7.11
Nature Center	1400000	12700	17,780	17.78
<b>Total Project</b>			<b>24,892</b>	<b>24.89</b>

GHG	lbs/MWh <sup>b</sup>	lbs	metric tons	CO <sub>2</sub> E
<b>Project</b>				
<b>CO<sub>2</sub></b>	702.968	17498.27946	7.937079575	7.937079575
<b>CH<sub>4</sub></b>	0.00536	0.13342112	6.05188E-05	0.001270894
<b>N<sub>2</sub>O</b>	0.00296	0.07368032	3.34208E-05	0.010360449
				<b>7.95</b>

<sup>b</sup> Emission factors for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O were derived from the California Climate Action Registry General Reporting Protocol; Version 3.1, January 2009

Table A-8  
 Project-Related Traffic GHG Emissions - with GHG Reduction Measures  
 Sierra Meadows Master Plan

Vehicle Class	Number of Daily Trips	Speed (mph)	VMT (mi/vehicle-day)	CO2		CH4		N2O		Emissions, metric tons/year			
				Running Exhaust (g/mi)	Start-Up (g/start) <sup>a</sup>	Running Exhaust (g/mi)	Start-Up (g/start) <sup>a</sup>	Running Exhaust (g/mi)	Start-Up (g/start) <sup>a</sup>	CO2	CH4	N2O	
<b>ADT</b>	<b>293</b>												
Light Auto	124	30	7.39	918.0745	229.7898	147.1545	0.014238	0.036	0.014191	0.041	<b>77</b>	<b>0.00</b>	<b>0.00</b>
Light Truck 1	35	30	7.39	261.9977	285.1892	175.3695	0.01695	0.0369	0.022395	0.039	<b>27</b>	<b>0.00</b>	<b>0.00</b>
Light Truck 2	62	30	7.39	456.872	287.7473	183.4227	0.021696	0.0504	0.032668	0.079	<b>48</b>	<b>0.00</b>	<b>0.01</b>
Medium Truck	35	30	7.39	257.6671	393.4305	251.55	0.02712	0.0648	0.04139	0.093	<b>37</b>	<b>0.00</b>	<b>0.00</b>
Lite-Heavy Truck 1	7	30	7.39	51.96648	377.3267	282.5784	0.016272	0.1314	0.098522	0.279	<b>7</b>	<b>0.00</b>	<b>0.00</b>
Lite-Heavy Truck 2	3	30	7.39	19.48743	371.761	225.54	0.012204	0.1017	0.174649	0.235	<b>3</b>	<b>0.00</b>	<b>0.00</b>
Medium Heavy Truck	4	30	7.39	28.14851	925.5866	96.5484	0.011526	0.108	0.37768	0.150	<b>10</b>	<b>0.00</b>	<b>0.00</b>
Heavy-Heavy Truck	8	30	7.39	60.62756	1293.236	45.1845	0.025764	0.1008	0.846417	0.188	<b>29</b>	<b>0.00</b>	<b>0.02</b>
Other Bus	0	30	7.39	2.16527	778.184	193.6881	0.025764	0.2097	0.307983	0.450	<b>1</b>	<b>0.00</b>	<b>0.00</b>
Urban Bus	0	30	7.39	0	1288.833	119.3031	0.025764	0.126	0.858465	0.347	<b>0</b>	<b>0.00</b>	<b>0.00</b>
Motorcycle	11	30	7.39	84.44553	91.63373	71.7327	0.131532	0.1881	0.09017	0.035	<b>3</b>	<b>0.00</b>	<b>0.00</b>
School Bus	0	30	7.39	2.16527	937.0563	44.8119	0.026442	0.0711	0.751369	0.073	<b>1</b>	<b>0.00</b>	<b>0.00</b>
Motor Home	3	30	7.39	21.6527	467.8912	287.6931	0.039324	0.2043	0.184849	0.347	<b>4</b>	<b>0.00</b>	<b>0.00</b>
All (metric tons)				2165.27							<b>223</b>	<b>0.0168</b>	<b>0.0435</b>

CO2e Emissions

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2012 emission factors, EMFAC2007 Model, Fresno County  
 Assume 8 hours prior to start for startup emissions

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Urbemis\Urbemis 9.2.2\Projects\Sierra Meadows Animal Adoption Ctr.urb924

Project Name: Sierra Meadows

Project Location: Fresno County

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>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2011 TOTALS (tons/year unmitigated)	0.30	2.09	1.43	0.00	0.22	0.15	0.37	0.05	0.14	0.18	223.76
2011 TOTALS (tons/year mitigated)	0.30	2.09	1.43	0.00	0.09	0.15	0.24	0.02	0.14	0.16	223.76
Percent Reduction	0.00	0.00	0.00	0.00	60.63	0.00	36.12	60.37	0.00	15.18	0.00
2012 TOTALS (tons/year unmitigated)	0.33	0.60	0.44	0.00	0.00	0.05	0.05	0.00	0.04	0.04	69.88
2012 TOTALS (tons/year mitigated)	0.33	0.60	0.44	0.00	0.00	0.05	0.05	0.00	0.04	0.04	69.88
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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)	0.03	0.03	0.16	0.00	0.00	0.00	33.10

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)	0.25	0.44	2.83	0.00	0.23	0.05	264.25

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)	0.28	0.47	2.99	0.00	0.23	0.05	297.35

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated



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2012	0.33	0.60	0.44	0.00	0.00	0.05	0.05	0.00	0.04	0.04	69.88
Asphalt 05/16/2011-03/31/2012	0.06	0.34	0.25	0.00	0.00	0.03	0.03	0.00	0.03	0.03	34.58
Paving Off-Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.05	0.33	0.21	0.00	0.00	0.03	0.03	0.00	0.03	0.03	30.29
Paving On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Paving Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.16
Building 05/16/2011-03/31/2012	0.04	0.26	0.19	0.00	0.00	0.02	0.02	0.00	0.01	0.01	35.01
Building Off Road Diesel	0.03	0.26	0.15	0.00	0.00	0.02	0.02	0.00	0.01	0.01	29.04
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18
Building Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.80
Coating 02/01/2012-03/31/2012	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
Architectural Coating	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29

Phase Assumptions

- Phase: Fine Grading 4/1/2011 - 5/15/2011 - Default Fine Site Grading Description
- Total Acres Disturbed: 2.83
- Maximum Daily Acreage Disturbed: 0.71
- 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
- 2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
- 1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

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Phase: Trenching 5/1/2011 - 5/15/2011 - Type Your Description Here

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 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 5/16/2011 - 3/31/2012 - Default Paving Description

Acres to be Paved: 0.71

Off-Road Equipment:

2 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

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

Phase: Building Construction 5/16/2011 - 3/31/2012 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 4 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

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

Phase: Architectural Coating 2/1/2012 - 3/31/2012 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 130

Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 130

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

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Mitigated



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2012	0.33	0.60	0.44	0.00	0.00	0.05	0.05	0.00	0.04	0.04	69.88
Asphalt 05/16/2011-03/31/2012	0.06	0.34	0.25	0.00	0.00	0.03	0.03	0.00	0.03	0.03	34.58
Paving Off-Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.05	0.33	0.21	0.00	0.00	0.03	0.03	0.00	0.03	0.03	30.29
Paving On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Paving Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.16
Building 05/16/2011-03/31/2012	0.04	0.26	0.19	0.00	0.00	0.02	0.02	0.00	0.01	0.01	35.01
Building Off Road Diesel	0.03	0.26	0.15	0.00	0.00	0.02	0.02	0.00	0.01	0.01	29.04
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18
Building Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.80
Coating 02/01/2012-03/31/2012	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
Architectural Coating	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Fine Grading 4/1/2011 - 5/15/2011 - Default Fine Site Grading Description

For Soil Stabilizing Measures, the Water exposed surfaces 3x daily watering mitigation reduces emissions by:

PM10: 61% PM25: 61%

For Unpaved Roads Measures, the Manage haul road dust 3x daily watering mitigation reduces emissions by:

PM10: 61% PM25: 61%

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	0.00	0.03	0.02	0.00	0.00	0.00	32.85
Hearth							
Landscape	0.01	0.00	0.14	0.00	0.00	0.00	0.25
Consumer Products							
Architectural Coatings	0.02						
<b>TOTALS (tons/year, unmitigated)</b>	<b>0.03</b>	<b>0.03</b>	<b>0.16</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>33.10</b>

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>
Animal Adoption Center	0.25	0.44	2.83	0.00	0.23	0.05	264.25
<b>TOTALS (tons/year, unmitigated)</b>	<b>0.25</b>	<b>0.44</b>	<b>2.83</b>	<b>0.00</b>	<b>0.23</b>	<b>0.05</b>	<b>264.25</b>

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2012 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
Animal Adoption Center		8.53	1000 sq ft	22.50	191.92	1,418.90
					191.92	1,418.90

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	44.3	0.9	98.9	0.2
Light Truck < 3750 lbs	10.7	1.9	93.4	4.7
Light Truck 3751-5750 lbs	21.9	0.9	98.6	0.5
Med Truck 5751-8500 lbs	12.0	0.8	99.2	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	76.2	23.8
Lite-Heavy Truck 10,001-14,000 lbs	0.8	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.4	0.0	14.3	85.7
Heavy-Heavy Truck 33,001-60,000 lbs	2.3	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	60.0	40.0	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

Travel Conditions

	Residential			Commute	Commercial	
	Home-Work	Home-Shop	Home-Other		Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Animal Adoption Center				2.0	1.0	97.0

Operational Changes to Defaults