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Climate Change Technical Report

Resource Management and Development Plan
Spineflower Conservation Plan

February 2009

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Acronyms

°C	degrees Centigrade
AB 1493	Assembly Bill No. 1493
AB 32	California Global Warming Solutions Act of 2006
ACM	Alternative Compliance Method
AF	acre-feet
ARB	California Air Resources Board
BAAQMD	Bay Area Air Quality Management District
C	carbon
CA	California
CAPCOA	California Air Pollution Control Officers Association
CAT	Climate Action Team
CBECS	Commercial Buildings Energy Consumption Survey
CCAR	California Climate Action Registry
ccf/yr	hundred cubic feet per year
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CDD	Cooling Degree Days
CF_4	tetrafluoromethane
CFC	chlorinated fluorocarbon
CH_4	methane
CHP	combined heat and power
CO_2	carbon dioxide
CO_2e	CO_2 equivalents
CPUC	California Public Utilities Commission
D2	design Alternative 2
DHW	domestic hot water
DOT	Department of Transportation
EEMIS	Enterprise Energy Management Information System
EIA	United States Energy Information Administration
EIR	Environmental Impact Report
EMFAC	Emissions Factors Estimation Software Program
ENVIRON	ENVIRON International Corporation
eQuest	quick energy simulation tool
GDP	gross domestic product
GHG	greenhouse gas
GRP	General Reporting Protocol
Gt	gigatonnes
GWP	global warming potential
H_2O	water
HDD	Heating Degree Days
HFC	hydrofluorocarbon
H.R. 620	Climate Stewardship Act of 2007
hr	hour

HVAC	heating ventilation and air conditioning
IPCC	Intergovernmental Panel on Climate Change
ISD	Internal Services Department
kW	kilowatt
kWh/yr	kilowatt hours/year
LA	Los Angeles
LACDPW	Los Angeles County Department of Public Works
lb	pounds
LCA	Life Cycle Assessment
LDA	light-duty auto
LDT	light-duty truck
LEED	Leadership in Energy and Environmental Design
LEV	Low-Emission Vehicle
LID	Low Impact Development
LULUCF	Land-Use, Land-Use Change and Forestry
MA	Massachusetts
MAC	Market Advisory Committee
MG	million gallons
MMT	million metric tonnes
$MMTCO_2e$	million metric tonnes of CO_2 equivalent
MN	Minnesota
MND	Mitigated Negative Declaration
mph	miles per hour
MW	megawatts
MWh	megawatt-hour
NEPA	National Environmental Policy Act
N_2O	nitrous oxide
NRSP	Newhall Ranch Specific Plan
O_2	oxygen
OFFROAD	database
OPR	Office of Planning and Research
PC	passenger car
PFC	perfluorocarbon
PG&E	Pacific Gas and Electric
ppb	parts per billion
ppm	parts per million
RCx	Facility Retrocommissioning
RECS	Residential Energy Consumption Survey
RGGI	Regional Greenhouse Gas Initiative
RMDP	Resource Management Development Plan
RoadMod	Road Construction Emissions Model
S. 280	Climate Stewardship and Innovation Act of 2007
S. 309	Global Warming Pollution Reduction Act
S. 317	Electric Utility Cap and Trade Act of 2007
S. 485	Global Warming Reduction Act of 2007

SAR	Second Assessment Report
SB 97	Senate Bill 97
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCP	Spineflower Conservation Plan
SCVCTM	Santa Clarita Valley Consolidated Traffic Model
SF_6	sulfur hexafluoride
SMAQMD	Sacramento Metropolitan Air Quality Management District
sqft	square feet
SWP	State Water Project
TAR	Third Assessment Report
TDV	Time Dependent Valuation
Tonnes	Metric tonnes; 1,000 kilograms
Tons	Short tons; 2,000 pounds
UN	United Nations
UNEP	United Nations Environment Programme
URBEMIS	Urban Emissions Model
US	United States
USEPA	United States Environmental Protection Agency
VCC	Valencia Commerce Center
VMT	vehicle miles traveled
WMO	World Meteorological Organization
WRI	World Resource Institute
WRP	Water Reclamation Plant

EXECUTIVE SUMMARY

The Proposed Project analyzed in this technical report is the Newhall Ranch Resource Management Development Plan (RMDP) and the Spineflower Conservation Plan (SCP). The RMDP is a conservation, mitigation, and permitting plan for sensitive biological resources within the previously approved 11,999-acre Newhall Ranch Specific Plan (NRSP) area. The SCP is a conservation and management plan to permanently protect and manage a system of preserves designed to maximize the long-term persistence of the San Fernando Valley spineflower, a federal candidate and a state-listed endangered plant species. The Project applicant and landowner is The Newhall Land and Farming Company, and the lead agencies for the Proposed Project, under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA), are the California Department of Fish and Game and U.S. Army Corps of Engineers.

Approval of the Proposed Project will facilitate build-out of the NRSP area, Entrada planning area, and Valencia Commerce Center (VCC) planning area. These three planning areas are located in a northern, unincorporated portion of Los Angeles County and within the Santa Clarita Valley Planning Area. The NRSP area will accommodate single-family and multi-family residential units, as well as commercial and mixed-use space, an elementary school, fire station, public and private recreation facilities, trails, and various road improvements. The Entrada planning area will accommodate single-family and multi-family residential units, as well as commercial space. Finally, the VCC planning area will accommodate commercial space. The build-out of these three planning areas will result in one-time and annual (direct and indirect) emissions of greenhouse gases (GHGs). This report discusses the scientific and regulatory developments surrounding global climate change and provides an inventory surveying the emissions from the Proposed Project.

There is a general scientific consensus that most current global warming is the result of human activity on the planet. This man-made, or anthropogenic, warming is primarily caused by increased emissions of GHGs that keep the earth's surface warm. This is called "the greenhouse effect" and contributes to global climate change.

Lawmakers at the national, state, and local levels have introduced legislation and regulations aimed at better tracking and controlling GHGs. On the national level, there are some incentives for businesses and individuals to take voluntary steps to limit GHG emissions. However, no federal legislation capping GHG emissions or requiring reporting has been passed at this time. California has passed numerous bills relating to global climate change, the most important of which for purposes of this analysis is the California Global Warming Solutions Act of 2006 (Assembly Bill 32 or AB 32), which established mandatory reductions in state-wide GHG emissions by 2020.

Residents of residential developments and the users of commercial and municipal buildings and services use electricity, heating, and motor vehicle transportation, all of which directly or indirectly emit GHGs. The most significant GHG emissions resulting from such residential developments are emissions of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). GHG emissions are typically measured in terms of pounds or tonnes of CO_2 equivalents (CO_2e), calculated as the product of the pounds emitted of a given GHG and its specific global warming potential (GWP).

The emissions inventory presented in this report is consistent with the methodologies established by the California Climate Action Registry (CCAR) where possible. The inventory prepared for the Proposed Project and its alternatives considers nine categories of GHG emissions: emissions due to vegetation changes, emissions from construction activities, residential building emissions, commercial building emissions, mobile source emissions, area emissions, municipal emissions, recreation center emissions, and golf course emissions. The emissions from construction and land use are one-time emissions events. The other emissions occur annually, throughout the life of the project. (All electrical power will be supplied by Southern California Edison (SCE). Accordingly, indirect GHG emissions from electricity usage are calculated using the SCE carbon-intensity factor.)

A variety of methods are employed to develop a complete GHG emissions inventory. In addition to well established emission factors for certain activities and emission estimates based on similar activities in other representative communities, several emissions estimation software programs are used. These include EMFAC, OFFROAD, URBEMIS, eQUEST, and Micropas.

Emissions from the Proposed Project (i.e., emissions resulting from approval of the RMDP and the subsequent, facilitated build-out of the NRSP area, Entrada planning area and VCC planning area) are presented in Table ES-1. Both the one-time and annual emissions are presented. There are 601,900 tonnes of CO_2e one-time emissions. The annual emissions from the Proposed Project amount to 329,500 tonnes/year. Of the annual emissions, 53% result from vehicular emissions associated with residential and commercial activities, and 38% result from the energy use associated with residential and non-residential buildings. If the one-time emissions are annualized, assuming a 40-year development life (which is likely low), then the one-time emissions account for approximately 15,000 tonnes, or 4% of the overall emissions. Taking these annualized one-time emissions into account, the annual emissions are 344,500 tonnes/year.

This inventory was prepared assuming that all emissions from these developments are "new," in the sense that, absent approval and implementation of the Proposed Project, these emissions would not occur. Given the global nature of GHG emissions, questions arise over whether new global GHG emissions instead are caused by economic and population growth, rather than local development projects that accommodate such growth. In other words, the question arises whether the emissions that would result from these developments are simply displaced from elsewhere and, therefore, not "new."

It is important to note that these emissions are estimated assuming that the carbon intensity of the electricity supply system and transportation system do not change in the future. This assumption is clearly an over-simplification, as the measures incorporated into AB 32 mandate change in both areas and would reduce future GHG emissions from the development.

Source	Units	Direct	NRSP	Entrada	VCC	Total	% of Annual CO_2e emissions
Vegetation	tonnes CO_2e total	9,523	33,895	1,570	0	44,988	NA
Construction (Grading)		24,965	169,297	15,102	12,118	221,481	NA
Construction (Buildings)		NA	266,236	49,110	20,041	335,387	NA
Total (one time emissions)		**34,487**	**469,428**	**65,783**	**32,159**	**601,856**	NA
Residential Buildings	tonnes CO_2e / year	NA	59,286	4,897	NA	64,183	19%
Non-residential		NA	45,208	4,554	9,697	59,460	18%
Mobile		NA	162,001	13,380	NA	175,381	53%
Municipal		NA	18,375	3,128	1,632	23,135	7%
Golf Course		NA	192	NA	NA	192	0.1%
Area Source		NA	2,556	387	0.5	2,944	0.9%
Pools / Recreation		NA	4,000	200	NA	4,200	1.3%
Total (annual emissions)		**0**	**291,618**	**26,546**	**11,330**	**329,494**	**100%**
Total[11]	**tonnes CO_2e / year**	**862**	**303,353**	**28,191**	**12,134**	**344,541**	**NA**

Table ES-1. Summary of Greenhouse Gas (GHG) Emissions for the Proposed Project.

1.0 INTRODUCTION

The Proposed Project is the Resource Management and Development Plan (RMDP) and Spineflower Conservation Plan (SCP). Approval of the Proposed Project would facilitate development of residential, nonresidential, industrial, commercial, and mixed-used development within the Newhall Ranch Specific Plan (NRSP) area, Entrada planning area, and Valencia Commerce Center (VCC) planning area. The Proposed Project will result in one-time and annual (direct and indirect) emissions of greenhouse gases (GHGs). This report discusses the scientific and regulatory developments surrounding global climate change and provides an emissions inventory that may result from approving the Proposed Project. This report also places the emissions inventory for the Proposed Project into context by comparing the emissions to global, national, and state emission inventories.

Occupants of residential developments and users of commercial and municipal buildings use electricity and heating and motor vehicle transportation, all of which directly or indirectly emit GHGs. The most significant GHG emissions resulting from residential developments and commercial and municipal buildings are emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). CO_2 is considered the most important GHG, due primarily to the large quantity of emissions produced by fossil fuel combustion, especially for the generation of electricity and powering of motor vehicles. CH_4 and N_2O are also emitted by fossil fuel combustion, though their emissions are much less significant than CO_2. CH_4 is also emitted from the transmission, storage, and incomplete combustion of natural gas.

The effect that each of these gases can have on global warming is a combination of the mass of their emissions and their global warming potential (GWP). GWP indicates, on a pound for pound basis, how much a gas is predicted to contribute to global warming relative to how much warming would be predicted to be caused by the same mass of CO_2. CH_4 and N_2O are substantially more potent greenhouse gases than CO_2, with GWPs of 21 and 310, respectively.[1] In emissions inventories, GHG emissions are typically reported in terms of pounds or tonnes[2] of CO_2 equivalents (CO_2e). CO_2e are calculated as the product of the pounds emitted of a given GHG and its specific GWP. While CH_4 and N_2O have much higher GWPs than CO_2, CO_2 is emitted in such vastly higher quantities that it accounts for the majority of GHG emissions in CO_2e, both from residential developments and human activity in general.

The Proposed Project site is located within the jurisdiction of the South Coast Air Quality Management District (SCAQMD). However, as SCAQMD guidelines for the preparation of GHG inventories have not yet been developed, this inventory has been developed consistent with the methodologies established by the California Climate Action Registry (CCAR) where possible. When

[1] GWPs were developed by the Intergovernmental Panel on Climate Change (IPCC). The most recent GWP values are from IPCC's Third Assessment Report (TAR, 2001) and are slightly different from those presented here. However, GWP values from the Second Assessment Report (SAR, 1996) are still used by international convention and are presented in this protocol where relevant.

[2] In this report, "tonnes" will be used to refer to metric tonnes (1,000 kilograms). "Tons" will be used to refer to short tons (2,000 pounds).

guidance from the CCAR is lacking, methodologies established by the Intergovernmental Panel on Climate Change (IPCC)[3] and best available science are used. Legislation and rules regarding climate change, as well as scientific understanding of the extent to which different activities emit GHGs, continue to evolve; as such, the inventory in this report is a reflection of the guidance and knowledge currently available.

At this stage of a development, the exact design of homes, businesses, and facilities is not known. However, estimates of the types of buildings and the types of facilities that would be built out in the NRSP area, and Entrada and VCC planning areas can serve as guidance for developing a first-order estimate of the Proposed Project's anticipated GHG emissions. Energy used in a building depends partially on the built environment and partially on the habits of the occupants. Because these are buildings planned for the future with unknown occupants, average current behavior is assumed. Actual future emissions of the site will depend heavily upon the future homeowners' and business owners' habits.

1.1 Emissions Inventory

The emissions inventories prepared for the Proposed Project and its alternatives consider the following categories of GHG emissions:

- emissions due to vegetation changes,
- emissions from construction activities,
- residential building emissions,
- non-residential building emissions,
- mobile source emissions,
- area source emissions,
- municipal emissions,
- recreation center emissions, and
- golf course emissions.

In addition, an estimate of "life-cycle" GHG emissions (i.e., GHG emissions from the processes used to manufacture and transport materials used in the buildings and infrastructure) is presented. This estimate is to be used for comparison purposes only and is not included in the final inventory as these emissions would be accounted for under California Global Warming Solutions Act of 2006 (Assembly Bill 32 or AB 32) in other industry sectors. For a life-cycle analysis for building materials, somewhat arbitrary boundaries must be drawn to define the processes considered in the life-cycle analysis.[4] Although life-cycle emission estimates can provide a broader view of a project's

[3] The WMO and the United Nations Environment Programme (UNEP) established the IPCC in 1988; it is open to all members of the United Nations (UN) and WMO.

[4] For instance, in the case of building materials, the boundary could include the energy to make the materials, the energy used to make the machine that made the materials, and the energy used to make the machine that made the machine that made the materials.

emissions, life cycle analyses often double count emissions that might be attributable to other sectors in a comprehensive analysis.

The inventory does not consider GHG emissions from sources outside of the Proposed Project site, or the NRSP area and Entrada and VCC planning areas, which may indirectly service the residents (e.g., a landfill) or whether the emissions from these developments are "new" in the sense that, absent the developments, these emissions may not occur. Quantifying emissions from a landfill, for example, and attributing those emissions to the Proposed Project may result in double counting; moreover, many off site sources, such as landfills, will be separately regulated for GHG emission reductions under AB 32.

Although electricity use and construction worker commuting can be viewed as "emissions outside of" the Proposed Project site, these emission source categories are addressed because accounting for emissions from these activities is clearly defined. The inventory quantifies GHG emissions directly attributable to the Proposed Project's construction and operational activities, including the emissions that would result from the Proposed Project's enabling of development within the NRSP area, and Entrada and VCC planning areas.

The timeframe over which GHGs are emitted varies from category to category, which is taken into consideration in the emissions inventory. For most of the categories, GHGs will be emitted every year that the development is inhabited. For these categories (residential buildings, non-residential buildings, mobile sources, area sources, municipal services, recreation centers, and golf course), the inventory includes estimates of annual GHG emissions from ongoing development operations. It is worth noting that the GHG emissions estimates assume a "business as usual" scenario, where there are no reductions in GHG-generating activities over time. This is clearly unlikely, given the expected reductions in GHG emissions from most activities that will take place over the years. For example, the emissions estimate for electricity consumption assumes that there will not be an increase in energy production from renewables or non-GHG producing sources; this is not realistic, given the mandates of AB 32, as discussed later in this report.

GHG emissions from two of the categories, construction and changes in vegetation, are one-time events that will not be part of the development's ongoing activity. The one-time emissions can be divided by the estimated "lifetime" of the project to allow direct comparison of these two emissions classes. The inventory presents estimates of one-time emissions, converts them to annualized estimates, and integrates them into an annual inventory.

A variety of methods are employed to develop a complete GHG emissions inventory. In addition to well established emission factors for certain activities and emission estimates based on similar activities in other representative communities, several emissions estimation software programs are used. These include EMFAC, OFFROAD, URBEMIS, eQUEST, and Micropas. Later sections of the report describe these models and other estimation methods.

Each section of the inventory addresses the activities and emissions sources specific to that category that are likely to have the most significant impact on overall GHG emissions. The major emissions sources that exist are described later in this report.

1.2 Comparison of GHG Emissions

Because none of the local or state agencies have established significance thresholds for GHG emissions under the California Environmental Quality Act (CEQA), it is necessary to compare the proposed GHG emissions from the Proposed Project to other inventories to gain perspective on what impact those emissions may have. To evaluate the Proposed Project's GHG emissions, the NRSP area inventory is compared with energy use data on the California housing stock. The NRSP area inventory is also compared with emissions thresholds associated with regulations being developed by the California Air Resources Board (ARB) pursuant to AB 32 to determine if the development is likely to be consistent with rules propagated for California to meet its 2020 emissions reduction goal. In addition to absolute emissions, emissions per capita are compared with the current average per capita emissions of California residents. Finally, to understand the large-scale significance of the NRSP area's GHG emissions, the inventory is compared to state, national and global inventories.

1.3 Report Description

This report contains six sections. Following this introduction, Sections 2 and 3 detail the state of climate change science and the regulatory setting. Section 4 presents the results of emissions inventories prepared for the Proposed Project and its alternatives. Section 5 compares these results to various benchmarks to gain perspective on the Proposed Project's emissions. Finally, the main findings from the report are summarized in the conclusion.

2.0 STATE OF SCIENCE

This section summarizes the scientific issues surrounding climate change and global warming. It also provides a discussion of what actions and phenomena contribute to climate change and puts into context global, national, and state emissions of greenhouse gases.

2.1 Global Climate Change

Global warming and *global climate change* are both terms that describe changes in the earth's climate. *Global climate change* is a broad term used to describe any worldwide, long-term change in the earth's climate. This change could be, for example, an increase or decrease in temperatures, the start or end of an ice age, or a shift in precipitation patterns. The term *global warming* is more specific than *global climate change* and refers to a general increase in temperatures across the earth. Though global warming is characterized by rising temperatures, it can cause other climatic changes, such as a shift in the frequency and intensity of rainfall or hurricanes. Global warming does not necessarily imply that all locations will be warmer. Some specific, unique locations may be cooler even though the world, on average, is warmer. All of these changes fit under the umbrella of global climate change.[5]

While global warming can be caused by natural processes, there is a general scientific consensus that most current global warming is the result of human activity on the planet.[6] This man-made, or anthropogenic, warming is primarily caused by increased emissions of "greenhouse gases" that keep the earth's surface warm. This is called "the greenhouse effect." The greenhouse effect and the role greenhouse gases play in it are described below.

2.2 The Greenhouse Effect

Greenhouses allow sunlight to enter and then capture some of the heat generated by the sunlight's impact on the earth's surface. The earth's atmosphere acts like a greenhouse by allowing sunlight in, but trapping some of the heat that reaches the earth's surface. When solar radiation from the sun reaches the earth, much of it penetrates the atmosphere to ultimately reach the earth's surface; this solar radiation is absorbed by the earth's surface and then re-emitted as heat in the form of infrared radiation.[7] Whereas the greenhouse gases in the atmosphere let solar radiation through, the infrared radiation is trapped by greenhouses gases, resulting in the warming of the earth's surface.[8] This phenomenon is referred to as the "greenhouse effect".

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[5] Other definitions of "Greenhouse Effect" and "Global Warming" can be found on Merriam-Webster online: http://www.m-w.com/. A definition for "Climate Change" can be found on dictionary.com which uses Webster's New Millennium™ Dictionary of English, Preview Edition (v 0.9.6).

[6] From the IPCC "Climate Change 2007: The Physical Science Basis, Summary for Policymakers." Available online at: http://www.ipcc.ch/SPM2feb07.pdf

[7] All light, be it visible, ultraviolet, or infrared, carries energy.

[8] Infrared radiation is characterized by longer wavelengths than solar radiation. Greenhouse gases reflect radiation with longer wavelengths. As a result, instead of escaping back into space, greenhouse gases reflect much infrared radiation (i.e., heat) back to Earth.

The earth's greenhouse effect has existed far longer than humans have and has played a key role in the development of life. Concentrations of major greenhouse gases, such as CO_2, CH_4, N_2O, and water vapor (H_2O) have been naturally present for millennia at relatively stable levels in the atmosphere, adequate to keep temperatures on Earth hospitable. Without these greenhouse gases, the earth's temperature would be too cold for life to exist.

As human industrial activity has increased, atmospheric concentrations of certain greenhouse gases have grown dramatically. **Figure 2-1** shows the increase in concentrations of CO_2 and CH_4 over time. In the absence of major industrial human activity, natural processes have maintained atmospheric concentrations of greenhouse gases, and, therefore, global temperatures at constant levels over the last several centuries.[9] As the concentrations of greenhouse gases increase due to human activity, more infrared radiation is trapped, and the earth is heated to higher temperatures. This is the process that is described as human-induced global warming.

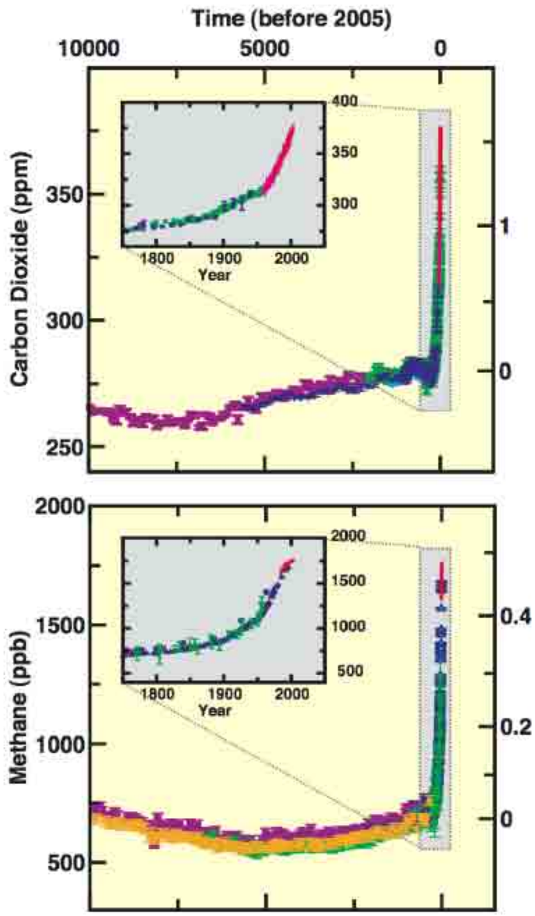

Figure 2-1. Carbon Dioxide and Methane concentrations have increased dramatically since the industrial revolution.[10]

[9] Examples of natural processes include the addition of GHGs to the atmosphere from respiration, fires, and decomposition of organic matter. The removal of greenhouse gases is mainly from plant and algae growth and absorption by the ocean.

[10] Adapted from figure SPM-1 of the IPCC "Climate Change 2007: The Physical Science Basis, Summary for Policymakers." Available online at: http://www.ipcc.ch/SPM2feb07.pdf

In 2007, the IPCC began releasing components of its Fourth Assessment Report on climate change. In February 2007, the IPCC provided a comprehensive assessment of climate change science in its Working Group I Report.[11] It stated that there is a scientific consensus that the global increases in greenhouse gases since 1750 are mainly due to human activities such as fossil fuel use, land use change (e.g., deforestation), and agriculture. In addition, the report stated that it is likely that these changes in greenhouse gas concentrations have contributed to global warming. Confidence levels of claims in this report have increased since 2001 due to the large number of simulations run and the broad range of available climate models.

2.3 Greenhouse Gases and Their Emissions

The term "greenhouse gases" includes gases that contribute to the natural greenhouse effect, such as CO_2, CH_4, N_2O, and H_2O, as well as gases that are only man-made and that are emitted through the use of modern industrial products, such as hydrofluorocarbons (HFCs), chlorinated fluorocarbons (CFCs), and sulfurhexafluoride (SF_6). These last three families of gases, while not naturally present in the atmosphere, have properties that also cause them to trap infrared radiation when they are present in the atmosphere, thus making them greenhouse gases. These six gases comprise the major GHGs that are recognized by the Kyoto Accords (H_2O is not included).[12] There are other GHGs that are not recognized by the Kyoto Accords, due either to the smaller role that they play in climate change or the uncertainties surrounding their effects. Atmospheric water vapor is not recognized by the Kyoto Accords because there is not an obvious correlation between water vapor concentrations and specific human activities. Water vapor appears to act in a positive feedback manner; higher temperatures lead to higher water vapor concentrations, which in turn cause more global warming.[13]

The effect each of these gases has on global warming is a combination of the volume of their emissions and their GWP. GWP indicates, on a pound for pound basis, how much a gas will contribute to global warming relative to how much warming would be caused by the same mass of carbon dioxide. Methane and nitrous oxide are substantially more potent than carbon dioxide, with GWPs of 21 and 310, respectively. However, these natural greenhouse gases are nowhere near as potent as sulfur hexafluoride and fluoromethane, which have GWPs of up to 23,900 and 6,500 respectively.[14] GHG emissions are typically measured in terms of mass of CO_2e. CO_2e are calculated as the product of the mass of a given GHG and its specific GWP.

The most important greenhouse gas in human-induced global warming is carbon dioxide. While many gases have much higher GWPs than the naturally occurring greenhouse gases, carbon dioxide is emitted in such vastly higher quantities that it accounts for 85% of the global warming

[11] Available online at: http://www.ipcc.ch/SPM2feb07.pdf

[12] This Kyoto Protocol sets legally binding targets and timetables for cutting the greenhouse-gas emissions of industrialized countries. The US has not approved the Kyoto treaty.

[13] From the IPCC Third Assessment Report: http://www.grida.no/climate/ipcc_tar/wg1/143.htm and http://www.grida.no/climate/ipcc_tar/wg1/268.htm

[14] California Climate Action Registry General Reporting Protocol - Reporting Entity-Wide Greenhouse Gas Emissions. SAR values, Appendix C. http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

potential of all GHGs emitted by the United States.[15] Fossil fuel combustion, especially for the generation of electricity and powering of motor vehicles, has led to substantial increases in carbon dioxide emissions and thus substantial increases in atmospheric carbon dioxide concentrations. In 2005, atmospheric carbon dioxide concentrations were about 379 parts per million (ppm), over 35 percent higher than the pre-industrial concentrations of about 280 ppm.[16] In addition to the sheer increase in the volume of its emissions, carbon dioxide is a major factor in human-induced global warming because of its lifespan in the atmosphere of 50 to 200 years.

Concentrations of the second most prominent GHG, methane, have also increased due to human activities such as rice production, degradation of waste in landfills, cattle farming, and natural gas mining. In 2005, atmospheric levels of methane were more than double pre-industrial levels, up to 1774 parts per billion (ppb) as compared to 715 ppb.[17] Methane has a relatively short atmospheric lifespan of only 12 years, but has a higher GWP than carbon dioxide.

Nitrous oxide concentrations have increased from about 270 ppb in pre-industrial times to about 319 ppb by 2005.[18] Most of this increase can be attributed to agricultural practices (such as soil and manure management), as well as fossil-fuel combustion and the production of some acids. Nitrous oxide's 120-year atmospheric lifespan increases its role in global warming.

Besides carbon dioxide, methane, and nitrous oxide, there are several gases and categories of gases that were not present in the atmosphere in pre-industrial times but now exist and contribute to warming. These include CFCs, used often as refrigerants, and their more stratospheric-ozone-friendly replacements, HFCs. Fully fluorinated species, such as SF_6 and tetrafluoromethane (CF_4), are present in the atmosphere in relatively small concentrations, but have extremely long lifespans of 50,000 and 3,200 years each, making them potent greenhouse gases.

2.4 The Effects of Global Warming

There is a scientific consensus that global climate change will increase the frequency of heat extremes, heat waves, and heavy precipitation events. Currently accepted models predict that continued greenhouse gas emissions at or above current rates will induce more extreme climate changes during the 21st century than were observed during the 20th century. A warming of about 0.2 degrees Centigrade (°C) per decade is projected. Even if the concentrations of all greenhouse gases and aerosols are kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected. A faster temperature increase will lead to more dramatic, and more unpredictable, localized climate extremes. Other likely direct effects of global warming include an increase in the areas affected by drought, an increase in tropical cyclone activity, a rise in sea level, and the continued recession of polar ice caps. There are already some identifiable signs that global warming is taking place. In addition to substantial ice loss in the Arctic, the top seven

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[15] Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2004, US Environmental Protection Agency. Available online at: http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/RAMR6MBSC3/$File/06_Complete_Report.pdf

[16] Page 2 of the IPCC "Climate Change 2007: The Physical Science Basis, Summary for Policymakers."

[17] Page 4 of the IPCC "Climate Change 2007: The Physical Science Basis, Summary for Policymakers."

[18] Page 4 of the IPCC "Climate Change 2007: The Physical Science Basis, Summary for Policymakers."

warmest years since the 1890s occurred after 1997.[19] **Figure 2-2** shows the rise of global temperatures, the global rise of sea level, and the loss of snow cover from 1850 to the present.

In April 2007, the IPCC provided an assessment of the "current scientific understanding of impacts of climate change on natural, managed and human systems, the capacity of these systems to adapt and their vulnerability" in its Working Group II Report.[20] Here, the IPCC states that although some people will gain and some will lose because of global climate change, the overall change will be one of social and economic losses. These negative effects will likely be disproportionately shouldered by the poor who do not have the resources to adapt to a change in climate. Some of the main ecosystem changes anticipated are that biodiversity of terrestrial and freshwater ecosystems will be compromised and that the ranges of infectious diseases will likely increase.

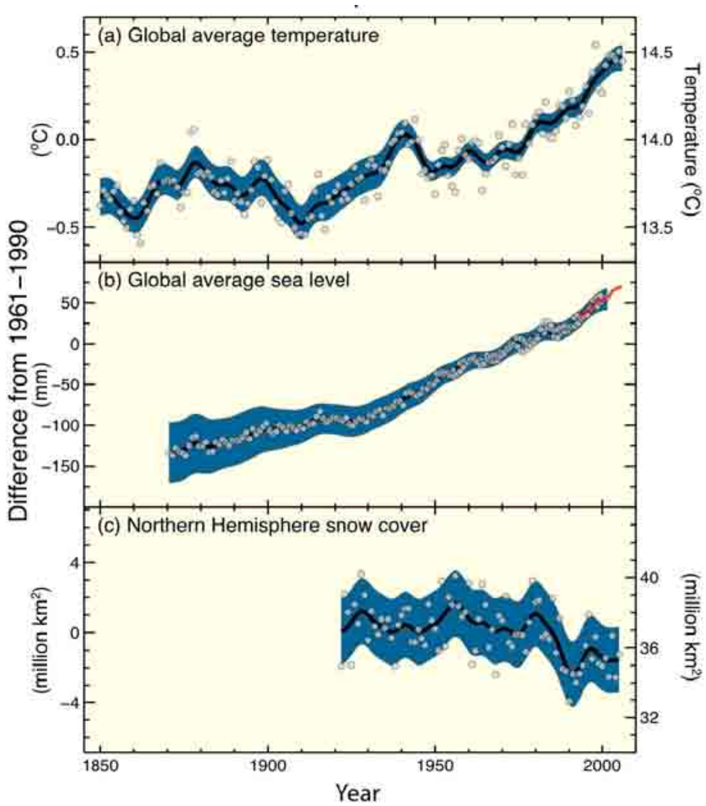

Figure 2-2. Global warming trends and associated sea level rise and snow cover decrease.[21]

2.5 California Climate Impacts

Global temperature increases may have a series of significant negative impacts on the health of California residents and the California economy. One result of the higher temperatures caused by

[19] Statistics from IPCC Working Group I and II Reports.

[20] Available online at: http://www.ipcc-wg2.org/index.html

[21] Figure SPM-3 of the IPCC "Climate Change 2007: The Physical Science Basis, Summary for Policymakers."

global warming may be compromised air quality. Warmer temperatures can cause more ground-level ozone, a pollutant that causes eye irritation and respiratory problems. California relies primarily on snowmelt for its drinking water and much of the water used in irrigation during the summer. Global warming could alter the seasonal pattern of snow accumulation and snowmelt and impact water supplies. Climatic changes would also affect agriculture, a major California industry, which could result in economic losses. For example, the heat wave in July 2006 is estimated to have cost the California dairy industry in excess of one billion dollars.[22]

2.6 Global, National, and California-wide GHG Emissions Inventories

Worldwide emissions of GHGs in 2004 were 26.8 billion tonnes of CO_2e.[23] In 2004, the United States (US) emitted about 7 billion tonnes of CO_2e or about 24 tonnes of CO_2e per year per person.[24] Over 80% of the GHG emissions in the United States are comprised of CO_2 emissions from energy related fossil fuel combustion. In 2004, California emitted 0.480 billion tonnes of CO_2e, or about 7% of the US emissions.[25] If California were a country, it would be the 16th largest emitter of greenhouse gases in the world.[26] This large number is due primarily to the sheer size of California. Compared to other states, California has one of the lowest per capita GHG emission rates in the country. This is due to California's higher energy efficiency standards, its temperate climate, and the fact that it relies on substantial out-of-state energy generation.

In 2004, 81% of greenhouse gas emissions (in CO_2e) from California were comprised of carbon dioxide emissions from fossil fuel combustion, with 4% comprised of CO_2 from process emissions. Methane and nitrous oxide accounted for 5.6% and 6.8% of total CO_2e respectively, and high GWP gases[27] accounted for 2.9% of the CO_2e emissions. Transportation is by far the largest end-use category of GHG emissions. Transportation includes that used for industry (i.e., shipping) as well as residential use.

2.7 Potential for Mitigation

In May 2007, the IPCC produced its Working Group III Report on the "scientific, technological, environmental, economic and social aspects" of mitigating climate change.[28] The report concluded that, with current climate mitigation and sustainable development practices and policies left unchanged, global GHG emissions will continue to grow over the next several decades.

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[22] Office of the Governor.

[23] Sum of Annex I and Annex II countries without counting Land-Use, Land-Use Change and Forestry (LULUCF) http://unfccc.int/ghg_emissions_data/predefined_queries/items/3814.php For countries that 2004 data was unavailable, the most recent year was used.

[24] 2006 Inventory of US Greenhouse Gas Emissions and Sinks. Available online at: http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/RAMR6MBLP4/$File/06ES.pdf

[25] ARB Draft California Greenhouse Gas Inventory by IPCC Category. Available online at: http://www.arb.ca.gov/cc/inventory/data/tables/rpt_Inventory_IPCC_Sum_2007-11-19.pdf

[26] Anywhere between the 12th and 16th depending upon methodology. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004. California Energy Commission.

[27] Such as HFCs and PFCs.

[28] Available online at: http://www.ipcc.ch/SPM040507.pdf

The amount of mitigation that will be economically achievable in the future will be tied to carbon prices. A summary of both bottom-up and top-down studies indicates that the global economic potential to mitigate GHGs by 2030 will range from 5 to 7 gigatonnes (Gt) CO_2e per year (bottom-up estimate) if there is no carbon price, 9 to 18 Gt CO_2e per year (top-down estimate) if the carbon price is set at $20 per ton CO_2e, or 17 to 26 Gt CO_2e per year (top-down estimate) if the carbon price is set at $100 per ton CO_2e. Significant GHG mitigation could have a positive or negative effect on global economic productivity. To stabilize atmospheric concentrations of GHGs in the range of 445 to 710 ppm CO_2e by 2050, the associated macroeconomic costs of multi-gas mitigation are estimated to be between a one percent gain in global gross domestic product (GDP) and a 5.5 percent fall in global GDP. If a lower GHG stabilization concentration is desired in the long term, mitigation activities in the next two to three decades will be the most crucial. In the building sector specifically, much opportunity to mitigate GHG emissions lies in energy efficiency; by 2030, about 30 percent of projected building-sector GHG emissions could be avoided while still providing a net economic benefit.

3.0 THE REGULATORY SETTING

As agreement over human-induced climate change has increased, lawmakers at the national, state and local levels have introduced legislation and regulations aimed at better tracking and controlling GHGs. At the federal, state, and local levels, legislation and regulations have been enacted to better track and reduce GHGs. At the federal level, some incentives for businesses and individuals to take voluntary steps to limit GHG emissions have been established. Many regions, states, and municipalities have taken independent action as well, electing to impose more strict mandates on GHG emissions. The following is a summary of the relevant federal and state GHG emissions legal framework, the regulatory efforts and policies of the local jurisdiction (*i.e.*, Los Angeles County), and other guidance.

3.1 Federal Authorities and Administering Agencies

At the federal level, GHG emissions have been addressed in the executive, legislative, and judicial branches. However, to date, mandatory GHG reduction measures have not been adopted.

With respect to the Executive Branch, in 2002, former President George W. Bush established a national policy goal to reduce the GHG emission intensity (tonnes of GHG emissions per million dollars of gross domestic product) of the United States economy by 18 percent by 2012. However, binding caps and/or reductions did not accompany this goal; rather, the U.S. Environmental Protection Agency (USEPA) administers a variety of voluntary programs and partnerships with GHG emitters. Such programs include the "Climate Leaders" program, in which companies create long-term GHG emission record-keeping and reduction strategies, and the high global warming potential gas voluntary programs, in which the USEPA partners with industries producing and utilizing synthetic gases to reduce emissions of particularly potent GHGs.[29]

In July 2008, former President Bush, and other members of the Group of 8 (*i.e.*, Japan, Germany, Britain, France, Italy, Canada, Russia), also pledged to move towards a low-carbon society by cutting GHG emissions in half by 2050. The pledge does not clarify what year the 2050 cuts will be measured from, and does not set a goal for cutting emissions over the next decade.

During his presidential election campaign, President Barack Obama indicated he would support a national cap-and-trade program.[30] However, at this early phase in his presidency, it is uncertain

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[29] See *U.S. Climate Policy And Actions*, USEPA, available online at http://www.epa.gov/climatechange/policy/index.html (last visited February 4, 2009). (This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

[30] Market-based, or cap-and-trade, systems work by establishing a cap on the total amount of GHG emissions that are allowed in a compliance period, and then either distribute emissions allowances to emitting facilities, allow emitting facilities to buy allowances from an auction system, or some combination of the two. Typically, only large emitters participate in cap-and-trade systems. All emitting facilities in the system must submit an allowance for each unit of carbon dioxide equivalent (CO_2e) they produce. If a facility is emitting more CO_2e than they have covered by allowances, they must choose between spending money to invest in CO_2e-mitigating technologies to reduce their emissions or purchasing additional allowances from facilities that are emitting less CO_2e for which they have

what the new administration's final policies and programs will be as they relate to global climate change.

As provided above, while the Executive Branch has not implemented any programs requiring GHG emissions reductions to date, several bills have been introduced in the U.S. Congress that would establish mandatory GHG reporting and/or emissions reductions. In general, the bills share many features—most establish or enable a market-based system of tradable emissions allowances as at least one means of implementing overall GHG reductions. The adopted Consolidated Appropriations Act, 2008 (H.R.2764) contains rules that require the USEPA to establish mandatory GHG emission reporting requirements. Sponsored by Senators Feinstein and Boxer, H.R.2764 directs the USEPA to publish draft reporting requirements by September 2008, with final rules in place by June 2009. These rules would mandate reporting "for all sectors of the economy" and direct the USEPA to include in its rule reporting of emissions resulting from upstream production and downstream sources. The new requirements also would allow for exclusions from the reporting requirements for emissions below "appropriate thresholds," as determined by the USEPA.

The recent U.S. Supreme Court decision also affects federal action on climate change (*Massachusetts v. Environmental Protection Agency* (2007) 549 U.S. 497). In that case, the Court ruled that the USEPA is authorized under the Clean Air Act (CAA) to regulate CO_2e emissions from new motor vehicles. While the Court did not mandate that the USEPA enact regulations to reduce GHG emissions, it found that the USEPA could only avoid taking action if it found that GHGs do not contribute to climate change or if it offered a "reasonable explanation" for not determining that GHGs contribute to climate change. The Court rejected the USEPA's arguments that: (1) voluntary programs already in place were sufficient to address global warming; and (2) the USEPA should not take action on climate change because it may conflict with the initiatives or negotiations of the Executive Branch.

On May 14, 2007, in response to this ruling, the former Bush Administration issued an executive order directing the USEPA and Departments of Transportation and Energy to work together to establish regulations by 2008 that reduce GHG emissions from motor vehicles, non-road vehicles, and non-road engines. However, the order did not specify what level of reductions these regulations need to achieve or how the agencies should achieve them. The order does state that any regulation needs to take into account sound scientific knowledge, cost-benefit analysis, public safety, and economic growth.

In response to the recent U.S. Supreme Court decision, the USEPA issued an Advanced Notice of Proposed Rulemaking (ANPRM) in July 2008, subject to a 120-day comment period, to seek further comment on the regulation of GHG emissions pursuant to the Clean Air Act. With the recent administration change, it is expected that the USEPA will adopt a new approach to climate change, particularly as President Obama has expressed his support for a nationalized cap-and-trade program; however, it is uncertain how exactly the agency will address GHG emissions.

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allowances. The goal of these systems is to achieve a specified overall reduction in emissions in the most cost-effective way possible.

In sum, to date, there has been no federal action requiring GHG emission reductions, and the likelihood of future regulations is not clear. Therefore, as discussed further below, some individual regions, states, and localities have fashioned individual regulatory schemes that address global climate change and the emission of greenhouse gases.

3.2 Regional Authorities and Administering Agencies

In the absence of federal action to control GHG emissions, several regional agreements have been established among various states. The agreements often develop GHG inventory and reporting standards, and set their own limits on acceptable emission levels.

One such agreement is the Western Regional Climate Action Initiative (the Initiative), entered into by Washington, Oregon, California, Arizona, Utah and New Mexico, as well as the Canadian provinces British Columbia and Manitoba. On August 22, 2007, the Initiative issued its "Statement of Regional Goal," which strives to secure "an aggregate reduction [of GHG emissions] of 15 percent below 2005 levels by 2020."[31] The regional goal is consistent with Short Term (2010-12), Medium Term (2020) and Long Term (2040-2050) goals for each member state and province. The Initiative is developing a regional, market-based cap-and-trade program, and California is expected to participate in that program.

A separate (but complimentary) regional effort is known as The Climate Registry, a collaboration among states, provinces, and tribes to develop and manage a common GHG reporting system. More than 30 states, three tribes, two Canadian provinces, and one Mexican state are participating. The Climate Registry began accepting quantitative emissions data in January 2008.[32]

3.3 State Authorities and Administering Agencies

The California legislature also has adopted several climate change-related bills in the past seven years. These bills aim to control and reduce the emission of GHGs in order to slow the effects of global climate change. In addition, Governor Schwarzenegger has issued several executive orders directed at global climate change-related matters.

3.3.1 Executive Orders

On June 1, 2005, Governor Schwarzenegger signed Executive Order No. S-3-05, which set the following GHG emission reduction targets for California: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and, by 2050, reduce GHG emissions to 80 percent below 1990 levels. Executive Order No. S-3-05 also instructed the Secretary of the California Environmental Protection Agency to coordinate with other state agencies and report to

[31] See *Western Climate Initiative Statement of Regional Goal*, Western Climate Initiative, available online at http://www.westernclimateinitiative.org/ewebeditpro/items/O104F13006.pdf (last visited February 9, 2009). (This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

[32] See *The Climate Registry* website, available online at http://www.theclimateregistry.org (last visited February 9, 2009). (This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

the Governor and State Legislature by January 2006 (and biannually thereafter) on progress made toward meeting the specified GHG emission reduction targets and the impacts of global climate change on California.

On November 14, 2008, Governor Schwarzenegger issued Executive Order No. S-13-08, which instructs various state agencies to come up with plans on how to address the expected effects of climate change in California, particularly sea level rise. The Executive Order specifically requires the California Resources Agency, in cooperation with other agencies, to request that the National Academy of Sciences (NAS) convene an independent panel to complete (by December 1, 2010) the first California Sea Level Rise Assessment Report and initiate, within 60 days after the signing of this Order, an independent sea level rise science and policy committee made up of state, national, and international experts. In addition, by June 30, 2009, the California Resources Agency is required to develop a state Climate Adaptation Strategy. The strategy must summarize the best known science on climate change impacts to California, assess California's vulnerability to the identified impacts, and outline solutions that can be implemented within and across state agencies to promote resiliency.

On November 17, 2008, Governor Schwarzenegger issued Executive Order No. S-14-08, which establishes a 2020 Renewable Portfolio Standard target for California's retail sellers of electricity. The Executive Order also endeavors to streamline the environmental review and permitting processes for renewable energy projects by directing all state regulatory agencies to give priority to such projects.

3.3.2 Assembly Bill 1493

Assembly Bill 1493 (AB 1493) was chaptered into law on July 22, 2002. AB 1493 required CARB to adopt regulations, by January 1, 2005, that would result in the achievement of the "maximum feasible" reduction in GHG emissions from vehicles used in the state primarily for noncommercial, personal transportation.[33] As enacted, the AB 1493 regulations were to become effective January 1, 2006, and apply to passenger vehicles and light-duty trucks manufactured for the 2009 model year or later.

Although the USEPA traditionally regulates tailpipe emissions, CARB maintains some regulatory authority due to the severe air quality issues in California. In fact, pursuant to the federal CAA, CARB may implement stricter regulations on automobile tailpipe emissions than the USEPA, provided a waiver from the USEPA is obtained.

In September 2004, CARB adopted the AB 1493-mandated regulations and incorporated those standards into the Low-Emission Vehicle (LEV) program. The regulations set fleet-wide average GHG emission requirements for two vehicle categories: passenger car/light duty truck (type 1) and light-duty truck (type 2). The standards took into account the different global warming potentials of the GHGs emitted by motor vehicles, and were scheduled to phase in during the 2009 through 2016

[33] AB 1493 prohibited CARB from requiring: (1) any additional tax on vehicles, fuel, or driving distance; (2) a ban on the sale of certain vehicle categories; (3) a reduction in vehicle weight; or (4) a limitation on or reduction of speed limits and vehicle miles traveled.

model years. If implemented, these regulations would produce a nearly 30 percent decrease in GHG emissions from light-duty vehicles by 2030.

In December 2004, these regulations were challenged in federal court by the Alliance of Automobile Manufacturers, who claimed that the regulations attempted to regulate vehicle fuel economy, a matter that lies within the exclusive jurisdiction of the federal government. In a decision rendered in December 2007, the U.S. District Court for the Eastern District of California rejected key elements of the automakers' challenge and concluded that CARB's regulations were neither precluded nor preempted by federal statutes and policy (*Central Valley Chrysler-Jeep, Inc. v. Goldstere*, 529 F.Supp. 2d 1751 (E.D. Cal. 2007).

While this litigation was pending, in December 2005, CARB submitted a waiver application to the USEPA. After waiting nearly two years for a decision from the USEPA, in November 2007, California filed a lawsuit alleging that the USEPA failed to consider the waiver application in a timely fashion. The USEPA's chief promised to issue a decision on the application by December 31, 2007, and, in mid-December 2007, the USEPA's chief fulfilled his promise by issuing a decision denying California's waiver application. The denial was based on the USEPA's determination that the new federal automobile fuel economy requirements would achieve what California sought to accomplish *via* the AB 1493 regulations.

The denial of California's waiver application precluded as many as 16 other states from implementing tailpipe emission regulations similar to those adopted by California under AB 1493. In response to this denial, California filed a lawsuit, with the support of 15 other states, challenging the USEPA's decision.

On January 26, 2009, President Obama issued a presidential memorandum directing the Administrator of the USEPA to reconsider California's waiver application. Accordingly, the USEPA scheduled a public hearing for March 5, 2009, and accepted public comments on the waiver application through April 6, 2009. Should the USEPA reverse its decision on California's waiver application, the state would be authorized to implement the AB 1493 regulations and secure the desired tailpipe GHG emission reductions.

3.3.3 Assembly Bill 32

In August 2006, California Legislature adopted the California Global Warming Solutions Act of 2006. Also known as Assembly Bill 32 (AB 32), the new law designates CARB as the state agency responsible for monitoring and regulating sources of GHG emissions and for devising rules and regulations that will achieve the maximum technologically feasible and cost-effective GHG emissions reductions. Specifically, AB 32 seeks to achieve a reduction in statewide GHG emissions to 1990 levels by 2020. While AB 32 sets out a timeline for the adoption of measures to evaluate and reduce GHG emissions across all source categories, it does not articulate these measures itself; instead, these measures are being determined in subsequent regulatory processes.

Under AB 32, by January 1, 2008, CARB was required to determine the amount of statewide GHG emissions in 1990, and set the 2020 limit equivalent to that level. In that regard, CARB determined that the 1990 GHG emissions level (and the 2020 statewide cap) was 427 million tonnes of CO_2e.

CARB further determined that the state must reduce its emissions inventory by 174 million tonnes of CO_2e to achieve the AB 32 reduction mandate (*i.e.*, 1990 levels by 2020). These GHG emission reductions are required to stabilize atmospheric carbon dioxide levels and, thereby, avoid dangerous climate change.[34]

CARB staff estimates that the early action measures required by AB 32 will provide approximately 42 million tonnes of CO_2e reductions. It is further anticipated that an additional 30 million tonnes of CO_2e reductions will be secured through the passage of anti-idling measures and implementation of AB 1493. The remaining 102 million tonnes of CO_2e needed to reduce California's GHG emissions to 1990 levels will be achieved through implementation of CARB's Scoping Plan, discussed below, and other regulatory efforts.

On December 6, 2007, CARB adopted regulations, pursuant to AB 32, requiring the largest facilities in California to report their annual GHG emissions. The facilities identified in the mandatory reporting regulations account for 94 percent of California's emissions from industrial and commercial stationary sources, and the regulations cover approximately 800 separate sources (*e.g.*, electricity generating facilities and retail providers; oil refineries; hydrogen plants; cement plants; cogeneration facilities; and industrial sources that emit more than 25,000 tonnes of CO_2e per year from an on-site stationary source).

CARB also has adopted its first set of GHG emission reduction measures, known as the "discrete early action measures." These measures either are currently underway or are to be initiated by CARB in the 2007-2012 timeframe. The discrete early action measures cover a number of sectors, including transportation, fuels, and agriculture, and address issues such as a low carbon fuel standard, landfill methane capture, and consumer products with high global warming potentials.

As mandated by AB 32, in December 2008, CARB adopted the *Climate Change Proposed Scoping Plan: A Framework For Change* (October 2008).[35] The Scoping Plan contains a comprehensive set of actions designed to reduce overall carbon emissions in California, improve the environment, reduce the state's dependence on oil, diversify energy sources, save energy, and enhance public health while creating new jobs and enhancing growth in California's economy. Key elements of the Scoping Plan include: (1) expansion and strengthening of existing energy efficiency programs, and building and appliance standards; (2) expansion of the renewable portfolio standard to 33 percent; (3) development of a regional cap-and-trade program (*i.e.*, participation in the Western Climate Initiative); (4) implementation of existing state laws and policies, including California's clean car standards, good movement measures, and the low carbon fuel standard; and

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[34] The atmospheric concentration of carbon dioxide is now 379 parts per million (ppm). According to some scientists, exceeding 450 ppm is a critical tipping point for global climate change. (See *Research Finds That Earth's Climate Is Approaching 'Dangerous' Point*, National Aeronautics and Space Administration, available online at http://www.nasa.gov/centers/goddard/news/topstory/2007/ danger_point.html. (last visited February 9, 2009). This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

[35] *Climate Change Proposed Scoping Plan: A Framework for Change*, California Air Resources Board, available online at http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm (last visited February 9, 2009). (This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

(5) targeted fees to fund the long-term implementation of AB 32. The GHG emission reduction measures identified in the Scoping Plan adopted by the Board will be developed over the next three years and enforceable by 2012. By January 1, 2014 and every five years thereafter, CARB is required to update the Scoping Plan.

3.3.4 Senate Bill 97

With respect to CEQA, the California legislature passed Senate Bill 97 (SB 97), which addresses GHG analysis under CEQA, during the 2007 legislative session. The bill contains two components, the first of which exempts from CEQA the requirement to assess GHG emissions for the following projects: (a) transportation projects funded under the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006; and (b) projects funded under the Disaster Preparedness and Flood Prevention Bond Act of 2006.

SB 97's second component confirms that no CEQA guidelines presently exist to advise agencies and project applicants of whether a particular project may result in a potentially significant impact to global climate change. Accordingly, SB 97 requires that the Office of Planning and Research (OPR), by July 1, 2009, develop and transmit to the California Resources Agency guidelines for the mitigation of GHG emissions and their effects. The California Resources Agency is required to adopt the regulations by January 1, 2010. (This second component of SB 97 is codified at Public Resources Code, section 21083.05.)

Notably, Governor Schwarzenegger issued a signing message when enacting SB 97 that is instructive as to the Governor's policy on global climate change, which includes a directive towards coordinating the efforts of various agencies to efficiently and fairly achieve GHG emissions reductions:

> Current uncertainty as to what type of analysis of greenhouse gas emissions is required under [CEQA] has led to legal claims being asserted which would stop these important infrastructure projects. Litigation under CEQA is not the best approach to reduce greenhouse gas emissions and maintain a sound and vibrant economy. To achieve these goals, we need a coordinated policy, not a piecemeal approach dictated by litigation.
>
> This bill advances a coordinated policy for reducing greenhouse gas emissions by directing the Office of Planning and Research and the Resources Agency to develop CEQA guidelines on how state and local agencies should analyze, and when necessary, mitigate greenhouse gas emissions.

On June 19, 2008, in light of its SB 97-mandated obligations, OPR issued a *Technical Advisory*, which provides lead agencies and project applicants with informal advice on how to conduct GHG emissions analysis in CEQA documents. OPR intends the *Technical Advisory* to be used on an interim basis only (*i.e.*, until OPR and the California Resources Agency accomplish their SB 97 mandates).[36] The *Technical Advisory*'s recommended approach notes that compliance with CEQA,

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[36] See *Technical Advisory -- CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review*, Governor's Office of Planning and Research, available online at http://opr.ca.gov/ceqa/pdfs/june08-ceqa.pdf (last visited February 9, 2009). (This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

for purposes of GHG emissions, entails three basic steps: (1) identification and quantification of GHG emissions; (2) assessment of the project's impact on climate change; and (3) identification and consideration of project alternatives and/or mitigation measures, if the project is determined to result in an individually or cumulatively significant impact.

On January 8, 2009, OPR issued its *Preliminary Draft CEQA* Guideline Amendments for Greenhouse Gas Emissions (preliminary amendments), in which it proposes to amend 14 sections of the CEQA Guidelines, consistent with its obligations under SB 97.[37] The preliminary amendments instruct lead agencies to consider the following, where applicable, in assessing the significance of GHG emissions: (i) the extent to which the project would help or hinder attainment of the state's goal to reduce GHG emissions to 1990 levels by 2020 under AB 32; (ii) the extent to which the project increases the consumption of fuels or other energy resources; (iii) the extent to which the project may increase energy efficiency and a reduction in overall GHG emissions from an existing facility; and, (iv) the extent to which the project emissions exceed any significance criteria that apply to the project. The preliminary amendments also address the consideration of regional blueprint plans, sustainable communities strategies, and/or climate action plans in climate change analysis, and provide general guidance regarding potentially feasible mitigation measures, which may include fossil fuel consumption measures; project design features; compliance with plans or programs that reduce or sequester GHG emissions; measures that sequester carbon or carbon-equivalent emissions; and, offsets. Other traditional CEQA issues, such as cumulative impact analyses, are addressed, as well. At this time, the preliminary amendments are in draft form and are only recommendations to the California Resources Agency. Currently, the preliminary amendments also are undergoing informal public review before transmittal to the California Resources Agency.

In its *Technical Advisory*, OPR requested that CARB submit recommendations regarding the appropriate significance criteria to use in environmental documentation, prepared pursuant to CEQA, when evaluating GHG emissions and global climate change impacts. Accordingly, on October 24, 2008, CARB issued its *Preliminary Draft Staff Proposal: Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act* (*Preliminary Draft Staff Proposal*).[38] In the *Preliminary Draft Staff Proposal*, CARB proposes tiered significance criteria for two types of projects: (1) industrial; and (2) commercial/residential. With respect to commercial/residential projects, CARB proposes a four tiered criterion:

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[37] See *Preliminary Draft CEQA Guideline Amendments for Greenhouse Gas Emissions*, Governor's Office of Planning and Research, available online at http://opr.ca.gov/index.php?a=ceqa/index.html (last visited February 9, 2009). (This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

[38] See *Preliminary Draft Staff Proposal: Recommended Approaches For Setting Interim Significance Thresholds For Greenhouse Gas Emissions Under The California Environmental Quality Act*, California Air Resources Board, available online at http://www.arb.ca.gov/cc/localgov/ceqa/ meetings/102708/prelimdraftproposal102408.pdf (last visited February 9, 2009). (This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

- Tier 1: Is the project exempt from further analysis under existing statutory or categorical exemptions? If yes, there is a presumption of less-than-significant impacts with respect to climate change.
- Tier 2: Does the project comply with a previously approved plan that addresses GHG emissions? (The plan must satisfy certain requirements (e.g., be consistent with AB 32 and/or SB 375, the latter of which is discussed further below).) If yes, there is a presumption of less-than-significant impacts with respect to climate change.
- Tier 3: Does the project satisfy certain minimum performance standards relating to construction and operational activities, or include equivalent mitigation measures, and emit no more than a yet to be determined quantity of emissions? If yes, there is a presumption of less-than-significant impacts with respect to climate change.
- Tier 4: The project will have significant climate change impacts.

CARB staff currently is receiving public comment on the draft criteria, and intends to make its final recommendations to the CARB Board on the significance criteria in 2009. As of this writing, the criteria remain draft recommendations, subject to further review and revision based on public comments and other information.

3.3.5 Senate Bill 375

Senate Bill 375 (SB 375) was passed by the California legislature on September 1, 2008, and chaptered into law on September 30, 2008. SB 375 requires CARB, working in consultation with California's metropolitan planning organizations (MPOs), to set regional GHG reduction targets for the automobile and light truck sector for 2020 and 2035. CARB must provide each MPO with its reduction target by September 30, 2010. Accordingly, CARB recently convened its Regional Targets Advisory Committee (RTAC), in February 2009, for its first meeting – the mission of the RTAC is to develop and recommend a technical methodology by which CARB can set the GHG reduction targets.

Pursuant to SB 375, each MPO must incorporate the assigned GHG reduction target into its Regional Transportation Plan (RTP), which is used for long-term transportation planning, via a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS). Certain transportation planning and programming activities will need to be consistent with the SCS; however, SB 375 expressly provides that the SCS does not regulate the use of land, and further provides that local land use plans and policies (*e.g.*, general plan) are not required to be consistent with either the RTP or SCS.

SB 375 includes CEQA streamlining provisions for "transit priority projects," so long as the projects are consistent with the SCS. As defined in SB 375, a "transit priority project" shall: (1) contain at least 50 percent residential use, based on total building square footage and, if the project contains between 26 and 50 percent nonresidential uses, a floor area ratio of not less than 0.75; (2) provide a maximum net density of at least 20 dwelling units per acre; and (3) be within 0.5 mile of a major transit stop or high quality transit corridor.

3.3.6 *Title 24*

The Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24), found in the California Code of Regulations, originally were established in 1978 in response to a legislative mandate to reduce California's energy consumption. Title 24 governs energy consumed by the built environment for commercial and residential buildings in California. This includes the HVAC system, water heating, and some fixed lighting. (Non-building energy use, or "plug-in" energy use, is not covered by Title 24.) The Title 24 standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The standards currently in use were formulated in October 2005. The CEC recently adopted a new set of standards on April 23, 2008, and the California Building Standards Commission approved them for publication on September 11, 2008. These new 2008 standards will be in effect as of July 1, 2009, such that all applications for building permits submitted after that date will be subject to the 2008 standards.

Title 24 does not specify building dimensions (*e.g.*, size, height, or orientation) and provides significant flexibility for window types, window amounts, insulation choice, and other parameters. Software is often used to calculate whether a building is Title 24 compliant by quantifying the built-environment energy use per square foot per year and the Time Dependent Valuation (TDV) of the energy use per square foot per year.[39] Title 24 compliance is based on TDV and not on annual energy use.

On July 17, 2008, the California Building Standards Commission also adopted a green building code for all new construction statewide.[40] This green building code represents the first-in-the-nation statewide program. Adherence to the code's provisions, which will take effect 180 days from its adoption, will be voluntary until 2010. The green building code is applicable to commercial and residential construction in the public and private sectors, as well as schools, hospitals and other public institutions. The code sets targets for energy efficiency, water consumption, dual plumbing systems for potable and recyclable water, diversion of construction waste from landfills, and the use of environmentally sensitive materials in construction and design.

3.3.7 *Other Reports*

In 2007, the CEC issued a report, entitled *The Role of Land Use in Meeting California's Energy and Climate Change Goals* (CEC Land Use Report).[41] The CEC Land Use Report examines how land use decisions affect emissions associated with passenger vehicle use and building energy use.

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39 TDV energy use is a parameter that speaks to the electricity burden that a building puts on the electric system. In general, there is a larger demand on the electricity supply system during the day (peak times) than at night (off peak). This results in a higher stress on the electricity delivery system per marginal unit electricity delivered at peak times. Therefore, the calculation of TDV weights energy used at different times at different values. For instance, for the same annual electricity use, a building that uses more electricity during the peak mid-day electrical usage period will have a higher TDV value.

40 See *2007 California Green Building Standards Code*, Building Standards Commission, available online at http://www.bsc.ca.gov/prpsd_stds/default.htm (last visited February 9, 2009). (This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

41 See *The Role Of Land Use In Meeting California's Energy And Climate Change Goals*, California Energy Commission, available online at http://www.energy.ca.gov/2007publications/CEC-600-2007-008/CEC-600-2007-008-

The CEC Land Use Report notes that transportation accounts for 40 percent of California's GHG gases, thereby making transportation the single largest category of GHG emissions in the state of California. The GHG emissions are a function of Vehicle Miles Traveled (VMT) and the GHG emissions per mile traveled. As provided in the CEC Land Use Report, the VMT rate has been growing by 3 percent per year, and modeling undertaken by the California Department of Transportation estimates a similar growth rate in the future.[42] Although fuel efficiency may be influenced in the near future by federal and state regulations, the CEC Land Use Report observes that land use planners cannot easily affect the fuel efficiency of vehicles driven to and from new development.

Nonetheless, the CEC Land Use Report also finds that: (1) "[r]esidential density may have the most profound effect on travel behavior, with higher density reducing vehicle miles traveled per capita;" and (2) "balancing jobs and housing in a given area may also reduce vehicle miles traveled per capita by shortening commute distances." At present time, the CEC Land Use Report notes that a standard method for predicting VMT has not been fully established and more research in the area is needed. In other words, a simple assessment of residential density and jobs-housing balance may not accurately predict VMT per capita at a development.

The CEC Land Use Report cites several energy saving project design features that developers have some control over, such as: (1) the on-site production of renewable energy; (2) the use of distributed electricity generation (DG); and (3) the orientation of residences in relation to the sun, so as to increase shade and incorporate roofs that reflect heat. The CEC Land Use Report also notes that different sizes and types of dwelling units influence the energy consumption of a home: "Residents of single-family detached housing, for example, are expected to consume 22 percent more primary energy than those of multifamily housing and 9 percent more than those of single-family attached housing."

3.4 Local Authorities and Administering Agencies

3.4.1 Los Angeles County Green Building Program

Three ordinances were adopted by the County of Los Angeles Board of Supervisors on October 7, 2008, and became effective January 1, 2009.[43] These ordinances include: (1) green building standards ordinance; (2) low-impact development standards ordinance; and, (3) drought-tolerant landscaping ordinance. The green building standards ordinance applies to four categories of development, with corresponding requirements for each: (1) small residential and nonresidential projects; (2) medium-sized residential projects; (3) medium-sized (*i.e.,* 10,000 to 25,000 square

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SF.PDF (last visited February 9, 2009). (This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

[42] Estimates assume current population growth rates and the continuation of current development and transportation practices.

[43] See *L.A. County Green Building Program*, Los Angeles County Department of Regional Planning, available online at http://planning.lacounty.gov/green (last visited February 9, 2009). (This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

feet) nonresidential, commercial, mixed-use, or first-time tenant improvement projects; and, (4) large nonresidential, commercial, mixed-use, or first-time tenant improvement projects greater than 25,000 square feet, and all new high-rise buildings greater than 75 feet in height.

3.4.2 South Coast Air Quality Management District Significance Threshold

In the spring of 2008, the SCAQMD convened a stakeholders working group in connection with its development of a CEQA significance threshold for GHG emissions. In December 2008, SCAQMD adopted a threshold for projects where it is the lead agency under CEQA (*e.g.*, stationary source projects; air quality management plans and regulations). It is uncertain whether SCAQMD will adopt thresholds for other types of projects (*e.g.*, residential and commercial).[44]

3.5 Other Guidance Addressing GHG Emission Inventories

The Greenhouse Gas Protocol Initiative is a multi-stakeholder partnership of businesses, non-governmental organizations (NGOs), governments, and others convened by the World Resources Institute (WRI), a US-based environmental NGO, and the World Business Council for Sustainable Development (WBCSD), a Geneva-based coalition of 170 international companies. The Greenhouse Gas Protocol Initiative prepared a step-by-step guide for *companies* to use in quantifying and reporting their GHG emissions.

WRI categorizes emissions into three scopes: Scope 1 – direct GHG emissions; Scope 2 – electricity-related indirect GHG emissions; and Scope 3 – other indirect GHG emissions. These classifications indicate decreasing control on the company's part relative to GHG emissions. In other words, the GHGs that are produced directly from the company's operations are within Scope 1; the company has a great deal of control over those emissions. Scope 2 covers GHG emissions that result from the company's electricity use. While the company has a great deal of control over the amount of electricity use, it does not control the GHG intensity of electricity production. Finally, the company has little control over Scope 3 emissions, which include emissions resulting from activities such as an employee's work commute.

This section discloses the GHG emissions resulting from the proposed Project and, although the proposed Project is not a company, it is informative to evaluate project emissions in light of the WRI categories.

- *Scope 1: Direct GHG Emissions*
  Direct GHG emissions occur from sources that are owned or controlled by the company, for example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, *etc.*; emissions from chemical production in owned or controlled process equipment.

  The only emissions that would result from the proposed Project that might be considered Scope 1 emissions are construction emissions and emissions associated with the loss of

[44] See *Greenhouse Gases (GHG) CEQA Significance Thresholds*, South Coast Air Quality Management District, available online at http://www.aqmd.gov/ceqa/handbook/GHG/GHG.html (last visited February 9, 2009). (This document is available for public inspection and review at the County of Los Angeles Public Library, Valencia Branch, 23743 West Valencia Boulevard, Santa Clarita, California 91355-2191, and is incorporated by reference.)

carbon sequestration capacity via vegetation removal. These are the only emissions over which the Project applicant has direct control.

- *Scope 2: Electricity-Related Indirect GHG Emissions*
  Scope 2 accounts for GHG emissions from the generation of purchased electricity consumed by the company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated.

  Although electricity consumption is accounted for in the proposed Project's GHG emissions inventory, the electricity would be consumed by the eventual occupants of the residential and nonresidential buildings facilitated by approval of the proposed Project. The proposed Project itself will not purchase this electricity. Therefore, the electricity-related emissions associated with the proposed Project are considered to fall within Scope 3, as described below.

- *Scope 3: Other Indirect GHG Emissions*
  Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the company, but occur from sources not owned or controlled by the company. Some examples of scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services.

  All emissions, other than the construction-related and vegetation removal-related emissions discussed above, quantified in this inventory would likely be considered Scope 3. Residents and users of the development facilitated by the proposed Project would not be owned or controlled by the Project applicant. Although, the Project applicant is unable to restrict the amount of electricity uses, miles driven, *etc.*; however, as discussed above, certain aspects of the development can influence these issues.

4.0 GREENHOUSE GAS INVENTORY

This section describes the methods that ENVIRON International Corporation (ENVIRON) used to estimate GHG emissions from the Proposed Project, including the emissions that would be generated by build-out in the NRSP area, and Entrada and VCC planning areas.

Notably, some of the Proposed Project's emission generating activities would be within the control of the project applicant (i.e., The Newhall Land and Farming Company), such as grading and the placement of utilities; others would be within the control of the individuals constructing the buildings and related facilities, such as construction emissions; and, others yet would be within the control of the developers, residents and users of other buildings, such as energy use in the built environment and traffic.

The emissions inventories presented in this report contain an estimate of the Proposed Project's "life-cycle" GHG emissions (i.e., GHG emissions from the processes used to manufacture and transport materials used in the buildings and infrastructure). This estimate is to be used for comparison purposes only and is not included in the final inventory as these emissions would be accounted for under AB 32 in other industry sectors. Additionally, for a life-cycle analysis for building materials, somewhat arbitrary boundaries must be drawn to define the processes considered in the life-cycle analysis.[45] Although life-cycle emission estimates can provide a broader view of a project's emissions, life cycle analyses often double count emissions that might be attributable to other sectors in a comprehensive analysis.

The inventory does not consider GHG emissions from sources outside of the Proposed Project site, or the NRSP area and Entrada and VCC planning areas, which may indirectly service the residents (e.g., a landfill) or whether the emissions from these developments are "new" in the sense that, absent the developments, these emissions may not occur. However, electricity use and construction worker commuting are addressed because accounting for emissions from these activities is clearly defined. The inventory quantifies GHG emissions directly attributable to the Proposed Project's construction and operational activities, including the emissions that would result from the Proposed Project's enabling of development within the NRSP area, and Entrada and VCC planning areas.

Emissions are not quantified for design alternative 1 (D1), the no project alternative, because there would be no notable emission generating activities; the Proposed Project site would remain undeveloped and in its natural state. Emissions for design alternative 2 through 7 (D2-D7) are quantified for emissions categories that contribute the most to the overall inventory. Notably, emissions will not be generated by build-out of the VCC planning area for design alternatives 4 through 7 (D4-D7) because these alternatives would preclude build-out of this planning area.

Each aspect of the GHG inventory is described in this section.

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[45] For instance, in the case of building materials, the boundary could include the energy to make the materials, the energy used to make the machine that made the materials, and the energy used to make the machine that made the machine that made the materials.

4.1 Units of measurement: Tonnes of CO_2 and CO_2e

The term "greenhouse gases" includes gases that contribute to the natural greenhouse effect, such as CO_2, CH_4, N_2O, and H_2O, as well as gases that are only man-made and that are emitted through the use of modern industrial products, such as hydrofluorocarbons (HFCs) and chlorinated fluorocarbons (CFCs). The most important greenhouse gas in human-induced global warming is carbon dioxide (CO_2). While many gases have much higher GWPs than CO_2, CO_2 is emitted in such vastly higher quantities that it accounts for 85% of the global warming potential of all GHGs emitted by the United States.[46]

The effect each of these gases has on global warming is a combination of the volume of their emissions and their GWP. GWP indicates, on a pound for pound basis, how much a gas will contribute to global warming relative to how much warming would be caused by the same mass of carbon dioxide. Methane and nitrous oxide are substantially more potent than carbon dioxide, with GWPs of 21 and 310, respectively. GHG emissions are typically measured in terms of mass of CO_2e. CO_2e are calculated as the product of the mass of a given GHG and its specific GWP.

In many sections of this report, including the final summary sections, emissions are presented in units of CO_2e either because the global warming potentials of methane and nitrous oxide were accounted for explicitly, or the methane and nitrous oxide are assumed to contribute a negligible amount of global warming potential when compared to the carbon dioxide emissions from that particular emissions category.

In this report, tonnes will be used to refer to metric tonnes (1,000 kilograms). Tons will be used to refer to short tons (2,000 pounds).

Additionally, totals presented in all tables and report sections may not equal the sum of components due to independent rounding.

4.2 Resources

To estimate GHG emissions from the Proposed Project, ENVIRON directly or indirectly relied primarily on five different types of resources: emissions estimation guidance from government-sponsored organizations, government-commissioned studies of energy use patterns, energy surveys by other consulting firms, emissions estimation software, and building energy modeling software. These sources are described below.

4.2.1 Emissions Estimation Guidance

This inventory was developed using guidance from two government-sponsored organizations to assist in the estimation of GHG emissions. The first is the CCAR, which was established by the California Legislature to assist willing parties in estimating and recording their GHG emissions to use as a baseline for meeting future emissions reduction requirements. Publications by the CCAR

[46] Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2004, US Environmental Protection Agency. Available online at:
http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/RAMR6MBSC3/$File/06_Complete_Report.pdf

include not only recommendations on how to compile a GHG emissions inventory, but also relevant data on energy use and emissions that are utilized in this protocol. The second organization is the IPCC, which was established in 1988 by the United Nations Environment Program and the World Meteorological Organization (WMO). The IPCC's main role is to assess information on climate change which is synthesized in IPCC reports, including methodology reports. These reports also include relevant emission factors and specific scientific data that can be used to estimate GHG activities from various activities.

4.2.2 Emissions and Energy Use Studies

For estimating emissions based on energy use, literature information on patterns of energy use must often be employed. Studies commissioned by the United States Energy Information Administration (EIA) and the California Energy Commission (CEC) provide data on energy use patterns associated with municipal activities, natural resource distribution, and other activities that will take place in the development that the Proposed Project would facilitate in the NRSP area, and Entrada and VCC planning areas. These data were used to estimate energy use patterns, and applied to the specific characteristics of the NRSP area, and Entrada and VCC planning areas to estimate GHG emissions. In addition to EIA and CEC studies, studies performed by individual municipalities or scientific organizations are also used in this report.

4.2.3 Emissions Estimation Software

The ARB, the SCAQMD, and other public and private organizations have developed several software programs to facilitate the calculation of emissions from construction, motor vehicles, and urban developments by streamlining emissions estimation from these sources. This inventory was developed using five models to estimate GHG emissions from the Proposed Project. These are the OFFROAD2007 model, the EMFAC model, the URBEMIS model, the eQUEST model, and the Micropas model. The features of each of these models are described below.

OFFROAD

OFFROAD2007 is the most recent version of a model developed by the ARB to estimate the activity and emissions of offroad mobile emissions sources, such as construction equipment. OFFROAD contains a database of default values for horsepower, load factor, and hours per day of operation and can calculate emission factors based on the type of equipment and year of use.

EMFAC

EMFAC, also developed by ARB, compiles real fleet data on the county-level for the state of California, including vehicle model year distributions, vehicle class (e.g., light-duty auto, medium-duty truck, heavy-heavy-duty truck) distributions, and emission rate information to generate fleet-average emission factors for most criteria pollutants and CO_2. EMFAC2007 is the newest version of the program. Emission factors from EMFAC depend on the vehicle class, vehicle technology, speed, year of operation, average ambient air temperature, and relative humidity.

URBEMIS

The URBEMIS software was created by SCAQMD, although it is used by other air districts as well. It estimates emissions associated with different aspects of urban development. The Operational Data module in URBEMIS calculates emissions from mobile sources operating during the use of a development based on emission factors from EMFAC and traffic use information specific to a development. Mobile source emissions during the construction phase are calculated separately in the construction module of URBEMIS. URBEMIS provides county, air district / air basin, or state wide averages for number of daily trips per housing unit and per student at an elementary school in the absence of more specific information from traffic engineers. URBEMIS also provides air district-specific default values for vehicle fleet characteristics (vehicle class distribution and technology categories) and travel conditions (average trip length, trip speed, and relative frequency of each type of trip). URBEMIS (Version 9.2.2), uses EMFAC2007 emission factors and calculates CO_2 emissions using District-specific default parameters for various inputs including vehicle fleet characteristics and travel conditions.

In addition to mobile source emissions, URBEMIS can also calculate emissions associated with the construction phase of a development and emissions from area sources, such as fireplaces, once the development is operational. The URBEMIS construction module enables separate emissions calculations from each of the three typical stages of any construction project: demolition, site grading, and building construction. Based on the timing of construction and size of the development, URBEMIS defaults can be used to estimate emissions. Alternatively, the user can override these defaults by entering specific information about the construction project, such as what types and numbers of equipment are going to be used. In terms of area sources, URBEMIS is equipped to estimate GHG emissions from three types of GHG-emitting area sources based either on program defaults or more specific project information inputted by the user. These uses are natural gas fuel combustion, hearth fuel combustion, and landscaping equipment.

eQUEST

The California Energy Commission approved eQUEST as an energy modeling software for the 2005 Title 24 non-residential Alternative Compliance Method (ACM). Title 24 compliant buildings can be created using the model. Default parameters specific to each building type are used for many parameters, including building area, number of floors, and cooling/heating equipment type. eQUEST is typically used for commercial buildings.

Micropas

Micropas 7.3[47] is a building energy efficiency modeling package approved by the California Energy Commission as a 2005 Title 24 residential ACM. The Micropas software calculates the energy use per square foot per year and the Time Dependent Valuation (TDV) of the energy use per square foot per year to determine Title 24 compliance. Micropas is typically used for residential buildings.

[47] Micropas version 7.3 is available for purchase at: http://www.micropas.com/

4.3 Evaluation of "New" Emissions

Given the global nature of GHG impacts, it is difficult to understand whether a project's emissions are "new," in a global sense. As described in this section, there are methods available to estimate emissions from certain aspects of projects, such as that from the additional vehicle travel associated with the project. However, it is not entirely clear how to determine whether those emissions are truly "additional" in the global sense, or whether those emissions associated with a project would have occurred globally without the project, in any event.

The analysis of airborne criteria pollutants has already, in a sense, addressed the issue of what is "new." The calculation of "project" criteria pollutants (oxides of nitrogen, sulfur oxides, carbon monoxide, volatile organic compounds, lead, and particulate matter) in air quality emissions inventories for EIRs has a long history. The SCAQMD first published a comprehensive manual on the analysis of air quality impacts in 1993, and the Bay Area Air Quality Management District (BAAQMD) followed in 1999. Other smaller districts have prepared detailed guidance documents that describe the methods that should be used to calculate emissions inventories for EIRs from projects, including residential and commercial projects.

The goal of estimating criteria pollutants is to understand whether there are significant new emissions in California's air basins, which have a limited ability to absorb additional criteria pollutant emissions without adverse air quality impacts. A review of how air quality analyses dealt with the issue of whether emissions are "new" might be instructive as to how to deal with the emissions of GHGs. However, while a similar approach for criteria pollutants and GHGs may be warranted, the impacts of GHG emissions are a function of their global concentrations, rather than local concentrations. Thus, the question of whether or not a project's GHG impacts are significant, both on a project basis and on a cumulative basis, must be based on global, rather than basin-wide considerations.

When evaluating the criteria pollutants impacts for a new project, the vehicular emissions associated with a project are counted as new emissions in traditional air quality analyses, even if those new residents would have moved from another house in the same air basin. The typical rationale for this is that the new residential development represents growth in the basin. As a result, all emissions associated with its vehicle travel should be counted as new emissions, even if this might lead to some over-counting of criteria pollutant emissions from the project.

World rankings in GHG emissions generally depend on which gases are accounted for, and whether land use changes are considered. Without considering land use changes, the US is the top GHG-emitting country in the world. When all of the developing countries are grouped together, they contribute approximately 52% of the world-wide GHG emissions.[48]

To understand how to put this in context for GHGs, it is useful to understand that the increase of new GHG emissions globally is caused by economic and population growth. Emission growth rates are the highest among developing countries. While CO_2 emissions in developed countries were

[48] Baumert, K.A., T. Herzog, J. Pershing. 2005. Navigating the Numbers: Greenhouse Gas Data and International Climate Policy. (http://www.wri.org/climate/pubs_description.cfm?pid=4093)

unchanged over the 1990-2002 period, emissions increased by 47% in developing countries during that same time period. Emissions in China grew about 50% during that time period – preliminary estimates show that China's GHG emissions increased 35% in 2003 and 2004 alone.[49] This is due to the increasing demand for higher standards of living as a result of GDP growth, requiring more vehicles and electricity demand. Also, developing countries often lack the technology or capital to utilize energy efficient products or to construct cleaner burning power plants. Carbon dioxide emissions in China are growing slightly faster than primary energy use as the fuel mix increasingly favors coal, a high-carbon fuel. China accounts for 39% of the projected increase between 2004 and 2030, overtaking the United States as the world's biggest emitter before 2010.[50]

In the developing world, GHG increases are directly tied to population growth. Therefore, it makes sense to consider operational emissions (including vehicular emissions) from new residential development as growth, as residences are rarely removed from the housing supply once constructed. There are exceptions, such as when one housing development replaces another, and, in those cases, the replacement residential development need not be considered growth.

However, it is not clear that the commercial development should be considered new growth for vehicular travel purposes. To the extent that commercial development serves existing residential development, its vehicular travel may not be new. For instance, if the new commercial area serves an area with a high residential/commercial balance, then this new commercial growth will reduce shopping and work trip lengths and will reduce GHG emissions associated with mobile sources. If, however, the new commercial area results in longer trips for its workers and residents than they would have previously made, then it adds GHGs emissions. Commercial development that could potentially increase vehicle miles traveled (VMT) would be facilities that draw trips from far away that otherwise would not be made. A theme park, for example, may be viewed as such a development.

In this report, it is assumed that the new commercial area serves an area with a high residential/commercial balance. Therefore, this new commercial growth will reduce shopping and work trip lengths and will reduce GHG emissions associated with mobile sources. As such, VCC, which is purely commercial, will not contribute to mobile GHG emissions. Additionally, all commercial space in the NRSP area and Entrada planning area will not contribute to mobile GHG emissions.

The approach described above is different than that for criteria emissions. For criteria pollutants, if new emissions move into the basin, although there is a reduction in criteria emissions elsewhere, these emissions are new to the basin and, therefore, counted. For GHGs, if the emissions simply moved location from one basin to another, these emissions are not new on a global scale. To evaluate the sustainability of new commercial developments, one must ask if the shoppers' and

[49] Baumert, K.A., T. Herzog, J. Pershing. 2005. Navigating the Numbers: Greenhouse Gas Data and International Climate Policy. Available online at: http://www.wri.org/climate/pubs_description.cfm?pid=4093)

[50] http://www.iea.org/textbase/weo/fact_sheets/fs_GlobalEnergyTrends.pdf (accessed June 12, 2007) *World Energy Outlook 2006: Fact Sheet- Global Energy Trends The World's Energy Future: Where Are We Headed?*

workers' travel distances to the new commercial development is greater or smaller than those individuals' travel distances to the commercial and residential development that it replaced.

To the extent that new commercial development serves new residential development, much of the commercial vehicle travel would already be counted in the evaluation of the new residential development. Accordingly, GHG emissions from VMT serving commercial areas will only be counted if the commercial areas contribute to greater VMT as a result of its location. If the commercial development lowers VMT, then it will be considered to have a zero or negative GHG contribution as a result of its shortened operational vehicle trips.

4.4 Indirect GHG Emissions from Electricity Use

As noted above, indirect GHG emissions are created as a result of electricity use. When electricity is used in a building, the electricity generation typically takes place offsite at the power plant; electricity use in a building generally causes emissions in an indirect manner. The Proposed Project, and the build-out in the NRSP area, and Entrada and VCC planning areas facilitated by it, would be supplied power by Southern California Edison (SCE). Accordingly, indirect GHG emissions from electricity usage are calculated using the SCE carbon-intensity factor of 666 lb CO_2e per MW-hr.[51] This emission factor takes into account the current mix of energy sources used to generate electricity for SCE and the relative carbon intensities of these sources.[52]

4.5 Vegetation Change

This section presents the calculation of the positive and negative GHG emissions associated with vegetation removal and re-vegetation at the Proposed Project site. The SCP component of the Proposed Project would not result in GHG emissions attributable to vegetation changes because the SCP is a conservation and management plan only; there would be minimal earth moving. However, the RMDP will directly cause vegetation removal during activities such as bank stabilization. The RMDP will also indirectly cause vegetation removal by enabling the development of the NRSP area, and Entrada and VCC planning areas. The removal of existing vegetation can contribute to net GHG increases by reducing existing carbon sequestration capacity.[53] Following build-out of the three planning areas, many privately owned areas will become re-vegetated with trees, shrubs and other vegetation. These areas could potentially sequester more CO_2 from the atmosphere than was sequestered pre-development. The difference between the total before-development sequestered CO_2 and the after-development sequestered CO_2 is the one-time CO_2 released from clearing the vegetation less the CO_2 sequestered by new plantings.[54] The overall CO_2 emissions due to

[51] California Climate Action Registry (CCAR) Database. Southern California Edison PUP Report. 2005.

[52] When calculating indirect emissions due to electricity usage, it is important to consider that indirect emissions from using a given amount of electricity will vary with the fuel-mix used to produce electricity. For example, CO_2 emissions per kW-hr from a coal-fired power plant are significantly higher than CO_2 emissions per kW-hr from a natural gas-fired power plant. Therefore, to most accurately estimate GHG emissions from the developments, the carbon intensity of the specific mix of energy sources SCE uses to generate electricity was used to calculate emissions since SCE is the most likely source of electricity.

[53] In this section, it is assumed that all mature land-types (at least 20 years old) are at steady-state. See The World Resource Institute (WRI) "Land Use, Land-Use Change, and Forestry Guidance for GHG Project Accounting" protocol available online at: http://www.ghgprotocol.org/DocRoot/97hb6BCSAAG2bImO7c9d/LULUCF%20Final.pdf

[54] In this section we assume that mature ecosystems do not have a net flux of carbon into or out of them.

vegetation change will result from two things: 1) the change in the amount of CO_2 sequestered by vegetation, which would lead to a one-time GHG release, and 2) the amount that can be expected to be sequestered by new plantings. Both issues are discussed in this section.

In this section of this report, the units CO_2 and CO_2e are used interchangeably because methane and nitrous oxide are assumed to contribute a negligible amount of global warming potential when compared to the carbon dioxide emissions from vegetation change.

4.5.1 Quantifying the One-Time Release by Changes in Carbon Sequestration Capacity

The one-time release of GHGs due to changes in carbon sequestration capacity was calculated using the following four steps:[55]

1. Identify and quantify the areas of various land types that will change due to the development (i.e. Grasses, forests, agricultural, etc.). This area includes not only the area of land that will be converted to houses, but also areas disrupted by the construction of utility corridors, water tank sites, and associated borrow and grading areas. Areas temporarily disturbed that will eventually recover to become vegetated will not be counted as vegetation removed as there is no net change in vegetation or land use.[56]

2. Estimate the biomass associated with each land type. For the purposes of this protocol, we have listed the land types that are present at the Proposed Project site and the three planning areas, and characterized them using the available vegetation types found in the IPCC publication *Guidelines for National Greenhouse Gas Inventories* (2006).[57] This is shown in Table 4-1. The biomass values[58] for each land type are based on these generalized categories. These values relate the identified vegetation types to IPCC vegetation types.

3. Calculate CO_2 emissions from the net change of vegetation. When vegetation is removed, it may undergo biodegradation,[59] or it may be combusted. Either pathway results in carbon (C) present in the plants being combined with oxygen (O_2) to form CO_2. To estimate the mass of carbon present in the biomass, biomass weight is multiplied by the carbon fraction, 0.47[60]. The

[55] This section follows the IPCC guidelines, but has been adapted for ease of use.

[56] This assumption facilitates the calculation as a yearly growth rate and CO_2 removal rate does not have to be calculated. As long as the disturbed land will indeed return to its original state, this assumption is valid for time periods over 20 years.

[57] Available online at http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.htm

[58] Each land type will have a corresponding total biomass (above-ground + below-ground) reported in tonne dry matter (d.m.) biomass/acre.

[59] Cleared vegetation may also be deposited in a landfill or compost area, where some anaerobic degradation which will generate CH_4 may take place. However, for the purposes of this section, we are assuming that only aerobic biodegradation will take place which will result in CO_2 emissions, only.

[60] The fraction of the biomass weight that is carbon. From IPCC (2006), default forestland and agricultural land ratio. Here, a carbon fraction of 0.47 is used for all vegetation types. CCAR assumes a similar value of 0.5 in its Forest Selector Protocol.

mass of carbon is multiplied by 3.67[61] to calculate the final mass of CO_2, assuming all of this carbon is converted into CO_2. The results of this calculation are shown in Table 4-1 for each type of vegetation.

4. Calculate the overall change in sequestered CO_2. For all types of land that change from one type of land to another,[62] initial and final values of sequestered CO_2 are calculated using the equation below. Individual tree planting will be addressed in the next section.

$$\text{Overall Change in Sequestered } CO_2 \text{ [tonne } CO_2\text{]}$$

$$= \sum_i (SeqCO_2)_i \times (area)_i - \sum_j (SeqCO_2)_j \times (area)_j$$

Where:

$SeqCO_2$	=	mass of sequestered CO_2 per unit area [tonne CO_2/acre]
area	=	area of land for specific land use type [acre]
i	=	index for final land use type
j	=	index for initial land use type

Table 4-2-A through 4-2-F show the effective change in the amount of sequestered CO_2 due to the change in land use of the developed area for each land type. The total equivalent CO_2 emissions attributable to the net change of vegetation for design alternative 2 (D2) that result directly from the RMDP are 9,500 tonnes. The NRSP area, and Entrada and VCC planning areas emissions for D2, all an indirect result from the RMDP, are approximately 58,700; 3,500; and 3,300 tonnes respectively. Emissions for D2 through D7 are given in Tables 4-2-A through 4-2-F.

4.5.2 Calculating CO_2 Sequestration by Trees

Planting individual trees results in carbon sequestration, and is considered to result in a one-time carbon-stock change. Table 4-3 presents default annual CO_2 sequestration rates on a per tree basis, based on values provided by the IPCC. The numbers given are for 10 likely species classes in urban areas and range from a high of 0.052 tonnes CO_2 per year (tonne CO_2/year) in hardwood maple to a low of 0.012 tonne CO_2 per year in Juniper trees. Alternatively, an average of 0.035 tonne CO_2 per year per tree can be assumed for trees planted, if the tree type is not known.

Urban trees are only net carbon sinks when they are actively growing. The IPCC assumes an active growing period of 20 years. Thereafter, the accumulation of carbon in biomass slows with age, and will be completely offset by losses from clipping, pruning, and occasional death. Of course, actual active growing periods are subject to, among other things, species, climate regime, and planting density. In this report, the IPCC default value of 20 years will be assumed. Note that trees

[61] The ratio of the molecular mass of CO_2 to the molecular mass of carbon is 44/12 or 3.67, the molecular mass of CO_2 to the molecular mass of carbon is 44/12 or 3.67

[62] For example from forestland to grassland, or from cropland to permanently developed.

may also be replaced at the end of the 20-year cycle, which will result in additional years of carbon sequestration. However, this will be offset by the potential net release of carbon from the removal of the replaced tree.

Approximately 35,000 new net trees will be planted in the NRSP area; 2,500 new net trees will be planted in the Entrada planning area; and, 5,000 new net trees will be planted in the VCC planning area.[63] Planting these trees will sequester approximately 24,800; 1,800; and 3,500 tonnes of CO_2 in the NRSP area, Entrada and VCC planning areas, respectively. This was calculated by using the average tree sequestration rate of 0.035 tonne CO_2/year/tree and assuming 20 years of growth. This sequestration brings the net CO_2 emissions from vegetation to 33,900; 1,600; and 0 tonnes for the NRSP area, Entrada and VCC planning areas, respectively.[64] RMDP direct emissions would remain at 9,500 tonnes.

Results of the emissions inventories for D2 through D7 are provided in Tables 4-2-A through 4-2-F. The change in number of new net trees for alternatives D3 through D7 was estimated by assuming the number of net new trees would decrease proportionally with the square footage of building area for each of the three planning areas. The overall emissions, after accounting for scaled net new trees, for each alternative are also presented in Table 4-4.

4.6 Construction Activities

This section describes the GHG estimation methods for the construction activities related to the Proposed Project, including the construction activities required to build-out the NRSP area, and Entrada and VCC planning areas. While the RMDP component of the Proposed Project would result in construction-related activities, the SCP, as a conservation and management plan, would not result in any construction-related activities and, therefore, not result in the emission of construction-related GHGs.

There are three major construction phases for an urban development: demolition, site grading, and building construction. There will not be a demolition phase for this development since the construction will occur on vacant, undeveloped land. The building construction phase can be broken down into three subphases: building construction, architectural painting, and asphalt paving. GHG emissions from these construction phases are largely attributable to fuel use from construction equipment and worker commuting.

Three programs, the URBEMIS[65] model, the OFFROAD2007[66] model, and the EMFAC2007[67] model, have the capability to calculate construction emissions. URBEMIS estimates emissions

[63] Personal communications with Newhall Land.

[64] If 5,000 trees are planted in VCC, approximately all of the vegetation removal from VCC will be offset.

[65] Urban Emissions Model (URBEMIS) (Version 8.7 – 2002 / Version 9.2.2 – 2007). Jones & Stokes Associates. Prepared for: South Coast Air Quality Management District. http://www.urbemis.com

[66] California Air Resources Board Mobile Source Emissions Inventory Program. December 2006. http://www.arb.ca.gov/msei/offroad/offroad.htm

[67] EMission FACtors (EMFAC2007) model (Version 2.3). November 2006. California Air Resources Board. http://www.arb.ca.gov/msei/onroad/latest_version.htm

associated with different aspects of urban development. The Construction Data module in URBEMIS Version 9.2.2 calculates emissions from construction sources based on emission factor data from OFFROAD2007, EMFAC2007, and construction equipment use information specific to the development.

In this section of this report, the units CO_2 and CO_2e are used interchangeably for diesel construction equipment because methane and nitrous oxide are assumed to contribute a negligible amount of global warming potential when compared to the carbon dioxide emissions from construction equipment. For worker commuting, methane and nitrous oxide are explicitly calculated and therefore CO_2 and CO_2e for worker commuting are not equal.

4.6.1 Estimating GHG Emissions from Grading

4.6.1.1 GHG Emissions from Construction Equipment

Emissions from the Proposed Project's construction activities are grouped into two categories: direct emissions and indirect emissions. These distinctions do not refer to the nature of the emissions or how the emissions are calculated, but rather to the legal and chronological framework under which different emission activities are authorized. The only emissions that are considered "direct emissions" are certain grading and worker commuting activities presented in this section and the direct emissions addressed in the vegetation section. GHG emissions that are not included in the grading section (building construction, operational, municipal, energy use in the built environment etc.) are considered "indirect."

Impact Sciences provided ENVIRON with the number of hours each type of equipment would be used for implementation of the RMDP (direct emissions) and during build-out of the NRSP area, and Entrada and VCC planning areas.[68] ENVIRON calculated emissions from grading using spreadsheets following the URBEMIS methodology. An equipment hour is defined as one hour of a piece of equipment being used. Tables 4-5 through 4-9 contain specifications for each type of construction equipment (horsepower, load factor, and GHG emission factor) provided by OFFROAD2007 and describe the detailed GHG calculations. CO_2 emissions for each type of construction equipment are calculated as follows:

Equipment Emissions [grams] = Total equipment-hours * emission factor [grams per brake horsepower-hour] * equipment brake horsepower * load factor

The contribution of CH_4 and N_2O to overall GHG emissions is likely small (< 1% of total CO_2e) from diesel construction equipment,[69] and was therefore not included in this calculation.

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[68] Received from David Deckman at Impact Sciences. 8/2/2007.

[69] California Climate Action Registry (CCAR). 2007. *General Reporting Protocol*. Version 2.2. March. Page 38. ENVIRON estimates these emissions to be less than 1% of total GHG contributions for diesel fueled equipment.

The total amount of GHG emissions from grading construction equipment is a one-time emission of approximately 24,500; 166,200; 14,800; and 11,900 tonnes of CO_2 for the RMDP, NRSP area, and Entrada and VCC planning areas, respectively.

4.6.1.2 GHG Emissions from Worker Commuting

Greenhouse gases are emitted from worker vehicles in two ways: running emissions, produced by driving the vehicle, and startup emissions, produced by turning the vehicle on. The majority of worker commute emissions are running emissions. Table 4-10 details emission calculations for worker commutes.

Running Emissions

Total running emissions from worker commuting was calculated by estimating the VMT by construction workers and multiplying this value by the representative GHG emission factors for the vehicles they are expected to drive. Based on the location of the Proposed Project site, URBEMIS estimates the length of the average roundtrip commute to be 12.7 miles. URBEMIS estimates that the number of worker-days needed for a project is equal to the number of equipment-days multiplied by 1.25. Therefore, for a project, the total number of VMT by construction workers is the product of the number of equipment days, the factor 1.25, and the average roundtrip commute length. Assuming that equipment is operated 8 hours per day, the number of equipment-days equals the total equipment-hours divided by 8 hours per day. After total VMT is calculated, GHG emissions can be calculated from the following equation:

$$GHG\ emissions = VMT * [EF_{LDA} + (EF_{LDT1} + EF_{LDT2})/2] / 2$$

Where: VMT = vehicle miles traveled
EF_{LDA} = emission factor of light duty autos
EF_{LDT1} = emission factor of light duty trucks: up to 6000 GVW
EF_{LDT2} = emission factor of light duty trucks: up to 8500 GVW

The GHG calculation involves the following assumptions:

a. URBEMIS defaults assume that half of the workers commute with light duty trucks (LDTs) and half commute in light duty autos (LDAs).[70]
b. Half of the LDTs were assumed to be type 1 and the other half type 2.
c. The emission factor depends upon the speed of the vehicle. The URBEMIS default value of 30 miles per hour was used.
d. EMFAC emission factors from the year 2010 were used for EF_{LDA}, EF_{LDT1}, and EF_{LDT2}.

Startup Emissions

Startup emissions are GHGs emitted from starting a vehicle. Startup emissions were calculated using the following assumptions:

[70] Page A-9 of the URBEMIS user manual.

1. The number of round trips were equal to the number of worker days,
2. The breakdown in vehicles was 50% light duty autos and 50% light duty trucks,
3. Two engine startups per day with a 12 hour wait before each startup.[71]

The USEPA recommends assuming that CH_4, N_2O, and HFCs account for 5% of GHG emissions from on-road vehicles, taking into account their global warming potentials.[72] To incorporate these additional GHGs into the calculations, the total GHG footprint was calculated by dividing the carbon dioxide emissions by 0.95.

The total amount of GHG emissions from worker commuting during grading is a one-time emission of approximately 436; 3,146; 263; and 222 tonnes CO_2e for the RMDP, NRSP area, and Entrada and VCC planning areas, respectively.

Table 4-11 shows total grading emissions, including offroad equipment and worker commuting, to be 25,000; 169,300; 15,100; and 12,100 tonnes CO_2e for the RMDP, NRSP area, Entrada and VCC planning areas, respectively.

4.6.2 Estimating GHG Emissions from Building Construction

Impact Sciences provided ENVIRON with the 2008-2030 URBEMIS runs for the NRSP area,[73] and Entrada and VCC planning areas (see Appendix A for details). URBEMIS calculates CO_2 emissions from off-road construction equipment, worker commuting, and vendor trips based on the size and type of buildings specified by the user and URBEMIS defaults.[74] The total amount of GHG emissions from the building construction phase is a one-time emission of 266,200; 49,100; and 20,000 tonnes CO_2e for the NRSP area, and Entrada and VCC planning areas, respectively, as shown in Table 4-12.

Table 4-12 presents the overall construction emissions for the Proposed Project. The total amount of GHG emissions from grading and building construction, including worker commuting during those phases, is 25,000; 453,500; 64,200; and 32,200 tonnes CO_2e for the RMDP, NRSP area, and Entrada and VCC planning areas, respectively, as shown in Table 4-13. The construction emissions for alternatives D3 through D7 were scaled based upon the square footage of buildings built.

4.6.3 Construction Emissions for Alternatives 2 through 7

Construction emissions for grading and building construction for the NRSP area, and Entrada and VCC planning areas were scaled for alternatives D2 through D7 as described above. For the RMDP area, construction emissions for grading and building construction were scaled for

[71] The emission factor grows with the length time the engine is off before each ignition.

[72] USEPA. 2005. *Emission Facts: Greenhouse Gas Emissions from a Typical Passenger Vehicle.* Office of Transportation and Air Quality. February.

[73] The building construction emissions from the individual villages of the NRSP area (Homestead, Landmark Village, Mission Village, and Potrero) were summed.

[74] URBEMIS generated values for vendor trip length, vendor trips per building built, and number of pieces of equipment.

alternatives D2 through D7 based on the total square footage of buildings built in the NRSP area, and Entrada and VCC planning areas.

4.6.4 Uncertainties in Construction GHG Emissions Calculations

URBEMIS inputs for phase length and number of construction equipment during construction of buildings were supplied by Impact Sciences. These values represent URBEMIS default values and settings. As such, these values are first-order approximations only. Updating these parameters with actual construction estimator estimates will provide more refined emissions.

4.7 GHG Emissions Associated with Residential Buildings

Residential buildings include single-family homes, attached homes, apartments, and condominiums. This section describes the methods used to estimate the GHGs associated with activities in those buildings. Notably, the Proposed Project itself (i.e., the RMDP and SCP) will not directly result in the construction of residential buildings. However, approval of the Proposed Project will indirectly facilitate the build-out of residential buildings in the NRSP area and Entrada planning area.

The amount of energy, and, therefore, the associated GHG emissions emitted per dwelling unit, varies with the type of residential building. Accordingly, some information on the type of residential buildings that would be built within the NRSP area and Entrada planning area is needed to estimate GHG emissions. No residential buildings would be constructed in the VCC planning area; as such, this planning area will have no emissions resulting from residential buildings.

Newhall provided data summarizing the main residential building categories for the NRSP area and Entrada planning area. The major types of residential buildings are:

1) Single-family homes;
2) Attached townhouses or condominiums (i.e., duplexes, triplexes, etc.); and
3) Apartments.

GHGs are emitted as a result of activities in residential buildings when electricity and natural gas are used as energy sources. Combustion of any type of fuel emits CO_2 and other GHGs directly into the atmosphere; when this occurs in a residential building, it is a direct emission source[75] associated with that building. GHGs are also emitted during the generation of electricity from fossil fuels. When electricity is used in a residential building, the electricity generation typically takes place offsite at the power plant; electricity use in a residential building generally causes emissions in an indirect manner.

While fuel combustion generates CH_4 and N_2O, the emissions of these GHGs typically comprise less than 1% of CO_2e emissions from electricity generation and natural gas consumption.[76] Fuel oil, kerosene, liquefied petroleum gas, and wood can also be used as fuels, but will likely contribute

[75] California Climate Action Registry (CCAR) General Reporting Protocol (GRP), Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf, Chapter 8.

[76] Ibid., Tables C1 and C2. The methane and nitrous oxide emission factors are negligible compared to the total CO_2 emission factor for electricity generation in California.

only in small amounts as combustion sources within residential buildings. Wood burning hearths are addressed in the area sources section of this report.

Energy use in residential buildings is divided into energy consumed by the built environment and energy consumed by uses that are independent of the construction of the building such as plug-in appliances. In California, Title 24 governs energy consumed by the built environment. This includes the HVAC system, water heating, and some fixed lighting. Non-building energy use, or "plug-in" energy use can be further subdivided by specific end-use (refrigeration, cooking, lighting, etc.). Energy use for each was calculated separately, as described below.

The resulting energy use quantities were then converted to GHG emissions by multiplying by the appropriate emission factors, incorporating information on local electricity production.[77]

In this section of this report, the units CO_2 and CO_2e are used interchangeably for residential buildings because methane and nitrous oxide are assumed to contribute a negligible amount of global warming potential when compared to the carbon dioxide emissions from residential buildings.

4.7.1 Estimate of Residential Energy Use Intensity

ENVIRON developed CO_2 intensity values (CO_2 emissions per Dwelling Unit per year) for the three residential building types found in the NRSP area and Entrada planning area using Micropas 7.3 energy modeling software and data from the 2001 Residential Energy Consumption Survey (RECS).[78] The methods that were used and the assumptions that were made in estimating energy use are described below.

4.7.1.1 Energy Use in the Built Environment

As described above, the Micropas software is used to calculate the built-environment energy use per square foot per year and the Time Dependent Valuation (TDV) of the energy use per square foot per year to determine Title 24 compliance. TDV energy use is a parameter that speaks to the electricity burden that a building puts on the electrical system. In general, there is a larger demand on the electricity supply system during the day (peak times) than at night (off peak). This results in a higher stress on the electricity delivery system per marginal unit electricity delivered at peak times. Therefore, the calculation of TDV weights energy used at different times at different values. For instance, for the same annual electricity use, a building that uses more electricity during the peak mid-day electrical usage period will have a higher TDV value. Title 24 compliance is based on TDV and not on annual energy use.

Title 24 determines compliance by comparing the energy use of a modeled, or "proposed home", to a minimally Title 24 compliant "standard home" of equal dimensions; Title 24

[77] The Southern California Edison specific emission factor for electricity deliveries is 665.72 lbs CO_2/MWh. From the California Climate Action Registry Database. Southern California Edison PUP Report. 2005. Although this emission factor accounts for only CO_2, the emissions associated with N_2O and CH_4 contribute to less than 1% of the electricity generation CO_2e emissions. Available at: http://www.climateregistry.org/CarrotDocs/26/2005/SCEPUP05.xls

[78] US Energy Information Administration (EIA). Public Use Microdata. http://www.eia.doe.gov/emeu/recs/contents.html.

focuses on building energy efficiency per square foot. It places no limits upon the size of the house or the actual energy used per dwelling unit. When a proposed home is designed and modeled in Micropas, a standard home based upon the specifications of the wall area, window area, and square footage of the proposed home is also modeled. The standard Title 24 compliant home for each house type was used to estimate energy use.

Table 4-14 presents the general specifications for each dwelling unit modeled. Appendix B provides schematic drawings of each dwelling unit. Appendix C provides the Micropas input files where details of the modeled houses can be found.

The output of the Micropas runs provides annual electricity use for the HVAC system and annual natural gas usage for the heating and domestic hot water (DHW) systems per building. Although track lighting is covered[79] under Title 24, it is not taken into account when determining TDV per square foot; as such, task lighting energy use is not calculated during an ACM run such as Micropas. These energy use values were divided by the number of dwelling units per building to calculate annual energy use of each dwelling unit type for electricity (in kilowatt hours per year) and for natural gas (in hundred cubic feet per year). HVAC electricity use and natural gas use from the Micropas runs are presented in Table 4-15. Electricity use in Title 24 compliant single family homes, attached homes, and apartments are 8,052; 5,580; and 4,413 kilowatt hours per dwelling unit per year respectively. Natural gas use in Title 24 compliant single family homes, attached homes, and apartments are 449, 264, and 231 hundred cubic feet per dwelling unit per year.

Newhall has committed to making all new homes 15% more energy efficient than Title 24 (2005), or 15% more energy efficient on a TDV basis. Although ENVIRON is aware that annual energy and TDV energy do not necessarily scale linearly with each other, ENVIRON assumed that all sources covered by Title 24 that are modeled in the ACM would uniformly use 15% less annual energy. These calculations are shown in Table 4-15. For each type of home, the Title 24 compliant energy use was calculated with Micropas as described above. These calculations include energy use for heating, air conditioning, and domestic hot water. These energy use numbers were then each multiplied by 0.85 to account for Newhall's commitment to a 15% energy efficiency improvement over Title 24 (2005). This improvement over the 2005 Title 24 standards reduces the electricity use for single family homes, attached homes, and apartments to 7,590; 5,327; and 4,201 kilowatt hours per dwelling unit per year respectively. This improvement over the 2005 Title 24 standards reduces the natural gas use for single family homes, attached homes, and apartments to 381, 224, and 197 hundred cubic feet per dwelling unit per year respectively. Since Title 24 does not address the plug-in energy use, a reduction of 15% over Title 24 only reduces the energy use in the built environment. Refrigerators and plug-in lighting are assumed to still use the same amount of electricity as a minimally Title 24 compliant home. The calculations for plug-in energy use are discussed in the next section below.

[79] Track lighting must comply to a set of prescribed measures.

4.7.1.2 EIA Database - Plug-in Energy Use

The Micropas software calculates energy use from the built environment only; Micropas does not calculate energy use from plug-ins such as lighting, office equipment, plug-in cooking equipment, and refrigerators. The overall electricity use for the building types modeled in Micropas was calculated by estimating the plug-in electricity use based on the RECS data provided by the EIA.[80] In an effort to represent the dwelling units that will be present in the NRSP area and Entrada, the RECS data was filtered by climate zone,[81] state, square footage, and type of residence.[82] Each aspect of the RECS data is described below.

Appliance/Lighting. Appliance/lighting refers to the electricity use associated with lighting, electric freezers, dishwashers, cooking units, and dryers. This energy use was calculated as the energy use per square foot[83] for each building type from the EIA data. This value was then multiplied by the square footage of each dwelling unit modeled by Micropas to estimate energy use per dwelling unit. The built-in lighting electricity use was reduced by 15% to account for Newhall's commitment to a 15% improvement over Title 24 (2005).[84]

Refrigeration. Refrigeration refers to the electricity use associated with refrigerators. Refrigeration energy use is assumed to not scale with dwelling unit size.[85] As such, the average energy use for refrigerators was calculated as energy use per dwelling unit of the specified building type from the EIA data.

4.7.1.3 Comparing Micropas Energy Modeling to EIA Database

The EIA database contains energy use for domestic hot water and HVAC systems. This data was also useful as a comparison to the Micropas modeling results. In general, the Micropas modeling and the EIA database give similar results[86] for energy usage per dwelling unit. Although the data was filtered for homes by climate zone, state, square footage, and dwelling type, the EIA data evaluates older buildings while Micropas estimates energy use in new Title 24-compliant buildings. In addition, the buildings in the EIA database cover homes with a wide range of heights, shapes, and energy efficiency measures.

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[80] US Energy Information Administration (EIA). Public Use Microdata. http://www.eia.doe.gov/emeu/recs/contents.html.

[81] US climate zone 4 was used (< 2,000 cooling degree days (CDD), < 4,000 heating degree days (HDD)). This climate zone is defined differently than the 16 California climate zones. These developments are in California climate zone 9.

[82] Single family detached and multifamily 5+ were the two housing types queried.

[83] As a dwelling unit increases in size, there will be more area to light.

[84] Built-in lighting was assumed to account for 25% of the total appliance and lighting load (excluding refrigerators) in Newhall homes. Building America Research Benchmark Definition, Updated December 20, 2007.

[85] A larger dwelling unit will not necessarily have a larger refrigerator than a smaller dwelling unit.

[86] Usually within a factor of two or three for each category.

4.7.2 Estimation of Annual Greenhouse Gas Emissions from Residential Buildings

Energy use data from Table 4-15 were multiplied by the emission factors presented in Table 4-16 to generate CO_2 intensity values (CO_2 emissions per dwelling unit). The results are shown in Table 4-17. The CO_2 intensity values (CO_2 emissions per dwelling unit) presented in Table 4-17 represent the residential building types in the NRSP area and Entrada planning area, as described earlier. As described above and shown in Table 4-15 and Table 4-17, the homes that are 15% more energy efficient than Title 24 (2005) have less electricity and natural gas use. The single family homes, attached homes, and apartments emit 10%, 9%, and 10% less CO_2 per year than the Title 24 compliant homes.

Tables 4-18-A through 4-18-F show the yearly CO_2 emissions from the NRSP area for alternatives D2 through D7 by incorporating the emission factors developed as discussed above and the number of dwelling units of each of the three building categories. Tables 4-19-A through 4-19-F show these calculations for Entrada for alternatives D2 through D7. For D2, without improvements over Title 24 (2005) and without renewable energy, the NRSP area and Entrada planning area homes emit 73,200 and 6,000 tonnes CO_2 per year, respectively. For D2, with 15% improvements over Title 24 and without renewable energy, the NRSP area and Entrada planning area homes emit 66,100 and 5,500 tonnes CO_2 per year, respectively.

Newhall has committed to using renewable electricity equivalent to putting photovoltaic systems (i.e., solar) on all of the single family detached residences.[87] Here, it is conservatively assumed that a 2 kilowatt (kW) system would be installed, although larger systems (2.3 kW) may be more common. An industry source[88] estimates that a 2 kW system in Santa Clarita will generate 3,356 kW-hr per year.[89] This value was subtracted from the single family residence electricity use to estimate GHG emissions reductions from installing solar panels. As seen in Tables 4-18A and 4-19A, with 15% improvements over Title 24 (2005) and with renewable energy, the NRSP area and Entrada planning area single family homes emit a total of 21,600 and 1,800 tonnes CO_2 per year – 10,000 and 800 tonnes less CO_2 then minimally Title 24 compliant single family homes without renewable energy.

Table 4-20 lists the CO_2 emissions reductions from the renewable energy and from the 15% better than Title 24 (2005) for D2. The total CO_2 emissions for all dwelling units in the NRSP area and Entrada planning area, if minimally Title 24 compliant and without renewable energy, would be 73,200 and 6,000 tonnes per year, respectively. The total CO_2 emissions for all dwelling units in the NRSP and Entrada planning area, if minimally Title 24 compliant and with renewable energy, would be 66,400 and 5,500 tonnes per year, respectively; a 9% reduction in GHG emissions. The total CO_2 emissions for all dwelling units in the NRSP area and Entrada planning area, if 15% better than Title 24 and without renewable energy, would be 66,000 and 5,500 tonnes per year, respectively; a 10% reduction in GHG emissions. The total CO_2 emissions for all dwelling units in

[87] Newhall has also committed to renewable energy for non-residential buildings.

[88] Sunpower Solar Calculator, Sunpower Company. Available at: http://www.sunpowercorp.com/For-Homes/How-To-Buy/Solar-Calculator.aspx

[89] A kW-hr is one kilowatt of power for one hour.

the NRSP area and Entrada planning area, if 15% better than Title 24 and with renewable energy, would be 59,300 and 4,900 tonnes per year, respectively; a 19% reduction in GHG emissions.

With the improvements over Title 24 and the solar panels, Newhall is estimated to reduce GHG emissions associated with residential buildings by a total of 19%, or 13,900 tonnes per year in the NRSP area and 1,100 tonnes per year in the Entrada planning area, as shown in Table 4-20. The emissions for the various design alternatives, accounting for energy efficiency measures and renewable energy, are given in Table 4-21. Emissions were explicitly calculated for each design alternative.

4.7.3 Uncertainties in Residential Building GHG Calculations

Several factors lead to uncertainties in the above analysis. These are described below.

- Although all buildings in the developments will be Title 24 compliant, Title 24 does not specify building dimensions (e.g., size, height, or orientation). Title 24 also provides significant flexibility for window types, window amounts, insulation choice, and other parameters. This uncertainty is expected to neither over- nor underestimate emissions. Title 24 grants enough flexibility that if a designer puts in more windows than is "allowed" under the prescriptive measures, the energy efficiency losses can be offset by improving the window quality, or installing a more efficient HVAC system. Although it is unknown how exactly the buildings will be designed, each home will be Title 24 compliant, and thereby all design features of the home that make it less energy efficient will be offset by design features that make it more energy efficient.

- Energy use will vary considerably depending upon the design of the home. The residential units to be built in the NRSP area and Entrada planning area will vary considerably in size, layout, and overall design. The parameters used here are intended to represent the upper quartile of homes relative to sizes in each category. As such, energy use from the homes that will actually be built in the NRSP area and Entrada planning area are anticipated to be lower.

- Built environment energy use will vary considerably depending upon the home owners' habits regarding energy use. For instance, homeowners determine the set point of thermostats, the duration of showers, the usage of lights, if they are to have a second refrigerator, and the temperature of the refrigerator, among other things. Newhall will have little, if any, influence over these choices made by the homeowner. Current median behavior attributes are presented here. To the extent that individuals are becoming more energy conscious, this will tend to overestimate energy use in the future.

- Plug-in energy use will vary considerably depending upon the appliances, lights, and other plug-ins installed by the homeowner. Newhall will have little, if any, influence over these choices made by the homeowner. As above, the current median behavior attributes are presented here. To the extent that individuals are becoming more energy conscious, or appliances are becoming more energy efficient, this will tend to overestimate energy use in the future.

4.8 GHG Emissions Associated with Non-Residential Buildings

Non-residential buildings include all structures, except residences, that may exist in a development, such as government, municipal, commercial, retail, and office space. This section describes the methods used to estimate the GHGs associated with activities in those buildings. Notably, the Proposed Project itself (i.e., the RMDP and SCP) will not directly result in the construction on nonresidential buildings; however, approval of the Proposed Project will facilitate and enable the construction of residential buildings in the NRSP area, and Entrada and VCC planning areas.

The amount of energy and, therefore, the associated GHG emissions emitted per square foot of available space vary with the type of non-residential building. For example, restaurants are far more energy intensive than warehouses, which have little climate conditioned space. Accordingly, information on the type of non-residential buildings that are planned for the NRSP area, and Entrada and VCC planning area is critical to estimating GHG emissions. Newhall provided data summarizing the non-residential building categories for the NRSP area, and Entrada and VCC planning areas. The breakdown of "Miscellaneous Retail / Commercial / Office" is assumed to be the same for all three planning areas. Likewise, the breakdown of the other building categories is assumed to be the same for each planning area. The types of non-residential buildings are:

1) Grocery
2) Miscellaneous Retail / Commercial / Office
    a. Restaurant (20%)
    b. Office (25%)
    c. Retail (55%)
3) Hotel
4) Business Park / Industrial
    a. Office (30%)
    b. Storage (20%)
    c. Research and Development (50%)
5) Public Safety
    a. Fire Station (100%)
6) Institutional
    a. Schools (75%)
    b. Library (25%)

Similar to that described for residential buildings, GHGs are emitted as a result of activities in non-residential buildings that require electricity and natural gas consumption. Combustion of any type of fuel emits CO_2 and other GHGs directly into the atmosphere; when this occurs in a non-residential building this is a direct emission source[90] associated with that building. GHGs are also emitted during the generation of electricity from fossil fuels. When electricity is used in a non-residential building, the electricity generation typically takes place offsite at the power plant; electricity use in a non-residential building generally causes emissions in an indirect manner.

[90] California Climate Action Registry (CCAR) General Reporting Protocol (GRP), Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf, Chapter 8.

While fuel combustion generates CH_4 and N_2O, the emissions of these GHGs typically comprise less than 1% of CO_2e emissions from electricity generation and natural gas consumption.[91] Fuel oil, kerosene, liquefied petroleum gas, and wood can also be used as fuels, but generally contribute only in small amounts as combustion sources within non-residential buildings. As such, these minor emissions are not accounted for here.

Similar to that in residential buildings, energy use in non-residential buildings is divided into energy consumed by the built environment and energy consumed by uses that are independent of the construction of the building such as plug-in appliances. In California, Title 24 governs energy consumed by the built environment. Non-building energy use, or "plug-in" energy use, can be further subdivided by specific end-use (refrigeration, cooking, office equipment, etc.). The following two steps were performed to quantify the energy use due to non-residential buildings:

1. Calculate energy use from systems covered by Title 24[92] (HVAC system, water heating system, and the lighting system) using building energy efficiency modeling software.
2. Calculate energy use from office equipment, plug-in lighting, and other sources not covered by Title 24.

The resulting energy use quantities were then converted to GHG emissions by multiplying by the appropriate emission factors for GHG emissions obtained by incorporating information on local electricity production.[93] The total GHG emissions for non-residential buildings, taking into account Newhall energy efficiency and renewable energy design features, in the NRSP area, and Entrada and VCC planning areas are estimated to be 45,200; 4,600; and 9,700 tonnes CO_2 per year, respectively. The following sections describe the methodologies employed to estimate GHG emissions.

In this section of this report, the units CO_2 and CO_2e are used interchangeably for non-residential buildings because methane and nitrous oxide are assumed to contribute a negligible[94] amount of global warming potential when compared to the carbon dioxide emissions from non-residential buildings.

4.8.1 Estimate of Non-residential Energy Use Intensity

ENVIRON developed CO_2 intensity values (CO_2 emissions per 1,000 sqft per year) for building types found in the NRSP area, and Entrada and VCC planning areas using data from the 2003

[91] Ibid., Tables C1 and C2. The methane and nitrous oxide emission factors are negligible compared to the total CO_2 emission factor for electricity generation in California.

[92] Title 24, Part 6, of the California Code of Regulations: California's Energy Efficiency Standards for Residential and Nonresidential Buildings. http://www.energy.ca.gov/title24/

[93] The Southern California Edison specific emission factor for electricity deliveries is 665.72 lbs CO_2/MWh. From the California Climate Action Registry Database. Southern California Edison PUP Report. 2005. Available at: http://www.climateregistry.org/CarrotDocs/26/2005/SCEPUP05.xls

[94] The Southern California Edison specific emission factor for electricity deliveries is 665.72 lbs CO_2/MWh. From the California Climate Action Registry Database. Southern California Edison PUP Report. 2005. Although this emission factor accounts for only CO_2, the emissions associated with N_2O and CH_4 contribute to less than 1% of the electricity generation CO_2e emissions. Available at: http://www.climateregistry.org/CarrotDocs/26/2005/SCEPUP05.xls

Commercial Buildings Energy Consumption Survey[95] and eQUEST energy modeling software. The methods that were used to estimate the emissions are described further below.

4.8.1.1 Overall Energy Use – EIA Database and eQUEST Energy Modeling

The overall electricity and natural gas use for the building types was calculated based on data provided by the EIA.[96] The end use data provide an estimate of the total electricity and natural gas used in various buildings, as well as an estimate of the percent of the total electricity use comprised by Title 24-regulated (built environment) and plug-in electricity in each building type. Each building type has a characteristic electricity and natural gas use per square foot of building space. Energy use was based upon buildings in EIA climate zone 4 (includes CA climate zone 9). Electricity and natural gas use per square foot (energy intensity) for each building sample was first calculated. The energy intensities were then averaged taking into account the weighting factor for each building in the survey. It was assumed that all natural gas use was for heating or hot water, both of which are covered by Title 24.

In addition, eQUEST energy modeling software was used as a comparison and to supplement the EIA data. As described above, eQUEST[97] is a building energy efficiency modeling package approved by the California Energy Commission as a 2005 Title 24 non-residential ACM. The eQUEST model runs presented here used default parameters for building area, number of floors, cooling/heating equipment type, etc., specific to each building type.[98] The eQUEST software was run in Title 24 mode, which automatically sets the building to be minimally Title 24 compliant. For the model runs used to estimate energy use in the nonresidential buildings that would be enabled in the NRSP area, and Entrada and VCC planning areas, most parameters remained unchanged from the Title 24 compliant settings. The parameters for the eQUEST runs used to customize the results were:

1) Energy Code Compliance Analysis = CA Title 24
2) Building Type
3) Region = Pasadena (CZ9)
4) City = Newhall Soledad

The output of the eQUEST runs provides annual electricity and annual natural gas usage. These values were divided by the square footage of the buildings to calculate the energy intensity (energy per square foot) of each building type for electricity and natural gas.

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[95] US Energy Information Administration (EIA). Public Use Microdata 2003. Available at http://www.eia.doe.gov/emeu/cbecs/contents.html

[96] Table 3a and 3b of: http://www.eia.doe.gov/emeu/cbecs/enduse_consumption/pba.html

[97] eQUEST version 3.6 is free software available at: http://www.doe2.com/equest/

[98] Specifications of the buildings to be built in the NRSP area, Entrada, and VCC have not been determined at this stage of the development.

For the building category modeled using eQUEST, plug-in energy use was estimated from general EIA data. The eQUEST software calculates energy use from the built environment only; eQUEST does not calculate energy use from plug-ins such as task lighting, office equipment, and plug-in cooking equipment. The overall electricity use for the building types modeled in eQUEST was calculated by estimating the plug-in electricity use based on data provided by the EIA.[99] Table 4-22 lists the percentage breakdown of end uses for electricity in various non-residential building types.

The end use data provide an estimate of the total electricity used in various buildings as well as an estimate of the percent of the total energy used comprised by plug-in electricity in each building type. The built-environment energy use values for each building type obtained from the eQUEST models were increased based on the percentage of total energy use comprised by plug-in electricity derived from the EIA data. For example, as shown in Table 4-22, 59% of the energy used in educational buildings is attributable to the built environment and the remaining 41% is attributable to plug-in uses. To calculate total electricity use for the building types evaluated using eQUEST, eQUEST results were divided by the percentage energy use by the built-environment energy (from Table 4-22) for each building type. This is shown in Table 4-23. Each building type has a characteristic electricity and natural gas use per square foot of building space. The electricity and natural gas use per square foot for each building type are converted to GHG emissions as shown in the next section.

4.8.1.2 Comparing eQUEST Energy Modeling to EIA Database

The Commercial Buildings Energy Consumption Survey[100] from the EIA compiles energy use from many different non-residential building types. This data was used to supplement information for building types for which eQUEST does not have default parameters. This data was also useful as a comparison to the eQUEST modeling results. Energy intensity was calculated by dividing the total energy use for each type of building by the total square footage of each type of building.[101] Table 4-23 lists the energy use per square foot for both the EIA data and the eQUEST data.

In general, the eQUEST modeling and the EIA database give similar results for energy usage per square foot. Slight discrepancies arise because the EIA data evaluates older buildings while eQUEST estimates energy use in new Title 24-compliant buildings. In addition, building categories for EIA data and eQUEST modeling are not always identical or comparable.

[99] Table 3a and 3b of: http://www.eia.doe.gov/emeu/cbecs/enduse_consumption/pba.html

[100] US Energy Information Administration (EIA). Public Use Microdata 2003. Available at http://www.eia.doe.gov/emeu/cbecs/contents.html

[101] Weighted numbers were used to represent the varying proportions of different types and sizes of non-residential buildings.

4.8.2 Estimation of Annual Greenhouse Gas Emissions from Non-Residential Buildings

Energy use data from Table 4-23 were multiplied by the emission factors presented in Table 4-24 to generate CO_2 intensity values (CO_2 emissions per 1,000 sqft building area). The results are shown in Table 4-25. The CO_2 intensity values (CO_2 emissions per 1,000 sqft building area) presented in Table 4-25 represent the non-residential building types in the NRSP area, and Entrada and VCC planning areas described earlier. The annual CO_2 emissions for different building types range from 2 to 3 tonnes per 1,000 square feet for storage up to 25 to 41 tonnes per 1,000 square feet for quick service restaurants. Most building types emit between 3 and 8 tonnes CO_2 per 1,000 square feet per year.

Newhall has committed to making all new non-residential buildings 15% more energy efficient than Title 24 (2005), or 15% more energy efficient on a TDV basis. Although ENVIRON is aware that annual energy use and TDV energy do not necessarily scale linearly with each other, as discussed in the residential section, ENVIRON assumed that all sources covered by Title 24 that are modeled in the ACM would uniformly use 15% less annual energy. These calculations are shown in Table 4-26. Non Title 24 regulated energy use is assumed to still use the same amount of electricity as a minimally Title 24 compliant building. This results in a reduction of energy use for all building types. Because plug-ins are not covered under Title 24, the decrease in energy use is typically less than 15%, yet still substantial. For instance, strip malls decreased from 7.4 to 6.8 tonnes CO_2 per 1,000 square feet per year, an 8% decrease in GHG emissions.

The building types and subcategories are shown in Table 4-27. Building categories provided by Newhall differ slightly from both the default building categories in eQUEST and the building categories in the EIA database. Table 4-27 provides the scheme used to relate Newhall building types to eQUEST and EIA building types. The table also shows the comparison of the CO_2 emissions use per square foot of the Title 24 buildings and the 15% more efficient than Title 24 buildings.

Table 4-28-A shows the yearly CO_2 emissions from the non-residential buildings that would be enabled by the Proposed Project's approval in the NRSP area, and Entrada and VCC planning areas by incorporating the emission factors developed as discussed above and the square footage of each of the five main building categories. Due to the project design feature of reducing energy use 15% below that required by Title 24 (2005), a reduction of approximately 4,400, 400, and 1,500 tonnes of CO_2 per year is realized in the NRSP area, and Entrada and VCC planning areas, respectively, or approximately 9%, 8%, and 12% of the CO_2 emissions associated with the non-residential buildings.

Newhall also has committed to the renewable equivalent of 1,920 solar systems for the non-residential buildings in the NRSP area. If the same percentage of roof area in the Entrada and VCC planning areas was covered with solar systems, approximately 180 and 1,100 systems, respectively, would be installed. This renewable energy would offset yet another 1,900 tonnes of CO_2 annually (4%) for the NRSP area, 180 tonnes of CO_2 annually (3%) for the Entrada planning area, and 1,100 tonnes of CO_2 annually (9%) for the VCC planning area.

Overall, the 15% better than Title 24 (2005) and renewable initiatives reduce the non-residential energy use by 12%, 12%, and 21% for the NRSP area's, and Entrada and VCC planning areas' non-residential buildings, respectively. These measures bring the overall CO_2 emissions associated with non-residential energy use down to 45,200; 4,600; and 9,700 tonnes CO_2 per year for the NRSP area's, and Entrada and VCC planning areas' non-residential buildings, respectively.

Tables 4-28-A through 4-28-F show the yearly non-residential emissions from the three planning areas for alternatives D2 through D7. Table 4-29 summarizes the emissions from the NRSP area's, and Entrada and VCC planning areas' non-residential buildings for each of these design alternatives. Emissions were explicitly calculated for each design alternative.

4.8.3 Uncertainties in Non-residential Building GHG Calculations

Several factors lead to uncertainties in the above analysis. These are described below.

- The EIA energy use data for electricity end-uses (Table 4-22) uses values from all climate zones and buildings built in all years. Data for new buildings broken down by climate zone is not yet available from the EIA. However, it is not clear that plug-in energy use would change substantially with climate zone, however, the percent of energy represented by plug-in uses will vary with climate zone. To the extent that more energy is used in the built environment in less temperate zones, this may serve to underestimate the plug-in energy use slightly.

- The eQUEST modeling in Table 4-23 assumes Title 24 compliant default parameters for windows, insulation, HVAC, etc. Although all buildings in the developments will be Title 24 compliant, Title 24 does not specify building dimensions (e.g. size, height, or orientation). Title 24 also provides significant flexibility for window types, window amounts, insulation choice, and other parameters. This uncertainty is expected to neither over- nor under-estimate emissions. Title 24 grants enough flexibility that if a designer puts in more windows than is "allowed" under the prescriptive measures, the energy losses can be offset by improving the window quality, or installing a more efficient HVAC system. Although it is unknown how exactly the buildings will be designed, each building will be Title 24 compliant, and thereby all design features of the building that make it less energy efficient will be offset by design features that make it more energy efficient.

4.9 Mobile Sources

This section estimates GHG emissions from the mobile sources that would be associated with build-out of the NRSP area and Entrada planning area. The Proposed Project itself (i.e., the RMDP and SCP) will not generate notable mobile source emissions – as resource management and conservation plans, no daily vehicular traffic would result. Mobile sources (e.g., worker commute trips) associated with the RMDP are addressed in the construction source category; and, the SCP would not generate measurable mobile source emissions. Accordingly, the mobile source emissions considered are from the typical daily operation of motor vehicles by NRSP area and Entrada planning area residents. Mobile source emissions from VCC, which has no residential buildings, are not accounted for in this inventory as explained below. Mobile source emissions from the non-residential areas of the NRSP area and Entrada planning area also are not counted, as discussed below.

Operational emissions from new residences are considered to be growth, as residences are rarely removed from the housing supply once constructed. There are exceptions, such as when one housing development replaces another, and, in those cases, the replacement residential development need not be considered growth.

However, it is not clear that commercial development should be considered new growth for vehicular travel purposes. To the extent that commercial development serves existing residential development its vehicular travel may not be new. For instance, if the new commercial area serves an area with a high residential/commercial balance, then this new commercial growth will reduce shopping and work trip lengths and will reduce GHG emissions associated with mobile sources. If, however, the new commercial area results in longer trips for its workers and residents than they would have previously made, then it adds GHG emissions. Commercial development that could potentially increase VMT would be facilities that draw trips from far away that otherwise would not be made. A theme park, for example, may be viewed as such a development.

In this report, it is assumed that new commercial area serves an area with a high residential/commercial balance. Therefore, this new commercial growth will reduce shopping and work trip lengths and will reduce GHG emissions associated with mobile sources. As such, the VCC planning area, which would be built out with commercial land uses only, will not contribute to mobile GHG emissions. Similarly, the commercial space in the NRSP area and Entrada planning area will not contribute to mobile GHG emissions.

For GHGs, if the emissions simply moved location from one basin to another, these emissions are not new on a global scale. To evaluate the sustainability of new commercial development, one must ask if the shoppers' and workers' travel distances to the new commercial development is greater or smaller than those individuals travel distances to the commercial and residential development that it replaced.

To the extent that new commercial development serves new residential development, much of the commercial vehicle travel would already be counted in the evaluation of the new residential development. Accordingly, GHG emissions from VMT serving commercial areas will only be counted if the commercial areas contribute to greater VMT as a result of its location. If the commercial development lowers VMT, then it will be considered to have a zero or negative GHG contribution as a result of its shortened operational vehicle trips. Here, although the commercial area likely reduces trip lengths from existing residences, we conservatively assume the commercial area to contribute to a net zero increase in overall United States-wide traffic.

The CCAR General Reporting Protocol[102] recommends estimating GHG emissions from mobile sources at an individual vehicle level, assuming knowledge of the fuel consumption rate for each vehicle as well as the miles traveled per car. Since these parameters are not known for a future development, the CCAR guidance is too specific to use as recommended. However, the CCAR

[102] California Climate Action Registry (CCAR). 2007. *General Reporting Protocol*. Version 2.2. March.

methodology can be used with fleet-average characteristics estimated from current data available for the state of California. The program developed for the ARB, the Urban Emissions (URBEMIS)[103] model, has the capability to calculate mobile source CO_2 emissions for the future NRSP area and Entrada planning area.

For worker mobile sources, methane and nitrous oxide are explicitly calculated and therefore CO_2 and CO_2e emissions from mobile sources are not equal.

4.9.1 Estimating GHG Emissions from Mobile Sources

Traffic patterns, trip rates, and trip lengths are based upon the Austin-Foust Newhall Ranch traffic study.[104] The analysis in this section uses trip generation rates and trip lengths specific to the Proposed Project. This approach provides an accurate representation of VMT at full build out.

In an effort to include only trips made by NRSP area and Entrada planning area residents, as opposed to trips associated only with the commercial development, only trips originating or ending at the NRSP area and Entrada planning area homes are analyzed. This approach avoids counting trips made by residents of other cities that visit the NRSP area, Entrada planning area, and VCC planning area. These trips are not counted because, as discussed above, these trips do not represent true growth; they would have been made in the absence of the population growth accommodated by the NRSP area and Entrada planning area. In fact, development of the NRSP area, and Entrada and VCC planning areas will likely reduce trip lengths as the development will provide local shopping and employment opportunities in the Santa Clarita Valley.

4.9.2 Assessment of the Validity of the GHG Estimation Approach

To assess the validity of using only home-based trips, VMT estimated from traffic model outputs using the home-based trip method were compared to actual traffic counts for LA County. The Southern California Association of Governments (SCAG) traffic model covers all of Ventura, LA, and Orange counties and the western half of San Bernardino and Riverside counties. VMT from all home-based trips for the SCAG model were calculated by multiplying SCAG computed trip lengths by the SCAG computed number of trips of each type. The 2003 trip length distributions and the trip generation results used are given in Appendix D1. The total VMT was divided by the total population of LA County.[105] The VMT based upon the SCAG computer model and counting only home-based trips was 6,545 VMT per capita (see Appendix D2 for calculating details).[106] This result compares well to the Department of Transportation's (DOT) estimate of VMT for LA county of

[103] Urban Emissions Model (URBEMIS) (Version 8.7 – 2002 / Version 9.2.2 – 2007). Jones & Stokes Associates. Prepared for: South Coast Air Quality Management District.

[104] Westside Santa Clarita Valley Roadway Phasing Analysis, November 2006, Austin Foust Associates.

[105] The resident population and the total population of LA county differ by less than 2%. See Appendix D.

[106] Includes all home based trips. Because of LA County's size, over 92% of home based trips in LA County are internal. Therefore, no correction for non-resident home-based trips were made. This is slightly different than the calculation method for Landmark where non-resident home-based trips were subtracted out.

5,953 VMT per capita in 2005 (see Appendix D3 for calculation details and DOT data).[107] In this example, using computer model outputs of home-based trip length and trip rates allows an accurate estimate of VMT and VMT per capita.

The Austin-Foust traffic study used a model that is similar to the SCAG model: the Santa Clarita Valley Consolidated Traffic Model (SCVCTM). The SCVCTM covers a smaller area and is specific to the Santa Clarita Valley. The SCVCTM was developed by the city of Santa Clarita and the Los Angeles County Department of Public Works (LACDPW).

Results from the Austin-Foust traffic study are attached in Appendix D4. Results give trip lengths for home-work, home-shop, and home-other[108] of 10.7, 5.2, and 7 miles respectively. The average home-based trip length was 7.7 miles. These trip lengths are significantly shorter than trip lengths for the rest of the Santa Clarita Valley (16.6, 10.8, and 11.1 miles, see Appendix D4), and reflect the reduction of trip length effected by the addition of commercial and employment opportunities.

Trip generation rates for each type of residential unit also were taken from the Austin-Foust traffic study. These trip generation rates estimate the number of trips taken. A trip made by a delivery truck, a baby-sitter, or a friend visiting from out of town is not counted as a trip for that home. If those trips are made by NRSP area or Entrada planning area residents, and begin or and at that resident's home, however, they would be counted. The trip generation rates are summarized in Table 4-30.

To estimate the length of each of these trips, the purpose of the trip must be known. The distribution of the types of home-based trips was used to determine what percentage trips were for work trips, shopping trips, or other trips.[109] For instance, 29% of the home based trips are work trips, 24% are shopping trips, and 47% are other.[110] Table 4-31 provides the average trip length and the trip type (e.g., home-to-work, home-to-shop, and home-to-other) used in this analysis.[111] The VMT for the NRSP area and Entrada planning area were calculated by multiplying trip lengths by number of trips. Annual VMT for the NRSP area and Entrada planning area is approximately 336 million and 28 million VMT per year. Assuming 58,860 residents in the NRSP area and 4,862 residents in Entrada (see Appendix D5 for estimates), VMT per capita per year is 5,712 miles for each development. The VMT per capita is the same for both the NRSP area and Entrada planning area because the percentage distribution of homes between single family, attached, and apartment is assumed to be the same for each development.

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[107] Calculated from the 2005 California Motor Vehicle Stock, Travel and Fuel Forecast study. California Department of Transportation. Division of Transportation System Information. December 30, 2005. Available online at http://www.dot.ca.gov/hq/tsip/smb/documents/mvstaff/mvstaff05.pdf

[108] Includes trips such as home-school.

[109] Trip percentages are based upon the results from the Newhall Ranch traffic study provided by Austin-Foust Associates.

[110] Including, among other things, home-based school.

[111] Trip lengths are based upon the results from the Westside Santa Clarita Valley Roadway Phasing Analysis, November 2006, Austin Foust Associates.

The VMT per capita for the NRSP area and Entrada planning area (5,712 miles per capita) is less than the VMT per capita for LA County (5,953 miles per capita), as discussed above.[112] As a comparison, the 2005 CA average VMT is 6,548 miles per person per year.[113]

The GHG emissions from mobile sources were calculated by running URBEMIS 9.2.2 with the trip rates and trip lengths as discussed above. The URBEMIS output file is given in Appendix D6. Fleet distribution types from EMFAC2007 from the year 2030 were used. URBEMIS default trip speeds were used.[114] Table 4-32 shows the GHG emissions from vehicles associated with residents of the NRSP area and Entrada planning area as calculated by the URBEMIS run as described above.

Note that the only GHG for which URBEMIS 9.2.2 calculates emissions is CO_2. Nitrous oxide, CH_4, and HFCs[115] are also emitted from mobile sources. The USEPA recommends assuming that CH_4, N_2O, and HFCs account for 5% of mobile source GHG emissions, taking into account their GWPs.[116] Therefore, CO_2 emissions in Table 4-32 were divided by 0.95 to account for non-CO_2 GHGs. Vehicles associated with the NRSP area and Entrada planning area developments will emit approximately 162,000 and 13,400 tonnes CO_2e per year, respectively. The URBEMIS runs for mobile sources are given in Appendix D6.[117] As noted above, this is likely an overestimate of GHG emissions from mobile sources at the NRSP area and Entrada planning area.

Table 4-33 lists the mobile source emissions from alternatives D2 through D7 for the NRSP area and Entrada planning area. Emissions were explicitly calculated for each design alternative.

4.9.3 Mobile Source Emission Estimation Assumptions

These calculations do not count cross country trips or trips with multiple stops. In an effort to include only trips made by NRSP area and Entrada planning area residents, only trips originating or ending at the NRSP area and Entrada planning area homes are analyzed. Non-home-based trips made by NRSP area and Entrada planning area residents (for example from work to a gas station) are not included in this analysis. This analysis also does not include all legs of multi-stop trips, as only the first leg of the trip from the home would be counted. However, as shown in the previous sections, using computer model outputs of home-based trip length and trip rates allows an accurate estimate of VMT and VMT per capita.

It must also be noted that methodologies for calculating VMT are constantly evolving. The analysis presented above likely over-estimates VMT per capita; a re-analysis with newer more accurate

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112 VMT per capita for LA county is approximately 6,220 (SCAG model) or 6,340 (DOT estimate).

113 Calculated from the 2005 California Motor Vehicle Stock, Travel and Fuel Forecast study. California Department of Transportation. Division of Transportation System Information. December 30, 2005. Available online at http://www.dot.ca.gov/hq/tsip/smb/documents/mvstaff/mvstaff05.pdf Note that the DOT report (CA-wide) and the emission factors from EMFAC (LA county only) assume different vehicle fuel efficiencies and fleet mixes.

114 The default speeds are very similar to the average speeds from the SCAG output for LA county as discussed above.

115 HFCs are emitted from leaking air conditioning systems.

116 USEPA. 2005. *Emission Facts: Greenhouse Gas Emissions from a Typical Passenger Vehicle.* Office of Transportation and Air Quality. February. http://www.epa.gov/otaq/climate/420f05004.pdf

117 Note that the URBEMIS outputs are given in short tons. In this report, all emissions are reported in metric tonnes.

techniques, once they are available, will provide a more accurate, and likely a substantially lower calculated VMT.

4.10 Area Sources

This section estimates GHG emissions from area sources at the NRSP area, Entrada planning area, and VCC planning area developments. The area emissions considered are from hearths[118] and landscaping fuel combustion sources, such as lawn mowers. (The RMDP and SCP would not directly result in emissions from area sources; instead, it would only be the development facilitated by approval of the Proposed Project that would produce area source emissions.) GHG emissions due to natural gas combustion are excluded from this section since they are covered in residential emissions. URBEMIS 9.2.2[119] was used to calculate the area source GHG emissions.

In this section of this report, the units CO_2 and CO_2e are used interchangeably for area sources because methane and nitrous oxide are assumed to contribute a negligible amount of global warming potential when compared to the carbon dioxide emissions from area sources.

4.10.1 Estimating GHG Emissions from Area Sources

GHG emissions from area sources were calculated using URBEMIS 9.2.2 and the land use information summarized in Table 4-34. The location of the Proposed Project, as specified in URBEMIS, determines the factors used to calculate the hearth fuel use. In the NRSP area, Entrada planning area, and VCC planning area, it is estimated that hearths will emit 2,400; 380; and 0 tonnes CO_2 per year, respectively. Landscape maintenance emissions will emit approximately 110, 10, and 0.5 tonnes CO_2 per year, respectively.

Table 4-34 presents the GHG emissions from area sources associated with the NRSP area, Entrada planning area, and VCC planning area developments.[120] In total, area sources from the NRSP area, Entrada planning area, and VCC planning area account for approximately 2,600; 390; and 0.5 tonnes CO_2 per year, respectively. The total area emissions for these developments are approximately 2,900 tonnes per year.

Because area sources account for such a small percentage of the overall CO_2 emissions, the contribution of methane and nitrous oxides to overall project GHG emissions was assumed to be small, and, therefore, was not calculated. The area source URBEMIS runs are given in Appendix E. The approximate area source emissions for each alternatives D2 through D7 are also presented in Table 4-34. The area emissions were scaled for each design alternative based upon the square footage of buildings built.

[118] wood stoves, fireplaces, and natural gas fired stoves

[119] Urban Emissions Model (URBEMIS) (Version 8.7 – 2002 / Version 9.2.2 – 2007). Jones & Stokes Associates. Prepared for: South Coast Air Quality Management District.

[120] Assumes full buildout.

4.10.2 Uncertainties in Area Source GHG Emissions Calculations

GHG emissions from hearths include natural gas fireplaces. As all natural gas consumed in residential homes is accounted for in the residential section of this report, some double counting (overestimation) of emissions occurs here.

4.11 Municipal Sources

This section presents the calculations of GHG emissions from municipal sources, which will include the supply and treatment of water and wastewater, public lighting, and municipal vehicles, such as police cars and garbage trucks. The RMDP and SCP would not directly result in municipal source emissions; however, this emission source category is inventoried because approval of the Proposed Project would facilitate land use development in the NRSP area, Entrada planning area, and VCC planning area – each of which would result in area source emissions. Municipal emissions for the NRSP area, Entrada planning area, and VCC planning area are 18,400; 3,100; and 1,600 tonnes of CO_2e per year, respectively, for a total of 23,100 tonnes of CO_2e per year.

The emissions estimates are based upon information specific to the development that would occur in each of the three planning areas, such as estimated water demand and characteristics of the waste water treatment plant.[121] Some VCC planning area municipal emissions (those that otherwise depend on population estimates) are estimated by scaling the NRSP area municipal emissions by the relative sizes of these developments. A more detailed explanation of this methodology is provided in the following sections.

The GHG emission estimates for water use are based on the energy needed to: supply, treat, and distribute water to the NRSP area, and Entrada and VCC planning areas; treat the wastewater produced by its residents and businesses; and, redistribute some reclaimed water to be used for non-potable purposes. Direct emissions of CH_4 and N_2O from wastewater treatment are also included in the inventory. Estimates of GHG emissions from public lighting include emissions attributable to powering street lights, traffic lights, lights for public lots and parks, and lights for public buildings. The bulk of emissions from municipal sources are indirect emissions attributable to energy and electricity use. As noted earlier, the three planning areas within the service area of the SCE utility and the carbon intensity factor from that utility will be used for these calculations.[122]

Estimates of GHG emissions from water supply and treatment are based on data specific to Southern California. Estimates of GHG emissions from public lighting are based on a study of city-wide GHG emissions from Duluth, MN.[123] The emissions for each type of municipal source have been expressed in annual tonnes of CO_2e, which takes into account emissions of other GHGs besides CO_2, like CH_4 and N_2O.

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[121] The indirect emissions source quantities for the wastewater treatment plant are based on water demand values specific to the developments and are scaled based on quantities provided in the Landmark Village Climate Change Technical Report.

[122] California Climate Action Registry (CCAR) Database. Southern California Edison PUP Report. 2005.

[123] Skoog., C. 2001. Greenhouse Gas Inventory and Forecast Report. City of Duluth Facilities Management and The International Council for Local Environmental Initiatives. October. http://www.ci.duluth.mn.us/city/information/ccp/GHGEmissions.pdf

The annual emissions from water treatment and distribution are approximately 16,700 tonnes CO_2e per year. The annual emissions from street lighting are approximately 3,000 tonnes CO_2 per year. The annual emissions from municipal vehicles are approximately 3,400 tonnes CO_2 per year. In summary, the overall municipal emissions, for the NRSP area and Entrada and VCC planning areas, from these three sources are 23,100 tonnes CO_2e per year.

In this section of this report, the units CO_2 and CO_2e are used interchangeably for public lighting and municipal vehicles because methane and nitrous oxide were accounted for in the literature studies examined. For water delivery, the units CO_2 and CO_2e are used interchangeably because methane and nitrous oxide are assumed to contribute a negligible amount of global warming potential when compared to the carbon dioxide emissions from electricity[124] use during water delivery. Because methane and nitrous oxide emissions are explicitly calculated for the treatment plant, the units of CO_2 and CO_2e refer to different emissions; CO_2 and CO_2e are not used interchangeably for the treatment plant.

4.11.1 Water/Sewage

The majority of estimated GHG emissions from water supply and sewage treatment are due to the energy used to convey, treat, and distribute water. Thus, these emissions are generally indirect emissions from the production of electricity to power these systems. Additional emissions from wastewater treatment include CH_4 and N_2O, which are emitted directly from the wastewater. In general, the water/sewage category is the major source of municipal sector GHG emissions.

Water quantities for the NRSP area, Entrada planning area, and VCC planning area were provided by Newhall Land.[125] The NRSP area will generate a total water demand of 16,400 acre-feet (AF) per year. Of these 16,400 AF, 8,100 AF will be potable groundwater pumped from an underlying aquifer and 8,300 AF will be non-potable reclaimed water produced by the Newhall Ranch Water Reclamation Plant. Potable water for the Entrada and VCC planning areas will not come from the underlying aquifer but rather from the State Water Project (SWP). The Entrada planning area will generate a total water demand of 2,400 AF per year, with 1,700 AF of potable water from the SWP and 700 AF of non-potable water from the Water Reclamation Plant. The VCC planning area will generate a total water demand of 1,100 AF per year, with 600 AF of potable water from the SWP and 500 AF of non-potable water from the Water Reclamation Plant. Water treatment direct emissions from the VCC planning area were scaled from the NRSP area based upon total building area as shown in Table 4-35.

To supply potable water to residential and commercial users, three processes are necessary: the supply and conveyance of the water from the source, the treatment of the water to make it acceptable for consumption, and the distribution of the water to individual users. After use, the wastewater is treated either for disposal or reuse as reclaimed water. Any reclaimed water is generally redistributed to users via pumping. The emission factors and GHG emissions for all these

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[124] The Southern California Edison specific emission factor for electricity deliveries is 665.72 lbs CO_2/MWh. From the California Climate Action Registry Database. Southern California Edison PUP Report. 2005. Although this emission factor accounts for only CO_2, the emissions associated with N_2O and CH_4 contribute to less than 1% of the electricity generation CO_2e emissions. Available at: http://www.climateregistry.org/CarrotDocs/26/2005/SCEPUP05.xls

[125] Email from John Porcello, GSI Water Solutions. November 3, 2008.

processes are shown in Table 4-36-A through 4-36-C. The annual emissions from water treatment and distribution are approximately 16,700 tonnes CO_2e per year.

4.11.1.1 Potable Groundwater Supply and Conveyance (NRSP Area Only)

Supplying and conveying groundwater in the NRSP area is estimated to account for 2,300 metric tonnes of CO_2e emissions per year. To supply the annual demand for 8,100 AF of potable water, the NRSP area will draw upon a local supply of water from an underground aquifer. The energy needed to supply and convey the NRSP area's water will be used to pump this water from the ground and distribute it throughout the development. The Electric Power Research Institute has estimated that, nationwide, the amount of energy required to pump water from the ground ranges from 228 to 587 kW-hr per AF.[126] Pumping groundwater in Southern California is typically more energy-intensive than in other areas of the state and nation because its aquifers are relatively deep; in Southern California's Chino Basin, which is to the southeast of the Newhall Ranch site, it has been estimated that 950 kW-hr of electricity are needed to supply one AF of groundwater.[127] To be conservative, it was assumed that it would require 950 kW-hr of electricity to extract one acre-foot of water from the aquifer underlying Newhall Ranch.[128] Using this emission factor, the expected potable water demand and the SCE carbon-intensity factor, GHG emissions from potable water supply and conveyance were calculated as shown in Table 4-36-A. Using the Chino estimate for pumping electricity demand likely overestimates the municipal CO_2 emissions by approximately 1,400 tonnes per year.[129] A more refined estimate taking into account the actual aquifer depth and the physical properties of the aquifer would likely lower the estimate of CO_2 emissions from ground water pumping.

4.11.1.2 Water from the State Water project (SWP) (Entrada and VCC Only)

Supplying and conveying groundwater in the Entrada and VCC planning areas is estimated to account for 1,600 and 580 tonnes of CO_2e emissions per year, respectively, as shown in Tables 4-36-B and 4-36-C. As previously mentioned, these two planning areas will rely exclusively on water from the SWP.

[126] California Energy Commission. (CEC) 2005. *California's Water-Energy Relationship.* Final Staff Report. CEC-700-2005-011-SF. November. Page 26.

[127] Ibid. Page 26.

[128] Ibid. The amount of energy required to supply and convey water depends heavily both on how the water is extracted and on the distance between the water source and the end user. At least half of the potable water consumed in Southern California is drawn from surface water in Northern California or nearby states and supplied to the south via aqueducts. Pumping this water over great distances and sometimes high elevations to the end user can be very energy-intensive (CEC 2005). It has been estimated that the average amount of electricity necessary to supply and convey one AF of water suitable for indoor use to Southern California is 3,170 kW-hr, taking into consideration the large portion of water that is imported from hundreds of miles away (CEC 2006). Using the SCE carbon-intensity factor, this is equivalent to approximately 0.96 tonnes of CO_2e per AF. However, since it is known that these developments will be using the much less energy-intensive process of pumping groundwater to supply its potable water needs, it is appropriate to use a groundwater specific emission factor and not the generic average emission factor for Southern California.

[129] 1,400 fewer tonnes per year are emitted if the energy requirement for groundwater pumping and conveyance is estimated as 400 kW-hr per AF instead of 950 kW-hr per AF.

Typical sources of water for Southern California are from Northern California and the Colorado River; based on CEC estimates for energy demand, pumping water to Southern California from these typical sources emits approximately 0.96 tonnes CO_2/AF of water delivered.[130]

4.11.1.3 Potable Water Treatment and Distribution

Treating and distributing potable water in the NRSP area are estimated to account for 90 tonnes[131] of CO_2e emissions and 1,000 tonnes of CO_2e emissions per year, respectively. Treating and distributing potable water in the Entrada planning area are estimated to account for 20 tonnes of CO_2e emissions and 200 tonnes of CO_2e emissions per year, respectively. Treating and distributing potable water in the VCC planning area are estimated to account for 10 tonnes of CO_2e emissions and 80 tonnes of CO_2e emissions per year, respectively. For water intended for indoor use in Southern California, it is estimated that 36 kW-hr of electricity is necessary to treat one AF of water and an additional 414 kW-hr is necessary to distribute that water to the end users.[132] Based on the estimated potable water demand, these emission factors and the SCE-carbon intensity factor, GHG emissions from potable water treatment and distribution were calculated for each development as shown in Tables 4-36-A through 4-36-C. The estimate presented here may double count some of the pumping energy requirements already accounted for in the groundwater pumping section. This is because the water may already be at the required pressure to distribute after being pumped from the aquifer. As such, the estimate provided here is likely conservative (high); a more refined analysis will likely yield lower emissions.

4.11.1.4 Wastewater Treatment

Wastewater treatment indirect emissions in the NRSP area, Entrada planning area, and VCC planning area are estimated to account for 1,900; 170; and 110 tonnes of CO_2e emissions per year, respectively. Wastewater treatment direct emissions in the NRSP area, Entrada planning area, and VCC planning area are estimated to account for 5,000; 400; and 300 tonnes of CO_2e emissions per year, respectively. Newhall Ranch will also contain a Water Reclamation Plant with the capacity to treat 21 AF per day of wastewater and accommodate a maximum flow of 42 AF per day.[133] Emissions associated with wastewater treatment include indirect emissions necessary to power the treatment process and direct emissions from the organic material in the wastewater.[134] This

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[130] The CEC estimates that 50% of Southern California's water is supplied by importing water from Northern California and the Colorado River.

[131] Because treatment is likely simply the addition of chlorine tablets, a low value (eight tonnes / year), or the approximate GHG emissions of two single family homes, is appropriate.

[132] California Energy Commission. (CEC) 2006. *Refining Estimates of Water-Related Energy Use in California.* PIER Final Project Report. Prepared by Navigant Consulting, Inc. CEC-500-2006-118. December. Page 22.

[133] Landmark Village Draft EIR. Section 4.11: Wastewater Disposal. Page 4.11-1.

[134] Source quantities for potable and non-potable water demand are provided by Newhall. The source quantity for wastewater treatment indirect emissions is scaled up from the recycled water quantity based on the ratio of the two quantities from Landmark Village (wastewater treatment quantities specific to Newhall Ranch were unavailable).

number is smaller than the total amount of water demanded by and supplied to Newhall Ranch (19,900 AF per year) because not all of the water used by the community is captured and treated as wastewater.

Indirect GHG emissions from the electricity necessary to power the wastewater treatment process also were calculated. The electricity required to operate a wastewater treatment plant in Southern California is estimated to be 623 kW-hr per AF.[135] This is a conservative estimate because it assumes a level of treatment necessary for indoor water (i.e., potable water or water acceptable for household uses such as in toilets); as not all wastewater treated at the reclamation plant will be re-used or treated to this level, the actual amount of electricity required will likely be lower. Based on the expected amount of wastewater requiring treatment, this emission factor and the SCE carbon-intensity factor, indirect emissions due to wastewater treatment were calculated as shown in Tables 4-36-A through 4-36-C.[136]

Direct emissions from wastewater treatment include emissions of CH_4 and N_2O. A per capita emission factor for these GHG emissions was developed based on a 2005 US GHG inventory for domestic wastewater treatment (25 teragrams CO_2e/year or 25 million tonnes CO_2e/year)[137] and the 2005 US population (approximately 296,410,400). Direct emissions from wastewater treatment were calculated using the emission factor developed from this data (0.084 tonnes CO_2e/capita/year) and the projected population at the NRSP area (58,860 residents) and Entrada planning area (4,862 residents) as shown in Table 4-36-A and 4-36-B respectively. Direct emissions from wastewater treatment for the VCC planning area were calculated by scaling the NRSP area's direct emissions by the ratio of total building area in the NRSP area to total building area in the VCC planning area as described in the previous sections.

4.11.1.5 Non-Potable Recycled Water Distribution

Non-potable recycled water distribution emissions in the NRSP area, Entrada planning area, and VCC planning area are estimated to account for 2,400; 210; and 140 tonnes of CO_2e emissions per year, respectively. Once treated at the wastewater treatment plant, the water will need to be re-pumped through the development to supply it to end users. Estimates of the amount of energy needed to redistribute and, if necessary, additionally treat reclaimed water vary from 391 to 978 kW-hr per AF.[138] To be conservative, the high-end energy intensity estimate was used in this inventory. Based on the estimated demand for reclaimed water, the estimated electricity demand and the SCE carbon-

[135] CEC 2006. Page 22.

[136] Information on the amount of water treated at the wastewater treatment plant was not available, so ENVIRON scaled the water treated at the wastewater treatment plant based on the Landmark Village ratio of the maximum possible quantity treated to the non-potable water demand.

[137] USEPA. 2007. Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2005. #430-R-07-002. April. http://epa.gov/climatechange/emissions/downloads06/07Waste.pdf

[138] CEC 2006. Page 24.

intensity factor, non-potable reclaimed water redistribution emissions were calculated as shown in Table 4-36-A through 4-36-C.

In total, all water and wastewater supply, treatment and distribution for the NRSP area, Entrada planning area, and VCC planning area is expected to produce 16,700 metric tonnes of CO_2e annually.

4.11.1.6 Energy Savings from Pumping from Aquifer

Typical sources of water for Southern California are from Northern California and the Colorado River; based on CEC estimates for energy demand, pumping water to Southern California from these typical sources emits approximately 0.96 tonnes CO_2 per AF of water delivered.[139] If the NRSP area were to acquire all of its water from these typical sources, the GHG emissions associated with pumping the water would be 7,800 tonnes CO_2 per year.[140] However, since the NRSP area will obtain most of its water from the local underground aquifer and from the reclamation plant, most of the water will not need to be pumped long distances. Therefore, the energy demand, and thus the GHG emissions, is lower than if the development were to obtain all of its water from the typical sources. Groundwater supply and conveyance emits an estimated 0.29 tonnes CO_2e per AF of water delivered. Because the anticipated water demand that will be met by potable groundwater is 8,135 AF per year, the estimated emissions savings for water demand is (.96 tonnes CO_2e/AF -.29 tonnes CO_2e/AF) * 8,135 AF = 5,450 tonnes CO_2e per year lower (0.18 tonnes CO_2e per dwelling unit per year).

4.11.2 Public Lighting

GHG emissions from public lighting sources are due to indirect emissions associated with the production of the electricity that powers these lights. Lighting sources considered in this source category include streetlights, traffic signals, area lighting for parks and lots, and lighting in public buildings. The emission factor for public lighting is shown in Table 4-36-A through 4-36-C. Data from a report by the City of Duluth shows that the amount of electricity demanded for all types of public lighting is 149 kW-hr per capita per year.[141] Using this study, the SCE-specific carbon-intensity emission factor, and the expected NRSP area population of 58,860 and the Entrada planning area population of 4,862, emissions from public lighting were calculated.[142] Thus, the Newhall Ranch-specific emission factor for public lighting would be 0.045 tonnes CO_2e per capita per year. Emissions from public lighting for the VCC planning area were calculated by scaling the NRSP area public lighting emissions by the ratio of total building area in the NRSP area to total

[139] The CEC estimates that 50% of Southern California's water is supplied by importing water from Northern California and the Colorado River.

[140] This estimate is derived by multiplying the emission factor for pumping water to Southern California, 0.96 tonnes CO_2/AF water, by the total potable water demand at Newhall. The emission factor for supplying groundwater is .29 tonnes of CO_2/AF water because groundwater is pumped over a shorter distance.

[141] Skoog., C. 2001. This factor was calculated by summing the total electricity needs for municipal uses and dividing by the Duluth population. The Duluth population was calculated by dividing the city's reported GHG emissions by its reported per capita emissions.

[142] Population estimate detailed in Appendix D1.

building area in the VCC planning area as described in the previous sections. Public lighting emissions in the NRSP area, Entrada planning area, and VCC planning area are estimated to account for 2,600; 220; and 180 tonnes of CO_2e emissions per year, respectively.

4.11.3 Municipal Vehicles

GHG emissions from municipal vehicles are due to direct emissions from the burning of fossil fuels. Municipal vehicles considered in this source category include vehicles such as police cars, fire trucks, and garbage trucks. The emission factor for municipal vehicles is shown in Table 4-36-A through 4-36-C. Data from reports by Medford, MA; Duluth, MN; Northampton, MA; and Santa Rosa, CA[143] show that the CO_2 emissions from municipal vehicles would be approximately[144] 0.05 tonnes per capita per year. Using these studies and the expected NRSP area population of 58,860 and the Entrada planning area population of 4,862, emissions from municipal vehicles in the NRSP area and Entrada planning area were calculated as shown in Tables 4-36-A and 4-36-B. Emissions from municipal vehicles for the VCC planning area were calculated by scaling the NRSP area's municipal vehicle emissions by the ratio of total building area in the NRSP area to total building area in the VCC planning area as described in the previous sections. Municipal vehicle emissions in the NRSP area, Entrada planning area, and VCC planning area are estimated to account for 2,900; 240; and 200 tonnes of CO_2e emissions per year, respectively.

4.11.4 Municipal Sources Emissions Summary

The emissions estimates for the municipal sources (i.e., supply and treatment of water and wastewater; public lighting; municipal vehicles) are based upon information specific to the NRSP area, Entrada planning area, and VCC planning area,[145] such as estimated water demand and characteristics of the waste water treatment plant. Municipal emissions for the NRSP area, Entrada planning area, and VCC planning area are 18,400; 3,100; and 1,600 tonnes of CO_2e per year, as shown in Table 4-36-D.

4.12 GHG Emissions Associated with Pools and Recreation Centers

The RMDP and SCP would not directly result in the construction of pools and recreation centers. However, approval of the Proposed Project would facilitate construction of forty recreation centers in the NRSP area and two recreation centers in the Entrada planning area.[146] It is assumed that no

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[143] City of Medford. 2001. Climate Action Plan. October. http://www.massclimateaction.org/pdf/MedfordPlan2001.pdf

City of Northampton. 2006. Greenhouse Gas Emissions Inventory. Cities for Climate Protection Campaign. June. http://www.northamptonma.gov/uploads/listWidget/3208/NorthamptonInventoryClimateProtection.pdf

City of Santa Rosa. Cities for Climate Protection: Santa Rosa. http://ci.santa-rosa.ca.us/City_Hall/City_Manager/CCPFinalReport.pdf

Skoog., C. 2001. Greenhouse Gas Inventory and Forecast Report. City of Duluth Facilities Management and The International Council for Local Environmental Initiatives. October.http://www.ci.duluth.mn.us/city/information/ccp/GHGEmissions.pdf

[144] In an effort to be conservative, the larges per capita number from these four reports was used.

[145] Direct emissions for the VCC planning area are estimated by scaling the NRSP area direct emissions by the ratio of total building area in the NRSP area to total building area in VCC planning area (because there is no population estimate for VCC).

[146] Personal communications with Newhall.

recreation centers will be built in the VCC planning area, as only commercial and industrial land uses are considered for that planning area. Recreation centers may include various pools, spas, and restroom buildings; ENVIRON assumed that pools are the main consumers of energy in recreation centers. This section describes the methods used to estimate the GHGs associated with pools in recreation centers.

The energy used to heat and maintain a swimming pool depends on several factors, including (but not limited to): whether the pool is indoors or outdoors, size of the pool (surface area and depth), water temperature, and energy efficiency of pool pump and water heater, and whether solar heating is used. By making assumptions for these parameters and using known or predicted values for energy use, ENVIRON estimated the electricity and natural gas use of an outdoor pool.

In this section of this report, the units CO_2 and CO_2e are used interchangeably for pools per recreation centers because methane and nitrous oxide are assumed to contribute a negligible[147] amount of global warming potential when compared to the carbon dioxide emissions from pools per recreation centers.

4.12.1 Recreation Center Characterization

ENVIRON assumed that the proposed pools will be outdoor pools with dimensions 50 meters by 22.9 meters (a typical, competition-size pool). ENVIRON based electricity calculations on a pool that ran its standard (not high-efficiency) water filter for 24 hours per day, 365 days per year. The large pool size and standard operating equipment allow for a conservative (high) energy use estimate that would decrease with a smaller pool or more efficient equipment.

As there is little data publicly available on the energy use of commercial swimming pools, ENVIRON extrapolated energy consumption from information obtained from two sources: 1) Data on electricity used by pool pumps from Pacific Gas and Electric (PG&E),[148] and 2) Data on the annual cost to heat a commercial pool located in Carlsbad, CA.[149]

4.12.2 Electricity Use of Recreation Centers

A PG&E study on energy efficiency of a pool pump at the Lyons Pool in Oakland, CA, found an annual electricity use of 110,400 kilowatt hours per year (kWh per yr).[150] The study pool is smaller than the assumed size of the proposed pool (actual size of the Lyons Pool is 35 yards by 16 yards). Accordingly, ENVIRON scaled the electricity use to reflect the larger size of the proposed pool.

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[147] The Southern California Edison specific emission factor for electricity deliveries is 665.72 lbs CO_2/MWh. From the California Climate Action Registry Database. Southern California Edison PUP Report. 2005. Although this emission factor accounts for only CO_2, the emissions associated with N_2O and CH_4 contribute to less than 1% of the electricity generation CO_2e emissions. Available at: http://www.climateregistry.org/CarrotDocs/26/2005/SCEPUP05.xls

[148] PG&E. 2006. Energy Efficient Commercial Pool Program, Preliminary Facility Report. Lyons Pool, "City of Oakland/Oakland Unified School District." October.

[149] Mendioroz, R. 2006. Fueling Change: A Number of Design Schemes and Alternative-Energy Strategies Can Help Operators Beat the Price of Natural Gas. Athletic Business. March.

[150] PG&E. 2006. Energy Efficient Commercial Pool Program, Preliminary Facility Report. Lyons Pool, "City of Oakland/Oakland Unified School District." October.

4.12.3 Natural Gas Use of Recreation Centers

The public pools in the NRSP area and Entrada planning area will be heated by solar water heaters. Solar water heaters can provide up to 100% of the heating needs for the pool.[151] The analysis for natural gas water heating below demonstrates the savings from using solar water heating for pools.

The estimated annual cost of heating a standard competition-size pool is $184,400 (or 72% of the total cost of pool operations).[152] ENVIRON used the average PG&E commercial rate for natural gas of $0.95 per therm to convert this cost into annual natural gas use (hundred cubic feet per year [ccf/year]).[153] The commercial rate averages the variable cost due to energy usage and time of year. This corresponds to approximately 184,400 ccf per year.[154]

This value is comparable to that obtained from the pool industry.[155] The estimated cost of heating a residential pool using a natural gas heater is about one dollar per square foot of water surface area per month ($/sqft-month) in residential therms.[156] Applying this value to a competition-size pool yields an annual natural gas use of 147,600 ccf/year.

4.12.4 Conversion of Electricity and Natural Gas Use to Greenhouse Gas Emissions

Table 4-37 shows the results of these calculations for electricity and natural gas use. ENVIRON used emission factors from Table 4-24 to calculate the total CO_2 emissions for each pool. Based upon these assumptions, pools emit approximately 85 tonnes of CO_2 per 1,000 sqft of surface area per year (8 tonnes from electricity used to pump water and 77 tonnes from natural gas used to heat the pool). However, the Newhall Ranch pools will have solar water heating, thereby reducing the GHG emissions to only 8 tonnes per 1,000 square feet per year.

A summary of the calculations is shown below:

Emissions from Electricity (Tonnes CO_2 / yr / 1,000 sqft) = Energy Use (kW-hr / yr) x *Emission Factor (lbs CO_2e / kW-hr)* x *Conversion Factor (tonne / 2205 lbs) / Surface Area of Pool (1,000 sqft)*

Emissions from Natural Gas (Tonnes CO_2 / yr / 1,000 sqft) = Energy Use (ccf / yr) x *Emission Factor (lbs CO_2e / ccf)* x *Conversion Factor (tonne / 2205 lbs) / Surface Area of Pool (1,000 sqft)*

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[151] http://www.rlmartin.com/rspec/factsheets/indoor.htm

[152] Mendioroz, R. 2006. Fueling Change: A Number of Design Schemes and Alternative-Energy Strategies Can Help Operators Beat the Price of Natural Gas. Athletic Business. March.

[153] Pacific Gas and Electric (PG&E). 2007. Gas Rate Finder. Vol 36-G, No. 9. September. http://www.pge.com/tariffs/GRF0907.pdf

[154] At the commercial rate given 1 ccf costs $1.

[155] SolarCraft Services Inc. 2007. Phone conversation with Chris Bumas on September 18, 2007. Novato, CA http://www.solarcraft.com/

[156] The residential price for one therm of natural gas.

Newhall land provided information regarding the number of pools for each design alternative. Number of pools and emissions from each design alternative are given in Table 4-38. There will be forty solar heated competition-sized pools in the NRSP area, two solar heated competition-sized pools in the Entrada planning area, and none in the VCC planning area, the total yearly CO_2 emissions from recreation centers in the NRSP area and Entrada planning area are 4,000 tonnes per year and 200 tonnes per year, respectively, as shown in Table 4-38. This is a total savings of 37,800 tonnes per year from using solar heating for the pools, which is approximately 90% of the emissions associated with traditionally-heated pools.

4.13 Golf Course Emissions

The Proposed Project would not directly result in the construction of a golf course. However, the Proposed Project would enable build-out of the NRSP area, which is anticipated in include an 18-hole golf course. No golf courses are planned for the Entrada or VCC planning areas. Emission flux resulting from the construction of the golf course is not discussed, nor is the sequestration of CO_2 into the turf, trees, or lakes of the golf course. Operational CO_2 emissions were calculated for three areas: irrigation, maintenance (mowing), and on-site buildings' energy use. All three components are discussed in this section. The yearly emissions from the golf course are estimated to be 192 tonnes CO_2 per year.

In this section of this report, the units CO_2 and CO_2e are used interchangeably for golf courses because methane and nitrous oxide are assumed to contribute a negligible amount of global warming potential when compared to the carbon dioxide emissions from golf courses.

4.13.1 Calculating CO_2 Emissions from Irrigation of the Golf Course

The release of GHGs due to irrigation practices was calculated in three steps:

1. Identify the source of water.
2. Identify the quantity of water needed.
3. Calculate the emissions associated with pumping the water.

1. *Identify the source of water.* According to the Newhall Ranch Specific Plan, the intention of an on-site WRP is to recycle the maximum amount of wastewater generated to meet non-potable needs; inclusive of park and recreational area needs. The plan specifically states using recycled water for irrigation of the planned 18-hole golf course. ENVIRON assumed that the source of all water needed for golf course irrigation will be the WRP to be built alongside the Santa Clara River, approximately 300 feet below the planned golf course. To avoid double counting irrigation emissions, calculations are based on moving the water from the source (WRP) to final destination (golf course). For information related to the transport, treatment, and distribution of water for primary use in Newhall Ranch residences and businesses, see the municipal section.

2. *Identify the quantity of water needed.* Standard water use for an 18-hole golf course ranges from 250 to 450 acre-ft yearly. A survey of golf course superintendents conducted in the summer of 2003 by the Northern and Southern California Golf Associations revealed an annual average

California usage of 345 acre-ft.[157] Numerous factors will affect the actual water usage of the course at Newhall Ranch, and it is likely to vary by year. ENVIRON assumed the average usage of 345 acre-ft per year annually.

3. Calculate the associated emissions. Using the information identified above, ENVIRON calculated total emissions from irrigation of an 18-hole golf course.

a) *Estimate total dynamic head:* This is the combination of lift (300 feet) and desired pressure. Standard athletic field sprinklers require a base pressure of approximately 65 psi.[158]

*60 psi * 2.31 ft/psi*[159]	=	*139 ft*
+ lift	=	*300 ft*
Total dynamic head	=	*439 ft*

b) *Identify fuel unit and multiply by head*: Possible pumping fuels include electricity, natural gas, diesel, and propane. ENVIRON assumed that all Newhall Ranch pumps will use electricity. Based on the literature, ENVIRON assumed a pumping energy use of 1.551 kW-hr/acre-ft/ft.[160]

*1.551 kW-hr/acre-ft/ft * 439 ft = 681 kW-hr/acre-foot*

c) *Multiply energy demand by emission factor and convert to tonnes*: The energy demand per acre-ft calculated above is multiplied by the emission factor for Southern California Edison and converted to tonnes.[161]

*681kW-hr/acre-ft * 0.666 lbs CO_2/kW-hr ÷ 2204.62 lbs/ton = 0.21 tonnes CO_2/acre-ft*

As discussed previously, ENVIRON assumed an annual water demand of 345 acre-ft. Combining this with the calculated emission factor yields total annual emissions of 73 tonnes CO_2 from irrigation of the golf course.

4.13.2 Calculating CO_2 Emissions from Maintenance of the Golf Course

Maintenance emissions include the emissions resulting from the mowing of turf grass. The release of GHGs due to mowing was calculated in three steps:

1. Identify the area of turf and frequency of mowing.

[157] Northern California Golf Association. Improving California Golf Course Water Efficiency, pg 14. http://www.owue.water.ca.gov/docs/2004Apps/2004-079.pdf

[158] Full Coverage Irrigation. Partial List of Customers Using FCI Nozzles. http://www.fcinozzles.com/clients.asp.

[159] Conversion factor: 1 psi = 2.31 feet of head. Kele & Associates Technical Reference: Liquid Level Measurement. http://www.kele.com/tech/monitor/Pressure/LiqLevMs.pdf

[160] Kansas State University Irrigation Management Series. Comparing Irrigation Energy Costs. Table 4. http://www.oznet.ksu.edu/library/ageng2/mf2360.pdf

[161] California Climate Action Registry (CCAR) Database. Southern California Edison PUP Report. 2005.

2. Identify the efficiency of a typical mower.
3. Calculate the emissions associated with mowing.

1. *Identify the area of turf and frequency of mowing*: An Arizona State economic analysis of golf courses reports that on average 2/3 of the land within a golf course is maintained.[162] This assumption suggests that 120 acres of the 180-acre golf course will be regularly mowed.[163] ENVIRON assumed that the course will be mowed twice weekly, although high maintenance areas such as greens will be mowed more frequently.[164] ENVIRON also assumed a growing season of 52 weeks/year.[165]

2. *Identify the efficiency of a typical mower*. Typical mower calculations are based on the specifications for a lightweight fairway mower (model 3235C) reported by John Deere's Golf & Turf division.[166] A typical mower will use one tank (18 gallons) of diesel per day (assumed to be 8 hours). Given the size specifications of the mower and assuming an average speed of 5.5 mph, such a mower can cover 44 acres on 18 gallons of diesel.

3. *Calculate the emissions associated with mowing*. Using the information collected above and a CO_2 emission factor for diesel combustion,[167] ENVIRON calculated the emission factor for mowing the golf course:

> *2 mowings/week * 52 weeks/year * 18 gallons diesel/44 acre-mowing * 22.4 lbs CO_2/gallon diesel / 2204 lbs/ton = 0.43 tonnes CO_2/acre-year*

Assuming 120 acres of turf are to be maintained, the annual emissions from mowing the golf course are 52 tonnes CO_2/year.

4.13.3 Calculating CO_2 Emissions from Building Energy Use at the Golf Course

ENVIRON used the 2003 Commercial Buildings Energy Consumption Survey (CBECS) conducted by the US Energy Information Administration (EIA)[168] to estimate the potential GHG emissions associated with buildings at the proposed golf course. These tables cover a range of building sizes, types, and climatic zones.

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[162] Total acreage divided by total acreage maintained. Arizona State University, Dr. Troy Schmitz. Economic Impacts and Environmental Aspects of the Arizona Golf Course Industry. http://agb.poly.asu.edu/workingpapers/0501.pdf.

[163] Newhall Ranch Specific Plan, p. 30.

[164] Based on Best Practices video. http://buckeyeturf.osu.edu/podcast/?p=51

[165] Based on 95% of Southern California Survey respondents report an irrigation season greater than 9-10 months. http://www.owue.water.ca.gov/docs/2004Apps/2004-079.pdf

[166] John Deere Product Specifications. 3235C Lightweight Fairway Mower. http://www.deere.com/en_US/ProductCatalog/GT/series/gt_lwfm_c_series.html

[167] EIA. Fuel and Energy Source Codes and Emission Coefficients. http://www.eia.doe.gov/oiaf/1605/factors.html

[168] 2003 Commercial Buildings Energy Consumption Survey (CBECS) conducted by the US Energy Information Administration: http://www.eia.doe.gov/emeu/cbecs/contents.html

Literature reports state that the average size of a clubhouse and pro-shop in an 18-hole golf course in California as 11,200 sqft and 1,300 sqft, respectively.[169] ENVIRON considered these two buildings to be “public assembly/recreational buildings” (defined as buildings in which people gather for social or recreational activities) for classification in the CBECS.

Using the average building sizes, the energy use reported by the CBECS, and the Southern California Edison emission factor for electricity and natural gas, ENVIRON calculated the estimated GHG emissions from the golf course buildings to be 67 tonnes CO_2/year.

4.13.4 Estimating Total CO_2 Emissions from the Golf Course

Combining the three sources of GHG emissions discussed previously, the proposed golf course at the NRSP area will emit approximately 192 tonnes CO_2/year as shown in Table 4-39.

4.14 Summary of Emissions from the Proposed Project

4.14.1 Project Emissions Under Alternatives D2-D7

Emissions resulting from the Proposed Project (i.e., installation of the RMDP infrastructure, and the development facilitated on the NRSP area, Entrada planning area, and VCC planning area) are presented in Tables 4-40-A through 4-40-F. The total overall annualized emissions for Alternatives D2, D3, D4, D5, D6, and D7 are 344,500; 330,400; 321,900; 312,400; 299,700; and 245,400 tonnes CO_2e per year, respectively.

In most instances, the CO_2e unit measurement is equivalent to the CO_2 unit measurement. However, all results in this section are presented in units of CO_2e either because the global warming potentials of methane and nitrous oxide were accounted for explicitly, or the methane and nitrous oxide are assumed to contribute a negligible amount of global warming potential when compared to the carbon dioxide emissions from that particular emissions category.

4.14.1.1 Alternative D2

Emissions from the various aspects of Alternative D2 (i.e., the Proposed Project) are presented in Table 4-40-A.

One-Time Emissions. The total amount of one-time emissions that would result from implementation and approval of Alternative D2 is 601,900 tonnes CO_2e. These one-time emissions are attributable to land use/vegetation changes and construction-related activities. The one-time vegetation emissions are 45,000 tonnes CO_2e, and the one-time construction emissions are 556,900 tonnes CO_2e. These construction emissions are attributable to grading activities (221,500 tonnes CO_2e) and building construction activities (335,400 tonnes CO_2e).

Annual Emissions. The total amount of annual emissions resulting from Alternative D2 is 329,500 tonnes CO_2e. This amount accounts for installation of the RMDP infrastructure, and

[169] Clemson University Department of Agriculture and Applied Economics. Economic Impacts of California's Golf Course Facilities in 2000. Table 9. http://ucrturf.ucr.edu/topics/EconImpact_Clemson.pdf

the development enabled on the NRSP area, Entrada planning area, and VCC planning area. Emissions from residential buildings are estimated to be 64,200 tonnes CO_2e per year, or 19% of the annual emissions. Emissions from non-residential buildings are estimated to be 59,500 tonnes CO_2e per year, or 18% of the annual emissions. Emissions from mobile sources are estimated to be 175,400 tonnes CO_2e per year, or 53% of the annual emissions. Emissions from area sources (hearths) are estimated to be 2,900 tonnes CO_2e per year, or 0.9% of the annual emissions. Emissions from municipal sources (water distribution, public lighting, and municipal vehicles) are estimated to be 23,100 tonnes CO_2e per year, or 7% of the annual emissions. Emissions from recreational centers (pools) are estimated to be 4,200 tonnes CO_2e per year, or 1.3% of the annual emissions. Emissions from golf courses are estimated to be 192 tonnes CO_2e per year, or 0.1% of the annual emissions.

Overall Annual Emissions, Including Annualized One-Time Emissions. The overall annual emissions were calculated by annualizing the one-time emissions by 40 years and then summing this quantity with the annual emissions. This result is shown in the final row in Table 4-40-A. Alternative D2's total amount of overall annualized emissions is 344,500 tonnes CO_2e per year.

4.14.1.2 Alternative D3

Emissions from the various aspects of Alternative D3 are presented in Table 4-40-B.

One-Time Emissions. The total amount of one-time emissions that would result from implementation and approval of Alternative D3 is 571,300 tonnes CO_2e. These one-time emissions are attributable to land use/vegetation changes and construction-related activities. The one-time vegetation emissions are 43,700 tonnes CO_2e, and the one-time construction emissions are 527,600 tonnes CO_2e. These construction emissions are attributable to grading activities (212,500 tonnes CO_2e) and building construction activities (315,100 tonnes CO_2e).

Annual Emissions. The total amount of annual emissions resulting from Alternative D3 is 316,200 tonnes CO_2e. This amount accounts for installation of the RMDP infrastructure, and the development enabled on the NRSP area, Entrada planning area, and VCC planning area. Emissions from residential buildings are estimated to be 62,000 tonnes CO_2e per year, or 19% of the annual emissions. Emissions from non-residential buildings are estimated to be 58,900 tonnes CO_2e per year, or 19% of the annual emissions. Emissions from mobile sources are estimated to be 167,200 tonnes CO_2e per year, or 53% of the annual emissions. Emissions from area sources (hearths) are estimated to be 2,800 tonnes CO_2e per year, or 0.9% of the annual emissions. Emissions from municipal sources (water distribution, public lighting, and municipal vehicles) are estimated to be 21,800 tonnes CO_2e per year, or 7% of the annual emissions. Emissions from recreational centers (pools) are estimated to be 4,100 tonnes CO_2e per year, or 1.3% of the annual emissions. Emissions from golf courses are estimated to be 192 tonnes CO_2e per year, or 0.1% of the annual emissions.

Overall Annual Emissions, Including Annualized One-Time Emissions. The overall annual emissions were calculated by annualizing the one-time emissions by 40 years and then summing this quantity with the annual emissions. This result is shown in the final row in Table 4-40-B. Alternative D3's total amount of overall annualized emissions is 330,400 tonnes CO_2e per year.

4.14.1.3 Alternative D4

Emissions from the various aspects of Alternative D4 are presented in Table 4-40-C. Emissions will not be generated by the VCC planning area as build-out of that planning area will not be facilitated in Alternative D4.

One-Time Emissions. The total amount of one-time emissions that would result from implementation and approval of Alternative D4 is 543,200 tonnes CO_2e. These one-time emissions are attributable to land use/vegetation changes and construction-related activities. The one-time vegetation emissions are 43,500 tonnes CO_2e, and the one-time construction emissions are 499,700 tonnes CO_2e. These construction emissions are attributable to grading activities (201,300 tonnes CO_2e) and building construction activities (298,400 tonnes CO_2e).

Annual Emissions. The total amount of annual emissions resulting from Alternative D4 is 308,400 tonnes CO_2e. This amount accounts for installation of the RMDP infrastructure, and the development enabled on the NRSP area and Entrada planning area. Emissions from residential buildings are estimated to be 62,000 tonnes CO_2e per year, or 20% of the annual emissions. Emissions from non-residential buildings are estimated to be 49,300 tonnes CO_2e per year, or 16% of the annual emissions. Emissions from mobile sources are estimated to be 169,500 tonnes CO_2e per year, or 55% of the annual emissions. Emissions from area sources (hearths) are estimated to be 2,800 tonnes CO_2e per year, or 0.9% of the annual emissions. Emissions from municipal sources (water distribution, public lighting, and municipal vehicles) are estimated to be 20,400 tonnes CO_2e per year, or 7% of the annual emissions. Emissions from recreational centers (pools) are estimated to be 4,200 tonnes CO_2e per year, or 1.3% of the annual emissions. Emissions from golf courses are estimated to be 192 tonnes CO_2e per year, or 0.1% of the annual emissions.

Overall Annual Emissions, Including Annualized One-Time Emissions. The overall annual emissions were calculated by annualizing the one-time emissions by 40 years and then summing this quantity with the annual emissions. This result is shown in the final row in Table 4-40-C. Alternative D4's total amount of overall annualized emissions is 321,900 tonnes CO_2e per year.

4.14.1.4 Alternative D5

Emissions from the various aspects of Alternative D5 are presented in Table 4-40-D. Emissions will not be generated by the VCC planning area as build-out of that planning area will not be facilitated in Alternative D5.

One-Time Emissions. The total amount of one-time emissions that would result from implementation and approval of Alternative D5 is 526,200 tonnes CO_2e. These one-time emissions are attributable to land use/vegetation changes and construction-related activities. The one-time vegetation emissions are 43,000 tonnes CO_2e, and the one-time construction emissions are 483,300 tonnes CO_2e. These construction emissions are attributable to grading activities (195,300 tonnes CO_2e) and building construction activities (288,000 tonnes CO_2e).

Annual Emissions. The total amount of annual emissions resulting from Alternative D5 is 299,300 tonnes CO_2e. This amount accounts for installation of the RMDP infrastructure, and the development enabled on the NRSP area and Entrada planning area. Emissions from residential buildings are estimated to be 60,100 tonnes CO_2e per year, or 20% of the annual emissions. Emissions from non-residential buildings are estimated to be 48,600 tonnes CO_2e per year, or 16% of the annual emissions. Emissions from mobile sources are estimated to be 164,100 tonnes CO_2e per year, or 55% of the annual emissions. Emissions from area sources (hearths) are estimated to be 2,700 tonnes CO_2e per year, or 0.9% of the annual emissions. Emissions from municipal sources (water distribution, public lighting, and municipal vehicles) are estimated to be 19,700 tonnes CO_2e per year, or 7% of the annual emissions. Emissions from recreational centers (pools) are estimated to be 4,000 tonnes CO_2e per year, or 1.3% of the annual emissions. Emissions from golf courses are estimated to be 192 tonnes CO_2e per year, or 0.1% of the annual emissions.

Overall Annual Emissions, Including Annualized One-Time Emissions. The overall annual emissions were calculated by annualizing the one-time emissions by 40 years and then summing this quantity with the annual emissions. This result is shown in the final row in Table 4-40-D. Alternative D5's total amount of overall annualized emissions is 312,400 tonnes CO_2e per year.

4.14.1.5 Alternative D6

Emissions from the various aspects of Alternative D6 are presented in Table 4-40-E. Emissions will not be generated by the VCC planning area as build-out of that planning area will not be facilitated in Alternative DD6.

One-Time Emissions. The total amount of one-time emissions that would result from implementation and approval of Alternative D6 is 500,900 tonnes CO_2e. These one-time emissions are attributable to land use/vegetation changes and construction-related activities. The one-time vegetation emissions are 43,500 tonnes CO_2e, and the one-time construction emissions are 457,400 tonnes CO_2e. These construction emissions are attributable to grading activities (187,300 tonnes CO_2e) and building construction activities (270,100 tonnes CO_2e).

Annual Emissions. The total amount of annual emissions resulting from Alternative D6 is 287,200 tonnes CO_2e. This amount accounts for installation of the RMDP infrastructure, and the development enabled on the NRSP area and Entrada planning area. Emissions from residential buildings are estimated to be 57,400 tonnes CO_2e per year, or 20% of the annual emissions. Emissions from non-residential buildings are estimated to be 47,900 tonnes CO_2e per year, or 17% of the annual emissions. Emissions from mobile sources are estimated to be 156,800 tonnes CO_2e per year, or 55% of the annual emissions. Emissions from area sources (hearths) are estimated to be 2,500 tonnes CO_2e per year, or 0.9% of the annual emissions. Emissions from municipal sources (water distribution, public lighting, and municipal vehicles) are estimated to be 18,600 tonnes CO_2e per year, or 6% of the annual emissions. Emissions from recreational centers (pools) are estimated to be 3,800 tonnes CO_2e per year, or 1.3% of the annual emissions. Emissions from golf courses are estimated to be 192 tonnes CO_2e per year, or 0.1% of the annual emissions.

Overall Annual Emissions, Including Annualized One-Time Emissions. The overall annual emissions were calculated by annualizing the one-time emissions by 40 years and then summing this quantity with the annual emissions. This result is shown in the final row in Table 4-40-E. Alternative D6's total amount of overall annualized emissions is 299,700 tonnes CO_2e per year.

4.14.1.6 Alternative D7

Emissions from the various aspects of Alternative D7 are presented in Table 4-40-F. Emissions will not be generated by VCC as build-out of that planning area will not be facilitated in Alternative D7.

One-Time Emissions. The total amount of one-time emissions that would result from implementation and approval of Alternative D7 is 419,000 tonnes CO_2e. These one-time emissions are attributable to land use/vegetation changes and construction-related activities. The one-time vegetation emissions are 33,700 tonnes CO_2e, and the one-time construction emissions are 385,300 tonnes CO_2e. These construction emissions are attributable to grading activities (156,200 tonnes CO_2e) and building construction activities (229,000 tonnes CO_2e).

Annual Emissions. The total amount of annual emissions resulting from Alternative D7 is 234,900 tonnes CO_2e. This amount accounts for installation of the RMDP infrastructure, and the development enabled on the NRSP area and Entrada planning area. Emissions from residential buildings are estimated to be 49,200 tonnes CO_2e per year, or 21% of the annual emissions. Emissions from non-residential buildings are estimated to be 30,100 tonnes CO_2e per year, or 13% of the annual emissions. Emissions from mobile sources are estimated to be 134,400 tonnes CO_2e per year, or 57% of the annual emissions. Emissions from area sources (hearths) are estimated to be 2,200 tonnes CO_2e per year, or 0.9% of the annual emissions. Emissions from municipal sources (water distribution, public lighting, and municipal vehicles) are estimated to be 15,700 tonnes CO_2e per year, or 7% of the annual emissions. Emissions from recreational centers (pools) are estimated to be 3,100 tonnes CO_2e per year, or 1.3% of the annual emissions. Emissions from golf courses are estimated to be 192 tonnes CO_2e per year, or 0.1% of the annual emissions.

Overall Annual Emissions, Including Annualized One-Time Emissions. The overall annual emissions were calculated by annualizing the one-time emissions by 40 years and then summing this quantity with the annual emissions. This result is shown in the final row in Table 4-40-F. Alternative D7's total amount of overall annualized emissions is 245,400 tonnes CO_2e per year.

4.15 Life Cycle Emissions of Building Materials

An estimate of the Proposed Project area "life-cycle" GHG emissions (i.e., GHG emissions from the processes used to manufacture and transport materials used in the buildings and infrastructure) is presented in this section and attached as Appendix G. This estimate is to be used for comparison purposes only and is not included in the final inventory as these emissions would be attributable to other industry sectors under AB 32. For instance, the concrete industry is required by law to report emissions and undergo certain early action emission reduction measures under AB32. Furthermore, for a life-cycle analysis for building materials, somewhat arbitrary boundaries must be drawn to define the processes considered in the life-cycle analysis.[170] Note that in support of this approach, the CAPCOA white paper, as discussed earlier, states: "The full life-cycle of GHG emissions from construction activities is not accounted for in the modeling tools available, and the information needed to characterize GHG emissions from manufacture, transport, and end-of-life of construction materials would be speculative at the CEQA analysis level."

The calculations and results discussed here and presented more fully in this Appendix are estimates and should be used only for a general comparison to the overall GHG emissions estimated in the Climate Change Technical Report. Life Cycle Assessment (LCA) emissions vary based on input assumptions and assessment boundaries (e.g., how far back to trace the origin of a material). Assumptions made in this report are generally conservative. However, due to the open-ended nature of LCAs, the analysis is not exact and may be highly uncertain.

Appendix G is an ENVIRON report that evaluates the life cycle GHG emissions associated with the building materials for the Proposed Project. The life cycle GHG emissions include the embodied energy from the materials manufacture and the energy used to transport those materials to the site. The report then compares the life cycle GHG emissions to the Proposed Project's overall annual operational emissions. The materials analyzed in the report include materials for 1) residential and non-residential buildings, 2) site infrastructure and 3) the water reclamation plant. This report calculates the overall life cycle emissions from construction materials to be approximately 1.3 – 8.9% of the overall emissions.

The report estimated the life cycle GHG emissions for buildings by conducting an analysis of available literature on LCAs for buildings. According to these studies, approximately 75 - 97% of GHG emissions from buildings are associated with energy usage during the operational phase; the other 3 - 25% of the GHG emissions is due to material manufacture and transport. Using the GHG emissions from the operation of buildings, 3% to 25% of building emissions corresponds to approximately 1.0 – 8.6% of the emissions.

[170] For instance, in the case of building materials, the boundary could include the energy to make the materials, the energy used to make the machine that made the materials, and the energy used to make the machine that made the machine that made the materials.

The report also calculated the life cycle GHG emissions for infrastructure (roads, storm drains, utilities, gas, electricity, and cable). This analysis considered the manufacture and transport of concrete and asphalt, only as ENVIRON assumed that other construction materials such as steel would be present in much smaller quantities. Because the manufacture of concrete has a higher CO_2 emission factor and Newhall estimates higher quantities of concrete than asphalt, the majority of the emissions for infrastructure result from the manufacture of concrete. Because the asphalt and concrete are locally sourced, the transportation emissions are relatively small. If a 40 year lifespan of the infrastructure is assumed, the total annualized emissions from embodied energy in infrastructure materials are approximately 0.3% of the project emissions.

The report calculated the life cycle GHG emissions for the WRP based upon the estimated amount of concrete used to construct the WRP. Based on this analysis, the transport of the concrete for the WRP leads to a negligible amount (> 0.1%) of the project emissions. Because the concrete is locally sourced, the transportation emissions are relatively small. The total annualized emissions from embodied energy in the water reclamation plant are approximately 0.02% of the project emissions.

The overall life cycle emissions, annualized by 40 years, are 1.3 – 8.9% of the annualized GHG emissions. The bulk of these emissions (1.0% to 8.6%) is from general life cycle analysis studies and do not reflect the project-specific details.[171]

Again, note that the calculations and results presented in this life cycle report are estimates and should be used only for a general comparison to the overall GHG emissions estimated in the Climate Change Technical Report. LCA emissions vary based on input assumptions and assessment boundaries (e.g., how far back to trace the origin of a material). Assumptions made in this report are generally conservative. However, due to the open-ended nature of LCAs, and the fact that literature evaluation, not site specific studies were used to analyze the embodied energy, the analysis is not comprehensive and should be considered to yield highly uncertain results. Additionally, these estimates likely double count emissions from other industry sectors.

[171] Note that the LCA study was conducted for the NRSP area only. However, because of the general nature of this study, the relative percentage contribution of embodied energy to VCC, Entrada, and the entire project would be comparable to that for the NRSP area.

5.0 INVENTORY IN CONTEXT

5.1 Greenhouse Gas Inventory in Context

At present time, there are no published significance thresholds for GHG emissions. (See Section 3.0.) Accordingly, this section evaluates the GHG emissions from the Proposed Project with respect to their intensity and consistency with AB 32, and their overall magnitude. For the intensity and consistency with AB 32 analysis, the built environment emissions (residential and non-residential), transportation emissions, and water-use emissions are compared with current California averages. The total emissions quantity, for the Proposed Project and the development that would be facilitated in the NRSP area, Entrada planning area and VCC planning area, are then compared to California and global GHG emissions.

5.2 Characterization of Emissions

In 2004, 81% of greenhouse gas emissions (in CO_2e) from California were comprised of CO_2 emissions from fossil fuel combustion, with 4% comprised of CO_2 from process emissions. CH_4 and N_2O accounted for 5.6% and 6.8% of total CO_2e respectively, and high GWP gases[172] accounted for 2.9% of the CO_2e emissions. Transportation, which is defined to include industrial-related transportation (e.g., shipping) and development-related transportation (e.g., residential), is by far the largest end-use category of GHG emissions.

5.3 Intensity Comparison Overview

Although there are currently no approved guidelines on how to approach the preparation of a climate change analysis under CEQA, and there are currently no adopted significance thresholds for climate change, several public agencies in California are in the process of developing guidance on these issues.

<u>Assembly Bill 32 Thresholds</u>

As noted earlier, AB 32 requires that statewide GHG emission in 2020 be equal to 1990 levels. California-wide GHG emissions in 2004 were 0.480 billion tonnes and 0.427 billion tonnes in 1990.[173] This would require an 11% decrease in emissions by 2020 to achieve AB 32 goals. The population in California in 2004 was 35,840,000, and is projected to be 42,210,000 in 2020; an 18% increase. The 18% increase in population coupled with an 11% decrease in emissions means that, compared to 2004 emissions, a per capita decrease of GHG emissions from 13.4 tonnes CO_2e per capita to 10.1 tonnes CO_2e per capita, or 24%, would need to be realized to

[172] Such as HFCs and PFCs.

[173] ARB Draft California Greenhouse Gas Inventory by IPCC Category. Available online at: http://www.arb.ca.gov/cc/inventory/data/tables/rpt_Inventory_IPCC_Sum_2007-11-19.pdf

achieve AB 32 mandated goals (see Appendix F for calculation details). The Proposed Project has estimated emissions of 344,500 tonnes per year, or 5.4 tonnes per capita per year.[174]

Notably, the California per capita CO_2 emissions quantity includes industries such as heavy industry, refining, and transportation of materials, while the per capita CO_2 emissions quantity for the Proposed Project do not include these emissions. Presumably, the necessary emission reductions needed from activities related to heavy industry, refining, and transportation of materials will be secured via implementation of AB 32 and the reduction measures identified in the Scoping Plan. GHG emission reductions in these industry-related sectors are beyond the control of the project applicant. Nonetheless, it is difficult to compare the project per capita emissions to the AB 32 goals, as its not clear what fraction of the reduction will be achieved in which sectors, and what portion will be achieved from energy efficiency and what fraction will be achieved by renewable resources. This is discussed more fully below.

Executive Order S-03-05

As previously discussed in Section 3.0, Executive Order S-03-05 mandates that California emit 80% less GHGs in 2050 than it emitted in 1990. As of 2004, California was emitting 12% more GHG emissions than in 1990. For California to emit 80% less than it emitted in 1990, the emissions would be only 18% of the 2004 emissions. Accounting for a population growth from 35,840,000 people in 2004 to approximately 55,000,000 people in 2050, the emissions per capita would have to be only 12% of what they were in 2004. This means 88% reductions in per capita GHG emissions from today's emissions intensities must be realized in order to achieve California's 2050 GHG goals. Clearly, energy efficiency and reduced vehicle miles traveled will play important roles in achieving this aggressive goal, but the decarbonization of fuel will also be necessary.

The extent to which the Proposed Project's mobile source GHG emissions will change in the future depends on the quantity (e.g., number of vehicles, average daily mileage) and quality (i.e., carbon content) of fuel that will be available and required to meet both regulatory standards and residents' needs. As discussed above, renewable power requirements, the low carbon fuel standard, and vehicle emissions standards will all decrease GHG emissions per unit of energy delivered or per vehicle mile traveled. This section also considers the impact that future regulated fuel decarbonization may have on vehicular emissions.

The CEC published an alternative fuels plan that identifies[175] "challenging but plausible ways to meet 2050 [transportation] goals." The main finding from this analysis is that reducing today's average per capita driving miles by about 5 percent (or back to 1990 levels), in addition to the decarbonization strategies listed below, would achieve S-03-05 goals of 80% below 1990 levels. The approach described below is directly[176] from the CEC report:

[174] Based upon 63,700 residents.

[175] STATE ALTERNATIVE FUELS PLAN. December 2007 CEC-600-2007-011-CMF. Available online at: http://www.energy.ca.gov/2007publications/CEC-600-2007-011/CEC-600-2007-011-CMF.PDF

[176] Ibid. Page 67 and 68.

An 80 percent reduction in GHG emissions associated with personal transportation can be achieved even though population grows to 55 million, an increase of 50 percent. The following set of measures could be combined to produce this result:

1. Lowering the energy needed for personal transportation by tripling the energy efficiency of on-road vehicles in 2050 with:
    a. Conventional gas, diesel, and flexible fuel vehicles (FFVs) averaging more than 40 miles per gallon (mpg).
    b. Hybrid gas, diesel, and FFVs averaging almost 60 mpg.
    c. All electric and plug-in hybrid electric vehicles (PHEVs) averaging well over 100 mpg (on a greenhouse gas equivalents (GGE) basis) on the electricity cycle.
    d. Fuel cell vehicles (FCVs) averaging over 80 mpg (on a GGE basis).
2. Moderating growth in per capita driving, reducing today's average per capita driving miles by about 5 percent or back to 1990 levels.
3. Changing the energy sources for transportation fuels from the current 96 percent petroleum-based to approximately:
    a. 30 percent from gasoline and diesel from traditional petroleum sources or lower GHG emission fossil fuels such as natural gas.
    b. 30 percent from transportation biofuels.
    c. 40 percent from a mix of electricity and hydrogen.
4. Producing transportation biofuels, electricity, and hydrogen from renewable or very low carbon-emitting technologies that result in, on average, at least 80 percent lower life cycle GHG emissions than conventional fuels.
5. Encouraging more efficient land uses and greater use of mass transit, public transportation, and other means of moving goods and people.

5.4 Comparison to 2020 Goals

Here, different strategies are presented for comparing some of the Proposed Project's emissions sources to BAU values for 2020, which is the year by which California must reduce its emissions to 1990 levels under AB 32. Specifically, this section presents a discussion of what constitutes BAU for the Proposed Project based upon the four major emission contributors, which comprise over 99% of the annual inventory: 1) dwelling units, 2) commercial buildings, 3) personal transportation, and 4) energy associated with water use. As construction and vegetation removal are one-time events, they will not be addressed in this section. If annualized over 40 years, these two emissions sources would still contribute to less than 2% of the overall inventory.

Although a comparison of each sector to a BAU goal is presented here, it must be noted that the approach for the assessment varies from sector to sector. For residential buildings, the energy usage (electricity and natural gas) per dwelling unit, as developed in Section 4 of this report, was compared directly with CEC estimates of BAU energy usage for dwelling units in 2020. For commercial buildings, the assessment was made by comparing energy-use of buildings built above the 2005 Title 24 code to buildings built to the 2001 Title 24 code. For water-use, representative data from the Irvine Ranch Water District was considered BAU. Although not directly tied to GHG goals, for mobile sources, an ARB benchmark value of 23,000 VMT per dwelling unit was chosen as a 'smart growth' suburban goal.

5.4.1 Residential Energy Use Intensity Comparison

Residential BAU Energy Estimate

This section presents a quantitative estimate for projected energy use from an 'average' dwelling located in the same energy forecast zone as the NRSP area and Entrada planning area. Because energy use is the principal source of residential GHG emissions, these projections help put the residential GHG emissions in perspective. The following sections present the goals, methods, results and uncertainty associated with this analysis.

Goals of the Analysis

This analysis compares the energy use of the average dwelling unit, the build-out of which would be facilitated by the Proposed Project on the NRSP area and Entrada planning area, to the 2020 BAU energy use from an average dwelling located in the same energy forecast zone. The 2020 BAU energy use was selected to reflect current trends in economic and demographic growth, and current energy efficiencies. A comparable energy forecast zone was chosen so as to not discourage or encourage development in certain energy forecast zones because of energy or GHG emissions goals.

Data Sources Used

The average dwelling unit energy use for residential buildings in the NRSP area and Entrada planning area was calculated earlier in this report. The 2020 BAU energy use from an average dwelling located in the same energy forecast zone was calculated based upon data from the CEC.[177] The CEC report uses information from economic, demographic and energy studies for modeling future energy use.

The CEC report presents five future scenarios that reflect different sets of modeling assumptions. ENVIRON used the 'baseline low-efficiency' scenario to estimate BAU energy use. The 'baseline-low efficiency' scenario assumes that levels of activity will follow current trends in economic and demographic growth, but energy efficiency (or energy intensity) will remain at current levels. Specifically, for example, this scenario assumes that no improvements to the Title 24 standards will be made.

In the report, *electricity* use projections are disaggregated by CEC energy demand forecast zones. These zones are distinct from the climate zones defined by Title 24; the latter are defined principally by utility service areas and counties.[178] *Natural gas* use is reported by electricity utility service

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[177] California Energy Commission (CEC). 2008. Appendix A: California Energy Demand Scenario Projections to 2050. PIER Final Project Report. Prepared by Institute of Transportation Studies, University of California at Davis. CEC-500-02-004. September. Available at: http://steps.ucdavis.edu/People/cyang/aep/final-report/pdf_versions/AEP%20Appendix%20A%20-%20Energy%20Demand%20Scenarios.pdf

Spreadsheets available at: http://steps.ucdavis.edu/People/cyang/aep/AEP%20Baseline%20Spreadsheet%20Files.zip/view

[178] CEC. 2005. Energy Demand Forecast Methods Report. CEC-400-2005-036. June. Available at: http://www.energy.ca.gov/2005publications/CEC-400-2005-036/CEC-400-2005-036.PDF

areas (as opposed to natural gas utility service areas). For this analysis, the SCE service area was used. The natural gas and electricity use from the CEC report for two energy forecast zones that are near the NRSP area and Entrada planning are presented in Table 5-1.

Newhall Land and Farming Company has committed to building homes that are 15% more energy efficient on a Title 24 (2005) basis compared to a minimally Title 24-compliant home and to the equivalent of a 2-kW photovoltaic (PV) system on each single-family home. The average energy use for Title 24 compliant and 15% better than Title 24 (2005) compliant with renewables homes are listed in Table 5-1.[179]

Analysis of the results

As shown in Table 5-1, an average home under BAU conditions in CEC energy forecast zone 9 in 2020 will use 6,468 kWh of electricity. An average home under BAU conditions in the SCE service area in 2020 will use 439 ccf of natural gas per year.[180] In comparison, the average home in the NRSP area and Entrada planning area will use 4,965 kWh of electricity and 270 ccf of natural gas per year. On a GHG basis, the average home in the NRSP area and Entrada planning area will emit 2.9 tons of GHGs per year as compared to 4.2 tons from a home in CEC energy forecast zone 8 or 9; a decrease of 31%. This analysis illustrates that the average home has 38% lower natural gas use and 23% lower electricity use relative to a comparable home in 2020.

Additional Analysis – California-wide comparison

The energy use and GHG emissions from the modeled homes[181] were also compared to the energy use and GHG emissions from the current housing stock in California. As shown in Table 5-2, the residential units modeled will use 27% less electricity and 33% less natural gas than the average California home on a per DU basis. The electricity supplied from Southern California Edison is less GHG intensive than the California average[182]. As such, Table 5-2 shows that the residential units ultimately produce 36% less GHGs than the average 2004 California-wide housing stock on a per dwelling unit basis[183]; of this percentage, approximately 1/6 is because of the lower energy intensity of SCE, and 5/6 is due to the project design features.

CO_2 emissions per DU are approximately 2.8 tonnes per DU per year. For the average California housing stock, emissions are approximately 4.7 tonnes per DU per year. As such, the homes that would be facilitated by the proposed project, per DU, emit approximately 1.9 tonnes less CO_2 per year than the average California housing stock.

According to this analysis, homes would emit 36% fewer GHGs than the current housing stock in California, when taking into account the cleaner SCE electricity as compared to the California

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179 Energy use for these homes was calculated earlier in this report.

180 Note that the project site is very close to the border of CEC energy forecast zone 8 and 9, and that the two energy forecast zones have very similar electricity and natural gas usage trends.

181 Entrada and the NRSP area have the same mix of residential housing types with the same energy efficiency measures. As such, per capita GHG emissions for NRSP area homes would be the same as per capita emissions from Entrada homes.

182 0.666 lb CO_2 / kw-hr compared to the CA-wide emission factor of 0.804.

183 Assumes that Newhall Ranch will have 20,885 dwelling units.

average. As such, the residential units meet AB 32 goals on a per DU basis, even without any decrease in GHG intensity from energy production, which is likely to occur.

Uncertainties and the Limitations of the Residential Analysis

- ENVIRON relied upon energy forecasts reported by the CEC for future residential electricity and natural gas use. To the extent that there is uncertainty in the CEC analysis due to various assumptions of energy-use patterns and boundaries for energy forecast zones, the BAU result presented here will have the same underlying uncertainties.

- In this analysis, ENVIRON only presents energy-use values; ENVIRON did not account for reductions in CO_2 emission factors for electricity generation that will likely take place in the future. Note that this decarbonization of the fuel that supplies electricity will work in tandem to energy the energy efficiency strategies listed here to achieve AB 32 mandated emission reductions.

- The models used to calculate energy use for the residences (e.g. Micropas, EIA database) were different from those used for the average 2020 dwelling (e.g. CEC end-user surveys). One must keep in mind that differences in energy use presented here may reflect the differences in the design and content of these databases and tools, as compared to reflecting actual energy savings measures present in the project design features.

5.4.2 Non-Residential Energy Use Comparison

Non-Residential BAU Analysis

This section presents a quantitative estimate for projected energy use intensity from the 'average' non-residential space in California. Because energy use is the principal source of non-residential GHG emissions, these projections help put the proposed project's non-residential GHG emissions in perspective. The following sections present the goals, methods, results and uncertainty associated with this analysis.

Goals of the Analysis

As discussed earlier, if the GHG intensity for each sector is reduced by approximately 24% from 2004 values, the AB 32 goals of 1990 emissions levels may be realized. As such, this analysis compares the energy use intensity of the project's non-residential buildings to a current baseline energy intensity value.

For the current baseline energy-intensity, ENVIRON used the energy use intensity of 2001 Title 24 compliant non-residential buildings. ENVIRON chose the 2001 Title 24 standards as the baseline because most buildings that *existed* in 2004 (the year chosen in this study as the baseline comparison to 2020 goals) were actually *built* before 2001. This approach is conservative (the baseline for comparison is higher) because most buildings in existence today were built to earlier less stringent versions of Title 24.

In addition, choosing a standard as the baseline comparison allows one to avoid biasing the analysis according to the building types that may be present at the project site; an issue that was not present in the residential dwelling unit comparison. As certain building types may use much more energy per square foot than other types, if actual energy-use was used for the comparison, there may be unintended consequences, such as discouraging future developments from building certain building types that may inherently use more energy per square foot such as grocery stores, restaurants, or convenient stores.

Data Sources Used

This analysis described above requires three main sets of data:

- The difference in energy use intensity between the 2001 Title 24 standards and the 2005 Title 24 standards.
  - The CEC estimates an 8.3% reduction in Title 24-regulated energy use relative to 2001, as a result of the stricter 2005 version of Title 24 standards.[184]
- The percentage improvement over the 2005 Title 24 standards that the project applicant has committed to.
  - Newhall Land and Farming has committed to a further 15% reduction (beyond compliance) in Title-24 regulated energy uses.
- Information on the proportion of energy use that is regulated by Title 24.
  - Title 24-regulated electricity use data for different non-residential building types was obtained from the 2003 Commercial Buildings Energy Consumption Survey, published by the US Energy Information Administration.[185] For natural gas, ENVIRON assumed that all natural gas was used for heating or hot water, which are both regulated by Title 24.

Analysis of the results

Table 5-3 calculates the electricity and energy use intensity reductions from stricter energy efficiency standards (8.3% reduction from 2001 to 2005 Title 24 standards) and the project applicant's additional commitment to a 15% improvement over the 2005 standards. Note that this table only accounts for the energy savings from the Title 24 covered sources; i.e., this analysis conservatively assumes that the non-Title 24 covered electricity intensities will remain the same.

The results of this analysis show that for the building types present at the project site, electricity use intensity is approximately 18% lower than the baseline value. For comparison, the reduction for each building type is included in this table, as it ranges from 13% to 21% reductions due to the different proportions of Title 24-regulated electricity use for each building type. Natural gas use is uniformly 22% lower than the BAU value for all building types, as it was assumed that all natural gas usage would be covered by Title 24.

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[184] California Energy Commission. 2005. 2005 Building Energy Efficiency Standards: Nonresidential Compliance Manual, Revision 3. CEC-400-2005-006-CMF. Available at: http://www.energy.ca.gov/2005publications/CEC-400-2005-006/chapters_4q/1_Introduction.pdf

[185] US Energy Information Administration. 2003 Commercial Buildings Energy Consumption Survey. Calculated from data from Tables 3a and 3b of: http://www.eia.doe.gov/emeu/cbecs/enduse_consumption/pba.html

To calculate the GHG reductions values, the relative contributions of GHG emissions were scaled according to the actual electricity and natural gas used in the buildings that would be facilitated by the proposed project. The results are shown in Table 5-3; the proposed project's commercial GHG reductions are 19% better than the 2001 Title 24 standards.

Note that the actual improvement over the current housing stock will be greater than 19% as the 2001 standards are likely a more energy-efficient baseline than the current building stock.

Uncertainties and the Limitations of the Analysis

- ENVIRON used baseline energy use values for non-residential buildings that are compliant with the 2001 version of Title 24. To the extent that a 2001 Title 24 compliant building would use less energy than the current non-residential stock, the actual energy savings of the proposed project over the baseline may be understated. The current stock is likely less energy efficient than 2001 Title 24 standards because the current stock includes buildings that were subject to even older versions of Title 24. As such, if the baseline value were to include non-Title 24-compliant buildings, the relative improvement in energy use for the proposed project would likely be higher.

- The 8.3% reduction over Title 24 2001 standards are presented for all buildings. However, specific building types may, in reality, be forced to reduce their energy use more than other types. It is not clear if this would serve to over or under-estimate the proposed project's emissions reductions over these standards.

- The impact of climate on the proportion of Title 24-regulated energy use for a given building type is not accounted for in EIA energy use data. In addition, data for new buildings broken down by climate zone is not yet available from the EIA. The percentage of energy represented by plug-in uses will vary with climate zone. To the extent that more energy is used in the built environment in less temperate zones, this may serve to underestimate the plug-in energy use slightly, which may ultimately change the results of the comparison presented here.

- In this analysis, ENVIRON did not account for reductions in CO_2 emission factors for electricity generation that will likely occur in the future. Note that this decarbonization of the fuel that supplies electricity will work in tandem with the energy efficiency strategies listed here to achieve AB 32 mandated emission reductions.

5.4.3 AB 32 Comparison for Transportation

This section first restates the general approach for calculating 'new' vehicular growth. Then, this section takes two very different approaches when comparing the proposed project's mobile source emissions to: 1) an ARB benchmark value of 23,000 VMT per dwelling unit as a 'smart growth' suburban goal, and 2) the average California transportation emissions intensity.

Calculating VMT From Residents

In the developing world, GHG increases are directly tied to population growth. Therefore, it makes sense to consider operational emissions (including vehicular emissions) from new residences as growth, as residences are rarely removed from the housing supply once constructed. There are exceptions, such as when one housing development replaces another, and, in those cases, the replacement residential development need not be considered growth.

However, it is not clear that commercial development should be considered new growth for vehicular travel purposes. To the extent that commercial development serves existing residential development its vehicular travel may not be new. For instance, if the new commercial area serves an area with a high residential/commercial balance, then this new commercial growth will reduce shopping and work trip lengths and will reduce GHG emissions associated with mobile sources. If, however, the new commercial area results in longer trips for its workers and residents than they would have previously made, then it adds GHGs emissions. Commercial development that could potentially increase VMT would be facilities that draw trips from far away that otherwise would not be made. A theme park, for example, may be viewed as such a development.

In this report, it is assumed that the new commercial area that would be facilitated by the proposed project would serve an area with a high residential/commercial balance. Therefore, this new commercial growth will reduce shopping and work trip lengths and will reduce GHG emissions associated with mobile sources. Accordingly, we assume that all commercial emission sources will not contribute to mobile GHG emissions. To the extent that this development serves new residences, its traffic emissions are accounted for in the residential vehicle emissions.

Importantly, vehicle emissions will be reduced in the future regardless of the development location, as the implementation of AB 32 will require improvements in vehicle mileage, increased use of public transit, and the incorporation of low-carbon fuels into the transportation fuel supply. Transportation emissions presented here are based upon EMFAC2007 values, which are based upon past vehicle emission trends and do not incorporate the known regulatory actions as described above. In fact, on a VMT basis, EMFAC2007 assumes that CO_2 emissions in 2030 are slightly higher than they are currently. This is clearly unlikely, given the mandates of AB 32 and the likelihood of federal regulation.

1) Comparison to an ARB benchmark value of 23,000 VMT per dwelling unit as a 'smart growth' suburban goal.

As discussed in Appendix B, each dwelling unit generates 16,099 VMT per year. A study[186] contracted by the California EPA Air Resources Board Research Division suggests a "community performance goal" of about 22,000 to 25,000 VMT per household per year for suburban level 3 communities. Additionally, a December 14, 2007 presentation from the ARB on Land Use and local Initiatives lists "smarter growth suburban" communities as having 17,000 to 23,000 VMT per

[186] Transportation-Related Land Use Strategies to Minimize Motor Vehicle Emissions: An Indirect Source Research Study. Contract No. 92-348. Final Report. June 1995. California Environmental Protection Agency. Air Resources Board Research Division. http://www.arb.ca.gov/research/apr/past/92-348a.pdf

household. The VMT per dwelling unit per year calculated here is 30% below the threshold value of 23,000 VMT per dwelling unit. The calculated 16,099 VMT per dwelling unit could therefore be considered to achieve the "community performance goal" and be considered a "smart growth suburb" according to the ARB documents.

The 23,000 VMT standard was not scaled up or down to account for future growth or trends in VMT per capita. These adjustments were not made because changes in VMT per capita may be more reflective of people moving into or out of the suburbs rather than changes in peoples' driving habits that already live in the suburbs.

2) Comparison to the average California transportation emissions intensity.

The next comparison that follows discusses a comparison of project emissions with the goals of AB 32; an approach that is consistent with one of the options in the CAPCOA White Paper.

ENVIRON estimated that California-wide per capita CO_2 emissions from residential vehicles are 3.6 tonnes per capita per year. [187,188] The California emissions from transportation in 2004, including freight transportation, were 5.4 tonnes per capita per year.[189] The traffic estimation method for the Proposed Project includes only residential vehicles; however, the estimates were developed with different methodologies and different underlying assumptions than the California-wide estimates. Therefore, they should be used only for an approximate comparison. Vehicular emissions from residents are approximately 2.8 tonnes per capita per year, as compared to the California-wide average of 3.6 or 5.4 tonnes per capita per year, if including freight transportation as mentioned above. The calculated per capita vehicular emissions are 24% better than the California average.[190]

Note again that the emissions per capita were not scaled up or down to account for future growth or trends in VMT per capita. These adjustments were not made because changes in VMT per capita may be more reflective of people moving into or out of the suburbs rather than changes in peoples' driving habits that already live in the suburbs.

5.4.4 Water-Use Intensity Comparison

The inventory section of this report presented a quantitative analysis of GHG emissions from water use. To put these emissions in perspective, we developed a quantitative estimate for the GHG emissions from a 'typical' Southern California development the same size as the development that would be facilitated by the proposed project. The first part of this section outlines the goals of the

[187] Calculated from the 2005 California Motor Vehicle Stock, Travel and Fuel Forecast study. California Department of Transportation. Division of Transportation System Information. December 30, 2005. Available online at http://www.dot.ca.gov/hq/tsip/smb/documents/mvstaff/mvstaff05.pdf Note that the DOT report (CA-wide) and the emission factors from EMFAC (LA county only) assume different vehicle fuel efficiencies and fleet mixes.

[188] California population from the US Census Bureau. http://www.census.gov/popest/states/tables/NST-EST2005-01.xls

[189] 194.58 million metric tonnes of CO_2e divided by 35,842,038 people in CA. Emissions: http://www.arb.ca.gov/cc/ccei/inventory/tables/rpt_inventory_ipcc_sum.pdf Population: http://www.census.gov/popest/states/tables/NST-EST2005-01.xls

[190] (2.75 – 3.62) / 3.62 = 24%

comparison and the data sources used. Then, we present a discussion of the procedure followed for the quantitative comparison. A short analysis of the results follows the description of the calculation procedure. Lastly, we discuss the uncertainties and the limitations of the analysis.

Note that although the direct emissions from wastewater treatment were included in the overall inventory of this report, they were not included in this *comparison* of emissions. Direct emissions were not included because wastewater emissions may be more of a function of the amount of *biological matter* in the wastewater than a function of the *amount of wastewater* generated. As the proposed applicant has no control over the amount of solid waste generated per household or per capita, direct emissions from the treatment were not included here.

Goals of the Analysis

As discussed earlier in this report, the GHG emissions from water use depend mainly upon two factors: 1) the quantity of water used, and 2) the source of the water. Using less water requires less pumping energy, and therefore will emit less GHGs. Using water from local sources, such as reclaimed / recycled water or groundwater aquifers, generally requires less energy than sourcing water from large distances away, such as the SWP. In this analysis, ENVIRON conservatively assumes that the quantity of water used is equal to BAU water usage, but compares the *source* of the water to a Southern California Standard - the Irvine Ranch Water District (IRWD).

Data Sources Used

The IRWD was chosen as a comparison for this analysis because 1) Newhall Ranch used IRWD data as a baseline to calculate its water demand, 2) IRWD has detailed disaggregated water-usage information available, and 3) IRWD has been recognized as a leader in both water conservation and water reuse.

Because IRWD has disaggregated water-use demand factors, ENVIRON was able to estimate the water-use and sources of water of a similarly sized development that had the typical demands of IRWD. Because of the detailed data available from IRWD, ENVIRON was able to account for the specific water use demands of commercial and residential, while taking into account the lack of large agriculture and heavy industry demands at the project site.

Procedure followed for the quantitative comparison – GHG Emissions Calculations

As the project applicant estimated its water demands based upon the IRWD water demands, ENVIRON conservatively assumed that the proposed project's water use was equal to a BAU scenario. This section describes the GHG savings from the efforts to recycle water and to source water locally.

GHG emissions can be calculated from the potable and non-potable water demands for the Proposed Project and a similar development. As discussed above, water from different sources will have different GHG emissions factors. As such, it is important to understand where the Proposed Project and a BAU scenario, in this case IRWD, typically source their potable and non-potable water.

Demand numbers from each water source for Irvine Ranch were taken from the 2005 Urban Water Management Plan[191] and are listed in Table 5-4. The fraction of *potable* demand from each source, as well as the fraction of *non-potable* demand from each source, is also presented in Table 5-4 for the IRWD. These percentages were then applied to the water demands for the Proposed Project to estimate the amount of water that would be demanded from various sources if sourced in a similar manner as IRWD. These values for water sources for the IRWD BAU scenario, as well as the demand numbers for each water source for the Proposed Project are presented in Table 5-5.

Table 5-5 lists not only the demand numbers for the Proposed Project and the IRWD BAU scenario for each water source, but also lists the CO_2 emission factor per AF of water delivered. Table 5-5 calculates the overall CO_2 emissions from electricity use for delivering this water. For instance, using groundwater is less energy intensive than using water from the SWP where water has to be pumped large distance and redistribution of recycled water requires even less energy.

Analysis of the results

The final comparison between the Proposed Project and IRWD BAU (Table 5-5) shows a water demand total of 19,909 AFY for the Proposed Project and 19,909 AFY for IRWD, and total calculated CO_2e for the Proposed Project and IRDW BAU to be 7,825 and 12,312 tonnes per year, respectively. This analysis suggests that the Proposed Project's water use related GHG emissions are 36% lower in GHG emissions than BAU. This large decrease in GHG emissions is due two main project design features of the proposed development:

- A large percentage of its water would come from recycled water.
- The Proposed Project, particularly the development that would be facilitated in the NRSP area, relies more heavily upon locally sourced water such as groundwater aquifers, as compared to sourcing water from the SWP.

Uncertainties and the Limitations of the Water Analysis

- The emission factors for pumping and treating water are, in general, conservative estimates, but have some uncertainties. These uncertainties would neither lead to an over- or under-estimate of reductions from BAU.
- IRWD was chosen as a representative baseline water use and water sourcing BAU scenario for Southern California. If another metric was chosen for the baseline case, the results in this analysis could be different.

5.4.5 Summary of Comparison to 2020 Goals

In this section, the BAU comparisons developed above are summarized. As discussed, a 24% reduction beyond the 2004 GHG intensity would meet California 2020 goals. However, a 24% reduction would likely reach beyond the 2020 goals because the 24% was calculated assuming no decarbonization of the California fuel mix. Also, in each quantitative analysis presented above,

[191] Irvine Ranch Water District 2005 Urban Water Management Plan

generally conservative estimates were taken and, as such, the Proposed Project's emissions reductions over today's GHG intensities are likely understated.

Residential

The residential GHG emissions per dwelling unit are calculated to be 36% better than the current California housing stock, when taking into account SCE's cleaner than average California electricity. NRSP and Entrada residential GHG emissions per dwelling unit are calculated to be 31% lower than housing stock in CEC energy forecast zone 8 or 9 (all electricity provided by SCE). The residential units use 27% less electricity and 33% less natural gas as compared to dwelling units in California,[192] and 23% less electricity and 38% less natural gas as compared to dwelling units in similar CEC forecast zones.[193]

Commercial

The non-residential GHG emissions per square foot are calculated to be 19% lower than the current California average (in this case a 2001 Title 24 compliant building). The SCE electricity emission factor was used for both the proposed building as well as the average building. The non-residential electricity use and natural gas use per square foot are calculated to be 18% lower and 22% lower than a 2001 Title 24 compliant building.

Transportation

Each dwelling unit generates 16,099 VMT per year, which meets the "community performance goal" of about 22,000 to 25,000 VMT per household per year for suburban level 3 communities.[194] Additionally, a December 14, 2007 presentation from the ARB on Land Use and local Initiatives lists "smarter growth suburban" communities as having 17,000 to 23,000 VMT per household. The calculated VMT per dwelling unit per year is 30% below the smarter growth goal of 23,000 VMT per dwelling unit.

Vehicular emissions from future residents are approximately 2.8 tonnes per capita per year; as compared to the California-wide average of 3.6[195,196] or 5.4[197] tonnes per capita per year, if

[192] Values are calculated for NRSP area only.

[193] Values are calculated for both the NRSP area and Entrada.

[194] Transportation-Related Land Use Strategies to Minimize Motor Vehicle Emissions: An Indirect Source Research Study. Contract No. 92-348. Final Report. June 1995. California Environmental Protection Agency. Air Resources Board Research Division. http://www.arb.ca.gov/research/apr/past/92-348a.pdf

[195] Calculated from the 2005 California Motor Vehicle Stock, Travel and Fuel Forecast study. California Department of Transportation. Division of Transportation System Information. December 30, 2005. Available online at http://www.dot.ca.gov/hq/tsip/smb/documents/mvstaff/mvstaff05.pdf Note that the DOT report (CA-wide) and the emission factors from EMFAC (LA county only) assume different vehicle fuel efficiencies and fleet mixes.

[196] California population from the US Census Bureau. http://www.census.gov/popest/states/tables/NST-EST2005-01.xls

[197] 194.58 million metric tonnes of CO_2e divided by 35,842,038 people in CA. Emissions: http://www.arb.ca.gov/cc/ccei/inventory/tables/rpt_inventory_ipcc_sum.pdf Population: http://www.census.gov/popest/states/tables/NST-EST2005-01.xls

including freight transportation as mentioned above. Therefore, the calculated per capita vehicular emissions are 24% better than the California average.

Water

The Proposed Project is 36% lower in GHG emissions than a comparative BAU for a similar development (IRWD). Although the water use *amount* was conservatively assumed to be equal to BAU, the GHG savings are mainly from recycled water use and more local sourcing of water.

Summary

Traffic and water are both 24% better than California average on a GHG basis. Residential and non-residential buildings are 36% and 19% better than California average, respectively. However, as residential emissions contribute more to the project's emissions than do non-residential, it is clear that these two categories, when take in aggregate, would be more than 24% better than the California average. As such, all major categories for the project (transportation, water, and buildings) are 24% better than the California average.

5.5 Comparison with State, Global, and Worldwide GHG Emissions

The emissions from the Proposed Project at build-out are compared to California and global GHG emissions to put the emissions from the Proposed Project in context, as shown in Appendix F. The project's annual emissions are approximately 329,500 metric tonnes CO_2e per year, and 601,900 tonnes of one-time emissions. If the one-time emissions are annualized by a development lifetime of 40 years (15,048 tonnes CO_2e per year), the overall yearly emissions are approximately 344,500 tonnes CO_2e per year. This is equivalent to approximately 5.4 tonnes per capita per year, assuming a population of 63,700.

Worldwide emissions of GHGs in 2004 were 26.8 billion tonnes of CO_2e per year.[198] In 2004, the US emitted about 7 billion tonnes of CO_2e.[199] Over 80% of the GHG emissions in the US are comprised of CO_2 emissions from energy related fossil fuel combustion. In 2004, California emitted 0.480 billion tonnes of CO_2e, or about 7% of the US emissions. 344,500 tonnes of CO_2e per year from the Proposed Project would be approximately .0013% of the world wide emissions, .0049% of the United State's emissions, or .072% of California's annual GHG emissions.

[198] Sum of Annex I and Annex II countries without counting Land-Use, Land-Use Change and Forestry (LULUCF) http://unfccc.int/ghg_emissions_data/predefined_queries/items/3814.php For countries that 2004 data was unavailable, the most recent year was used.

[199] 2006 Inventory of US Greenhouse Gas Emissions and Sinks. Available online at: http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/RAMR6MBLP4/$File/06ES.pdf

6.0 CONCLUSIONS

ENVIRON prepared an emissions inventory for the Proposed Project; this inventory includes emissions that would result from construction of the RMDP-related infrastructure improvements, and emissions that would result from the NRSP area, Entrada planning area and VCC planning area, the build-out of which would be facilitated by approval of the Proposed Project.. This emissions inventory was prepared to be consistent with the methodologies established by the CCAR where possible. The emissions inventories consider nine categories, as applicable, of GHG emissions: emissions due to vegetation changes, emissions from construction activities, residential emissions, commercial building emissions, mobile source emissions, area emissions, municipal emissions, recreation center emissions, and golf course emissions. The emissions from construction and land use change would be a one-time emissions event, while the other emissions would occur annually, throughout the life of the project.

A variety of methods were employed to develop the GHG emissions inventory. In addition to well established emission factors for certain activities and emission estimates based on similar activities in other representative communities, several emissions estimation software programs were used. These included EMFAC, OFFROAD, and URBEMIS. For energy use in buildings, energy modeling software including Micropas and eQUEST were used.

Emissions from the various aspects of the developments are presented in Tables 4-39 through 4-40-F. These tables highlight the one-time emissions that would be attributable to project entitlement, and the annual emissions expected to occur each year after the full build out of the development. The only emissions that are directly associated with the developments are the one-time construction and land use change emissions. There are approximately 601,900 tonnes of CO_2e one-time emissions; 34,500; 469,400; 65,800; and 32,200 tonnes from the RMDP, the NRSP area, Entrada planning area, and VCC planning area, respectively. The annual indirect emissions from the use of the development amount to approximately 329,500 tonnes; 291,600; 26,500; and 11,300 tonnes from the NRSP area, Entrada planning area, and VCC planning area developments, respectively. Of this total amount, about 53% result from vehicular emissions associated with residential and commercial activities, and about 38% result from the energy use associated with residential and non-residential buildings. If the one-time emissions are annualized assuming a 40-year development life (which is likely low), then the one-time emissions account for approximately 4% of the overall emissions.

This inventory was prepared assuming that all emissions from the RMDP and the NRSP area, Entrada planning area, and VCC planning area developments are "new," in the sense that, absent the developments, these emissions would not occur. It is also important to note that these emissions are estimated assuming that the carbon intensity of the electricity supply system and transportation system do not change in the future. This assumption is clearly incorrect, as the measures incorporated into AB 32 mandate change in both areas.

Compared to California 2004 per capita emissions, a per capita decrease of GHG emissions from 13.4 tonnes CO_2e per capita to 10.1 tonnes CO_2e per capita, or 24%, would need to be realized to achieve AB 32 mandated goals. This change is due to an increasing California population, and a need to decrease the absolute GHG emissions. The RMDP, the NRSP area, Entrada planning area, and VCC planning area developments have estimated emissions of 344,500 tonnes per year, or 5.4 tonnes per capita per year.[200] These estimates do not include emissions from heavy industry, refining, or commercial transportation.

CO_2 emissions attributable to residential building energy use and mobile sources are clearly a direct result of the population increase. Therefore, it makes sense to compare the per capita emissions from these two categories to AB 32 mandated goals.

The residential GHG emissions per dwelling unit are calculated to be 36% lower than the current California housing stock, due in part to Southern California Edison's cleaner-than- average electricity generation. The residential GHG emissions per dwelling unit also are calculated to be 31% lower than housing stock in CEC forecast zone 9 and 31% less than in CEC forecast zone 8 (all electricity provided by SCE). These residential units use 27% less electricity and 33% less natural gas as compared to dwelling units in California. In comparison to dwelling units in CEC forecast zones in the vicinity, the residential units use 23% less electricity and 38% less natural gas.

The non-residential GHG emissions per square foot are calculated to be 19% better than the current California average (in this case a 2001 Title 24 compliant building). The SCE electricity emission factor was used for both the proposed building as well as the average building. The non-residential electricity-use and natural gas use per square foot are calculated to be 18% better and 22% better than a 2001 Title 24 compliant building.

Each dwelling unit generates 16,099 VMT per year which meets the "community performance goal" of about 22,000 to 25,000 VMT per household per year for suburban level 3 communities.[201] Additionally, a December 14, 2007 presentation from the ARB on Land Use and Local Initiatives lists "smarter growth suburban" communities as having 17,000 to 23,000 VMT per household.

Vehicular emissions from the residents are approximately 2.8 tonnes per capita per year as compared to the California-wide average of 3.6[202,203] or 5.4[204] tonnes per capita per year if including freight transportation as mentioned above.

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[200] Assuming a Newhall Ranch population of 58,860, an Entrada population of 4,862, and a VCC population of 0.

[201] Transportation-Related Land Use Strategies to Minimize Motor Vehicle Emissions: An Indirect Source Research Study. Contract No. 92-348. Final Report. June 1995. California Environmental Protection Agency. Air Resources Board Research Division. http://www.arb.ca.gov/research/apr/past/92-348a.pdf

[202] Calculated from the 2005 California Motor Vehicle Stock, Travel and Fuel Forecast study. California Department of Transportation. Division of Transportation System Information. December 30, 2005. Available online at http://www.dot.ca.gov/hq/tsip/smb/documents/mvstaff/mvstaff05.pdf Note that the DOT report (CA-wide) and the emission factors from EMFAC (LA county only) assume different vehicle fuel efficiencies and fleet mixes.

[203] California population from the US Census Bureau. http://www.census.gov/popest/states/tables/NST-EST2005-01.xls

[204] 194.58 million metric tonnes of CO_2e divided by 35,842,038 people in CA. Emissions: http://www.arb.ca.gov/cc/ccei/inventory/tables/rpt_inventory_ipcc_sum.pdf Population: http://www.census.gov/popest/states/tables/NST-EST2005-01.xls

The Proposed Project may be 36% better in GHG emissions than a comparative BAU for a similar development (IRWD). The GHG savings are mainly from recycled water use and more local sourcing of water.

It is yet unclear as to how to compare construction and vegetation change to AB 32 mandated goals.

To place the estimated emissions due to entitlement of the Proposed Project in context with global, national and statewide emissions, the 344,500 tonnes of CO_2e per year from the Proposed Project would be approximately 0.0013% of the world wide emissions, 0.005% of the United State's emissions, and 0.07% of California's annual GHG emissions.

The California Energy Commission (CEC) published[205] a "challenging but plausible ways to meet 2050 [transportation] goals." The main finding from this analysis is that reducing today's average per capita driving miles by about 5 percent (or back to 1990 levels), in addition to decarbonization strategies, would achieve S-03-05 goals of 80% below 1990 levels. We would anticipate that similar decarbonization of the electricity supply would have a similar impact on the other sources major sources of GHGs from the development, such as the residential and commercial GHG emissions.

[205] STATE ALTERNATIVE FUELS PLAN. December 2007 CEC-600-2007-011-CMF. Available online at: http://www.energy.ca.gov/2007publications/CEC-600-2007-011/CEC-600-2007-011-CMF.PDF

Table 4-1
CO_2 Sequestration in Various Land Types
Newhall Land
Newhall Ranch, California

Newhall Land Designation[A]	Mapped IPCC Land Designation[B]	Ratio of Above Ground / Below Ground Biomass[C]	Notes	Above Ground Biomass[D] [tonne d.m./acre]	Notes	Total Biomass[E] [tonne d.m./acre]	Notes	Tons Dry Matter Carbon/Acre[F] [tonne/acre]	Sequestered CO_2 / Acre[G] [tonne/acre]
Agricultural, Developed, or Disturbed	Cropland	--		--		4.0	L	1.9	7
Grass and Herbs	Grassland	--		--		2.5	M	1.2	4
Riparian and Bottomland	Forest land	4.35	H	53	J	65		30	112
Broad Leaf Upland Trees	Forest land	4.35	H	53	J	65		30	112
Scrub and Chaparral	Forest land	2.17	I	5.7	K	8		4	14
Bog and marsh[N]	--	--		--		0	N	0	0

Notes:
A. Land types shown here represent vegetation that will be potentially removed upon development. Land designations from the RMDP Habitat Impact Report.
B. Land types are mapped to generalized IPCC Land Designations (IPCC 2006).
C. This value is used to calculate total biomass when data is only available for the above-ground biomass for a particular land type.
D. Numbers listed are used in conjunction with above ground/below ground ratios to calculate total biomass per acre. Values from source converted to tonne/acre.
E. Total biomass is either 1.) Listed directly in the IPCC protocol, or 2.) Calculated from above ground biomass and the Above Ground / Below Ground biomass ratios as follows: Total = Above + (Above / Ratio). Values from source converted to tonne/acre as necessary.
F. Total biomass multiplied by carbon fraction in plant material (0.47) to calculate carbon content. From IPCC (2006), default value for Forest Land (Table 4.3 of IPCC). Here, it is assumed that agricultural vegetation has the same carbon fraction as other vegetation types.
G. It is conservatively assumed that all carbon is eventually converted into CO2. Multiply the mass of carbon by 3.67 to calculate the final mass of CO2 (the molecular mass of CO2 / the molecular mass of carbon is 44/12 or 3.67).
H. The value for the ratio of above ground/below ground biomass for forest land corresponds to the IPCC value for temperate mountain/continental systems (other broadleaf above-ground biomass 75-150 tonnes/hectare)(Table 4.4 of IPCC).
I. The value for the ratio of above ground/below ground biomass for various scrub types corresponds to the IPCC value for temperate mountain/continental systems (other broadleaf above-ground biomass <75 tonnes/hectare)(Table 4.4 of IPCC). This value is likely to be conservative since scrub is a type of shrub which is likely to have a smaller ratio than for trees.
J. The value for above ground biomass for forest land corresponds to the IPCC value for temperate mountain/continental systems (North and South America > 20 years)(Table 4.7 of IPCC).
K. The value for above ground biomass applied to various scrub types is based on a value of 1,417 g biomass/m2 (or 5.7 tonne biomass/acre) for coastal sage scrub (Gray and Schlesinger). It is assumed that all scrub types will have similar values.
L. Total biomass for agricultural land corresponds to IPCC value for cropland (Table 8.4 of IPCC).
M. Total biomass for non-native grassland corrsponds to IPCC value for grassland in warm temperate-dry climates (Table 6.4 of IPCC).
N. There is limited data on biomass content of river wash and freshwater marsh. For the purposes of this inventory, it will be assumed that these land types have negligible biomass associated with it. Any changes in GHG emissions are expected to be de minimis because the amount of these land types is very low.

Abbreviations:
CO2 - carbon dioxide
d.m - dry matter
IPCC - Intergovernmental Panel on Climate Change

Sources:

2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Use. Available online at http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.htm
Areas are from the RMDP Habitat Impact Report 071010.
Gray, J.T and W.H. Schlesinger. 1981. Biomass, Production, and Litterfall in the Coastal Sage Scrub of Southern California. *Amer. J. Bot.* 68(1):24-33.

Table 4-2-A
Change in CO_2 Sequestration Due to Change in Land Use Type (Alternative D2)
Newhall Land
Newhall Ranch, California

Newhall Land Designation[A]	Mapped IPCC Land Designation[B]	Total Developed Area				Sequestered CO_2 / Acre[C]	Change in Sequestered CO_2			
		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent
		[acres]				[tonne/acre]	[tonnes]			
Agricultural, Developed, or Disturbed	Cropland	146	1,895	86	50	7	1,016	13,214	598	347
Grass and Herbs	Grassland	21	925	63	23	4	91	3,936	269	98
Riparian and Bottomland	Forest land	57.9	32.7	18.5	4.3	112	6,457	3,647	2,063	480
Broad Leaf Upland Trees	Forest land	8.5	100.7	0.0	0.0	112	948	11,230	0	0
Scrub and Chaparral	Forest land	70.1	1,848.0	37.6	167.5	14	1,011	26,663	542	2,417
Bog and marsh[D]	--	10.4	0.5	0.6	0.0	0	0	0	0	0
Total							**9,523**	**58,689**	**3,473**	**3,341**

Notes:
A. Land types shown here represent vegetation that will be potentially removed upon development. Land designations from the Landmark Village Executive Summary of DEIR, page ES-43.
B. Land types are mapped to generalized IPCC Land Designations (IPCC 2006).
C. It is conservatively assumed that all carbon is eventually converted into CO_2. Multiply the mass of carbon by 3.67 to calculate the final mass of CO_2 (the molecular mass of CO2 / the molecular mass of carbon is 44/12 or 3.67).
D. There is limited data on biomass content of river wash and freshwater marsh. For the purposes of this inventory, it will be assumed that these land types have negligible biomass associated with it. Any changes in GHG emissions are expected to be de minimus.

Abbreviations:
CO_2 - carbon dioxide
IPCC - Intergovernmental Panel on Climate Change
RMDP - Resource Management Development Plan
VCC - Valencia Commerce Center

Sources:
2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Use. Available online at http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.htm
Areas are from the RMDP Habitat Impact Report 071010.
Gray, J.T and W.H.

Table 4-2-B
Change in CO_2 Sequestration Due to Change in Land Use Type (Alternative D3)
Newhall Land
Newhall Ranch, California

Newhall Land Designation[A]	Mapped IPCC Land Designation[B]	Total Developed Area				Sequestered CO_2 / Acre[C]	Change in Sequestered CO_2			
		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent
		[acres]				[tonne/acre]	[tonnes]			
Agricultural, Developed, or Disturbed	Cropland	160.1	1,876.2	86.0	44.0	7	1,117	13,085	600	307
Grass and Herbs	Grassland	30.3	920.2	63.3	5.8	4	129	3,915	269	25
Riparian and Bottomland	Forest land	53.7	28.9	18.5	1.7	112	5,988	3,223	2,063	190
Broad Leaf Upland Trees	Forest land	8.3	98.7	0.0	0.0	112	926	11,007	0	0
Scrub and Chaparral	Forest land	69.5	1,833.9	37.6	149.3	14	1,003	26,460	542	2,154
Bog and marsh[D]	--	8.8	0.0	0.6	0.0	0	0	0	0	0
Total							**9,162**	**57,689**	**3,475**	**2,675**

Notes:

A. Land types shown here represent vegetation that will be potentially removed upon development. Land designations from the Landmark Village Executive Summary of DEIR, page ES-43.

B. Land types are mapped to generalized IPCC Land Designations (IPCC 2006).

C. It is conservatively assumed that all carbon is eventually converted into CO_2. Multiply the mass of carbon by 3.67 to calculate the final mass of CO_2 (the molecular mass of CO2 / the molecular mass of carbon is 44/12 or 3.67).

D. There is limited data on biomass content of river wash and freshwater marsh. For the purposes of this inventory, it will be assumed that these land types have negligible biomass associated with it. Any changes in GHG emissions are expected to be de minimus.

Abbreviations:

CO_2 - carbon dioxide
IPCC - Intergovernmental Panel on Climate Change
RMDP - Resource Management Development Plan
VCC - Valencia Commerce Center

Sources:

2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Use. Available online at http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.htm
Areas are from the RMDP Habitat Impact Report 071010.
Gray, J.T and W.H.

Table 4-2-C
Change in CO_2 Sequestration Due to Change in Land Use Type (Alternative D4)
Newhall Land
Newhall Ranch, California

Newhall Land Designation[A]	Mapped IPCC Land Designation[B]	Total Developed Area				Sequestered CO_2 / Acre[C]	Change in Sequestered CO_2			
		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent
		[acres]				[tonne/acre]	[tonnes]			
Agricultural, Developed, or Disturbed	Cropland	137.9	1,887.6	0.0	44.0	7	962	13,164	0	307
Grass and Herbs	Grassland	21.5	921.8	0.0	5.8	4	91	3,922	0	25
Riparian and Bottomland	Forest land	52.6	31.8	0.0	1.7	112	5,866	3,546	0	190
Broad Leaf Upland Trees	Forest land	7.7	99.8	0.0	0.0	112	859	11,129	0	0
Scrub and Chaparral	Forest land	66.3	1,823.7	0.0	149.3	14	957	26,313	0	2,154
Bog and marsh[D]	--	7.9	0.7	0.0	0.0	0	0	0	0	0
Total							**8,734**	**58,074**	**0**	**2,675**

Notes:
A. Land types shown here represent vegetation that will be potentially removed upon development. Land designations from the Landmark Village Executive Summary of DEIR, page ES-43.
B. Land types are mapped to generalized IPCC Land Designations (IPCC 2006).
C. It is conservatively assumed that all carbon is eventually converted into CO_2. Multiply the mass of carbon by 3.67 to calculate the final mass of CO_2 (the molecular mass of CO2 / the molecular mass of carbon is 44/12 or 3.67).
D. There is limited data on biomass content of river wash and freshwater marsh. For the purposes of this inventory, it will be assumed that these land types have negligible biomass associated with it. Any changes in GHG emissions are expected to be de minimus.

Abbreviations:
CO_2 - carbon dioxide
IPCC - Intergovernmental Panel on Climate Change
RMDP - Resource Management Development Plan
VCC - Valencia Commerce Center

Sources:
2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Use. Available online at http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.htm
Areas are from the RMDP Habitat Impact Report 071010.
Gray, J.T and W.H.

Table 4-2-D
Change in CO_2 Sequestration Due to Change in Land Use Type (Alternative D5)
Newhall Land
Newhall Ranch, California

Newhall Land Designation[A]	Mapped IPCC Land Designation[B]	Total Developed Area				Sequestered CO_2 / Acre[C]	Change in Sequestered CO_2			
		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent
		[acres]				[tonne/acre]	[tonnes]			
Agricultural, Developed, or Disturbed	Cropland	162.6	1,862.8	0.0	43.6	7	1,134	12,991	0	304
Grass and Herbs	Grassland	39.3	901.9	0.0	8.1	4	167	3,837	0	34
Riparian and Bottomland	Forest land	52.8	25.5	0.0	2.6	112	5,888	2,844	0	290
Broad Leaf Upland Trees	Forest land	7.7	98.1	0.0	0.0	112	859	10,940	0	0
Scrub and Chaparral	Forest land	68.4	1,807.8	0.0	129.7	14	987	26,083	0	1,871
Bog and marsh[D]	--	9.2	0.0	0.0	0.0	0	0	0	0	0
Total							**9,035**	**56,695**	**0**	**2,500**

Notes:

A. Land types shown here represent vegetation that will be potentially removed upon development. Land designations from the Landmark Village Executive Summary of DEIR, page ES-43.

B. Land types are mapped to generalized IPCC Land Designations (IPCC 2006).

C. It is conservatively assumed that all carbon is eventually converted into CO_2. Multiply the mass of carbon by 3.67 to calculate the final mass of CO_2 (the molecular mass of CO2 / the molecular mass of carbon is 44/12 or 3.67).

D. There is limited data on biomass content of river wash and freshwater marsh. For the purposes of this inventory, it will be assumed that these land types have negligible biomass associated with it. Any changes in GHG emissions are expected to be de minimus.

Abbreviations:

CO_2 - carbon dioxide
IPCC - Intergovernmental Panel on Climate Change
RMDP - Resource Management Development Plan
VCC - Valencia Commerce Center

Sources:

2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Use. Available online at http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.htm
Areas are from the RMDP Habitat Impact Report 071010.
Gray, J.T and W.H.

Table 4-2-E
Change in CO_2 Sequestration Due to Change in Land Use Type (Alternative D6)
Newhall Land
Newhall Ranch, California

Newhall Land Designation[A]	Mapped IPCC Land Designation[B]	Total Developed Area				Sequestered CO_2 / Acre[C]	Change in Sequestered CO_2			
		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent
		[acres]				[tonne/acre]	[tonnes]			
Agricultural, Developed, or Disturbed	Cropland	138	1,888	0.00	44	7	962	13,164	0	307
Grass and Herbs	Grassland	22	922	0.00	6	4	91	3,922	0	25
Riparian and Bottomland	Forest land	52.6	31.8	0.00	1.7	112	5,866	3,546	0	190
Broad Leaf Upland Trees	Forest land	7.7	99.8	0.00	0.0	112	859	11,129	0	0
Scrub and Chaparral	Forest land	66.3	1,823.7	0.00	149.3	14	957	26,313	0	2,154
Bog and marsh[D]	--	7.9	0.7	0.00	0.0	0	0	0	0	0
Total							**8,734**	**58,074**	**0**	**2,675**

Notes:
A. Land types shown here represent vegetation that will be potentially removed upon development. Land designations from the Landmark Village Executive Summary of DEIR, page ES-43.
B. Land types are mapped to generalized IPCC Land Designations (IPCC 2006).
C. It is conservatively assumed that all carbon is eventually converted into CO_2. Multiply the mass of carbon by 3.67 to calculate the final mass of CO_2 (the molecular mass of CO2 / the molecular mass of carbon is 44/12 or 3.67).
D. There is limited data on biomass content of river wash and freshwater marsh. For the purposes of this inventory, it will be assumed that these land types have negligible biomass associated with it. Any changes in GHG emissions are expected to be de minimus.

Abbreviations:
CO_2 - carbon dioxide
IPCC - Intergovernmental Panel on Climate Change
RMDP - Resource Management Development Plan
VCC - Valencia Commerce Center

Sources:
2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Use. Available online at http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.htm
Areas are from the RMDP Habitat Impact Report 071010.
Gray, J.T and W.H.

Table 4-2-F
Change in CO_2 Sequestration Due to Change in Land Use Type (Alternative D7)
Newhall Land
Newhall Ranch, California

Newhall Land Designation[A]	Mapped IPCC Land Designation[B]	Total Developed Area				Sequestered CO_2 / Acre[C]	Change in Sequestered CO_2			
		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent		RMDP Direct Permanent	RMDP Indirect Permanent	VCC Indirect Permanent	Entrada Indirect Permanent
		[acres]				[tonne/acre]	[tonnes]			
Agricultural, Developed, or Disturbed	Cropland	117	1,514	0.00	44	7	819	10,556	0	303
Grass and Herbs	Grassland	20	843	0.00	19	4	86	3,588	0	82
Riparian and Bottomland	Forest land	16.9	13.4	0.00	2.9	112	1,885	1,494	0	323
Broad Leaf Upland Trees	Forest land	5.9	87.9	0.00	0.0	112	658	9,802	0	0
Scrub and Chaparral	Forest land	51.8	1,611.7	0.00	150.4	14	747	23,254	0	2,170
Bog and marsh[D]	--	0.8	0.0	0.00	0.0	0	0	0	0	0
Total							**4,195**	**48,694**	**0**	**2,879**

Notes:

A. Land types shown here represent vegetation that will be potentially removed upon development. Land designations from the Landmark Village Executive Summary of DEIR, page ES-43.

B. Land types are mapped to generalized IPCC Land Designations (IPCC 2006).

C. It is conservatively assumed that all carbon is eventually converted into CO_2. Multiply the mass of carbon by 3.67 to calculate the final mass of CO_2 (the molecular mass of CO2 / the molecular mass of carbon is 44/12 or 3.67).

D. There is limited data on biomass content of river wash and freshwater marsh. For the purposes of this inventory, it will be assumed that these land types have negligible biomass associated with it. Any changes in GHG emissions are expected to be de minimus.

Abbreviations:

CO_2 - carbon dioxide
IPCC - Intergovernmental Panel on Climate Change
RMDP - Resource Management Development Plan
VCC - Valencia Commerce Center

Sources:

2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Use. Available online at http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.htm
Areas are from the RMDP Habitat Impact Report 071010.
Gray, J.T and W.H.

Table 4-3
Average Annual CO_2 Sequestration Per Tree
Newhall Land
Newhall Ranch, California

Species Class	Annual CO_2 Sequestered Per Tree[1] [tonne CO_2/year]
Aspen	0.035
Soft Maple	0.043
Mixed Hardwood	0.037
Hardwood Maple	0.052
Juniper	0.012
Cedar/Larch	0.026
Douglas Fir	0.045
True Fir/Hemlock	0.038
Pine	0.032
Spruce	0.034
Average Default	0.035
Species Class	**Total CO_2 Sequestered by All Trees Planted[2] [tonne CO_2]**
Newhall Ranch (35,000 trees)	24,794
Entrada (2,500 trees)	1,771
VCC (5,000 trees)	3,542

Notes:
1. Annual mass of carbon accumulated is converted into mass of CO_2 sequestered based on the assumption that all carbon accumulated in the tree represents an equivalent amount of CO_2. Annual carbon accumulation rates provided in IPCC (2006) in Table 8.2 of the settlements section.
2. Total mass of CO_2 sequestered = average default value of annual CO_2 sequestered per tree (0.035 tonne CO_2/year) x (number of trees planted) x total CO_2 sequestration time (20 years - age at which tree matures and CO_2 sequestration reaches a saturation point).

Abbreviations
CO_2 - carbon dioxide
IPCC - Intergovernmental Panel on Climate Change

Source
2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Use. Available online at http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.htm

Table 4-4
Summary of Change in CO_2 Sequestration Due to Change in Land Type, per Development Alternative
Newhall Land
Newhall Ranch, California

Development	Accounts for Trees Planted	Change in Sequestered CO_2 [tonnes]					
		D2	D3	D4	D5	D6	D7
RMDP direct[1]	No	9,523	9,162	8,734	9,035	8,734	4,195
NRSP (RMDP indirect)[2]		58,689	57,689	58,074	56,695	58,074	48,694
Entrada[2]		3,341	2,675	2,675	2,500	2,675	2,879
VCC[2]		3,473	3,475	0	0	0	0
RMDP direct[1]	Yes	9,523	9,162	8,734	9,035	8,734	4,195
NRSP (RMDP indirect)[2]		33,895	33,317	33,540	32,743	33,540	28,122
Entrada[2]		1,570	1,257	1,257	1,175	1,257	1,353
VCC[2,3]		0	0	0	0	0	0

Notes:
1. Direct emissions are those from construction performed under the Resource Management and Development Plan (RMDP) and the Spineflower Conservation Plan (SCP).
2. Indirect emissions are those enabled by the RMDP and SCP. Here, indirect emissions cover the construction of Newhall Ranch, Entrada, and Valencia Commerce Center.
3. Based on the assumed number of trees planted in VCC (7500), the change in sequestered CO_2 can be assumed to be zero (i.e., enough trees are planted to compensate for the change in CO_2 sequestration from vegetation cleared).

Abbreviations:
CO_2 - carbon dioxide
NRSP - Newhall Ranch Specific Plan
VCC - Valencia Commerce Center

Table 4-5
Grading Equipment GHG Emissions - Direct Emissions[1] (SCP, RMDP)
Newhall Land
Newhall Ranch, California

	Total Hours of Operation[2]	Horsepower[3]	Load Factor	Emission Factor (g/bhp-hr)	CO_2e Emission[4,5] (tonne)
SCRAPERS	71,850	313	0.72	568	9,202
CRAWLER TRACTORS (DOZERS)	24,835	147	0.64	568	1,328
RUBBER TIRED DOZER	13,510	357	0.59	568	1,617
OFF-HIGHWAY WATER TRUCKS	26,720	189	0.50	568	1,435
GRADER	12,900	174	0.61	568	778
LOADER/BACKHOE	12,250	108	0.55	568	414
EXCAVATOR	6,200	168	0.57	568	337
OFF-HIGHWAY TRUCKS	51,100	479	0.57	568	7,929
ON-HIGHWAY TRUCKS[6]	24,810	--	N/A	N/A	348
CRUSHING/PROCESSING EQUIPMENT	12,250	142	0.78	568	771
ROLLERS	12,250	95	0.56	568	370
Total	**243,865**				**24,529**

Notes:
1. Direct emission hours cover construction under the Resource Management and Development Plan (RMDP) and Spineflower Conservation Plan (SCP).
2. The total hours for Direction Emission of each piece of machine is the sum of its Direct Emission hours in Newhall Ranch, Valencia Commerce Center (VCC), and Entrada.
3. The values of Horsepower, Load Factor, and Emissin Factor of each type of equipment are from OFFROAD2007 defaults.
4. The CO_2 Emission calculation formula for each piece of equipment is:

$_2$ Emission = Total Hours of Operation x HP x Load Factor x Emission Factor

5. Assume CO_2 = CO2e because the contribution of CH_4 and N_2O to overall GHG emissions is likely small (< 1% of total CO_2e) from diesel construction equipment.
6. The CO_2 Emission calculation of on-highway trucks is different from other offroad equipments. See on-highway truck table for detailed calculation methodology.

Abbreviations:
CO_2e: carbon dioxide equivalent
GHG: greenhouse gas
g/bhp-hr: gram per brake hoursepower per hour
HP: horsepower
N/A: not applicable. See footnote 6
RMDP: Resource Management and Development Plan
SCP: Spineflower Conservation Plan

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Table 4-6
Grading Equipment GHG Emissions from Newhall Ranch Specific Plan
Newhall Land
Newhall Ranch, California

	Equipment-Hour[1]	Horsepower[2]	Load Factor	Emission Factor (g/bhp-hr)	CO_2e Emission[3,4] (tonne)
SCRAPERS	715,545	313	0.72	568.3	91,641
CRAWLER TRACTORS (DOZERS)	236,000	147	0.64	568.3	12,618
RUBBER TIRED DOZER	160,500	357	0.59	568.3	19,212
OFF-HIGHWAY WATER TRUCKS	367,500	189	0.5	568.3	19,736
GRADER	117,770	174	0.61	568.3	7,104
LOADER/BACKHOE	43,413	108	0.55	568.3	1,466
EXCAVATOR	70,005	168	0.57	568.3	3,810
OFF-HIGHWAY TRUCKS	9,200	479	0.57	568.3	1,427
ON-HIGHWAY TRUCKS[5]	173,700	N/A	N/A	N/A	7,184
CRUSHING/PROCESSING EQUIPMENT	0	142	0.78	568.3	0
ROLLERS	17,709	95	0.56	568.3	535
CRANES	2,668	399	0.43	568.3	260
DRILL/BORE RIGS	1,270	291	0.75	568.3	158
PAVERS	343	100	0.62	568.3	12
ON-HIGHWAY WATER TRUCKS[6]	18,396	189	0.5	568.3	988
Total	**1,934,020**				**166,151**

Notes:

1. The equipment-hour cover the grading for the following developments:
   a. Water Reclamation Plant
   b. Landmark Village
   c. Mission Village
   d. Homestead: Onion Field, Chiquito Canyon, Mesas West, Long Canyon North, and Potrero Ridge
   e. Potrero Canyon
2. The values of Horsepower, Load Factor, and Emissin Factor of each type of equipment are from OFFROAD2007 defaults.
3. The CO_2 Emission calculation formula for each piece of equipment is:

   $_2$ Emission = Total Hours of Operation x HP x Load Factor x Emission Factor
4. Assume CO_2 = CO_2e because the contribution of CH_4 and N_2O to overall GHG emissions is likely small (< 1% of total CO_2e) from diesel construction equipment.
5. The CO_2 Emission calculation of on-highway trucks is different from other offroad equipments. See on-highway truck table for calculation detail.
6. The HP, load factor, emission factor of off-hightway water trucks (from OFFROAD2007) are used by assuming the same type of water trucks running under different road conditions.

Abbreviations:

CO_2e: carbon dioxide equivalent
GHG: greenhouse gas
CO
g/bhp-hr: gram per brake hoursepower per hour
HP: horsepower
N/A: not applicable. See footnote 5
RMDP: Resource Management and Development Plan
SCP: Spineflower Conservation Plan

Table 4-7
Grading Equipment GHG Emissions from Entrada
Newhall Land
Newhall Ranch, California

	Equipment-Hour[1]	HP[2]	Load Factor	Emission Factor (g/bhp-hr)	CO_2e Emission[3,4] (tonne)
SCRAPERS	40,252	313	0.72	568	5,155
CRAWLER TRACTORS (DOZERS)	17,250	147	0.64	568	922
RUBBER TIRED DOZER	9,300	357	0.59	568	1,113
OFF-HIGHWAY WATER TRUCKS	14,900	189	0.50	568	800
GRADER	12,023	174	0.61	568	725
LOADER/BACKHOE	6,609	108	0.55	568	223
EXCAVATOR	13,075	168	0.57	568	712
OFF-HIGHWAY TRUCKS	23,280	479	0.57	568	3,612
ON-HIGHWAY TRUCKS[5]	11,750	N/A	N/A	N/A	1,021
CRUSHING/PROCESSING EQUIPMENT	0	142	0.78	568	0
ROLLERS	3,037	95	0.56	568	92
CRANES	873	399	0.43	568	85
DRILL/BORE RIGS	413	291	0.75	568	51
PAVERS	112	100	0.62	568	4
ON-HIGHWAY WATER TRUCKS	6,017	189	0.50	568	323
Total	**143,432**				**14,839**

Notes:

1. The equipment-hour cover the grading for five development sub-phases of Entrada: PA-1, PA-2, PA-3, PA-4-14, and PA-5,
2. The values of Horsepower, Load Factor, and Emissin Factor of each type of equipment are from OFFROAD2007 defaults.
3. The CO_2 Emission calculation formula for each piece of equipment is:

   $_2$ Emission = Total Hours of Operation x HP x Load Factor x Emission Factor
4. Assume CO_2 = CO_2e because the contribution of CH4 and N2O to overall GHG emissions is likely small (< 1% of total CO2e) from diesel construction equipment.
5. On-Highway Truck emission calculation is different from other offroad equipment. See on-highway truck table for the detailed methodology.

Abbreviations:

CO_2e: carbon dioxide equivalent
g/bhp-hr: gram per brake hoursepower per hour
GHG: greenhouse gas
HP: horsepower
N/A: not applicable. See footnote 5

Table 4-8
Grading Equipment GHG Emissions from Valencia Commerce Center
Newhall Land
Newhall Ranch, California

	Equipment-Hour	**Hoursepower[1]**	**Load Factor**	**Emission Factor (g/bhp-hr)**	**CO_2e Emission[2,3] (tonne)**
SCRAPERS	47,113	313	0.72	568.3	6,034
CRAWLER TRACTORS (DOZERS)	15,000	147	0.64	568.3	802
RUBBER TIRED DOZER	12,000	357	0.59	568.3	1,436
OFF-HIGHWAY WATER TRUCKS	16,600	189	0.50	568.3	891
GRADER	12,316	174	0.61	568.3	743
LOADER/BACKHOE	3,136	108	0.55	568.3	106
EXCAVATOR	8,664	168	0.57	568.3	471
OFF-HIGHWAY TRUCKS	6,500	479	0.57	568.3	1,009
ON-HIGHWAY TRUCKS[4]	18,500	N/A	N/A	N/A	259
CRUSHING/PROCESSING EQUIPMENT	0	142	0.78	568.3	0
ROLLERS	1,354	95	0.56	568.3	41
CRANES	195	399	0.43	568.3	19
DRILL/BORE RIGS	92	291	0.75	568.3	11
PAVERS	25	100	0.62	568.3	1
ON-HIGHWAY WATER TRUCKS	1,342	189	0.50	568.3	72
Total	**124,336**				**11,896**

Notes:

1. The values of Horsepower, Load Factor, and Emissin Factor of each type of equipment are from OFFROAD2007 defaults.
2. The CO_2 Emission calculation formula for each piece of equipment is:

   $_2$ Emission = Total Hours of Operation x HP x Load Factor x Emission Factor
3. Assume CO_2 = CO_2e because the contribution of CH4 and N2O to overall GHG emissions is likely small (< 1% of total CO_2e) from diesel construction equipment.
4. On-Highway Truck emission calculation is different from other offroad equipment. See on-highway truck table for the detailed methodology.

Abbreviation:

CO_2e: carbon dioxide equivalent
g/bhp-hr: gram per brake hoursepower per hour
GHG: greenhouse gas
N/A: not applicable. See footnote 4.

Table 4-9
On-Highway Trucks GHG Emissions Calculation During Grading Period
Newhall Land
Newhall Ranch, California

	Development	Direct Hours[1]	Indirect Hours[2]	Imported Dust	VMT_{total}	VMT_{dir}	VMT_{ind}	Direct CO_2e Emission[3,4]	Indirect CO_2e Emission[5]
				(cubic yard)	(mile)			(tonne)	
Newhall Ranch	Water Reclamation Plant	1,000	1,000	N/A	N/A	7,500	7,500	14	14
Newhall Ranch	Landmark Village	2,000	8,500	4,800,000	960,000	15,000	945,000	28	1,765
Newhall Ranch	Mission Village	250	45,000	N/A	N/A	1,875	337,500	4	630
Newhall Ranch	Onion Field	1,550	8,000	4,500,000	900,000	11,625	888,375	22	1,659
Newhall Ranch	North of River in Chiquito Canyon	4,600	15,000	N/A	N/A	34,500	112,500	64	210
Newhall Ranch	Mesas West	150	10,600	N/A	N/A	1,125	79,500	2	148
Newhall Ranch	Long Canyon North	2,500	12,000	N/A	N/A	18,750	90,000	35	168
Newhall Ranch	Potrero Ridge	50	4,600	N/A	N/A	375	34,500	1	64
Newhall Ranch	Potrero Canyon	6,500	69,000	7,000,000	1,400,000	48,750	1,351,250	91	2,524
VCC	Valencia Commerce Center	5,000	18,500	N/A	N/A	37,500	138,750	70	259
Entrada	PA-1[6]	800	5,000	2,400,000	480,000	6,000	474,000	11	885
Entrada	PA-2	200	750	145,000	29,000	1,500	27,500	3	51
Entrada	PA-3	10	800	N/A	N/A	75	6,000	0	11
Entrada	PA-4-14	0	4,500	N/A	N/A	0	33,750	0	63
Entrada	PA-5	200	700	N/A	N/A	1,500	5,250	3	10
	Total							**348**	**8,464**

Notes:

1. Direct emission hours cover construction under the Resource Management and Development Plan (RMDP) and Spineflower Conservation Plan (SCP).
2. Indirect emission hours cover developments enabled by the SCP and RMDP: construction of Newhall Ranch, construction of Entrada, and construction of VCC.
3. When amount of imported dust is available, use the following methodology to calculate on highway truck CO_2 emissions:

Direct Emissions:

a. Direct hours / 8 hours per day * 60 miles per day = $VMTD_{dir}$

b. VMT_{dir} * EF_{HHD} = Direct CO_2 Emission

The emission factor of on-highway trucks (EF_{HHD} = 1630.7 g/mile) was given by EMFACT2007 with the following assumption:

i. Vehicle Speed: 30 mph - following the default speed of URBEMIS 9.2.2 in the worker commute section.

ii. Ambient Temperature: 75 F - estimated based on the available historical average maximum temperature (77.1F) of Newhall, California (1989-1997) Http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca6165

Relative Humidity: 56% - the mean annual relative humidity of Los Angeles City was used. Http://www.wrcc.dri.edu/htmlfiles/westcomp.rhaft.html

Http://www.wrcc.dri.edu/htmlfiles/westcomp.rhaft.html

Indirect Emissions:

a. Divide the cubic yards of imported dust by 20 cubic yards per trip per truck to get the number of truck-trips.

b. Multiply the number of truck-trips by 4 miles per round trip to get the VMT_{total} (Direct + Indirect).

c. Subtract the VMT_{dir} from VMT_{total} to get VMT_{ind}.

d. VMT_{ind} * EF_{HHD} = Indirect CO_2 Emission

4. When there is no dust imported data available, calculate Direct Emissions from Direct Hours, and Indirect Emissions from Indirect Hours (Direct Hours = Total Hours - Indirect Hours) with the following formula:

a. Hours for trucks / 8 hours per day * 60 miles per day = VMT

b. VMT * EF_{HHD} = CO_2 Emission

5. Assume CO_2 = CO_2e because the contribution of CH_4 and N_2O to overall GHG emissions is likely small (< 1% of total CO_2e) from diesel construction equipment.
6. PA-1, PH-2, PH-3, PH-4-14, and PH-5 are five sub-phases under Entrada developments.

Abbreviations:

CO_2e: carbon dioxide equivalent
dir: direct
EF_{HHD}: emission factor of heavy heavy-duty truck
GHG: greenhouse gas
ind: indirect
N/A: not applicable. No data for imported dust (in cubic yard) information.
VCC: Valencia Commercial Center
VMT: vehicle miles traveled

Table 4-10
GHG Emissions from Worker's Commute During Grading
Newhall Land
Newhall Ranch, California

Development	Worker Trips[1]	VMT[2]	EF_{LDA} Running[5]	EF_{LDA} Startup[5]	EF_{LDT1}[3] Running	EF_{LDT1}[3] Startup	EF_{LDT2}[3] Running	EF_{LDT2}[3] Startup	GHG Emissions[4] Running	GHG Emissions[4] Startup	Total CO_2 Emissions	Total CO_2e Emissions[6,7]
		(miles)	(g/mile)	(g/trip)	(g/mile)	(g/trip)	(g/mile)	(g/trip)	(tonnes)			
Newhall	550,100	6,986,269	366	209	452	254	454	260	2,860	128	2,988	3,146
Valencia Commerce Center	38,855	493,459	366	209	452	254	454	260	202	9	211	222
Entrada	45,981	583,960	366	209	452	254	454	260	239	11	250	263
Direct Emission	76,208	967,839	366	209	452	254	454	260	396	18	414	436
Total	711,144	9,031,526									3,863	**4,066**

Notes:

1. Worker one-way trips were calculated based upon the following assumptions:
   a. Operational hours of each piece of machine = 8 hours per day
   b. Number of working days for each type of equipment = total hour of operation / 8 hours per day
   c. Round trips per working day = 1.25
   d. Worker One-Way Trips = Number of working days x 1.25 x 2
2. Vehicle Miles Traveled = Worker Trips x 12.7 miles per one-way trip, the default value from Urbemis 9.2.2
3. LDT1: up to 6000 GVW; LDT2: up to 8500 GVW
4. GHG Running Emission calculation formula: GHG Emission = VMT x (0.5 x EF_{LDT} + 0.25 x EF_{LDT1} + 0.25 x EF_{LDT2})
   GHG Startup Emission calculation formula: GHG Emission = Worker Trips x (0.5 x EF_{LDT} + 0.25 x EF_{LDT1} + 0.25 x EF_{LDT2})
   Urbemis assumes that LDA and LDT have a 50:50 mixing ratio.
5. The Running emission factor depends on the speed of the vehicle. The emission factor used in this calculation refers to the Urbemis 9.2.2 default vehicle speed: 30 MPH
   The startup emission factor depends on the setting period before driving. The startup emission was calculated based on the most conservative assumption: 720 min (12 hour) before each engine startup.
6. CO_2e = CO_2 / 0.95. The United States Environmental Protection Agency (USEPA) recommends assuming that CH4, N2O, and HFCs account for 5% of GHG emissions from on-road vehicles, taking into account their global warming potentials.
7. For conservative estimation, the emission facor values of 2010 were used for all calculation.

Abbreviations:

CO_2: carbon dioxide
CO_2e: carbon dioxide equivalent
EF: emission factor
GVW: gross vehicle weight
LDT: light duty truck
VMT: vehicle miles traveled

Table 4-11
Grading Construction GHG Emissions
Newhall Land
Newhall Ranch, California

Development	Offroad Equipment	Worker's Commute[2]	Total GHG Emissions
	[tonne CO_2e]		
Newhall	166,151	3,146	169,297
Valencia Commerce Center	11,896	222	12,118
Entrada	14,839	263	15,102
Direct Emission	24,529	436	24,965
Total	**217,415**	**4,066**	**221,481**

Notes:
1. See the construction equipment section for emission calculation detail.
2. See the worker's commute section for emission calculation detail.

Abbreviations:
CO_2: carbon dioxide
CO_2e: carbon dioxide equivalent

Table 4-12
Newhall Ranch Construction GHG Emission Summary
Newhall Land
Newhall Ranch, California

Development	Grading[1]	Building Construction[2,3]	Total
	tonnes CO_2e		
Newhall[4]	169,297	266,236	435,533
VCC	12,118	20,041	32,159
Entrada	15,102	49,110	64,212
Direct	24,965		24,965
Total	221,481	335,387	556,868

Notes:
1. See grading section for calculation detail.
2. The total GHG emissions were calculated using URBEMIS 9.2.2. with the input files provided by Impact Sciences.
3. Outputs from Urbemis was converted from short tons to metric tonnes.
1 short ton = 0.90718474 metric tonnes
4. Newhall development includes the developments of Homestead, Landmark Village, Mission Village, and Potrero. See the appendix for emission contribution from each sub-development during its correpsonding buildout period.

Abbreviations:
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
VCC - Valencia Commerce Center

Table 4-13
Construction GHG Emission from Design Alternatives D2 to D7
Newhall Land
Newhall Ranch, California

Development	Area of Construction[1] (sqft)						CO_2e Emssions from Grading[2] (tonnes)						CO_2e Emssions from Building Construction[2] (tonnes)						Total eCO_2 Emissions[3] (tonnes)					
	D2	**D3**	**D4**	**D5**	**D6**	**D7**	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**
Newhall Ranch	5.1E+07	5.0E+07	5.1E+07	5.0E+07	4.9E+07	4.0E+07	169,297	165,840	167,962	163,918	160,735	131,901	266,236	260,800	264,137	257,778	252,772	207,428	435,533	426,640	432,098	421,695	413,507	339,328
VCC	3.5E+06	3.5E+06	0	0	0	0	12,118	12,118	0	0	0	0	20,041	20,041	0	0	0	0	32,159	32,159	0	0	0	0
Entrada	4.3E+06	3.0E+06	3.0E+06	2.7E+06	1.5E+06	1.9E+06	15,102	10,543	10,543	9,282	5,336	6,649	49,110	34,285	34,285	30,183	17,351	21,621	64,212	44,828	44,828	39,465	22,687	28,270
Direct							24,965	23,974	22,772	22,102	21,220	17,687							24,965	23,974	22,772	22,102	21,220	17,687
Total	5.9E+07	5.7E+07	5.4E+07	5.3E+07	5.0E+07	4.2E+07	221,481	212,474	201,276	195,302	187,291	156,236	335,387	315,126	298,422	287,961	270,124	229,049	556,868	527,600	499,698	483,263	457,415	385,285

Notes:
1. The total area of construction for each development includes both residential and non-residential building construction.
2. Emissions due to grading and building construction from each development in design alternatives are assumed to scale by the number of square feet constructed.
3. The total CO_2e emissions from each development in each alternative constructin plan was the sum of the corresponding grading and building construct

Abbreviations:
CO_2e - carbon dioxide equivalent
GHG - greenhouse g
sqft - square feet
VCC - Valencia Commerce Center

Table 4-14
Specifications for Homes Modeled Using Micropas
Newhall Land
Newhall Ranch, CA

Specification	Units	Micropas[4]			EIA Database[5]		
		Single Family[1]	Attached[2]	Apartment[3]	Single Family[1]	Attached[2]	Apartment[3]
Climate Zone		CA Climate Zone 9			CDD < 2,000 and HDD < 4,000		
Number of Dwelling Units per Building	DU	1	8	16	1	5+	5+
Dwelling Unit Size	sqft	3,322	1,764	1,260	3181	1244	1244
Total building size	sqft	3,322	14,112	20,160			
Number of Stories	stories	2	2	4			
Residents / dwelling unit	people	4	3	3			
Attached Garage	sqft	528	0	0			
Height	ft	18	18	36			
Length	ft	55	168	140			
Width	ft	35	42	36			
Windows as % of wallspace	%	20	25	25			

Notes:
1. The large-end single family home as specified by Newhall will be 3,300 square feet.
2. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
3. The large-end 16 DU apartments as specified by newhall will be 1,250 square feet.
4. The Micropas specifications below are for the actual home modeled in Micropas. The length, width, and height are for the entire building (including atttached garage if applicable). Micropas 7.3 is a building energy efficiency modeling package approved by the California Energy Commission as a 2005 Title 24 residential Alternative Compliance Method (ACM). The Micropas software calculates the site energy use per square foot per year and the Time Dependent Valuation (TDV) of the energy use per square foot per year to determine Title 24 compliance. Micropas version 7.3 is available for purchase at http://www.micropas.com/
5. The EIA specifications are for the average dwelling unit queried from the EIA database. Data originates from the EIA Residential Energy Consumption Survey year 2001, files 1 (Housing Unit Characteristics), 9 (Housing Unit Measurements), and 11 (Energy Consumption)

Abbreviations:
HDD = Heating Degree Days. Subtract the avg. temp. from 65^o for each day where the avg. temp. was below 65^o Fahrenheit and sum the results.
CDD = Cooling Degree Days. Subtract 65^o from the avg. temp. for each day where the avg. temp. was above 65^o Fahrenheit and sum the results.

Table 4-15
Energy Use per Residential Dwelling Unit
Newhall Land
Newhall Ranch, CA

	Dwelling Sizes			Electricity Delivered				Natural Gas Delivered		
				Micropas[2]	EIA Elec / Unit			Micropas[2]		
Title 24 Compliance	**Type**	**Micropas Square Footage / DU[1]**	**EIA Square Footage / DU[1]**	**HVAC (Cooling)**	**Refrigerators[3]**	**Appliances / Lighting[4]**	**Total**	**Heating**	**Domestic Hot Water**	**Total**
				[kw-hr/DU/year]				(ccf of natural gas / DU / year)		
Minimally Title 24 Compliant	Single Family[5]	3,322	3,181	1,867	1,341	4,844	**8,052**	206	243	**449**
	Attached[6]	1,764	1,244	656	786	4,138	**5,580**	45	219	**264**
	Apartment[7]	1,260	1,244	671	786	2,956	**4,413**	39	192	**231**
15% Better Than Title 24	Single Family[5]	3,322	3,181	1,587	1,341	4,663	**7,590**	175	207	**381**
	Attached[6]	1,764	1,244	558	786	3,983	**5,327**	39	186	**224**
	Apartment[7]	1,260	1,244	570	786	2,845	**4,201**	33	163	**197**
Percentage Improvement over Title 24	Single Family[5]	3,322	3,181	15%	0%	4%	**6%**	15%	15%	**15%**
	Attached[6]	1,764	1,244	15%	0%	4%	**5%**	15%	15%	**15%**
	Apartment[7]	1,260	1,244	15%	0%	4%	**5%**	15%	15%	**15%**

Notes:
1. Micropas square footage is the actual square footage of the dwelling units of the homes used for modeling. EIA square footage is based upon the average square footage of the homes filtered from the database. Total heated square footages was used in calculations. Homes with 0 heated square feet were not considered.
2. Energy use shown is from a Title 24 compliant house. The proposed designs in Micropas used between 95% and 97% of the TDV energy, and between 98% and 99% of the source energy of a Title 24 compliant home.
3. Estimated from the EIA database. The average energy use for refrigerators per dwelling unit of the specified size range is used. Refrigeration energy use is assumed to not scale with dwelling unit size.
4. "Appliance/Lighting" refers to the electricity use associated with electric freezers, dishwashers, cooking units, and dryers. This energy use is calculated as the energy use per square foot from the EIA data. This value is then multiplied by the square footage of each dwelling unit modeled by Micropas to estimate energy use per dwelling unit. Approximately 25% of this energy use is from built-in lighting that is covered by Title 24; thereby a 15% reduction of 25% of this energy-use is taken.
5. Data originates from the EIA Residential Energy Consumption Survey, year 2001 files 1 (Housing Unit Characteristics), 9 (Housing Unit Measurements), and 11 (Energy Consumption). Single family homes in the EIA database met the following criteria: the homes are single family detached; the homes are in CA; HDD < 4,000; CDD < 2,000; total heated square footage 2,800 - 3,800. The sample size after these filters was 16 homes with an average of 3,181 sq. ft.
6. Data originates from the EIA Residential Energy Consumption Survey, year 2001 files 1 (Housing Unit Characteristics), 9 (Housing Unit Measurements), and 11 (Energy Consumption). Attached homes in the EIA database met the following criteria: the buildings have more than 5 dwelling units; the homes are in CA; HDD < 4,000; CDD < 2,000; total heated square footage 1,000 - 2,000. The sample size after these filters was 14 units with an average of 1,244 sq. ft.
7. Data originates from the EIA Residential Energy Consumption Survey year 2001, files 1 (Housing Unit Characteristics), 9 (Housing Unit Measurements), and 11 (Energy Consumption). Apartment homes in the EIA database met the following criteria: the buildings have more than 5 dwelling units; the homes are in CA; HDD < 4,000; CDD < 2,000; total heated square footage 1,000 - 2,000. The sample size after these filters was 14 units with an average of 1,244 sq. ft.

Abbreviations:
HDD = Heating Degree Days. Subtract the avg. temp. from 65^{o} for each day where the avg. temp. was below 65^{o} Fahrenheit and sum the results.
CDD = Cooling Degree Days. Subtract 65^{o} from the avg. temp. for each day where the avg. temp. was above 65^{o} Fahrenheit and sum the results.
kW-hr = kilowatt-hour
SF = square feet
TDV = Time Dependent Valuation

Source:
2001 Residential Energy Consumption Survey conducted by the US Energy Information Administarion: http://www.eia.doe.gov/emeu/recs/contents.html
Building America Research Benchmark Definition. Technical Report NREL/TP-550-42662. January 2008. http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/42662.pdf

Table 4-16
Emission Factors for Different Energy Sources for Buildings
Newhall Land
Newhall Ranch, CA

Energy Source	Units	lb CO_2e/unit
Electricity[1]	(kW-hr)	0.666
Natural Gas[2]	(hundred cubic feet)	11.3

Notes:
1. From California Climate Action Registry (CCAR) Database. Southern California Edison PUP Report. 2005.
2. From CCAR GRP. Emission factors (in kg CO2/MMBtu) are provided in Table C.5. Conversion to units of lb CO2e/ccf was performed using high heating values in Table III. 8.1

Abbreviations:
CCAR = California Climate Action Registry
GRP = General Reporting Protocol
IPCC = Intergovernmental Panel on Climate Change
kW-hr = kilowatt-hour
lb = pound

Sources:
California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at:
http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-17
CO_2e Emissions per Dwelling Unit
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Type	DU per Building[1]	Average SF[2]	CO_2 Electricity[3] (pounds / DU)	CO_2 natural Gas[4] (pounds / DU)	CO_2 Electricity[3] (tonnes / DU)	CO_2 natural Gas[4] (tonnes / DU)	CO_2 Total (tonnes / DU)
Minimally Title 24 Comliant	Single Family[5]	1	3,322	5362	5069	2.4	2.3	4.7
	Attached[6]	8	1,764	3717	2983	1.7	1.4	3.0
	Apartment[7]	16	1,260	2939	2615	1.3	1.2	2.5
15% Better Than Title 24	Single Family[5]	1	3,322	5055	4309	2.3	2.0	4.2
	Attached[6]	8	1,764	3548	2535	1.6	1.1	2.8
	Apartment[7]	16	1,260	2798	2223	1.3	1.0	2.3
Percentage Improvement over Title 24	Single Family[5]	1	3,322	6%	15%	6%	15%	10%
	Attached[6]	8	1,764	5%	15%	5%	15%	9%
	Apartment[7]	16	1,260	5%	15%	5%	15%	10%

Notes:
1. Based on Newhall Ranch Specific Plan
2. Specifications for the average dwelling unit queried from 2001 Residential Energy Consumption Survey year 2001, files 1 (Housing Unit Characteristics), 9 (Housing Unit Measurements), and 11 (Energy Consumption)
3. Emission Factor per square foot from California Climate Action Registry (CCAR) Database. Southern California Edison PUP Report. 2005.
4. Emission factor per square foot from CCAR GRP. Emission factors (in kg CO2/MMBtu) are provided in Table C.5. Conversion to units of lb/CO2e/ccf was performed using high heating values in Table III. 8.1
5. The large-end single family home as specified by Newhall will be 3,300 square feet.
6. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
7. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.

Abbreviations:
DU = dwelling
kW-hr = kilowatt-hour
SF = square feet

Source:
2001 Residential Energy Consumption Survey conducted by the US Energy Information Administarion: http://www.eia.doe.gov/emeu/recs/contents.html

Table 4-18-A

CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Newhall Ranch Specific Plan D2

Newhall Land

Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2] (CO₂ / DU / year)	Final CO_2 (tonne CO_2 / year)		Final CO_2 With Renewable Source[6] (tonne CO_2 / year)	
Minimally Title 24 Compliant	Single Family[3]	6,683	4.73	31,622	**73,151**	24,847	**66,375**
	Attached[4]	11,069	3.04	33,635		33,635	
	Apartment[5]	3,133	2.52	7,893		7,893	
15% Better Than Title 24	Single Family[3]	6,683	4.25	28,385	**66,062**	21,610	**59,286**
	Attached[4]	11,069	2.76	30,541		30,541	
	Apartment[5]	3,133	2.28	7,135		7,135	
Percentage Improvement over Title 24	Single Family[3]	6,683	10%	10%	**10%**	13%	**11%**
	Attached[4]	11,069	9%	9%		9%	
	Apartment[5]	3,133	10%	10%		10%	

Notes:

1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:

DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-18-B
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Newhall Ranch Specific Plan D3
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2] (CO2 / DU / year)	Final CO_2 (tonne CO_2 / year)		Final CO_2 With Renewable Source[6] (tonne CO_2 / year)	
Minimally Title 24 Compliant	Single Family[3]	6,539	4.73	30,938	**71,568**	24,309	**64,939**
	Attached[4]	10,829	3.04	32,908		32,908	
	Apartment[5]	3,065	2.52	7,722		7,722	
15% Better Than Title 24	Single Family[3]	6,539	4.25	27,771	**64,632**	21,142	**58,003**
	Attached[4]	10,829	2.76	29,880		29,880	
	Apartment[5]	3,065	2.28	6,981		6,981	
Percentage Improvement over Title 24	Single Family[3]	6,539	10%	10%	**10%**	13%	**11%**
	Attached[4]	10,829	9%	9%		9%	
	Apartment[5]	3,065	10%	10%		10%	

Notes:
1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-18-C
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Newhall Ranch Specific Plan D4
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2] (CO_2 / DU / year)	Final CO_2 (tonne CO_2 / year)		Final CO_2 With Renewable Source[6] (tonne CO_2 / year)	
Minimally Title 24 Compliant	Single Family[3]	6,631	4.73	31,374	**72,576**	24,652	**65,854**
	Attached[4]	10,982	3.04	33,371		33,371	
	Apartment[5]	3,108	2.52	7,831		7,831	
15% Better Than Title 24	Single Family[3]	6,631	4.25	28,163	**65,543**	21,440	**58,821**
	Attached[4]	10,982	2.76	30,301		30,301	
	Apartment[5]	3,108	2.28	7,079		7,079	
Percentage Improvement over Title 24	Single Family[3]	6,631	10%	10%	**10%**	13%	**11%**
	Attached[4]	10,982	9%	9%		9%	
	Apartment[5]	3,108	10%	10%		10%	

Notes:
1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-18-D
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Newhall Ranch Specific Plan D5
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2]	Final CO_2		Final CO_2 With Renewable Source[6]	
			(CO_2 / DU / year)	(tonne CO_2 / year)			
Minimally Title 24 Compliant	Single Family[3]	6,463	4.73	30,579	**70,737**	24,027	**64,185**
	Attached[4]	10,704	3.04	32,526		32,526	
	Apartment[5]	3,029	2.52	7,632		7,632	
15% Better Than Title 24	Single Family[3]	6,463	4.25	27,449	**63,882**	20,897	**57,330**
	Attached[4]	10,704	2.76	29,534		29,534	
	Apartment[5]	3,029	2.28	6,900		6,900	
Percentage Improvement over Title 24	Single Family[3]	6,463	10%	10%	**10%**	13%	**11%**
	Attached[4]	10,704	9%	9%		9%	
	Apartment[5]	3,029	10%	10%		10%	

Notes:
1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-18-E
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Newhall Ranch Specific Plan D6
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2]	Final CO_2		Final CO_2 With Renewable Source[6]	
			(CO_2 / DU / year)	(tonne CO_2 / year)			
Minimally Title 24 Compliant	Single Family[3]	6,332	4.73	29,960	**69,305**	23,541	**62,886**
	Attached[4]	10,487	3.04	31,867		31,867	
	Apartment[5]	2,968	2.52	7,478		7,478	
15% Better Than Title 24	Single Family[3]	6,332	4.25	26,893	**62,589**	20,474	**56,169**
	Attached[4]	10,487	2.76	28,935		28,935	
	Apartment[5]	2,968	2.28	6,760		6,760	
Percentage Improvement over Title 24	Single Family[3]	6,332	10%	10%	**10%**	13%	**11%**
	Attached[4]	10,487	9%	9%		9%	
	Apartment[5]	2,968	10%	10%		10%	

Notes:
1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-18-F
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Newhall Ranch Specific Plan D7
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2]	Final CO_2		Final CO_2 With Renewable Source[6]	
			(CO_2 / DU / year)	(tonne CO_2 / year)			
Minimally Title 24 Compliant	Single Family[3]	5,271	4.73	24,939	**57,690**	19,596	**52,347**
	Attached[4]	8,730	3.04	26,527		26,527	
	Apartment[5]	2,471	2.52	6,225		6,225	
15% Better Than Title 24	Single Family[3]	5,271	4.25	22,386	**52,100**	17,043	**46,756**
	Attached[4]	8,730	2.76	24,086		24,086	
	Apartment[5]	2,471	2.28	5,627		5,627	
Percentage Improvement over Title 24	Single Family[3]	5,271	10%	10%	**10%**	13%	**11%**
	Attached[4]	8,730	9%	9%		9%	
	Apartment[5]	2,471	10%	10%		10%	

Notes:
1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-19-A
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Entrada D2
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2] (CO2 / DU / year)	Final CO_2 (tonne CO_2 / year)		Final CO_2 With Renewable Source[6] (tonne CO_2 / year)	
Minimally Title 24 Compliant	Single Family[3]	552	4.73	2,612	**6,042**	2,052	**5,482**
	Attached[4]	914	3.04	2,778		2,778	
	Apartment[5]	259	2.52	652		652	
15% Better Than Title 24	Single Family[3]	552	4.25	2,345	**5,456**	1,785	**4,897**
	Attached[4]	914	2.76	2,523		2,523	
	Apartment[5]	259	2.28	589		589	
Percentage Improvement over Title 24	Single Family[3]	552	10%	10%	**10%**	13%	**11%**
	Attached[4]	914	9%	9%		9%	
	Apartment[5]	259	10%	10%		10%	

Notes:
1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-19-B
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Entrada D3
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2] (CO₂ / DU / year)	Final CO_2 (tonne CO_2 / year)		Final CO_2 With Renewable Source[6] (tonne CO_2 / year)	
Minimally Title 24 Compliant	Single Family[3]	360	4.73	1,703	**3,940**	1,338	**3,575**
	Attached[4]	596	3.04	1,812		1,812	
	Apartment[5]	169	2.52	425		425	
15% Better Than Title 24	Single Family[3]	360	4.25	1,529	**3,559**	1,164	**3,194**
	Attached[4]	596	2.76	1,645		1,645	
	Apartment[5]	169	2.28	384		384	
Percentage Improvement over Title 24	Single Family[3]	360	10%	10%	**10%**	13%	**11%**
	Attached[4]	596	9%	9%		9%	
	Apartment[5]	169	10%	10%		10%	

Notes:
1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-19-C
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Entrada D4
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2] (CO_2 / DU / year)	Final CO_2 (tonne CO_2 / year)		Final CO_2 With Renewable Source[6] (tonne CO_2 / year)	
Minimally Title 24 Compliant	Single Family[3]	360	4.73	1,703	**3,940**	1,338	**3,575**
	Attached[4]	596	3.04	1,812		1,812	
	Apartment[5]	169	2.52	425		425	
15% Better Than Title 24	Single Family[3]	360	4.25	1,529	**3,559**	1,164	**3,194**
	Attached[4]	596	2.76	1,645		1,645	
	Apartment[5]	169	2.28	384		384	
Percentage Improvement over Title 24	Single Family[3]	360	10%	10%	**10%**	13%	**11%**
	Attached[4]	596	9%	9%		9%	
	Apartment[5]	169	10%	10%		10%	

Notes:
1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-19-D
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Entrada D5
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2] (CO_2 / DU / year)	Final CO_2 (tonne CO_2 / year)		Final CO_2 With Renewable Source[6] (tonne CO_2 / year)	
Minimally Title 24 Compliant	Single Family[3]	307	4.73	1,452	**3,359**	1,141	**3,048**
	Attached[4]	508	3.04	1,544		1,544	
	Apartment[5]	144	2.52	362		362	
15% Better Than Title 24	Single Family[3]	307	4.25	1,303	**3,033**	992	**2,722**
	Attached[4]	508	2.76	1,402		1,402	
	Apartment[5]	144	2.28	328		328	
Percentage Improvement over Title 24	Single Family[3]	307	10%	10%	**10%**	13%	**11%**
	Attached[4]	508	9%	9%		9%	
	Apartment[5]	144	10%	10%		10%	

Notes:
1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-19-E
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Entrada D6
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2]	Final CO_2		Final CO_2 With Renewable Source[6]	
			(CO_2 / DU / year)	(tonne CO_2 / year)			
Minimally Title 24 Compliant	Single Family[3]	136	4.73	644	**1,522**	506	**1,384**
	Attached[4]	289	3.04	878		878	
	Apartment[5]	0	2.52	0		0	
15% Better Than Title 24	Single Family[3]	136	4.25	578	**1,375**	440	**1,237**
	Attached[4]	289	2.76	797		797	
	Apartment[5]	0	2.28	0		0	
Percentage Improvement over Title 24	Single Family[3]	136	10%	10%	**10%**	13%	**11%**
	Attached[4]	289	9%	9%		9%	
	Apartment[5]	0	10%	NA		NA	

Notes:
1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-19-F
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units With and Without Product Design Features - Entrada D7
Newhall Land
Newhall Ranch, CA

Title 24 Compliance	Housing Type	# Dwelling Units[1]	CO_2 Emission Factor[2] (CO_2 / DU / year)	Final CO_2 (tonne CO_2 / year)		Final CO_2 With Renewable Source[6] (tonne CO_2 / year)	
Minimally Title 24 Compliant	Single Family[3]	273	4.73	1,290	**2,984**	1,014	**2,708**
	Attached[4]	452	3.04	1,372		1,372	
	Apartment[5]	128	2.52	322		322	
15% Better Than Title 24	Single Family[3]	273	4.25	1,158	**2,695**	882	**2,419**
	Attached[4]	452	2.76	1,246		1,246	
	Apartment[5]	128	2.28	291		291	
Percentage Improvement over Title 24	Single Family[3]	273	10%	10%	**10%**	13%	**11%**
	Attached[4]	452	9%	9%		9%	
	Apartment[5]	128	10%	10%		10%	

Notes:
1. From Newhall Ranch Specific Plan
2. From California Climate Action Registry (CCAR) Database.
3. The large-end single family home as specified by Newhall will be 3,300 square feet.
4. The large-end 8 DU atttached homes as specified by Newhall will be 1,750 square feet.
5. The large-end 16 DU apartments as specified by Newhall will be 1,250 square feet.
6. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
DU = dwelling units

Sources:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-20-A
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units with Renewable Sources - D2
Newhall Land
Newhall Ranch, CA

Development	Title 24 and Renewable Scenario[1]	Final CO_2 (Tonnes CO_2 / year)	% Saved over Title 24
NRSP	Minimally Title 24 compliant	73,151	
	Minimally Title 24 compliant, with renewable	66,375	9%
	15% better than Minimally Title 24, no renewable	66,062	10%
	15% better than Minimally Title 24, with renewable	**59,286**	19%
Entrada	Minimally Title 24 compliant	6,042	
	Minimally Title 24 compliant, with renewable	5,482	9%
	15% better than Minimally Title 24, no renewable	5,456	10%
	15% better than Minimally Title 24, with renewable	**4,897**	19%

Notes:
1. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided for the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
CO_2 = Carbon Dioxide

Table 4-20-B
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units with Renewable Sources - D3
Newhall Land
Newhall Ranch, CA

Development	Title 24 and Renewable Scenario[1]	Final CO_2 (Tonnes CO_2 / year)	% Saved over Title 24
NRSP	Minimally Title 24 compliant	71,568	
	Minimally Title 24 compliant, with renewable	64,939	9%
	15% better than Minimally Title 24, no renewable	64,632	10%
	15% better than Minimally Title 24, with renewable	**58,003**	19%
Entrada	Minimally Title 24 compliant	3,940	
	Minimally Title 24 compliant, with renewable	3,575	9%
	15% better than Minimally Title 24, no renewable	3,559	10%
	15% better than Minimally Title 24, with renewable	**3,194**	19%

Notes:
1. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided for the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
CO_2 = Carbon Dioxide

Table 4-20-C
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units with Renewable Sources - D4
Newhall Land
Newhall Ranch, CA

Development	**Title 24 and Renewable Scenario[1]**	**Final CO_2 (Tonnes CO_2 / year)**	**% Saved over Title 24**
NRSP	Minimally Title 24 compliant	72,576	
	Minimally Title 24 compliant, with renewable	65,854	9%
	15% better than Minimally Title 24, no renewable	65,543	10%
	15% better than Minimally Title 24, with renewable	**58,821**	19%
Entrada	Minimally Title 24 compliant	3,940	
	Minimally Title 24 compliant, with renewable	3,575	9%
	15% better than Minimally Title 24, no renewable	3,559	10%
	15% better than Minimally Title 24, with renewable	**3,194**	19%

Notes:
1. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided for the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
CO_2 = Carbon Dioxide

Table 4-20-D
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units with Renewable Sources - D5
Newhall Land
Newhall Ranch, CA

Development	Title 24 and Renewable Scenario[1]	Final CO_2 (Tonnes CO_2 / year)	% Saved over Title 24
NRSP	Minimally Title 24 compliant	70,737	
	Minimally Title 24 compliant, with renewable	64,185	9%
	15% better than Minimally Title 24, no renewable	63,882	10%
	15% better than Minimally Title 24, with renewable	**57,330**	19%
Entrada	Minimally Title 24 compliant	3,359	
	Minimally Title 24 compliant, with renewable	3,048	9%
	15% better than Minimally Title 24, no renewable	3,033	10%
	15% better than Minimally Title 24, with renewable	**2,722**	19%

Notes:

1. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided for the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:

CO_2 = Carbon Dioxide

Table 4-20-E
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units with Renewable Sources - D6
Newhall Land
Newhall Ranch, CA

Development	Title 24 and Renewable Scenario[1]	Final CO_2 (Tonnes CO_2 / year)	% Saved over Title 24
NRSP	Minimally Title 24 compliant	69,305	
	Minimally Title 24 compliant, with renewable	62,886	9%
	15% better than Minimally Title 24, no renewable	62,589	10%
	15% better than Minimally Title 24, with renewable	**56,169**	19%
Entrada	Minimally Title 24 compliant	1,522	
	Minimally Title 24 compliant, with renewable	1,384	9%
	15% better than Minimally Title 24, no renewable	1,375	10%
	15% better than Minimally Title 24, with renewable	**1,237**	19%

Notes:
1. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided for the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
CO_2 = Carbon Dioxide

Table 4-20-F
CO_2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units with Renewable Sources - D7
Newhall Land
Newhall Ranch, CA

Development	Title 24 and Renewable Scenario[1]	Final CO_2 (Tonnes CO_2 / year)	% Saved over Title 24
NRSP	Minimally Title 24 compliant	57,690	
	Minimally Title 24 compliant, with renewable	52,347	9%
	15% better than Minimally Title 24, no renewable	52,100	10%
	15% better than Minimally Title 24, with renewable	**46,756**	19%
Entrada	Minimally Title 24 compliant	2,984	
	Minimally Title 24 compliant, with renewable	2,708	9%
	15% better than Minimally Title 24, no renewable	2,695	10%
	15% better than Minimally Title 24, with renewable	**2,419**	19%

Notes:
1. Using energy generated by any renewable resource. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided for the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:
CO_2 = Carbon Dioxide

Table 4-21
Summary of Residential CO_2 Emissions
Newhall Land
Newhall Ranch, CA

Development	Efficiency Scenario	Newhall CO_2 Emissions	Entrada CO_2 Emissions	Total Residential CO_2 Emissions
		(tonnes/year)		
Design Alternative 2	Title 24 Compliant[1]	73,151	6,042	**79,193**
	15% better than Title 24 [2]	66,062	5,456	**71,518**
	Title 24 Compliant with Renewables[3]	66,375	5,482	**71,857**
	15% better than Title 24 and Renewables[3]	59,286	4,897	**64,183**
Design Alternative 3	Title 24 Compliant[1]	71,568	3,940	**75,508**
	15% better than Title 24 [2]	64,632	3,559	**68,190**
	Title 24 Compliant with Renewables[3]	64,939	3,575	**68,514**
	15% better than Title 24 and Renewables[3]	58,003	3,194	**61,196**
Design Alternative 4	Title 24 Compliant[1]	72,576	3,940	**76,517**
	15% better than Title 24 [2]	65,543	3,559	**69,101**
	Title 24 Compliant with Renewables[3]	65,854	3,575	**69,429**
	15% better than Title 24 and Renewables[3]	58,821	3,194	**62,014**
Design Alternative 5	Title 24 Compliant[1]	70,737	3,359	**74,096**
	15% better than Title 24 [2]	63,882	3,033	**66,916**
	Title 24 Compliant with Renewables[3]	64,185	3,048	**67,233**
	15% better than Title 24 and Renewables[3]	57,330	2,722	**60,053**
Design Alternative 6	Title 24 Compliant[1]	69,305	1,522	**70,827**
	15% better than Title 24 [2]	62,589	1,375	**63,964**
	Title 24 Compliant with Renewables[3]	62,886	1,384	**64,269**
	15% better than Title 24 and Renewables[3]	56,169	1,237	**57,406**
Design Alternative 7	Title 24 Compliant[1]	57,690	2,984	**60,675**
	15% better than Title 24 [2]	52,100	2,695	**54,795**
	Title 24 Compliant with Renewables[3]	52,347	2,708	**55,055**
	15% better than Title 24 and Renewables[3]	46,756	2,419	**49,175**

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Emissions assuming buildings are Title 24-compliant, without the 15% improvements.
2. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These emissions represent the 15% improvements.
3. Using energy generated by any renewable resource. For this calculation, it is assumed that a 2.0 Kw photovoltaic unit from Sunpower company will be mounted on every 1,600 square feet of roof space (this would cover approximately 8% of the rooftop building space). Here, we assume that the rooftop space available is approximately half of the total square footage. The yearly electricity savings are estimated to be 3,356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx
Number of systems = (commercial square footage) / (1,600 sqft per system) / 2 (sqft roof space per sqft building space)

Table 4-22
End-uses of Electricity for Non-residential Building Types in Newhall Ranch
Newhall Land
Newhall Ranch, California

Principal Building Activity	Cooling[1]	Lighting[1]	Office Equipment[2]	Refrigeration[2]	Ventilation[1]	Space Heating[2]	Cooking[2]	Water Heating[2]	Other[2]
All Buildings	26%	23%	18%	9%	7%	5%	2%	1%	9%
Education	26%	26%	20%	4%	7%	5%	1%	1%	10%
Food Sales	14%	13%	17%	44%	4%	2%	2%	1%	4%
Food Service	12%	9%	14%	38%	3%	2%	18%	0%	3%
Health Care	35%	22%	17%	3%	8%	3%	1%	0%	9%
Inpatient	37%	22%	17%	5%	8%	1%	2%	Q	9%
Outpatient	32%	23%	17%	Q	8%	8%	Q	2%	8%
Lodging	28%	23%	7%	6%	7%	11%	1%	5%	13%
Mercantile	25%	22%	20%	10%	7%	7%	1%	1%	8%
Retail (Other than Mall)	24%	25%	19%	6%	7%	7%	1%	1%	9%
Enclosed and Strip Mall	25%	20%	20%	13%	7%	6%	2%	1%	7%
Office	29%	22%	26%	1%	7%	6%	1%	1%	8%
Public Assembly	32%	26%	11%	5%	8%	4%	2%	1%	11%
Public Order and Safety	30%	28%	13%	Q	8%	3%	Q	Q	13%
Religious Worship	38%	26%	5%	2%	10%	5%	(*)	(*)	14%
Service	22%	32%	14%	Q	9%	4%	Q	1%	15%
Warehouse and Storage	15%	38%	9%	4%	13%	3%	Q	1%	18%
Other	31%	27%	18%	Q	9%	Q	Q	1%	11%
Vacant	30%	10%	20%	Q	10%	(*)	Q	Q	30%

Notes:
1. Cooling, Lighting, and Ventilation are included in and regulated by California Title 24.
2. Non-built energy uses such as Office Equipment, Refrigeration, Space Heating, Cooking, Water Heating, and Other are not regulated by California Title 24 but still contribute to energy consumption.

Abbreviations:
Q = data withheld, fewer than 20 buildings sampled.
(*) = value rounds to zero in original units.

Source:
US Energy Information Administration. 2003 Commercial Buildings Energy Consumption Survey: Calculated from data from Tables 3a and 3b of:
http://www.eia.doe.gov/emeu/cbecs/enduse_consumption/pba.html

Table 4-23
Energy Use for Non-residential Building Types in Newhall Ranch
Newhall Land
Newhall Ranch, California

eQUEST[1]				EIA[2]		
eQUEST Building Type[3]	Electricity (Title 24)[4] (kW-hr / sqft / yr)	Electricity (Total)[5] (kW-hr / sqft / yr)	Natural Gas[6] (ccf / sqft / yr)	EIA Building Type[7]	Electricity (Total) (kW-hr / sqft / yr)	Natural Gas (ccf / sqft / yr)
NA	NA	NA	NA	Grocery Store	53.97	0.19
Office Building, High Rise	10.40	17.88	0.03	Admin/Professional Office	15.58	0.15
Office Building, Mid Rise	9.97	17.15	0.03	Admin/Professional Office	15.58	0.15
Office Building, Two Story	8.52	14.65	0.02	Admin/Professional Office	15.58	0.15
Restaurant, Quick Service	19.40	80.58	0.11	Fast Food	106.68	1.71
Restaurant, Full Service (full menu)	12.95	53.78	0.23	Restaurant/Cafeteria	45.13	1.74
Retail, Large Single Story	15.69	28.19	0.03	Retail Store	9.81	0.10
Retail, Strip Mall	12.45	24.03	0.03	Strip Mall	20.18	0.26
Lodging, High-Rise Hotel	12.19	21.14	0.29	NA	NA	NA
Storage, Conditioned High Bay	3.61	5.47	0.02	Distribution/Shipping Center	5.41	0.24
Storage, Conditioned Low Bay	3.45	5.23	0.02	Distribution/Shipping Center	5.41	0.24
Manufacturing, High Tech/Bio Tech	8.13	8.13	0.02	NA	NA	NA
NA	NA	NA	NA	Fire/Police Station	8.54	0.24
School, Secondary (High School)	6.31	10.67	0.13	High School	10.60	0.12
School, K-6 Elementary	5.45	9.22	0.04	Elementary/Middle	12.67	0.32
School, Middle School	5.96	10.07	0.07	Elementary/Middle	12.67	0.32
School, Preschool/Daycare	11.14	18.84	0.07	Preschool/Daycare	10.47	0.35
NA	NA	NA	NA	Library	16.51	0.34

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. eQUEST is an energy modeling software approved by the California Energy Commission as a 2005 Title 24 non-residential Alternative Compliance Method (ACM). Buildings in the model are assumed to be minimally Title 24 compliant; default parameters specific to each building type are used for building area, number of floors, cooling/heating equipment type, etc.
2. Data is from the 2003 Commercial Buildings Energy Consumption Survey conducted by the US Energy Information Administration.
3. As specified by eQUEST.
4. Title 24 regulates energy used in HVAC and lighting systems.
5. Includes Title 24-regulated electricity and non-built electricity (refrigeration, appliances, etc.)
6. Natural Gas use is calculated by eQUEST.
7. As specified by EIA; descriptions mapped to closest eQUEST building types for comparison.

Abbreviations:
EIA = Energy Information Administration
kW-hr = kilowatt-hour
sqft = square foot
yr = year
ccf = 100 cubic feet
NA = Not Available
HVAC = Heating, Ventilation, and Air Conditioning

Sources:
US Energy Information Administration. 2003 Commercial Buildings Energy Consumption Survey: http://www.eia.doe.gov/emeu/cbecs/contents.html
eQUEST: The Quick Energy Simulation Tool. http://www.doe2.com/equest/

Table 4-24
Emission Factors for Different Energy Sources for Buildings
Newhall Land
Newhall Ranch, California

Energy Source	Units	lb CO_2e/unit
Electricity[1]	(kW-hr)	0.666
Natural Gas[2]	(ccf)	11.3

Notes:
1. From California Climate Action Registry (CCAR) Database. Southern California Edison PUP Report. 2005.
2. From CCAR General Reporting Protocol (GRP). Emission factors (in kg CO2/MMBtu) are provided in Table C.5. Conversion to units of lb CO2e/ccf was performed using high heating values in Table III. 8.1

Abbreviations:
CCAR = California Climate Action Registry
EIA = Energy Information Administration
GRP = General Reporting Protocol
kW-hr = kilowatt-hour
ccf = hundred cubic feet
CO_2e = carbon dioxide equivalents

Sources:
California Climate Action Registry Database. Southern California Edison PUP Report. 2005. Available at: http://www.climateregistry.org/CarrotDocs/26/2005/SCEPUP05.xls
California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf

Table 4-25
Greenhouse Gas Emissions from Electricity and Natural Gas Usage for Non-residential Building Types Present in Newhall Ranch
Newhall Land
Newhall Ranch, California

eQUEST[1]					EIA[2]			
eQUEST Building Type[3]	**Electricity (Title 24)[4]**	**Electricity (Total)[5]**	**Natural Gas[6]**	**Total**	**EIA Building Type[7]**	**Electricity (Total)**	**Natural Gas**	**Total**
	(Tonnes CO_2 / 1,000 sqft / yr)					**(Tonnes CO_2 / 1,000 sqft / yr)**		
NA	NA	NA	NA	**NA**	Grocery Store	16.30	0.95	**17.25**
Office Building, High Rise	3.14	5.40	0.15	**5.55**	Admin/Professional Office	4.70	0.78	**5.48**
Office Building, Mid Rise	3.01	5.18	0.15	**5.33**	Admin/Professional Office	4.70	0.78	**5.48**
Office Building, Two Story	2.57	4.42	0.12	**4.54**	Admin/Professional Office	4.70	0.78	**5.48**
Restaurant, Quick Service	5.86	24.33	0.57	**24.90**	Fast Food	32.21	8.76	**40.97**
Restaurant, Full Service (full menu)	3.91	16.24	1.16	**17.39**	Restaurant/Cafeteria	13.63	8.94	**22.56**
Retail, Large Single Story	4.74	8.51	0.16	**8.67**	Retail Store	2.96	0.49	**3.45**
Retail, Strip Mall	3.76	7.26	0.17	**7.42**	Strip Mall	6.09	1.31	**7.41**
Lodging, High-Rise Hotel	3.68	6.38	1.49	**7.88**	NA	NA	NA	**NA**
Storage, Conditioned High Bay	1.09	1.65	0.10	**1.75**	Distribution/Shipping Center	1.63	1.22	**2.86**
Storage, Conditioned Low Bay	1.04	1.58	0.10	**1.68**	Distribution/Shipping Center	1.63	1.22	**2.86**
Manufacturing, High Tech/Bio Tech	2.46	2.46	0.12	**2.58**	NA	NA	NA	**NA**
NA	NA	NA	NA	**NA**	Fire/Police Station	2.58	1.21	**3.78**
School, Secondary (High School)	1.91	3.22	0.69	**3.91**	High School	3.20	0.62	**3.82**
School, K-6 Elementary	1.65	2.78	0.21	**3.00**	Elementary/Middle	3.83	1.65	**5.48**
School, Middle School	1.80	3.04	0.35	**3.39**	Elementary/Middle	3.83	1.65	**5.48**
School, Preschool/Daycare	3.37	5.69	0.34	**6.03**	Preschool/Daycare	3.16	1.77	**4.93**
NA	NA	NA	NA	**NA**	Library	4.99	1.73	**6.72**

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. eQUEST is an energy modeling software approved by the California Energy Commission as a 2005 Title 24 non-residential Alternative Compliance Method (ACM). Buildings in the model are assumed to be minimally Title 24 compliant; default parameters specific to each building type are used for building area, number of floors, cooling/heating equipment type, etc.
2. Data is from the 2003 Commercial Buildings Energy Consumption Survey conducted by the US Energy Information Administration.
3. As specified by eQUEST.
4. Title 24 regulates energy used in HVAC and lighting systems.
5. Includes Title 24-regulated electricity and non-built electricity (refrigeration, appliances, etc.)
6. Natural Gas use is calculated by eQUEST.
7. As specified by EIA; descriptions mapped to closest eQUEST building types for comparison.

Abbreviations:
EIA = Energy Information Administration
sqft = square foot
yr = year
NA = Not Available

Table 4-26
Greenhouse Gas Emissions from Electricity and Natural Gas Usage for Non-residential Building Types Present in Newhall Ranch
Scenario: 15% Better than Title 24[1]
Newhall Land
Newhall Ranch, California

eQUEST[2]					EIA[3]			
eQUEST Building Type[4]	Electricity (Title 24)[5]	Electricity (Total)[6]	Natural Gas[7]	Total	EIA Building Type[8]	Electricity (Total)	Natural Gas	Total
	(Tonnes CO_2 / 1,000 sqft / yr)					(Tonnes CO_2 / 1,000 sqft / yr)		
NA	NA	NA	NA	**NA**	Grocery Store	15.66	0.81	**16.46**
Office Building, High Rise	2.67	4.93	0.13	**5.06**	Admin/Professional Office	4.30	0.66	**4.96**
Office Building, Mid Rise	2.56	4.73	0.13	**4.86**	Admin/Professional Office	4.30	0.66	**4.96**
Office Building, Two Story	2.19	4.04	0.10	**4.14**	Admin/Professional Office	4.30	0.66	**4.96**
Restaurant, Quick Service	4.98	23.46	0.48	**23.94**	Fast Food	30.90	7.44	**38.35**
Restaurant, Full Service (full menu)	3.32	15.65	0.98	**16.63**	Restaurant/Cafeteria	13.07	7.60	**20.67**
Retail, Large Single Story	4.03	7.80	0.13	**7.94**	Retail Store	2.71	0.42	**3.13**
Retail, Strip Mall	3.20	6.69	0.14	**6.83**	Strip Mall	5.64	1.11	**6.76**
Lodging, High-Rise Hotel	3.13	5.83	1.27	**7.10**	NA	NA	NA	**NA**
Storage, Conditioned High Bay	0.93	1.49	0.09	**1.58**	Distribution/Shipping Center	1.47	1.04	**2.51**
Storage, Conditioned Low Bay	0.88	1.42	0.08	**1.51**	Distribution/Shipping Center	1.47	1.04	**2.51**
Manufacturing, High Tech/Bio Tech	2.09	2.09	0.10	**2.19**	NA	NA	NA	**NA**
NA	NA	NA	NA	**NA**	Fire/Police Station	2.13	1.02	**3.16**
School, Secondary (High School)	1.62	2.94	0.58	**3.52**	High School	2.93	0.53	**3.46**
School, K-6 Elementary	1.40	2.54	0.18	**2.72**	Elementary/Middle	3.50	1.41	**4.91**
School, Middle School	1.53	2.77	0.30	**3.07**	Elementary/Middle	3.50	1.41	**4.91**
School, Preschool/Daycare	2.86	5.18	0.29	**5.47**	Preschool/Daycare	2.89	1.51	**4.40**
NA	NA	NA	NA	**NA**	Library	4.56	1.47	**6.04**

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances.
2. eQUEST is an energy modeling software approved by the California Energy Commission as a 2005 Title 24 non-residential Alternative Compliance Method (ACM). Buildings in the model are assumed to be minimally Title 24 compliant; default parameters specific to each building type are used for building area, number of floors, cooling/heating equipment type, etc.
3. Data is from the 2003 Commercial Buildings Energy Consumption Survey conducted by the US Energy Information Administration.
4. As specified by eQUEST.
5. Title 24 regulates energy used in HVAC and lighting systems.
6. Includes Title 24-regulated electricity and non-built electricity (refrigeration, appliances, etc.)
7. Natural Gas use is calculated by eQUEST.
8. As specified by EIA; descriptions mapped to closest eQUEST building types for comparison.

Abbreviations:
EIA = Energy Information Administration
sqft = square foot
yr = year
NA = Not Available

Table 4-27
Calculation of Greenhouse Gas Intensity for Land Use Categories (Non-Residential)
Newhall Land
Newhall Ranch, California

General Building Type[1, 13]	%[2]	Refined Building Type[3]	%[4]	Modeled Building Category[5]	eQUEST[6] or EIA[7]	Final % of General Building Type[8]	Title 24-Compliant[9]: Tonnes CO_2 per 1,000 sqft / yr[11]	Title 24-Compliant[9]: Final EF: Tonnes CO_2 / 1,000 sqft / yr (for General Building Type)[12]	15% Better than Title 24[10]: Tonnes CO_2 per 1,000 sqft / yr[11]	15% Better than Title 24[10]: Final EF: Tonnes CO_2 / 1,000 sqft / yr (for General Building Type)[12]
Grocery	100%	Grocery Store	100%	Grocery Store	EIA	100%	17.25	**17.25**	16.46	**16.46**
Misc Retail / Commercial / Office	25%	Office	100%	Admin/Professional Office	EIA	25%	5.48	**9.79**	4.96	**8.98**
	20%	Restaurant	25%	Fast Food	EIA	5%	40.97		38.35	
			75%	Restaurant/Cafeteria	EIA	15%	22.56		20.67	
	55%	Retail	50%	Retail Store	EIA	28%	3.45		3.13	
			50%	Strip Mall	EIA	28%	7.41		6.76	
Hotel	100%	Hotel	100%	Lodging, High-Rise Hotel	eQUEST	100%	7.88	**7.88**	7.10	**7.10**
Business Park / Industrial	30%	Office	100%	Admin/Professional Office	EIA	30%	5.48	**3.51**	4.96	**3.09**
	20%	Storage	100%	Distribution/Shipping Center	EIA	20%	2.86		2.51	
	50%	Research and Development	100%	Manufacturing, High Tech/Bio Tech	eQUEST	50%	2.58		2.19	
Public Safety	100%	Fire Station	100%	Fire/Police Station	EIA	100%	3.78	**3.78**	3.16	**3.16**
Institutional (schools, library, etc.)	75%	Schools	33%	High School	EIA	25%	3.82	**5.24**	3.46	**4.70**
			33%	Elementary/Middle	EIA	25%	5.48		4.91	
			33%	Preschool/Daycare	EIA	25%	4.93		4.40	
	25%	Library	100%	Library	EIA	25%	6.72		6.04	

Notes:

Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.

1. Five main building types provided by Newhall.
2. The percentage of each Refined Building Type present in the General Building Type.
3. The subcategories of General Building Type provided by Newhall.
4. The percentage of each Modeled Building Category present in the Refined Building Type.
5. The building type used in modeling that represents each Refined Building Type. It is selected from either the eQUEST or EIA data as it best maps to the Newhall specifications.
6. eQUEST is an energy modeling software approved by the California Energy Commission as a 2005 Title 24 non-residential Alternative Compliance Method (ACM). Buildings in the model are assumed to be minimally Title 24 compliant; default parameters specific to each building type are used for building area, number of floors, cooling/heating equipment type, etc.
7. The source of the CO_2 intensity value (eQUEST or EIA).
8. The percentage of each Modeled Building Category present in the General Building Type.
9. Emission factors assuming buildings are Title 24-compliant, without the 15% improvements.
10. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These emission factors represent the 15% improvements.
11. The CO_2 intensity value for each Modeled Building Category.
12. The final CO_2 intensity value for each General Building Type.
13. The breakdown of "Miscellaneous Retail / Commercial / Office" is assumed to be the same for the NRSP area, Entrada and VCC. Likewise, the breakdown of the other building categories is assumed to be the same for each development area.

Abbreviations:

EIA = Energy Information Administration
sqft = square foot
yr = year
EF = emission factor

Sources:

Land use breakdown provided by Newhall, presented as it maps to eQUEST and EIA building types.

Table 4-28-A
Calculation of Yearly Greenhouse Gas Emissions from Electricity and Natural Gas Usage for Newhall Ranch (Non-Residential D2)
Newhall Land
Newhall Ranch, California

				Title 24-Compliant[2]			15% Better than Title 24[4]				
Development	**Type[1]**	**Building Area** (sqft)	**Building Area** (1,000 sqft)	**Emission Factors[3]** (Tonnes CO_2 / 1,000 sqft / year)	**Emissions Per Building Type within Development** (Tonnes CO_2 / year)	**Total Non-Residential Emissions** (Tonnes CO_2 / year)	**Emission Factors[3]** (Tonnes CO_2 / 1,000 sqft / year)	**Emissions Per Building Type within Development** (Tonnes CO_2 / year)	**Total Non-Residential Emissions** (Tonnes CO_2 / year)	**Emissions Considering Renewable Energy[5]** (Tonnes CO_2 / year)	**Overall CO_2 Savings[6]** (%)
NRSP	Grocery[7]	180,000	180	17.25	3,104	51,553	16.46	2,963	47,154	**45,208**	**12%**
	Misc Retail / Commercial / Office[7]	4,170,000	4,170	9.79	40,825		8.98	37,435			
	Hotel[7]	100,000	100	7.88	788		7.10	710			
	Business Park / Industrial	1,100,000	1,100	3.51	3,857		3.09	3,396			
	Public Safety[8]	95,000	95	3.78	359		3.16	300			
	Institutional (schools, library, etc.)[9]	500,000	500	5.24	2,620		4.70	2,350			
Entrada	Grocery[7]	45,000	45	17.25	776	5,170	16.46	741	4,735	**4,554**	**12%**
	Misc Retail / Commercial / Office[7]	250,000	250	9.79	2,448		8.98	2,244			
	Hotel[7]	200,000	200	7.88	1,576		7.10	1,420			
	Business Park / Industrial	0	0	3.51	0		3.09	0			
	Public Safety[8]	15,000	15	3.78	57		3.16	47			
	Institutional (schools, library, etc.)[9]	60,000	60	5.24	314		4.70	282			
VCC	Grocery[7]	0	0	17.25	0	12,272	16.46	0	10,806	**9,697**	**21%**
	Misc Retail / Commercial / Office[7]	0	0	9.79	0		8.98	0			
	Hotel[7]	0	0	7.88	0		7.10	0			
	Business Park / Industrial	3,500,000	3,500	3.51	12,272		3.09	10,806			
	Public Safety[8]	0	0	3.78	0		3.16	0			
	Institutional (schools, library, etc.)[9]	0	0	5.24	0		4.70	0			

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Emissions assuming buildings are Title 24-compliant, without the 15% improvements.
3. As calculated in previous table.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These emissions represent the 15% improvements.
5. Using energy generated by any renewable resource. For this calculation, it is assumed that a 2.0 Kw photovoltaic unit from Sunpower company will be mounted on every 1,600 square feet of roof space (this would cover approximately 8% of the rooftop building space). Here, we assume that the rooftop space available is approximately half of the total square footage. The yearly electricity savings are estimated to be 3,356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx Number of systems = (commercial square footage) / (1,600 sqft per system) / 2 (sqft roof space per sqft building space)
6. Estimated CO_2 savings from buildings that are 15% better than Title 24 compared to Title 24-compliant buildings. Also includes savings from renewable energy.
7. Building Area values are scaled based on land distribution proportions provided by Newhall.
8. Data provided by Newhall.
9. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools). The square footage of schools for Landmark was scaled by the ratio of dwelling units in Landmark Village (1,444) and Newhall Ranch (20,855).

Abbreviations:
CO_2 = carbon dioxide
sqft = square foot

Sources:
Land use areas provided by Newhall.

Table 4-28-B
Calculation of Yearly Greenhouse Gas Emissions from Electricity and Natural Gas Usage for Newhall Ranch (Non-Residential D3)
Newahll Land
Newhall Ranch, California

				Title 24-Compliant[2]			15% Better than Title 24[4]				
Development	**Type[1]**	**Building Area**	**Building Area**	**Emission Factors[3]**	**Emissions Per Building Type within Development**	**Total Non-Residential Emissions**	**Emission Factors[3]**	**Emissions Per Building Type within Development**	**Total Non-Residential Emissions**	**Emissions Considering Renewable Energy[5]**	**Overall CO_2 Savings[6]**
		(sqft)	**(1,000 sqft)**	**(Tonnes CO_2 / 1,000 sqft / year)**	**(Tonnes CO_2 / year)**		**(Tonnes CO_2 / 1,000 sqft / year)**	**(Tonnes CO_2 / year)**			**%**
NRSP	Grocery[7]	180,000	180	17.25	3,104	50,867	16.46	2,963	46,526	**44,602**	**12%**
	Misc Retail / Commercial / Office[7]	4,100,000	4,100	9.79	40,140		8.98	36,806			
	Hotel[7]	100,000	100	7.88	788		7.10	710			
	Business Park / Industrial	1,100,000	1,100	3.51	3,857		3.09	3,396			
	Public Safety[8]	95,000	95	3.78	359		3.16	300			
	Institutional (schools, library, etc.)[9]	500,000	500	5.24	2,620		4.70	2,350			
Entrada	Grocery[7]	45,000	45	17.25	776	5,170	16.46	741	4,735	**4,554**	**12%**
	Misc Retail / Commercial / Office[7]	250,000	250	9.79	2,448		8.98	2,244			
	Hotel[7]	200,000	200	7.88	1,576		7.10	1,420			
	Business Park / Industrial	0	0	3.51	0		3.09	0			
	Public Safety[8]	15,000	15	3.78	57		3.16	47			
	Institutional (schools, library, etc.)[9]	60,000	60	5.24	314		4.70	282			
VCC	Grocery[7]	0	0	17.25	0	12,272	16.46	0	10,806	**9,697**	**21%**
	Misc Retail / Commercial / Office[7]	0	0	9.79	0		8.98	0			
	Hotel[7]	0	0	7.88	0		7.10	0			
	Business Park / Industrial	3,500,000	3,500	3.51	12,272		3.09	10,806			
	Public Safety[8]	0	0	3.78	0		3.16	0			
	Institutional (schools, library, etc.)[9]	0	0	5.24	0		4.70	0			

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Emissions assuming buildings are Title 24-compliant, without the 15% improvements.
3. As calculated in previous table.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These emissions represent the 15% improvements.
5. Using energy generated by any renewable resource. For this calculation, it is assumed that a 2.0 Kw photovoltaic unit from Sunpower company will be mounted on every 1,600 square feet of roof space (this would cover approximately 8% of the rooftop building space). Here, we assume that the rooftop space available is approximately half of the total square footage. The yearly electricity savings are estimated to be 3,356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx Number of systems = (commercial square footage) / (1,600 sqft per system) / 2 (sqft roof space per sqft building space)
6. Estimated CO_2 savings from buildings that are 15% better than Title 24 compared to Title 24-compliant buildings. Also includes savings from renewable energy.
7. Building Area values are scaled based on land distribution proportions provided by Newhall.
8. Data provided by Newhall.
9. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools). The square footage of schools for Landmark was scaled by the ratio of dwelling units in Landmark Village (1,444) and Newhall Ranch (20,855).

Abbreviations:
CO_2 = carbon dioxide
sqft = square foot

Sources:
Land use areas provided by Newhall.

Table 4-28-C
Calculation of Yearly Greenhouse Gas Emissions from Electricity and Natural Gas Usage for Newhall Ranch (Non-Residential D4)
Newhall Land
Newhall Ranch, California

Development	Type[1]	Building Area	Building Area	Title 24-Compliant[2] Emission Factors[3]	Title 24-Compliant[2] Emissions Per Building Type within Development	Title 24-Compliant[2] Total Non-Residential Emissions	15% Better than Title 24[4] Emission Factors[3]	15% Better than Title 24[4] Emissions Per Building Type within Development	15% Better than Title 24[4] Total Non-Residential Emissions	15% Better than Title 24[4] Emissions Considering Renewable Energy[5]	Overall CO_2 Savings[6]
		(sqft)	(1,000 sqft)	(Tonnes CO_2 / 1,000 sqft / year)	(Tonnes CO_2 / year)		(Tonnes CO_2 / 1,000 sqft / year)	(Tonnes CO_2 / year)			%
NRSP	Grocery[7]	180,000	180	17.25	3,104	51,063	16.46	2,963	46,705	**44,775**	**12%**
	Misc Retail / Commercial / Office[7]	4,120,000	4,120	9.79	40,335		8.98	36,986			
	Hotel[7]	100,000	100	7.88	788		7.10	710			
	Business Park / Industrial	1,100,000	1,100	3.51	3,857		3.09	3,396			
	Public Safety[8]	95,000	95	3.78	359		3.16	300			
	Institutional (schools, library, etc.)[9]	500,000	500	5.24	2,620		4.70	2,350			
Entrada	Grocery[7]	45,000	45	17.25	776	5,170	16.46	741	4,735	**4,554**	**12%**
	Misc Retail / Commercial / Office[7]	250,000	250	9.79	2,448		8.98	2,244			
	Hotel[7]	200,000	200	7.88	1,576		7.10	1,420			
	Business Park / Industrial	0	0	3.51	0		3.09	0			
	Public Safety[8]	15,000	15	3.78	57		3.16	47			
	Institutional (schools, library, etc.)[9]	60,000	60	5.24	314		4.70	282			
VCC	Grocery[7]	0	0	17.25	0	0	16.46	0	0	**0**	**NA**
	Misc Retail / Commercial / Office[7]	0	0	9.79	0		8.98	0			
	Hotel[7]	0	0	7.88	0		7.10	0			
	Business Park / Industrial	0	0	3.51	0		3.09	0			
	Public Safety[8]	0	0	3.78	0		3.16	0			
	Institutional (schools, library, etc.)[9]	0	0	5.24	0		4.70	0			

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Emissions assuming buildings are Title 24-compliant, without the 15% improvements.
3. As calculated in previous table.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These emissions represent the 15% improvements.
5. Using energy generated by any renewable resource. For this calculation, it is assumed that a 2.0 Kw photovoltaic unit from Sunpower company will be mounted on every 1,600 square feet of roof space (this would cover approximately 8% of the rooftop building space). Here, we assume that the rooftop space available is approximately half of the total square footage. The yearly electricity savings are estimated to be 3,356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx Number of systems = (commercial square footage) / (1,600 sqft per system) / 2 (sqft roof space per sqft building space)
6. Estimated CO_2 savings from buildings that are 15% better than Title 24 compared to Title 24-compliant buildings. Also includes savings from renewable energy.
7. Building Area values are scaled based on land distribution proportions provided by Newhall.
8. Data provided by Newhall.
9. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools). The square footage of schools for Landmark was scaled by the ratio of dwelling units in Landmark Village (1,444) and Newhall Ranch (20,855).

Abbreviations:
CO_2 = carbon dioxide
sqft = square foot

Sources:
Land use areas provided by Newhall.

Table 4-28-D
Calculation of Yearly Greenhouse Gas Emissions from Electricity and Natural Gas Usage for Newhall Ranch (Non-Residential D5)
Newhall Land
Newhall Ranch, California

Development	Type[1]	Building Area	Building Area	Title 24-Compliant[2] Emission Factors[3]	Title 24-Compliant[2] Emissions Per Building Type within Development	Title 24-Compliant[2] Total Non-Residential Emissions	15% Better than Title 24[4] Emission Factors[3]	15% Better than Title 24[4] Emissions Per Building Type within Development	15% Better than Title 24[4] Total Non-Residential Emissions	15% Better than Title 24[4] Emissions Considering Renewable Energy[5]	Overall CO_2 Savings[6]
		(sqft)	(1,000 sqft)	(Tonnes CO_2 / 1,000 sqft / year)	(Tonnes CO_2 / year)		(Tonnes CO_2 / 1,000 sqft / year)	(Tonnes CO_2 / year)			%
NRSP	Grocery[7]	180,000	180	17.25	3,104	50,182	16.46	2,963	45,898	**43,996**	**12%**
	Misc Retail / Commercial / Office[7]	4,030,000	4,030	9.79	39,454		8.98	36,178			
	Hotel[7]	100,000	100	7.88	788		7.10	710			
	Business Park / Industrial	1,100,000	1,100	3.51	3,857		3.09	3,396			
	Public Safety[8]	95,000	95	3.78	359		3.16	300			
	Institutional (schools, library, etc.)[9]	500,000	500	5.24	2,620		4.70	2,350			
Entrada	Grocery[7]	45,000	45	17.25	776	5,170	16.46	741	4,735	**4,554**	**12%**
	Misc Retail / Commercial / Office[7]	250,000	250	9.79	2,448		8.98	2,244			
	Hotel[7]	200,000	200	7.88	1,576		7.10	1,420			
	Business Park / Industrial	0	0	3.51	0		3.09	0			
	Public Safety[8]	15,000	15	3.78	57		3.16	47			
	Institutional (schools, library, etc.)[9]	60,000	60	5.24	314		4.70	282			
VCC	Grocery[7]	0	0	17.25	0	0	16.46	0	0	**0**	**NA**
	Misc Retail / Commercial / Office[7]	0	0	9.79	0		8.98	0			
	Hotel[7]	0	0	7.88	0		7.10	0			
	Business Park / Industrial	0	0	3.51	0		3.09	0			
	Public Safety[8]	0	0	3.78	0		3.16	0			
	Institutional (schools, library, etc.)[9]	0	0	5.24	0		4.70	0			

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Emissions assuming buildings are Title 24-compliant, without the 15% improvements.
3. As calculated in previous table.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These emissions represent the 15% improvements.
5. Using energy generated by any renewable resource. For this calculation, it is assumed that a 2.0 Kw photovoltaic unit from Sunpower company will be mounted on every 1,600 square feet of roof space (this would cover approximately 8% of the rooftop building space). Here, we assume that the rooftop space available is approximately half of the total square footage. The yearly electricity savings are estimated to be 3,356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx Number of systems = (commercial square footage) / (1,600 sqft per system) / 2 (sqft roof space per sqft building space)
6. Estimated CO_2 savings from buildings that are 15% better than Title 24 compared to Title 24-compliant buildings. Also includes savings from renewable energy.
7. Building Area values are scaled based on land distribution proportions provided by Newhall.
8. Data provided by Newhall.
9. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools). The square footage of schools for Landmark was scaled by the ratio of dwelling units in Landmark Village (1,444) and Newhall Ranch (20,855).

Abbreviations:
CO_2 = carbon dioxide
sqft = square foot

Sources:
Land use areas provided by Newhall.

Table 4-28-E
Calculation of Yearly Greenhouse Gas Emissions from Electricity and Natural Gas Usage for Newhall Ranch (Non-Residential D6)
Newhall Land
Newhall Ranch, California

Development	Type[1]	Building Area	Building Area	Title 24-Compliant[2] Emission Factors[3]	Title 24-Compliant[2] Emissions Per Building Type within Development	Title 24-Compliant[2] Total Non-Residential Emissions	15% Better than Title 24[4] Emission Factors[3]	15% Better than Title 24[4] Emissions Per Building Type within Development	15% Better than Title 24[4] Total Non-Residential Emissions	15% Better than Title 24[4] Emissions Considering Renewable Energy[5]	Overall CO_2 Savings[6]
		(sqft)	(1,000 sqft)	(Tonnes CO_2 / 1,000 sqft / year)	(Tonnes CO_2 / year)		(Tonnes CO_2 / 1,000 sqft / year)	(Tonnes CO_2 / year)			%
NRSP	Grocery[7]	180,000	180	17.25	3,104	49,399	16.46	2,963	45,179	**43,303**	**12%**
	Misc Retail / Commercial / Office[7]	3,950,000	3,950	9.79	38,671		8.98	35,460			
	Hotel[7]	100,000	100	7.88	788		7.10	710			
	Business Park / Industrial	1,100,000	1,100	3.51	3,857		3.09	3,396			
	Public Safety[8]	95,000	95	3.78	359		3.16	300			
	Institutional (schools, library, etc.)[9]	500,000	500	5.24	2,620		4.70	2,350			
Entrada	Grocery[7]	45,000	45	17.25	776	5,170	16.46	741	4,735	**4,554**	**12%**
	Misc Retail / Commercial / Office[7]	250,000	250	9.79	2,448		8.98	2,244			
	Hotel[7]	200,000	200	7.88	1,576		7.10	1,420			
	Business Park / Industrial	0	0	3.51	0		3.09	0			
	Public Safety[8]	15,000	15	3.78	57		3.16	47			
	Institutional (schools, library, etc.)[9]	60,000	60	5.24	314		4.70	282			
VCC	Grocery[7]	0	0	17.25	0	0	16.46	0	0	**0**	**NA**
	Misc Retail / Commercial / Office[7]	0	0	9.79	0		8.98	0			
	Hotel[7]	0	0	7.88	0		7.10	0			
	Business Park / Industrial	0	0	3.51	0		3.09	0			
	Public Safety[8]	0	0	3.78	0		3.16	0			
	Institutional (schools, library, etc.)[9]	0	0	5.24	0		4.70	0			

Notes:

Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Emissions assuming buildings are Title 24-compliant, without the 15% improvements.
3. As calculated in previous table.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These emissions represent the 15% improvements.
5. Using energy generated by any renewable resource. For this calculation, it is assumed that a 2.0 Kw photovoltaic unit from Sunpower company will be mounted on every 1,600 square feet of roof space (this would cover approximately 8% of the rooftop building space). Here, we assume that the rooftop space available is approximately half of the total square footage. The yearly electricity savings are estimated to be 3,356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx Number of systems = (commercial square footage) / (1,600 sqft per system) / 2 (sqft roof space per sqft building space)
6. Estimated CO_2 savings from buildings that are 15% better than Title 24 compared to Title 24-compliant buildings. Also includes savings from renewable energy.
7. Building Area values are scaled based on land distribution proportions provided by Newhall.
8. Data provided by Newhall.
9. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools). The square footage of schools for Landmark was scaled by the ratio of dwelling units in Landmark Village (1,444) and Newhall Ranch (20,855).

Abbreviations:

CO_2 = carbon dioxide
sqft = square foot

Sources:

Land use areas provided by Newhall.

Table 4-28-F
Calculation of Yearly Greenhouse Gas Emissions from Electricity and Natural Gas Usage for Newhall Ranch (Non-Residential D7)
Newhall Land
Newhall Ranch, California

				Title 24-Compliant[2]			15% Better than Title 24[4]				
Development	**Type[1]**	**Building Area**	**Building Area**	**Emission Factors[3]**	**Emissions Per Building Type within Development**	**Total Non-Residential Emissions**	**Emission Factors[3]**	**Emissions Per Building Type within Development**	**Total Non-Residential Emissions**	**Emissions Considering Renewable Energy[5]**	**Overall CO_2 Savings[6]**
		(sqft)	**(1,000 sqft)**	**(Tonnes CO_2 / 1,000 sqft / year)**	**(Tonnes CO_2 / year)**		**(Tonnes CO_2 / 1,000 sqft / year)**	**(Tonnes CO_2 / year)**			**%**
NRSP	Grocery[7]	180,000	180	17.25	3,104	34,028	16.46	2,963	31,085	**29,706**	**13%**
	Misc Retail / Commercial / Office[7]	2,380,000	2,380	9.79	23,301		8.98	21,366			
	Hotel[7]	100,000	100	7.88	788		7.10	710			
	Business Park / Industrial	1,100,000	1,100	3.51	3,857		3.09	3,396			
	Public Safety[8]	95,000	95	3.78	359		3.16	300			
	Institutional (schools, library, etc.)[9]	500,000	500	5.24	2,620		4.70	2,350			
Entrada	Grocery[7]	0	0	17.25	0	490	16.46	0	449	**433**	**12%**
	Misc Retail / Commercial / Office[7]	50,000	50	9.79	490		8.98	449			
	Hotel[7]	0	0	7.88	0		7.10	0			
	Business Park / Industrial	0	0	3.51	0		3.09	0			
	Public Safety[8]	0	0	3.78	0		3.16	0			
	Institutional (schools, library, etc.)[9]	0	0	5.24	0		4.70	0			
VCC	Grocery[7]	0	0	17.25	0	0	16.46	0	0	**0**	**NA**
	Misc Retail / Commercial / Office[7]	0	0	9.79	0		8.98	0			
	Hotel[7]	0	0	7.88	0		7.10	0			
	Business Park / Industrial	0	0	3.51	0		3.09	0			
	Public Safety[8]	0	0	3.78	0		3.16	0			
	Institutional (schools, library, etc.)[9]	0	0	5.24	0		4.70	0			

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Emissions assuming buildings are Title 24-compliant, without the 15% improvements.
3. As calculated in previous table.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These emissions represent the 15% improvements.
5. Using energy generated by any renewable resource. For this calculation, it is assumed that a 2.0 Kw photovoltaic unit from Sunpower company will be mounted on every 1,600 square feet of roof space (this would cover approximately 8% of the rooftop building space). Here, we assume that the rooftop space available is approximately half of the total square footage. The yearly electricity savings are estimated to be 3,356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx Number of systems = (commercial square footage) / (1,600 sqft per system) / 2 (sqft roof space per sqft building space)
6. Estimated CO_2 savings from buildings that are 15% better than Title 24 compared to Title 24-compliant buildings. Also includes savings from renewable energy.
7. Building Area values are scaled based on land distribution proportions provided by Newhall.
8. Data provided by Newhall.
9. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools). The square footage of schools for Landmark was scaled by the ratio of dwelling units in Landmark Village (1,444) and Newhall Ranch (20,855).

Abbreviations:
CO_2 = carbon dioxide
sqft = square foot

Sources:
Land use areas provided by Newhall.

Table 4-29
Summary of Non-Residential CO_2 Emissions
Newhall Land
Newhall Ranch, CA

Development	Efficiency Scenario	Newhall CO_2 Emissions	Entrada CO_2 Emissions	VCC CO_2 Emissions	Total Non-Residential CO_2 Emissions
		(tonnes/year)			
Design Alternative 2	Title 24 Compliant[1]	51,553	5,170	12,272	**68,995**
	15% better than Title 24 [2]	47,154	4,735	10,806	**62,695**
	15% better than Title 24 and Renewables[3]	45,208	4,554	9,697	**59,460**
Design Alternative 3	Title 24 Compliant[1]	50,867	5,170	12,272	**68,309**
	15% better than Title 24 [2]	46,526	4,735	10,806	**62,067**
	15% better than Title 24 and Renewables[3]	44,602	4,554	9,697	**58,854**
Design Alternative 4	Title 24 Compliant[1]	51,063	5,170	0	**56,234**
	15% better than Title 24 [2]	46,705	4,735	0	**51,440**
	15% better than Title 24 and Renewables[3]	44,775	4,554	0	**49,330**
Design Alternative 5	Title 24 Compliant[1]	50,182	5,170	0	**55,352**
	15% better than Title 24 [2]	45,898	4,735	0	**50,632**
	15% better than Title 24 and Renewables[3]	43,996	4,554	0	**48,550**
Design Alternative 6	Title 24 Compliant[1]	49,399	5,170	0	**54,569**
	15% better than Title 24 [2]	45,179	4,735	0	**49,914**
	15% better than Title 24 and Renewables[3]	43,303	4,554	0	**47,857**
Design Alternative 7	Title 24 Compliant[1]	34,028	490	0	**34,518**
	15% better than Title 24 [2]	31,085	449	0	**31,534**
	15% better than Title 24 and Renewables[3]	29,706	433	0	**30,139**

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Emissions assuming buildings are Title 24-compliant, without the 15% improvements.
2. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These emissions represent the 15% improvements.
3. Using energy generated by any renewable resource. For this calculation, it is assumed that a 2.0 Kw photovoltaic unit from Sunpower company will be mounted on every 1,600 square feet of roof space (this would cover approximately 8% of the rooftop building space). Here, we assume that the rooftop space available is approximately half of the total square footage. The yearly electricity savings are estimated to be 3,356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx Number of systems = (commercial square footage) / (1,600 sqft per system) / 2 (sqft roof space per sqft building space)

Table 4-30
Unit Parameters for Calculating Mobile Source GHG Emissions
Newhall Land
Newhall Ranch, California

Unit Category[1]		Amount[1]		Daily Productions[2]				Number of Daily Trips[6]
				ADT Rate[3]	% Home-Based Productions[4]	Effective Resident Trip Productions[5]	Units	
Newhall Ranch	Single family housing	6,683	Dwelling Units	9.90	64%	**6.34**	trips/dwelling units	**42,345**
	Attached	11,069	Dwelling Units	8.00	71%	**5.68**	trips/dwelling units	**62,872**
	Apartment	3,133	Dwelling Units	6.90	71%	**4.90**	trips/dwelling units	**15,347**
Entrada	Single family housing	552	Dwelling Units	9.90	64%	**6.34**	trips/dwelling units	**3,497**
	Attached	914	Dwelling Units	8.00	71%	**5.68**	trips/dwelling units	**5,193**
	Apartment	259	Dwelling Units	6.90	71%	**4.90**	trips/dwelling units	**1,268**

Notes:
1. Land use types and amounts were provided by Newhall.
2. Trip rates for each unit type are from the Austin Faust Newhall Land and Lennar Westside Area traffic study. These represent the number of vehicle trips associated with each type of land use.
3. Unadjusted daily trips associated with a single dwelling unit of the specified type.
4. Percentage of home-based trips that are attributed to the residents of that particular home. A trip made by a delivery truck or a friend visiting from out of town is not counted as a trip for that home.
5. Number of trips made by residents of the dwelling unit.
6. Amount of each dwelling unit type multiplied by the effective daily trip rate.

Abbreviations:
GHG - greenhouse gas
URBEMIS - Urban Emissions Model

Table 4-31
Trip Lengths for Different Trip Categories
Newhall Land
Newhall Ranch, California

	Units	Home Based			
		Home-Work	Home-Shop	Home-Other	Total
Urban Trip Length[1]	(miles)	10.7	5.2	7	7.7
# Trips from Newhall	(trips/day)	34,941	28,919	56,705	120,564
# Trips from Entrada	(trips/day)	2,886	2,389	4,684	9,958
% Trips Newhall[2]	(trips/day)	29%	24%	47%	100%
VMT Newhall[3]	(VMT/day)	373,870	150,376	396,933	921,179
VMT Entrada[3]	(VMT/day)	30,880	12,420	32,785	76,085
Per capita VMT Newhall	(VMT/year/cap)	2,318	933	2,461	5,712
Per capita VMT Entrada	(VMT/year/cap)	2,318	933	2,461	5,712

Notes:
1. Urban trip lengths from the Austin Faust traffic study for Newhall Ranch at full buildout.
2. % of trips is the percentage of that type of trip (residential, ememENTARY school, etc.) that are home-work, home-shop, commute, etc. Based upon Newhall Ranch at full buildout.
3. Number of trips multiplied by average trip length.

Abbreviations:
VMT = Vehicle Miles Traveled

Table 4-32
Greenhouse Gas Emissions from Vehicles at Full Buildout
Newhall Land
Newhall Ranch, California

Development	Annual CO_2 Emissions[1]	Annual GHG Emissions[2]
	(tonne CO_2/year)	(tonne CO_2e/year)
Newhall	153,901	162,001
Entrada	12,711	13,380
Total	166,612	175,381

Notes:
1. Calculated from URBEMIS 9.2.2 based upon trip lengths and trip generation rates from Austin Faust traffic study.
2. Total GHG emissions were calculated by dividing CO_2 emissions by 0.95. USEPA. 2005. Emission Facts: Greenhouse Gas Emissions from a Typical Passenger Vehicle. Office of Transportation and Air Quality. February. (http://www.epa.gov/otaq/climate/420f05004.pdf)

Abbreviations:
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
URBEMIS - Urban Emissions Model
USEPA - U.S. Environmental Protection Agency

Table 4-33
Greenhouse Gas Emissions from Vehicles for Design Alternatives D2 through D7
Newhall Land
Newhall Ranch, California

	Unit Category[1]	Number of Dwelling Units[3]							Trips[3]						Annual eCO_2 Emissions[4] (tonnes)					
		D2	D3	D4	D5	D6	D7	Units	D2	D3	D4	D5	D6	D7	D2	D3	D4	D5	D6	D7
Newhall Ranch	Single family housing	6,683	6,539	6,631	6,463	6,332	5,271	Dwelling Units	42,345	41,428	42,012	40,948	40,119	33,395						
Newhall Ranch	Attached	11,069	10,829	10,982	10,704	10,487	8,730	Dwelling Units	62,872	61,512	62,378	60,798	59,567	49,584	162,001	158,495	160,729	156,656	153,484	127,762
Newhall Ranch	Apartment	3,133	3,065	3,108	3,029	2,968	2,471	Dwelling Units	15,347	15,015	15,227	14,841	14,540	12,104						
Entrada	Single family housing	552	360	360	307	136	273	Dwelling Units	3,497	2,281	2,281	1,944	862	1,727						
Entrada	Attached	914	596	596	508	289	452	Dwelling Units	5,193	3,387	3,387	2,887	1,642	2,565	13,380	8,726	8,726	7,439	3,363	6,609
Entrada	Apartment	259	169	169	144	0	128	Dwelling Units	1,268	827	827	705	0	626						
Total															175,381	167,221	169,455	164,095	156,847	134,371

Notes:
1. Land use types as provided by Newhall Land.
2. The number of dwelling units under each construction plan (D2 - D7) was provided by Newhall.
3. The trip number for each construction plan (D2 - D7) was calculated using the trip rate from the Austin Faust Newhall Land and Lennar Westside Area traffic study. See mobile source unit parameter table for detail.
4. The total GHG emissions from each development under different construction plans were scaled from D2 emissions by assuming the direct relationship between GHG emissions and total trips. See previous tables for D2 emission calculation detail.

Abbreviations:
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas

Table 4-34
Area CO_2 Emissions
Newhall Land
Newhall Ranch, CA

Development	Newhall CO_2 Emissions[1]	Entrada CO_2 Emissions[1,2]	VCC CO_2 Emissions[1,3]	Total Area CO_2 Emissions
	(tonnes/year)			
Design Alternative 2	2,556	387	0.5	**2,944**
Design Alternative 3	2,503	252	0.5	**2,755**
Design Alternative 4	2,537	252	0.0	**2,789**
Design Alternative 5	2,474	215	0.0	**2,689**
Design Alternative 6	2,423	99	0.0	**2,522**
Design Alternative 7	2,018	191	0.0	**2,210**

Notes:
1. Area emissions here include Landscaping and Hearth. Natural gas emissions are calculated in the residential and non-residential sections.
2. Entrada area source emissions were only available for Design Alternative 2. The values for Design Alternatives 3 - 7 are estimated by scaling D2 emissions directly with residential building area.
3. VCC area source emissions were only available for Design Alternative 2. The values for Design Alternatives 3 - 7 are estimated by scaling D2 emissions directly with building area.

Table 4-35
Scaling Factor for VCC
Newhall Land
Newhall Ranch, California

Development	Building Area (sq ft)	Scaling Factor[1]
NRSP	51,486,335	
VCC[1]	3,500,000	0.07

Notes:
1. Scaling factor for VCC is based on total square footage of residential and non-residential buildings. The scaling factor is used to estimate municipal emissions that would otherwise be based on population because VCC has no population.

Abbreviations:
GHG = greenhouse gas
VCC = Valencia Commerce Center
NRSP = Newhall Ranch Specific Plan

Sources:
Building areas provided by Newhall.

Table 4-36-A
GHG Emission Factors for Municipal Sources from the Newhall Ranch Specific Plan
Newhall Land
Newhall Ranch, California

Source[1]	Energy Requirements	Units	Emission Factor	Units	Source Quantity[11]	Units	Total CO_2e Emission [Tonne CO_2e per year]
Lighting							
Public Lighting[2]	148.7	kW-hr/capita/yr	0.045	tonne CO_2e/capita/year	58,860	residents (capita)	2,642
						Lighting Total:	**2,642**
Municipal Vehicles							
Municipal Vehicles[3]	--	--	0.05	tonne CO_2e/capita/year	58,860	residents (capita)	2,943
						Municipal Vehicles Total:	**2,943**
Water and Wastewater							
Groundwater Supply and Conveyance (Potable)[4]	950	kW-hr/acre-foot	0.29	tonne CO_2e/acre-foot	8,135	acre-feet/yr	2,333
Average Southern California Supply And Conveyance[5]	3,170	kW-hr/acre-foot	0.96	tonne CO_2e/acre-foot	0	acre-feet/yr	0
Water Treatment (Potable)[6]	36	kW-hr/acre-foot	0.01	tonne CO_2e/acre-foot	8,135	acre-feet/yr	89
Water Distribution (Potable)[7]	414	kW-hr/acre-foot	0.13	tonne CO_2e/acre-foot	8,135	acre-feet/yr	1,018
Wastewater Treatment (Indirect Emissions)[8]	623	kW-hr/acre-foot	0.19	tonne CO_2e/acre-foot	10,343	acre-feet/yr	1,945
Wastewater Treament Plant (Direct Emissions)[9]	--	--	0.084	tonne CO_2e/capita/year	58,860	residents (capita)	4,964
Recycled Water Distribution (Non-Potable)[10]	978	kW-hr/acre-foot	0.30	tonne CO_2e/acre-foot	8,265	acre-feet/yr	2,440
						Water and Wastewater Total:	**12,789**
							18,375

Notes:

1. Public Lighting includes streetlights, traffic signals, area lighting and lighting municipal buildings. Emissions from the Water and Wastewater category are primarily due to the energy required for supply, treatment and distribution. GHG emissions attributed to electricity use are calculated using the Southern California Edison carbon-intensity factor.

2. Emission factor for public lighting is based on a study of energy usage and GHG emissions from Duluth, MN and the Southern California-specific electricity generation emission factor from Southern California Edison.

3. Emission factors for municipal vehicles are based on the most conservative number from studies of GHG emission for four cities of different sizes: Medford, MA; Duluth, MN; Northampton, MA; and Santa Rosa, CA. Population data provided by the US Census (2000).

4. Emission factor for groundwater supply and conveyance is based on the estimated energy necessary to pump and convey 1 million gallons of groundwater in Southern California's Chino Basin and the Southern California-specific electricity generation emission factor from Southern California Edison. This factor is applied to potable water demand.

5. Emission factor accounts for the various ways water is supplied, the energy intensities of those methods and the amount each method is used. The CEC estimates that 50% of Southern California's water is supplied by importing water from Northern California and the Colorado River. This factor is provided only for purposes of comparison and was not used for the NRSP.

6. Emission factor for water treatment is based on a Navigant Consulting refinement of a CEC study on the energy necessary to initially treat 1 million gallons of water and the Southern California-specific electricity generation emission factor from Southern California Edison. This factor is applied to potable water demand.

7. Emission factor for water distribution is based on a Navigant Consulting refinement of a CEC study on the energy necessary to distribute 1 million gallons of treated water and the Southern California-specific electricity generation emission factor from Southern California Edison. This factor is applied to potable water demand.

8. Emission factor for wastewater treatment is based on a Navigant Consulting refinement of a California Energy Commission study on the energy necessary to treat 1 million gallons of wastewater for indoor (i.e., potable or other household) use and the Southern California-specific electricity generation emission factor from Southern California Edison.

9. Emission factor for the wastewater treatment plant accounts for direct methane and nitrous oxide emissions from wastewater. The value used here is based on the 2005 US inventory of GHG emissions for domestic wastewater treatment plants (USEPA) divided by the 2005 US population. (25 Tg CO_2e/year/296,410,404 people = 0.093 ton CO_2e/capita/year)

10. Emission factor for recycled water distribution is based on an estimate of the energy necessary to redistrubute 1 million gallons of reclaimed water (i.e., treated wastewater) and the Southern-California specific electricity generation emission factor from Southern California Edison. This factor is applied to non-potable water demand.

11. Source quantities for potable and non-potable water demand are provided by Newhall. The source quantity for wastewater treatment indirect emissions is scaled up from the recycled water quantity based on the ratio of the two quantities from Landmark Village (wastewater treatment quantities specific to Newhall Ranch were unavailable).

Abbreviations:

CEC - California Energy Commission
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
kW-hr - kilowatt hour
MW-hr - megawatt hour
Tg - teragram
USEPA - United States Environmental Protection Agency

References:

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Table 4-36-B
GHG Emission Factors for Municipal Sources from Entrada
Newhall Land
Newhall Ranch, California

Source[1]	Energy Requirements	Units	Emission Factor	Units	Source Quantity[11]	Units	Total CO_2e Emission [Tonne CO_2e per year]
Lighting							
Public Lighting[2]	148.7	kW-hr/capita/yr	0.045	tonne CO_2e/capita/year	4,862	residents (capita)	218
						Lighting Total:	**218**
Municipal Vehicles							
Municipal Vehicles[3]	--	--	0.05	tonne CO_2e/capita/year	4,862	residents (capita)	243
						Municipal Vehicles Total:	**243**
Water and Wastewater							
Groundwater Supply and Conveyance (Potable)[4]	950	kW-hr/acre-foot	0.29	tonne CO_2e/acre-foot	0	acre-feet/yr	0
Average Southern California Supply And Conveyance[5]	3,170	kW-hr/acre-foot	0.96	tonne CO_2e/acre-foot	1,721	acre-feet/yr	1,647
Water Treatment (Potable)[6]	36	kW-hr/acre-foot	0.01	tonne CO_2e/acre-foot	1,721	acre-feet/yr	19
Water Distribution (Potable)[7]	414	kW-hr/acre-foot	0.13	tonne CO_2e/acre-foot	1,721	acre-feet/yr	215
Wastewater Treatment (Indirect Emissions)[8]	623	kW-hr/acre-foot	0.19	tonne CO_2e/acre-foot	886	acre-feet/yr	167
Wastewater Treament Plant (Direct Emissions)[9]	--	--	0.084	tonne CO_2e/capita/year	4,862	residents (capita)	410
Recycled Water Distribution (Non-Potable)[10]	978	kW-hr/acre-foot	0.30	tonne CO_2e/acre-foot	708	acre-feet/yr	209
						Water and Wastewater Total:	**2,667**
							3,128

Notes:

1. Public Lighting includes streetlights, traffic signals, area lighting and lighting municipal buildings. Emissions from the Water and Wastewater category are primarily due to the energy required for supply, treatment and distribution. GHG emissions attributed to electricity use are calculated using the Southern California Edison carbon-intensity factor.

2. Emission factor for public lighting is based on a study of energy usage and GHG emissions from Duluth, MN and the Southern California-specific electricity generation emission factor from Southern California Edison.

3. Emission factors for municipal vehicles are based on the most conservative number from studies of GHG emission for four cities of different sizes: Medford, MA; Duluth, MN; Northampton, MA; and Santa Rosa, CA. Population data provided by the US Census (2000).

4. Emission factor for groundwater supply and conveyance is based on the estimated energy necessary to pump and convey 1 million gallons of groundwater in Southern California's Chino Basin and the Southern California-specific electricity generation emission factor from Southern California Edison. This factor is not used for Entrada or VCC; their water will come from the State Water Program.

5. Emission factor accounts for the various ways water is supplied, the energy intensities of those methods and the amount each method is used. The CEC estimates that 50% of Southern California's water is supplied by importing water from Northern California and the Colorado River.

6. Emission factor for water treatment is based on a Navigant Consulting refinement of a CEC study on the energy necessary to initially treat 1 million gallons of water and the Southern California-specific electricity generation emission factor from Southern California Edison. This factor is applied to potable water demand.

7. Emission factor for water distribution is based on a Navigant Consulting refinement of a CEC study on the energy necessary to distribute 1 million gallons of treated water and the Southern California-specific electricity generation emission factor from Southern California Edison. This factor is applied to potable water demand.

8. Emission factor for wastewater treatment is based on a Navigant Consulting refinement of a California Energy Commission study on the energy necessary to treat 1 million gallons of wastewater for indoor (i.e., potable or other household) use and the Southern California-specific electricity generation emission factor from Southern California Edison.

9. Emission factor for the wastewater treatment plant accounts for direct methane and nitrous oxide emissions from wastewater. The value used here is based on the 2005 US inventory of GHG emissions for domestic wastewater treatment plants (USEPA) divided by the 2005 US population. (25 Tg CO_2e/year/296,410,404 people = 0.093 ton CO_2e/capita/year)

10. Emission factor for recycled water distribution is based on an estimate of the energy necessary to redistrubute 1 million gallons of reclaimed water (i.e., treated wastewater) and the Southern-California specific electricity generation emission factor from Southern California Edison. This factor is applied to non-potable water demand.

11. Source quantities for potable and non-potable water demand are provided by Newhall. The source quantity for wastewater treatment indirect emissions is scaled up from the recycled water quantity based on the ratio of the two quantities from Landmark Village (wastewater treatment quantities specific to Newhall Ranch were unavailable).

Abbreviations:

CEC - California Energy Commission
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
kW-hr - kilowatt hour
MW-hr - megawatt hour
Tg - teragram
USEPA - United States Environmental Protection Agency

References:

California Climate Action Registry (CCAR) Database. Southern California Edison PUP Report. 2005.
California Energy Commission. 2005. *California's Water-Energy Relationship* . Final Staff Report. CEC-700-2005-011-SF.
California Energy Commission. 2006. *Refining Estimates of Water-Related Energy Use in California.* PIER Final Project Report. Prepared by Navigant Consulting, Inc. CEC-500-2006-118. December.
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USEPA. 2007. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005. #430-R-07-002. April. http://epa.gov/climatechange/emissions/downloads06/07Waste.pdf

Table 4-36-C
GHG Emission Factors for Municipal Sources from the Valencia Commerce Center
Newhall Land
Newhall Ranch, California

Source[1]	Energy Requirements	Units	Emission Factor	Units	Source Quantity[11]	Units	Total CO_2e Emission [Tonne CO_2e per year]
Lighting							
Public Lighting[2]	148.7	kW-hr/capita/yr	NA	tonne CO_2e/capita/year	NA	residents (capita)	180
						Lighting Total:	**180**
Municipal Vehicles							
Municipal Vehicles[3]	--	--	NA	tonne CO_2e/capita/year	NA	residents (capita)	200
						Municipal Vehicles Total:	**200**
Water and Wastewater							
Groundwater Supply and Conveyance (Potable)[4]	950	kW-hr/acre-foot	0.29	tonne CO_2e/acre-foot	0	acre-feet/yr	0
Average Southern California Supply And Conveyance[5]	3,170	kW-hr/acre-foot	0.96	tonne CO_2e/acre-foot	608	acre-feet/yr	582
Water Treatment (Potable)[6]	36	kW-hr/acre-foot	0.01	tonne CO_2e/acre-foot	608	acre-feet/yr	7
Water Distribution (Potable)[7]	414	kW-hr/acre-foot	0.13	tonne CO_2e/acre-foot	608	acre-feet/yr	76
Wastewater Treatment (Indirect Emissions)[8]	623	kW-hr/acre-foot	0.19	tonne CO_2e/acre-foot	591	acre-feet/yr	111
Wastewater Treament Plant (Direct Emissions)[9]	--	--	0.084	tonne CO_2e/capita/year	NA	residents (capita)	337
Recycled Water Distribution (Non-Potable)[10]	978	kW-hr/acre-foot	0.30	tonne CO_2e/acre-foot	472	acre-feet/yr	139
						Water and Wastewater Total:	**1,253**
							1,632

Notes:

1. Public Lighting includes streetlights, traffic signals, area lighting and lighting municipal buildings. Emissions from the Water and Wastewater category are primarily due to the energy required for supply, treatment and distribution. GHG emissions attributed to electricity use are calculated using the Southern California Edison carbon-intensity factor.

2. Emission factor for public lighting is based on a study of energy usage and GHG emissions from Duluth, MN and the Southern California-specific electricity generation emission factor from Southern California Edison.

3. Emission factors for municipal vehicles are based on the most conservative number from studies of GHG emission for four cities of different sizes: Medford, MA; Duluth, MN; Northampton, MA; and Santa Rosa, CA. Population data provided by the US Census (2000).

4. Emission factor for groundwater supply and conveyance is based on the estimated energy necessary to pump and convey 1 million gallons of groundwater in Southern California's Chino Basin and the Southern California-specific electricity generation emission factor from Southern California Edison. This factor is not used for Entrada or VCC; their water will come from the State Water Program.

5. Emission factor accounts for the various ways water is supplied, the energy intensities of those methods and the amount each method is used. The CEC estimates that 50% of Southern California's water is supplied by importing water from Northern California and the Colorado River.

6. Emission factor for water treatment is based on a Navigant Consulting refinement of a CEC study on the energy necessary to initially treat 1 million gallons of water and the Southern California-specific electricity generation emission factor from Southern California Edison. This factor is applied to potable water demand.

7. Emission factor for water distribution is based on a Navigant Consulting refinement of a CEC study on the energy necessary to distribute 1 million gallons of treated water and the Southern California-specific electricity generation emission factor from Southern California Edison. This factor is applied to potable water demand.

8. Emission factor for wastewater treatment is based on a Navigant Consulting refinement of a California Energy Commission study on the energy necessary to treat 1 million gallons of wastewater for indoor (i.e., potable or other household) use and the Southern California-specific electricity generation emission factor from Southern California Edison.

9. Emission factor for the wastewater treatment plant accounts for direct methane and nitrous oxide emissions from wastewater. The value used here is based on the 2005 US inventory of GHG emissions for domestic wastewater treatment plants (USEPA) divided by the 2005 US population. (25 Tg CO_2e/year/296,410,404 people = 0.093 ton CO_2e/capita/year)

10. Emission factor for recycled water distribution is based on an estimate of the energy necessary to redistrubute 1 million gallons of reclaimed water (i.e., treated wastewater) and the Southern-California specific electricity generation emission factor from Southern California Edison. This factor is applied to non-potable water demand.

11. Source quantities for potable and non-potable water demand are provided by Newhall. The source quantity for wastewater treatment indirect emissions is scaled up from the recycled water quantity based on the ratio of the two quantities from Landmark Village (wastewater treatment quantities specific to Newhall Ranch were unavailable).

Abbreviations:

CEC - California Energy Commission
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
kW-hr - kilowatt hour
MW-hr - megawatt hour
Tg - teragram
USEPA - United States Environmental Protection Agency

References:

California Climate Action Registry (CCAR) Database. Southern California Edison PUP Report. 2005.
California Energy Commission. 2005. *California's Water-Energy Relationship* . Final Staff Report. CEC-700-2005-011-SF.
California Energy Commission. 2006. *Refining Estimates of Water-Related Energy Use in California.* PIER Final Project Report. Prepared by Navigant Consulting, Inc. CEC-500-2006-118. December.
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Table 4-36-D
D2 GHG Emission Factors for Municipal Sources in Newhall Ranch, Entrada, and VCC
Newhall Land
Newhall Ranch, California

Development	Public Lighting[1]	Vehicles[2]	Water/Waste Water[3]	Total Emissions
	(Tonnes CO_2e / year)			
NRSP	2,642	2,943	12,789	18,375
Entrada	218	243	2,667	3,128
VCC	180	200	1,253	1,632
TOTAL	3,040	3,386	16,709	23,135

Notes:

1. Public lighting emission factors for NRSP and Entrada are based on a study of energy usage and GHG emissions from Duluth, MN and the Southern California-specific electricity generation emission factor from Southern California Edison. As VCC contains no residential and therefore no population, emissions for public lighting are based on the Newhall Ranch emissions and the scaling factor provided in the previous tables in the municipal section.
2. Municipal vehicle emission factors for NRSP and Entrada are based on the most conservative number from studies of GHG emission for four cities of different sizes: Medford, MA; Duluth, MN; Northampton, MA; and Santa Rosa, CA. Population data provided by the US Census (2000). As VCC contains no residential and therefore no population, emissions for municipal vehicles are based on the Newhall Ranch emissions and the scaling factor provided in the previous tables in the municipal section.
3. Water and waste water emission drivers include water supply and conveyance, water treatment and distribution, waste water treatment, and recycled water distribution.

Abbreviations:

GHG = greenhouse gas
VCC = Valencia Commerce Center
NRSP = Newhall Ranch Specific Plan
CO_2e = carbon dioxide equivalent

Table 4-36-E

D3 GHG Emission Factors for Municipal Sources in Newhall Ranch, Entrada, and VCC[1]

Newhall Land

Newhall Ranch, California

Development	Public Lighting	Vehicles	Water/Waste Water	Total Emissions
	(Tonnes CO_2e / year)			
NRSP	2,588	2,883	12,528	17,999
Entrada	152	170	1,862	2,184
VCC	180	200	1,253	1,632
TOTAL	2,920	3,253	15,642	21,816

Notes:

1. Alternative 3 values are scaled from Alternative 2 based upon total residential and non-residential building area. Alternative 2 emissions are calculated as described in previous tables and report sections."

Abbreviations:

GHG = greenhouse gas

VCC = Valencia Commerce Center

NRSP = Newhall Ranch Specific Plan

CO_2e = carbon dioxide equivalent

Table 4-36-F

D4 GHG Emission Factors for Municipal Sources in Newhall Ranch, Entrada, and VCC[1]

Newhall Land

Newhall Ranch, California

Development	Public Lighting	Vehicles	Water/Waste Water	Total Emissions
	(Tonnes CO_2e / year)			
NRSP	2,622	2,920	12,688	18,230
Entrada	152	170	1,862	2,184
VCC	0	0	0	0
TOTAL	2,774	3,089	14,550	20,414

Notes:

1. Alternative 4 values are scaled from Alternative 2 based upon total residential and non-residential building area. Alternative 2 emissions are calculated as described in previous tables and report sections."

Abbreviations:

GHG = greenhouse gas

VCC = Valencia Commerce Center

NRSP = Newhall Ranch Specific Plan

CO_2e = carbon dioxide equivalent

Table 4-36-G
D5 GHG Emission Factors for Municipal Sources in Newhall Ranch, Entrada, and VCC[1]
Newhall Land
Newhall Ranch, California

Development	Public Lighting	Vehicles	Water/Waste Water	Total Emissions
	(Tonnes CO_2e / year)			
NRSP	2,558	2,850	12,383	17,791
Entrada	134	149	1,639	1,923
VCC	0	0	0	0
TOTAL	2,693	2,999	14,022	19,714

Notes:
1. Alternative 5 values are scaled from Alternative 2 based upon total residential and non-residential building area. Alternative 2 emissions are calculated as described in previous tables and report sections."

Abbreviations:
GHG = greenhouse gas
VCC = Valencia Commerce Center
NRSP = Newhall Ranch Specific Plan
CO_2e = carbon dioxide equivalent

Table 4-36-H
D6 GHG Emission Factors for Municipal Sources in Newhall Ranch, Entrada, and VCC[1]
Newhall Land
Newhall Ranch, California

Development	Public Lighting	Vehicles	Water/Waste Water	Total Emissions
	(Tonnes CO_2e / year)			
NRSP	2,509	2,794	12,142	17,445
Entrada	77	86	942	1,105
VCC	0	0	0	0
TOTAL	2,586	2,880	13,085	18,551

Notes:
1. Alternative 6 values are scaled from Alternative 2 based upon total residential and non-residential building area. Alternative 2 emissions are calculated as described in previous tables and report sections."

Abbreviations:
GHG = greenhouse gas
VCC = Valencia Commerce Center
NRSP = Newhall Ranch Specific Plan
CO_2e = carbon dioxide equivalent

Table 4-36-I
D7 GHG Emission Factors for Municipal Sources in Newhall Ranch, Entrada, and VCC[1]
Newhall Land
Newhall Ranch, California

Development	Public Lighting	Vehicles	Water/Waste Water	Total Emissions
	(Tonnes CO_2e / year)			
NRSP	2,059	2,293	9,964	14,316
Entrada	96	107	1,174	1,377
VCC	0	0	0	0
TOTAL	2,155	2,400	11,138	15,693

Notes:
1. Alternative 7 values are scaled from Alternative 2 based upon total residential and non-residential building area. Alternative 2 emissions are calculated as described in previous tables and report sections."

Abbreviations:
GHG = greenhouse gas
VCC = Valencia Commerce Center
NRSP = Newhall Ranch Specific Plan
CO_2e = carbon dioxide equivalent

Table 4-37
GHG Emissions Factor of Recreation Centers[1]
Newhall Land
Newhall Ranch, CA

Energy Use			Emission Factors[4] (Tonnes CO_2 / 1,000 sqft / yr)	Surface Area[1] (sqft)	Emissions[5] (Tonnes CO_2 / yr / pool)
Electricity[2]	338,500	kW-hr / yr	8.3	12,300	100
Natural Gas[3]	184,400	ccf / yr	76.8		900

Notes:

1. ENVIRON assumed an outdoor competition-size (50 m x 25 yrd x 8 ft) swimming pool as the main source of GHGs in an aquatic/recreation center.
2. Based on the annual energy consumption by a filter pump for an outdoor lap pool with approximately 240,000 gallons of water: 110,376 kwh/yr. Filter ran 24 hours/day for 365 days/yr at 667 gpm (PG&E, 2006). ENVIRON scaled this factor to reflect energy used by a pool pump for a competition-size pool.
3. Based on an estimate for the annual heating cost (natural gas) of a commercial pool: $184,400 (Mendioroz 2006). ENVIRON used an average PG&E commercial natural gas rate ($0.95/therm) to convert annual cost ($/yr) to annual consumption (ccf/yr) (PG&E 2007).
4. Emission Factors calculated from electricity and natural gas use and Unit Emission Factors assuming a competition-size pool.
5. Emissions for one competition-size pool.

Abbreviations:

ccf = hundred cubic feet
CO_2 = carbon dioxide
ft = foot
gal = gallon
GHGs = greenhouse gases
gpm = gallon per minute
kWh = kilowatt-hour
m = meter
PG&E = Pacific Gas and Electric
sqft = square foot
yr = year
yrd = yard

Sources:

PG&E. 2006. Energy Efficient Commercial Pool Program, Preliminary Facility Report. Lyons Pool, "City of Oakland/Oakland
Mendioroz, R. 2006. Fueling Change: A Number of Design Schemes and Alternative-Energy Strategies Can Help Operators Beat the
Pacific Gas and Electric (PG&E). 2007. Gas Rate Finder. Vol 36-G, No. 9. September. http://www.pge.com/tariffs/GRF0907.pdf

Table 4-38
GHG Emissions from Electricity and Natural Gas Usage in Recreation Centers[1]
Newhall Land
Newhall Ranch, CA

Development	Number of Pools[2]	Total Emissions[3] (Tonnes CO_2 / yr)	Total Emissions Assuming Solar Heating[4] (Tonnes CO_2 / yr)
NRSP	40	40,000	4,000
Entrada	2	2,000	200

Notes:
1. ENVIRON assumed an outdoor competition-size (50 m x 25 yrd x 8 ft) swimming pool as the main source of GHGs in an aquatic/recreation center.
2. The number of pools for Design Alternative 2 was provided by Newhall. The numbers of pools in the NRSP area for the other design alternatives were scaled based on total residential and non-residential building area; the numbers of pools in Entrada for the other design alternatives were provided by Newhall:

D3: 39 pools in NRSP, 2 pools in Entrada
D4: 40 pools in NRSP, 2 pools in Entrada

D5: 39 pools in NRSP, 1 pool in Entrada
D6: 38 pools in NRSP, 0 pools in Entrada
D7: 31 pools in NRSP, 0 pools in Entrada
3. Emissions for thirteen recreation centers in the NRSP area, assuming no solar heating.
4. Emissions for thirteen recreation centers in the NRSP area assuming solar heating replaces all natural gas heating. This value now includes electricity from pumping only.

Abbreviations:
ccf = hundred cubic feet
CO_2 = carbon dioxide
ft = foot
gal = gallon
GHGs = greenhouse gases
gpm = gallon per minute
kWh = kilowatt-hour
m = meter
PG&E = Pacific Gas and Electric
sqft = square foot
yr = year
yrd = yard

Sources:
PG&E. 2006. Energy Efficient Commercial Pool Program, Preliminary Facility Report.
Mendioroz, R. 2006. Fueling Change: A Number of Design Schemes and Alternative-Energy Strategies Can Help Operators
Pacific Gas and Electric (PG&E). 2007. Gas Rate Finder. Vol 36-G, No. 9. September.

Table 4-39
GHG Emissions for the Golf Course
Newhall Land
Newhall Ranch, California

Source	Emission Factor	Units	Quantity	Units	Total Golf Course Emissions [Tonne CO_2 / yr]
Irrigation[1]	0.21	tonne CO_2/acre-foot	345	acre-feet/year	73
Mowing (Maintainence)[2]	0.43	tonne CO_2/acre-year	120	Acres Maintained	52
Electricity (Building Use)[3]	8.19	tonne CO_2/year	1	Pro Shop (1,300 sqft)	67
	58.73	tonne CO_2/year	1	Clubhouse (11,200 sqft)	
Total					**192**

Notes:
1. Irrigation emission factor is based on an average California golf course irrigation water use of 345 acre-feet/year (from *Improving California Golf Course Water Efficiency* , pg. 14). ENVIRON assumed that the irrigation water will be pumped an average elevation of 300 ft from the Water Reclamation Plant (NRSP) to the golf course at an average pressure of 50 psi (Full Coverage Irrigation), with the emission factor of 0.666 lbs CO_2/kW-hr for Southern California Edison electricity generation. The energy required to pump 1 acre-foot of water an elevation of 1 foot is 1.551 kW-hr (Kansas State University Irrigation Management Series, Table 4).
2. Mowing emission factor is based on an estimated 18 gallons of diesel used for mowing 44 acres of turf. These estimates are based on a John Deere lightweight fairway mower (model 3235C) mowing for 8 hours on one tank of diesel (18 gallons) at an average mowing speed of 5.5 miles per hour with a mowing span of 100 inches (John Deere Product Specifications). ENVIRON assumed 2 mowings per week for 52 weeks annually. Approximately 22.4 lbs of CO_2 are emitted for every gallon of diesel consumed (EIA Fuel and Energy Source Codes and Emission Coefficients). Acres maintained reflects 2/3 of overall golf course size (180 acres), based on an Arizona State University golf couse study.
3. Electricity emission factor is based on the 2003 Commercial Buildings Energy Consumption Survey. ENVIRON assumed the Pro Shop and Clubhouse to be public assembly/recreation buildings and calculated emission factors based on average square footage of the Pro Shop and Clubhouse for an 18-hole regulation golf course in California (Clemson University Department of Agriculture and Applied Economics).

Abbreviations:
GHG = greenhouse gas
sqft = square foot
CO_2 = carbon dioxide
yr = year
psi = pounds per square inch
kW-hr = kilowatt hour
EIA = Energy Information Administration

Sources:
Northern California Golf Association. *Improving California Golf Course Water Efficiency* . http://www.owue.water.ca.gov/docs/2004Apps/2004-079.pdf
Full Coverage Irrigation. Partial List of Customers Using FCI Nozzles. http://www.fcinozzles.com/clients.asp
California Climate Action Registry (CCAR) Database. Southern California Edison PUP Report. 2005.
Kansas State University Irrigation Management Series. Comparing Irrigation Energy Costs. http://www.oznet.ksu.edu/library/ageng2/mf2360.pdf
John Deere Product Specifications. 3235C Lightweight Fairway Mower. http://www.deere.com/en_US/ProductCatalog/GT/series/gt_lwfm_c_series.html
EIA. Fuel and Energy Source Codes and Emission Coefficients. http://www.eia.doe.gov/oiaf/1605/factors.html
Arizona State University, Dr. Troy Schmitz. Economic Impacts and Environmental Aspects of the Arizona Golf Course Industry. http://agb.poly.asu.edu/workingpapers/0501.pdf
2003 Commercial Buildings Energy Consumption Survey (CBECS) conducted by the US Energy Information Administration: http://www.eia.doe.gov/emeu/cbecs/contents.html
Clemson University Department of Agriculture and Applied Economics. Economic Impacts of California's Golf Course Facilities in 2000. Table 9. http://ucrturf.ucr.edu/topics/EconImpact_Clemson.pdf

Table 4-40-A
Summary of GHG emissions for D2
Newhall Land
Newhall, California

Source	Units	Direct	NRSP	Entrada	VCC	Total	% of Annual CO_2e emissions
Vegetation[1]	tonnes CO_2e total	9,523	33,895	1,570	0	44,988	NA
Construction (Grading)[2]		24,965	169,297	15,102	12,118	221,481	NA
Construction (Buildings)[3]		NA	266,236	49,110	20,041	335,387	NA
Total (one time emissions)		**34,487**	**469,428**	**65,783**	**32,159**	**601,856**	NA
Residential Buildings[4]	tonnes CO_2e / year	NA	59,286	4,897	NA	64,183	19%
Non-residential[5]		NA	45,208	4,554	9,697	59,460	18%
Mobile[6]		NA	162,001	13,380	NA	175,381	53%
Municipal[7]		NA	18,375	3,128	1,632	23,135	7%
Golf Course[8]		NA	192	NA	NA	192	0.1%
Area Source[9]		NA	2,556	387	0.5	2,944	0.9%
Pools / Recreation[10]		NA	4,000	200	NA	4,200	1.3%
Total (annual emissions)		**0**	**291,618**	**26,546**	**11,330**	**329,494**	**100%**
Total[11]	**tonnes CO_2e / year**	**862**	**303,353**	**28,191**	**12,134**	**344,541**	**NA**

Abbreviations
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas

Notes
1. Vegetation emissions are one-time emissions from the removal of existing vegetation. Emission values are estimated assuming that all carbon currently sequestered by vegetation is released to the atmosphere upon removal of the vegetation. The CO_2 sequestered by new net trees expected from the project is subtracted from this value. For VCC, the CO_2 sequestered by new trees is expected to offset the change in CO_2 sequestration from vegetation cleared, resulting in zero net change in CO_2 sequestration.
2. Construction (grading) emissions are one-time emissions from equipment used in land grading prior to building construction and from worker commute.
3. Construction (building) emissions are one-time emissions from equipment used in building construction and from worker commute.
4. Residential emissions for single family, attached, and apartment dwelling units include emissions associated with electricity and natural gas use. Emission values account for efficiency measures to make homes 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
5. Non-Residential emissions for grocery, misc. retail/commercial/office, business parks, hotel, public safety, and institutional buildings account for electricity and natural gas use. Emission values account for efficiency measures to make buildings 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
6. Mobile source emissions account for worker, consumer, and other vehicle trips based from residential buildings.
7. Municipal emissions account for emissions due to energy production associated with water supply, public/street lighting, and municipal vehicles. Emission values for Entrada are estimated by scaling NRSP municipal emissions directly with population. Emission values for VCC are estimated by scaling NRSP municipal emissions directly with building area.
8. Golf course emissions account for irrigation, mowing, and electricity usage at the planned golf course. Emission values are assumed to stay at the D2 value for all design alternatives. Based on available data, Entrada and VCC are assumed not to have any golf courses.
9. Area source emissions account for hearth fuel consumption and landscaping equipment operations. VCC is assumed not to have hearth emissions because it is all non-residential.
10. Pool / recreation emissions account for electricity and natural gas use at pools, which are assumed to be the chief source of emissions at recreation facilities. Based on available data, VCC is assumed not to have recreational facilities for this design alternative.
11. One-time emissions (vegetation, construction grading, and construction buildings) are "annualized" in this Total row. This is done by dividing by an annualization factor (40), effectively converting the one-time emission into an annual emission rate. One-time emissions are not annualized in their respective rows above.

Table 4-40-B
Summary of GHG emissions for D3
Newhall Land
Newhall, California

Source	Units	Direct	NRSP	Entrada	VCC	Total	% of Annual CO_2e emissions
Vegetation[1]	tonnes CO_2e total	9,162	33,317	1,257	0	43,737	NA
Construction (Grading)[2]		23,974	165,840	10,543	12,118	212,474	NA
Construction (Buildings)[3]		NA	260,800	34,285	20,041	315,126	NA
Total (one time emissions)		**33,136**	**459,957**	**46,085**	**32,159**	**571,337**	NA
Residential Buildings[4]	tonnes CO_2e / year	NA	58,003	3,194	NA	61,196	19%
Non-residential[5]		NA	44,602	4,554	9,697	58,854	19%
Mobile[6]		NA	158,495	8,726	NA	167,221	53%
Municipal[7]		NA	17,999	2,184	1,632	21,816	7%
Golf Course[8]		NA	192	NA	NA	192	0.1%
Area Source[9]		NA	2,503	252	0.5	2,755	0.9%
Pools / Recreation[10]		NA	3,918	200	NA	4,118	1.3%
Total (annual emissions)		**0**	**285,712**	**19,110**	**11,330**	**316,152**	**100%**
Total[11]	**tonnes CO_2e / year**	**828**	**297,211**	**20,262**	**12,134**	**330,436**	**NA**

Abbreviations
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas

Notes
1. Vegetation emissions are one-time emissions from the removal of existing vegetation. Emission values are estimated assuming that all carbon currently sequestered by vegetation is released to the atmosphere upon removal of the vegetation. The CO_2 sequestered by new net trees expected from the project is subtracted from this value. For VCC, the CO_2 sequestered by new trees is expected to offset the change in CO_2 sequestration from vegetation cleared, resulting in zero net change in CO_2 sequestration.
2. Construction (grading) emissions are one-time emissions from equipment used in land grading prior to building construction and from worker commute. Emission values are estimated by scaling D2 grading emissions directly with building area.
3. Construction (building) emissions are one-time emissions from equipment used in building construction and from worker commute. Emission values are estimated by scaling D2 building emissions directly with building area.
4. Residential emissions for single family, attached, and apartment dwelling units include emissions associated with electricity and natural gas use. Emission values account for efficiency measures to make homes 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
5. Non-Residential emissions for grocery, misc. retail/commercial/office, business parks, hotel, public safety, and institutional buildings account for electricity and natural gas use. Emission values account for efficiency measures to make buildings 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
6. Mobile source emissions account for worker, consumer, and other vehicle trips based from residential buildings. Emission values are estimated by scaling D2 operational emissions directly with population.
7. Municipal emissions account for emissions due to energy production associated with water supply, public/street lighting, and municipal vehicles. Emission values for Entrada are estimated by scaling NRSP municipal emissions directly with population. Emission values for VCC are estimated by scaling NRSP municipal emissions directly with total residential and non-residential building area.
8. Golf course emissions account for irrigation, mowing, and electricity usage at the planned golf course. Emission values are assumed to stay at the D2 value for all design alternatives. Based on available data, Entrada and VCC are assumed not to have any golf courses.
9. Area source emissions account for hearth fuel consumption and landscaping equipment operations. VCC is assumed not to have hearth emissions because it is all non-residential. Emission values for Entrada and VCC are estimated by scaling D2 area source emissions directly with building area.

10. Pool / recreation emissions account for electricity and natural gas use at pools, which are assumed to be the chief source of emissions at recreation facilities. The emissions from NRSP are estimated by scaling D2 Pool/recreation emissions directly with building area. The emissions from Entrada are calculated with the number of pools provided by Newhall. Based on available data, VCC is assumed not to have recreational facilities for this design alternative.
11. One-time emissions (vegetation, construction grading, and construction buildings) are "annualized" in this Total row. This is done by dividing by an annualization factor (40), effectively converting the one-time emission into an annual emission rate. One-time emissions are not annualized in their respective rows above.

Table 4-40-C
Summary of GHG emissions for D4
Newhall Land
Newhall, California

Source	Units	Direct	NRSP	Entrada	VCC[12]	Total	% of Annual CO_2e emissions
Vegetation[1]	tonnes CO_2e total	8,734	33,540	1,257	NA	43,531	NA
Construction (Grading)[2]		22,772	167,962	10,543	NA	201,276	NA
Construction (Buildings)[3]		NA	264,137	34,285	NA	298,422	NA
Total (one time emissions)		**31,506**	**465,638**	**46,085**	**NA**	**543,229**	NA
Residential Buildings[4]	tonnes CO_2e / year	NA	58,821	3,194	NA	62,014	20%
Non-residential[5]		NA	44,775	4,554	NA	49,330	16%
Mobile[6]		NA	160,729	8,726	NA	169,455	55%
Municipal[7]		NA	18,230	2,184	NA	20,414	7%
Golf Course[8]		NA	192	NA	NA	192	0.1%
Area Source[9]		NA	2,537	252	NA	2,789	0.9%
Pools / Recreation[10]		NA	3,968	200	NA	4,168	1.4%
Total (annual emissions)		**0**	**289,251**	**19,110**	**NA**	**308,361**	**100%**
Total[11]	**tonnes CO_2e / year**	**788**	**300,892**	**20,262**	**NA**	**321,942**	**NA**

Abbreviations
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas

Notes
1. Vegetation emissions are one-time emissions from the removal of existing vegetation. Emission values are estimated assuming that all carbon currently sequestered by vegetation is released to the atmosphere upon removal of the vegetation. The CO_2 sequestered by new net trees expected from the project is subtracted from this value.
2. Construction (grading) emissions are one-time emissions from equipment used in land grading prior to building construction and from worker commute. Emission values are estimated by scaling D2 grading emissions directly with building area.
3. Construction (building) emissions are one-time emissions from equipment used in building construction and from worker commute. Emission values are estimated by scaling D2 building emissions directly with building area.
4. Residential emissions for single family, attached, and apartment dwelling units include emissions associated with electricity and natural gas use. Emission values account for efficiency measures to make homes 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
5. Non-Residential emissions for grocery, misc. retail/commercial/office, business parks, hotel, public safety, and institutional buildings account for electricity and natural gas use. Emission values account for efficiency measures to make buildings 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
6. Mobile source emissions account for worker, consumer, and other vehicle trips based from residential buildings. Emission values are estimated by scaling D2 operational emissions directly with population.
7. Municipal emissions account for emissions due to energy production associated with water supply, public/street lighting, and municipal vehicles. Emission values for Entrada are estimated by scaling NRSP municipal emissions directly with population. Emission values for VCC are estimated by scaling NRSP municipal emissions directly with total residential and non-residential building area.
8. Golf course emissions account for irrigation, mowing, and electricity usage at the planned golf course. Emission values are assumed to stay at the D2 value for all design alternatives. Based on available data, Entrada and VCC are assumed not to have any golf courses.
9. Area source emissions account for hearth fuel consumption and landscaping equipment operations. Emission values for Entrada are estimated by scaling D2 area source emissions directly with building area.

10. Pool / recreation emissions account for electricity and natural gas use at pools, which are assumed to be the chief source of emissions at recreation facilities. The emissions from NRSP are estimated by scaling D2 Pool/recreation emissions directly with building area. The emissions from Entrada are calculated with the number of pools provided by Newhall. Based on available data, VCC is assumed not to have recreational facilities for this design alternative.
11. One-time emissions (vegetation, construction grading, and construction buildings) are "annualized" in this Total row. This is done by dividing by an annualization factor (40), effectively converting the one-time emission into an annual emission rate. One-time emissions are not annualized in their respective rows above.
12. In this design alternative, VCC will not be built, therefore no emissions will be produced.

Table 4-40-D
Summary of GHG emissions for D5
Newhall Land
Newhall, California

Source	Units	Direct	NRSP	Entrada	VCC[12]	Total	% of Annual CO_2e emissions
Vegetation[1]	tonnes CO_2e total	9,035	32,743	1,175	NA	42,953	NA
Construction (Grading)[2]		22,102	163,918	9,282	NA	195,302	NA
Construction (Buildings)[3]		NA	257,778	30,183	NA	287,961	NA
Total (one time emissions)		**31,137**	**454,438**	**40,640**	**NA**	**526,215**	NA
Residential Buildings[4]	tonnes CO_2e / year	NA	57,330	2,722	NA	60,053	20%
Non-residential[5]		NA	43,996	4,554	NA	48,550	16%
Mobile[6]		NA	156,656	7,439	NA	164,095	55%
Municipal[7]		NA	17,791	1,923	NA	19,714	7%
Golf Course[8]		NA	192	NA	NA	192	0.1%
Area Source[9]		NA	2,474	215	NA	2,689	0.9%
Pools / Recreation[10]		NA	3,873	100	NA	3,973	1.3%
Total (annual emissions)		**0**	**282,311**	**16,953**	**NA**	**299,264**	**100%**
Total[11]	**tonnes CO_2e / year**	**778**	**293,672**	**17,969**	**NA**	**312,420**	**NA**

Abbreviations
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas

Notes
1. Vegetation emissions are one-time emissions from the removal of existing vegetation. Emission values are estimated assuming that all carbon currently sequestered by vegetation is released to the atmosphere upon removal of the vegetation. The CO_2 sequestered by new net trees expected from the project is subtracted from this value.
2. Construction (grading) emissions are one-time emissions from equipment used in land grading prior to building construction and from worker commute. Emission values are estimated by scaling D2 grading emissions directly with building area.
3. Construction (building) emissions are one-time emissions from equipment used in building construction and from worker commute. Emission values are estimated by scaling D2 building emissions directly with building area.
4. Residential emissions for single family, attached, and apartment dwelling units include emissions associated with electricity and natural gas use. Emission values account for efficiency measures to make homes 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
5. Non-Residential emissions for grocery, misc. retail/commercial/office, business parks, hotel, public safety, and institutional buildings account for electricity and natural gas use. Emission values account for efficiency measures to make buildings 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
6. Mobile source emissions account for worker, consumer, and other vehicle trips based from residential buildings. Emission values are estimated by scaling D2 operational emissions directly with population.
7. Municipal emissions account for emissions due to energy production associated with water supply, public/street lighting, and municipal vehicles. Emission values for Entrada are estimated by scaling NRSP municipal emissions directly with population. Emission values for VCC are estimated by scaling NRSP municipal emissions directly with total residential and non-residential building area.
8. Golf course emissions account for irrigation, mowing, and electricity usage at the planned golf course. Emission values are assumed to stay at the D2 value for all design alternatives. Based on available data, Entrada and VCC are assumed not to have any golf courses.
9. Area source emissions account for hearth fuel consumption and landscaping equipment operations. Emission values for Entrada are estimated by scaling D2 area source emissions directly with building area.

10. Pool / recreation emissions account for electricity and natural gas use at pools, which are assumed to be the chief source of emissions at recreation facilities. The emissions from NRSP are estimated by scaling D2 Pool/recreation emissions directly with building area. The emissions from Entrada are calculated with the number of pools provided by Newhall. Based on available data, VCC is assumed not to have recreational facilities for this design alternative.
11. One-time emissions (vegetation, construction grading, and construction buildings) are "annualized" in this Total row. This is done by dividing by an annualization factor (40), effectively converting the one-time emission into an annual emission rate. One-time emissions are not annualized in their respective rows above.
12. In this design alternative, VCC will not be built, therefore no emissions will be produced.

Table 4-40-E
Summary of GHG emissions for D6
Newhall Land
Newhall, California

Source	Units	Direct	NRSP	Entrada	VCC[12]	Total	% of Annual CO_2e emissions
Vegetation[1]	tonnes CO_2e total	8,734	33,540	1,257	NA	43,531	NA
Construction (Grading)[2]		21,220	160,735	5,336	NA	187,291	NA
Construction (Buildings)[3]		NA	252,772	17,351	NA	270,124	NA
Total (one time emissions)		**29,954**	**447,047**	**23,944**	**NA**	**500,946**	NA
Residential Buildings[4]	tonnes CO_2e / year	NA	56,169	1,237	NA	57,406	20%
Non-residential[5]		NA	43,303	4,554	NA	47,857	17%
Mobile[6]		NA	153,484	3,363	NA	156,847	55%
Municipal[7]		NA	17,445	1,105	NA	18,551	6%
Golf Course[8]		NA	192	NA	NA	192	0.1%
Area Source[9]		NA	2,423	99	NA	2,522	0.9%
Pools / Recreation[10]		NA	3,798	NA	NA	3,798	1.3%
Total (annual emissions)		**0**	**276,814**	**10,359**	**NA**	**287,173**	**100%**
Total[11]	**tonnes CO_2e / year**	**749**	**287,990**	**10,957**	**NA**	**299,697**	**NA**

Abbreviations

CO_2e - carbon dioxide equivalent

GHG - greenhouse gas

Notes

1. Vegetation emissions are one-time emissions from the removal of existing vegetation. Emission values are estimated assuming that all carbon currently sequestered by vegetation is released to the atmosphere upon removal of the vegetation. The CO_2 sequestered by new net trees expected from the project is subtracted from this value.
2. Construction (grading) emissions are one-time emissions from equipment used in land grading prior to building construction and from worker commute. Emission values are estimated by scaling D2 grading emissions directly with building area.
3. Construction (building) emissions are one-time emissions from equipment used in building construction and from worker commute. Emission values are estimated by scaling D2 building emissions directly with building area.
4. Residential emissions for single family, attached, and apartment dwelling units include emissions associated with electricity and natural gas use. Emission values account for efficiency measures to make homes 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
5. Non-Residential emissions for grocery, misc. retail/commercial/office, business parks, hotel, public safety, and institutional buildings account for electricity and natural gas use. Emission values account for efficiency measures to make buildings 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
6. Mobile source emissions account for worker, consumer, and other vehicle trips based from residential buildings. Emission values are estimated by scaling D2 operational emissions directly with population.
7. Municipal emissions account for emissions due to energy production associated with water supply, public/street lighting, and municipal vehicles. Emission values for Entrada are estimated by scaling NRSP municipal emissions directly with population. Emission values for VCC are estimated by scaling NRSP municipal emissions directly with total residential and non-residential building area.
8. Golf course emissions account for irrigation, mowing, and electricity usage at the planned golf course. Emission values are assumed to stay at the D2 value for all design alternatives. Based on available data, Entrada and VCC are assumed not to have any golf courses.
9. Area source emissions account for hearth fuel consumption and landscaping equipment operations. Emission values for Entrada are estimated by scaling D2 area source emissions directly with building area.
10. Pool / recreation emissions account for electricity and natural gas use at pools, which are assumed to be the chief source of emissions at recreation facilities. The emissions from NRSP are estimated by scaling D2 Pool/recreation emissions directly with building area. Based on available data, Entrada and VCC are assumed not to have recreational facilities for this design alternative.
11. One-time emissions (vegetation, construction grading, and construction buildings) are "annualized" in this Total row. This is done by dividing by an annualization factor (40), effectively converting the one-time emission into an annual emission rate. One-time emissions are not annualized in their respective rows above.
12. In this design alternative, VCC will not be built, therefore no emissions will be produced.

Table 4-40-F
Summary of GHG emissions for D7
Newhall Land
Newhall, California

Source	Units	Direct	NRSP	Entrada	VCC[12]	Total	% of Annual CO_2e emissions
Vegetation[1]	tonnes CO_2e total	4,195	28,122	1,353	NA	33,670	NA
Construction (Grading)[2]		17,687	131,901	6,649	NA	156,236	NA
Construction (Buildings)[3]		NA	207,428	21,621	NA	229,049	NA
Total (one time emissions)		**21,881**	**367,451**	**29,623**	**NA**	**418,955**	NA
Residential Buildings[4]	tonnes CO_2e / year	NA	46,756	2,419	NA	49,175	21%
Non-residential[5]		NA	29,706	433	NA	30,139	13%
Mobile[6]		NA	127,762	6,609	NA	134,371	57%
Municipal[7]		NA	14,316	1,377	NA	15,693	7%
Golf Course[8]		NA	192	NA	NA	192	0.1%
Area Source[9]		NA	2,018	191	NA	2,210	0.9%
Pools / Recreation[10]		NA	3,116	NA	NA	3,116	1.3%
Total (annual emissions)		**0**	**223,867**	**11,029**	**NA**	**234,895**	**100%**
Total[11]	**tonnes CO_2e / year**	**547**	**233,053**	**11,769**	**NA**	**245,369**	**NA**

Abbreviations
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas

Notes
1. Vegetation emissions are one-time emissions from the removal of existing vegetation. Emission values are estimated assuming that all carbon currently sequestered by vegetation is released to the atmosphere upon removal of the vegetation. The CO_2 sequestered by new net trees expected from the project is subtracted from this value.
2. Construction (grading) emissions are one-time emissions from equipment used in land grading prior to building construction and from worker commute. Emission values are estimated by scaling D2 grading emissions directly with building area.
3. Construction (building) emissions are one-time emissions from equipment used in building construction and from worker commute. Emission values are estimated by scaling D2 building emissions directly with building area.
4. Residential emissions for single family, attached, and apartment dwelling units include emissions associated with electricity and natural gas use. Emission values account for efficiency measures to make homes 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
5. Non-Residential emissions for grocery, misc. retail/commercial/office, business parks, hotel, public safety, and institutional buildings account for electricity and natural gas use. Emission values account for efficiency measures to make buildings 15% more efficient than Title 24 requirements and also account for development-wide utilization of renewable sources (e.g., solar power).
6. Mobile source emissions account for worker, consumer, and other vehicle trips based from residential buildings. Emission values are estimated by scaling D2 operational emissions directly with population.
7. Municipal emissions account for emissions due to energy production associated with water supply, public/street lighting, and municipal vehicles. Emission values for Entrada are estimated by scaling NRSP municipal emissions directly with population. Emission values for VCC are estimated by scaling NRSP municipal emissions directly with total residential and non-residential building area.
8. Golf course emissions account for irrigation, mowing, and electricity usage at the planned golf course. Emission values are assumed to stay at the D2 value for all design alternatives. Based on available data, Entrada and VCC are assumed not to have any golf courses.
9. Area source emissions account for hearth fuel consumption and landscaping equipment operations. Emission values for Entrada are estimated by scaling D2 area source emissions directly with building area.
10. Pool / recreation emissions account for electricity and natural gas use at pools, which are assumed to be the chief source of emissions at recreation facilities. The emissions from NRSP are estimated by scaling D2 Pool/recreation emissions directly with building area. Based on available data, Entrada and VCC are assumed not to have recreational facilities for this design alternative.
11. One-time emissions (vegetation, construction grading, and construction buildings) are "annualized" in this Total row. This is done by dividing by an annualization factor (40), effectively converting the one-time emission into an annual emission rate. One-time emissions are not annualized in their respective rows above.
12. In this design alternative, VCC will not be built, therefore no emissions will be produced.

Table 5-1

Comparison of Energy Use at Average Newhall Ranch Single-Family Dwelling to 'Business as Usual' Projections (Includes NRSP and Entrada)

Newhall Ranch, CA

Location	Scenario	Electricity	Natural Gas	Total CO_2 Emissions[8,9]
		(kWh/DU/yr)	(ccf/DU/year)	(tonnes/DU/yr)
CEC Energy Forecast Zone 8 [1]	2020 BAU Projections[2,3]	6,451	439	4.2
CEC Energy Forecast Zone 9 [1]	2020 BAU Projections[2,3]	6,468	439	4.2
Newhall Ranch[4]	Title 24 Compliant (No Renewables)[5]	6,196	318	3.5
	15% Improvement Over Title 24 plus Renewables[6,7]	**4,965**	**270**	**2.9**
	% Improvement Over 2020 BAU (Zone 8)	23%	38%	31%
	% Improvement Over 2020 BAU (Zone 9)	23%	38%	31%

Notes:

1. CEC Energy Forecast Zones are defined by the California Energy Commission for energy demand forecasting purposes. They do not correspond to Title 24 Climate Zone definitions. Available at: http://www.energy.ca.gov/2005publications/CEC-400-2005-036/CEC-400-2005-036.PDF

2. 'Business as Usual' projected residential electricity use for each Forecast Zone was determined by dividing total predicted residential electricity use in 2020 by total number of households. Projections were obtained from "Appendix A: California Energy Demand Scenario Projections to 2050". The projection assumes energy efficiency is frozen at current levels (baseline low-efficiency scenario), but demographic and economic changes follow current trends.

3. 'Business as Usual' projected residential natural gas use in Southern Califronia Edision service area (which includes CEC energy forecast zones 8 and 9) was determined by dividing total residential natural gas use projected for 2020 by total number of 2020 households. Natural gas data was disaggregated by utility service areas, and not by forecast zones. Estimates were obtained from "Appendix A: California Energy Demand Scenario Projections to 2050". The projection assumes that energy efficiency is frozen at current levels (baseline low-efficiency scenario), and demographic and economic changes follow current trends.

4. Newhall Ranch features multiple dwelling types. Energy use for the average residence was calculated by summing the energy use for all dwellings, and then dividing that sum by the total number of dwelling units.

5. Energy consumption values reflect buildings that are Title 24-compliant, without improvements.

6. Newhall Land and Farming Company has committed to making all new homes 15% more energy efficient than Title 24. This improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values reflect the 15% improvements.

7. 'Renewables' refers to energy generated by any renewable resource. For this calculation, single-family dwelling units are assumed to be provided with a 2.0 kW solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 kWh for a 2 kW solar system with a 30 degree roof slope and a south roof direction as provided by the City of Santa Clarita, CA. Available at: http://www.sunpowercorp.com/For-Homes/How-To-Buy/Solar-Calculator.aspx

8. CO_2 emissions from electrictiy use was calculated using the emission factor from Southern California Power/Utility Protocol (PUP).

9. CO_2 emissions from natural gas use was calculated using emission factor from California Climate Action Registry General Reporting Protocol (CCAR GRP). Conversion to units of lb/CO2e/ccf was performed using high heating values in Table III. 8.1.

Abbreviations:

BAU - 'business as usual' scenario
ccf - hundred cubic feet
CEC - California Energy Commission
DU - dwelling unit (household)
kW - kilowatt
kWh - kilowatt hour

References:

California Climate Action Registry. 2008. California Climate Action Registry General Reporting Protocol, Version 3.0. April. Available at: http://www.climateregistry.org/tools/protocols/general-reporting-protocol.html

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California Energy Commission. 2008. Appendix A: California Energy Demand Scenario Projections to 2050. PIER Final Project Report. Prepared by Institute of Transportation Studies, University of California at Davis. CEC-500-02-004. September. Available at: http://steps.ucdavis.edu/People/cyang/aep/final-report/pdf_versions/AEP%20Appendix%20A%20-%20Energy%20Demand%20Scenarios.pdf. Spreadsheets entitled "Electricity_AEPscenarios.xls" and "Naturalgas_AEPscenarios.xls" available at: http://steps.ucdavis.edu/People/cyang/aep/AEP%20Baseline%20Spreadsheet%20Files.zip/view.

Table 5-2
Residential Buildings in Context
Newhall Land
Newhall Ranch, CA

Dwelling Type	Energy Use Per Dwelling Unit[1]		# DU's[2]	Energy Use Total[3]		GHG Emissions[4]		
	Electricity	Natural Gas		Electricity	Natural Gas	Electricity	Natural Gas	Total
	[kWh/DU/year]	(ccf of natural gas / DU / year)		(kWh/year)	(ccf of natural gas / year)	(tonnes CO_2 / year)		
Single Family[5,10]	4,234	381	6,683	28,297,628	2,548,265	8,549	13,061	21,610
Attached[5]	5,327	224	11,069	58,962,237	2,483,424	17,812	12,729	30,541
Apartment[5]	4,201	197	3,133	13,161,666	616,333	3,976	3,159	7,135
Total[6]			20,885	100,421,531	5,648,022	30,337	28,949	59,286
CA Average[7,8]				136,896,778	8,408,877	49,925	43,100	93,025
Improvement over CA Stock[9]				**27%**	**33%**	**39%**	**33%**	**36%**

Notes:

1. Energy use for homes as developed in residential section.

2. Number of dwelling units present in the NRSP area for each type as desribed in residential section. Entrada and the NRSP area have the same mix of residential housing types with the same energy efficiency measures. As such, per capita GHG emissions for NRSP area homes would be the same as per capita emissions from Entrada homes.

3. Energy use for the entire development. NRSP area single family, NRSP area attached, and NRSP area apartment are calculated by multiplying energy use per dwelling unit by number of dwelling units. NRSP area Total is the sum of these individual categories. CA average electricity is calculated by dividing the total CA residential electricity use (83,361,251 MWhrs according to http://www.eia.doe.gov/cneaf/electricity/epa/sales_state.xls) by the 2004 CA population (35,842,038 people from http://www.census.gov/popest/states/tables/NST-EST2006-01.xls) to give a per capita electricity use of 2326 kw-hr / capita. This was multiplied by the projected NRSP area population of 58,860 (calculated from housing types and quantities provided by Newhall and the population factors from pg 5-31 of the Newhall Ranch Specific Plan). CA average natural gas use is calculated by dividing the total CA residential natural gas use use (512,046 million cubic feet or 5,120,460,000 ccf from http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm) by the 2004 CA population (35,842,038 people from http://www.census.gov/popest/states/tables/NST-EST2006-01.xls) to give a per capita natural gas use of 142.86 ccf / capita. This was multiplied by the projected NRSP area population, 58,860.

4. GHG emissions are calculated by multiplying the electricity and natural gas use by the approprite emission factors presented in residential section. The CA average GHG emissions for electricity uses the CA average emission factor of 0.804 lb / kw-hr instead of the Southern California Edison specific emission factor of 0.666 lb / kw-hr.

5. Energy use per dwelling unit and number of dwelling units are described in residential section. Total NRSP area single family, NRSP area attached, and NRSP area apartment are calculated by multiplying energy use per dwelling unit by number of dwe units.

6. The sum of the above three housing types.

7. CA average electricity is calculated by dividing the total CA residential electricity use (83,361,251 MWhrs according to http://www.eia.doe.gov/cneaf/electricity/epa/sales_state.xls) by the 2004 CA population (35,842,038 people from http://www.census.gov/popest/states/tables/NST-EST2006-01.xls) to give a per capita electricity use of 2326 kw-hr / capita. This was multiplied by the projected NRSP area population of 58,860 (calculated from housing types and quantities provided by Newhall and the population factors from pg 5-31 of the Newhall Ranch Specific Plan). The CA average GHG emissions for electricity uses the CA average emission factor of 0.804 lb / kw-hr instead of the Southern California Edison specific emission factor of 0.666 lb / kw-hr.

8. CA average natural gas use is calculated by dividing the total CA residential natural gas use use (5,120,460,000 ccf from http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm) by the 2004 CA population (35,842,038 people from http://www.census.gov/popest/states/tables/NST-EST2006-01.xls) to give a per capita natural gas use of 142.86 ccf / capita. This was multiplied by the projected NRSP area population of 58,860 (calculated from housing types and quantities provided by Newhall and the population factors from pg 5-31 of the Newhall Ranch Specific Plan).

9. The improvement of the NRSP area Total row as compared to the CA Average row.

10. For this calculation, Single Family dwelling units are assumed to be provided with a 2.0 Kw solar system from Sunpower company. The yearly electricity savings are estimated to be 3356 Kwh for a 2 Kw solar system with a 30 degree roof slope and a south roof direction as provided for the City of Santa Clarita, CA in http://sunpower1.cleanpowerestimator.com/default.aspx

Abbreviations:

NRSP = Newhall Ranch Specific Plan
ccf = 100 cubic feet
DU = dwelling unit
kWh = kilowatt-hour
SF = square feet

Source:

California Climate Action Registry General Reporting Protocol, Version 2.2 (March). Available at: http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf
Energy Information Administration, Department of Energy Electricity Sales http://www.eia.doe.gov/cneaf/electricity/epa/sales_state.xls
Census Bureau Population Data http://www.census.gov/popest/states/tables/NST-EST2006-01.xls
California Natural Gas Consumption by End Use. Available at: http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm

Table 5-3
Comparison of Newhall Non-Residential Energy Use to 'Business as Usual' Scenario (Includes NRSP, Entrada, and VCC)
Newhall Ranch, CA

	Energy Use Subject to Title 24		Reductions			Overall Reductions[6]		
Non-Residential Building Type	**Electricity[1] (%)**	**Natural Gas[2] (%)**	**Title 24 (2005) Improvement Over Title 24 (2001)[3]**	**Newhall's Improvement over Title 24[4]**	**Photovoltaic contributions (above the baseline Title 24)[5]**	**Electricity Use (%)**	**Natural Gas Use (%)**	**% GHG Reductions[7]**
Average Non-Residential Building[8]	**56%**	**100%**	**8.3%**	**15%**	**6%**	**18%**	**22%**	**19%**
Food Sales	30%	100%	8.3%	15%	6%	13%	22%	
Retail (Other than Mall)	56%					18%		
Enclosed and Strip Mall	52%					17%		
Office	58%					19%		
Warehouse and Storage	66%					21%		
Lodging	58%					19%		

Notes:

1. Proportions of Title 24 regulated electricity use by building type were obtained from 2003 Commercial Buildings Energy Consumption Survey.
2. ENVIRON assumed that all natural gas use is for heating or hot water, both of which are covered by Title 24.
3. This improvement reflects additional and revised requirements in the 2005 version of Title 24, according to the 2005 Building Energy Efficiency Standards.
4. Newhall Land and Farming Company has committed to an additional 15% reduction in Title 24-compliant energy use.
5. For this calculation, it is assumed that a 2.0 kW photovoltaic unit from Sunpower company will be mounted on every 1,600 square feet of roof space (this would cover approximately 8% of the rooftop building space). Here, we assume that the rooftop space available is approximately half of the total square footage. The yearly electricity savings are estimated to be 3,356 kWh for a 2 kW solar system with a 30 degree roof slope and a south roof direction as provided foe the City of Santa Clarita, CA. Number of systems = (commercial square footage) / (1,600 sqft per system) / 2 (sqft roof space per sqft building space). Available at: http://www.sunpowercorp.com/For-Homes/How-To-Buy/Solar-Calculator.aspx
6. Reductions are evaluated relative to a comparable non-residential building that is compliant with the 2001 version of Title 24, which ENVIRON has defined as the 'business as usual' scenario.
7. The calculation of total reduction in greenhouse gas (GHG) emissions accounts for the different contributions of electricity and natural gas (prior to any improvements) to total GHG emissions.
8. Value represents the average of all building types included in the 2003 Commercial Buildings Energy Consumption Survey.

Abbreviations:

GHG - Greenhouse gas

References

California Energy Commission. 2005. 2005 Building Energy Efficiency Standards: Nonresidential Compliance Manual, Revision 3. CEC-400-2005-006-CMF. Available at: http://www.energy.ca.gov/2005publications/CEC-400-2005-006/chapters_4q/1_Introduction.pdf

US Energy Information Administration. 2003 Commercial Buildings Energy Consumption Survey: Calculated from data from Tables 3a and 3b of: http://www.eia.doe.gov/emeu/cbecs/enduse_consumption/pba.html

Table 5-4
Irvine Ranch Water District 2005 Water Supplies
Newhall Ranch, California

	Quantity (AFY)	Percent[1] (%)
Potable Supplies:		
Purchased MWD treated	19,306	34%
Clear groundwater	29,960	53%
Treated groundwater	7,200	13%
Non-potable Supplies:		
Recycled water	15,296	51%
Purchased MWD untreated	5,304	18%
Native (surface water)	7,251	24%
Non-potable groundwater	2,285	8%

Notes:

[1] Percentages of water sources were calculated for both potable water and non-potable water based on IRWD water supplies data.

Sources:

Irvine Ranch Water District (IRWD). 2005 Urban Water Management Plan. November 2005.

Table 5-5
GHG Emissions for Municipal Sources
Newhall Ranch, California

Source	Emission Factor	Units	Source Quantity [1] Newhall	Source Quantity [1] IRDW BAU	Units	Total CO2e Emission[9] (Tonne CO2e per year) Newhall	Total CO2e Emission[9] (Tonne CO2e per year) IRWD BAU	Difference (Newhall-IRWD BAU)/(Newhall BAU) %
Groundwater Supply and Conveyance[2]	0.29	tonne CO_2e/AF	8,135	7,602	AFY	2,333	2,181	7%
Average Southern California Supply And Conveyance[3]	0.96	tonne CO_2e/AF	2,329	5,240	AFY	0	5,015	-100%
Water Treatment (Potable)[4]	0.01	tonne CO_2e/AF	10,464	10,464	AFY	89	114	-22%
Water Distribution (Potable)[5]	0.13	tonne CO_2e/AF	10,464	10,464	AFY	1,018	1,310	-22%
Recycled Water Distribution (Non-Potable)[6]	0.30	tonne CO_2e/AF	9,445	4,794	AFY	2,440	1,415	72%
Surface Water[7]	0.14	tonne CO_2e/AF	0	2,273	AFY	0	309	-100%
Wastewater Treatment (Indirect Emissions)[8]	0.19	tonne CO_2e/AF	11,819	10,464	AFY	1,945	1,968	-1%
Total[10]			19,909	19,909	AFY	7,825	12,312	-36%

Notes:

1. Source quantities for Newhall water use, including NRSP, Entrada, and VCC, were provided by Newhall Land. Source quantities for IRDW BAU scenario were based on the estimated IRDW BAU potable and non-potable water demand multiplied the percentages of potable and non-potable water sources as follows:
- Groundwater supply and conveyance calculated as the fraction of potable and non-potable that is typically sourced from groundwater according to the IRWD.
- Average Southern California Supply and Conveyance calculated as the fraction of potable and non-potable that is typically sourced from the MWD according to the IRWD.
- Water treatment (potable) and water distribution (potable) is the same as for Newhall.
- Recycled Water Distribution (Non-Potable) calculated as the fraction of non-potable water that is typically sourced from recycled sources according to the IRWD.
- Surface Water calculated as the fraction of non-potable water that is typically sourced from recycled sources according to the IRWD.
- Wastewater Treatment (Indirect Emissions) assumed to conservatively be the same as all potable water demand.

2. Emission factor for groundwater supply and conveyance is based on the estimated energy necessary to pump and convey 1 million gallons of groundwater in Southern California's Chino Basin and the Southern California-specific electricity generation emission factor from Southern California Edison.
3. Emission factor accounts for the various ways water is supplied, the energy intensities of those methods and the amount each method is used. The CEC estimates that 50% of Southern California's water is supplied by importing water from Northern California and the Colorado River.
4. Emission factor for water treatment is based on a Navigant Consulting refinement of a CEC study on the energy necessary to initially treat 1 million gallons of water and the Southern
5. Emission factor for water distribution is based on a Navigant Consulting refinement of a CEC study on the energy necessary to distribute 1 million gallons of treated water and the Southern California-specific electricity generation emission factor from Southern California Edison. This factor is applied to potable water demand.
6. Emission factor for recycled water distribution is based on an estimate of the energy necessary to redistrubute 1 million gallons of reclaimed water (i.e., treated wastewater) and the Southern-California specific electricity generation emission factor from Southern California Edison. This factor is applied to non-potable water demand.
7. Emission factor for surface water is based on the sum of the emission factors for water treatment and water distribution since no energy is required for pump and convery surface water.
8. Emission factor for wastewater treatment is based on a Navigant Consulting refinement of a California Energy Commission study on the energy necessary to treat 1 million gallons of wastewater for indoor (i.e., potable or other household) use and the Southern California-specific electricity generation emission factor from Southern California Edison.
9. GHG emissions are represented as CO2 equivalent emissions based on the emission factor multiplied source quantity.
10. Total source quantity is the sum of water supplies from groundwater, Southern Calfornia State Water Project, and recycled water. Total GHG emissions come from multiple water processing steps, which includes pumping water from the sources (e.g., groundwater, state water project, and reclamation facility), treating and distributing water for use, and wastewater treatment.

Abbreviations:
BAU: Business as Usual
IRWD: Irvine Ranch Water District
AFY: Acre Feet per Year
VCC = Valencia Commerce Center
NRSP = Newhall Ranch Specific Plan

APPENDIX A
Building Construction URBEMIS Runs Received from Impact Sciences

APPENDIX A1
Building Construction Summary

Newhall Ranch, Entrada, and VCC Building Construction GHG Emission Detail
Newhall Land
Newhall Ranch, California

Development[1]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total CO_2e Emissions[2]	Total CO_2e Emissions[3]
	tons																								tonnes
Entrada			5,850	5,716	5,737	5,737	5,736	5,736	3,493	3,432	3,445	818	779	776	773	942	920	917	321	820	817	820	547	**54,135**	**49,110**
Homestead				2,919	2,863	2,863	2,863	2,863	5,436	5,312	5,333	5,333	5,353	6,628	6,503	6,503	6,554	6,529	1,290	1,231	1,226	1,231	821	**79,652**	**72,259**
Landmark Village	1,624	6,049	6,049	6,025	4,060																			**23,808**	**21,598**
Mission Village		1,843	3,516	3,502	3,515	3,515	6,089	6,000	6,000	5,976	5,999	3,941	3,870	3,856	3,841	3,841	2,587							**67,892**	**61,590**
Potrero					1,946	1,874	1,874	1,874	1,874	9,865	9,760	9,760	9,797	9,760	9,515	9,375	9,448	9,412	9,412	4,571	4,490	4,507	3,008	**122,125**	**110,789**
VCC	2,935	2,870	2,869	2,858	2,923	2,867	2,867	1,903																**22,091**	**20,041**
Total	4,559	10,762	18,284	21,020	21,045	16,856	19,430	18,376	16,803	24,586	24,538	19,852	19,800	21,020	20,633	20,662	19,509	16,857	11,023	6,622	6,533	6,558	4,376	**369,701**	**335,387**

Notes:

1. There are three major developments: Entrada, Valencia Commerce Center (VCC), and Newhall. Homestead, Landmark Village, Mission Village, and Potrero are the sub-developments of Newhall.
2. The total GHG emissions were calculated using URBEMIS 9.2.2. with the input files provided by the Impact Science.
3. Outputs from Urbemis was converted from short tons to metric tonnes.

1 short ton = 0.90718474 metric tonnes

Abbreviations:

CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
sqft - square feet
VCC - Valencia Commerce Center

APPENDIX A2
Building Construction Detail (Received from Impact Sciences)

ENTRADA

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Entrada 2010-2015	Single family housing	572
Entrada 2010-2015	Apartments low rise	102
Entrada 2010-2015	Apartments mid rise	0
Entrada 2010-2015	Apartments high rise	0
Entrada 2010-2015	Condo/townhouse general	989.8
Entrada 2010-2015	Condo/townhouse high rise	0
Entrada 2010-2015	Mobile home park	0
Entrada 2010-2015	Retirement community	0
Entrada 2010-2015	Congregate care (Assisted Living) Facility	0
Entrada 2010-2015	Day-care center	0
Entrada 2010-2015	Elementary school	0
Entrada 2010-2015	Junior high school	0
Entrada 2010-2015	High school	0
Entrada 2010-2015	Junior college (2 yrs)	0
Entrada 2010-2015	University/college (4 yrs)	0
Entrada 2010-2015	Library	0
Entrada 2010-2015	Place of worship	0
Entrada 2010-2015	City park	0
Entrada 2010-2015	Racquet club	0
Entrada 2010-2015	Racquetball/health	0
Entrada 2010-2015	Quality resturant	0
Entrada 2010-2015	High turnover (sit-down) rest.	0
Entrada 2010-2015	Fast food rest. w/ drive thru	0
Entrada 2010-2015	Fast food rest. w/o drive thru	0
Entrada 2010-2015	Hotel	0
Entrada 2010-2015	Motel	0
Entrada 2010-2015	Free-standing discount store	0
Entrada 2010-2015	Free-standing discount superstore	0
Entrada 2010-2015	Discount club	0
Entrada 2010-2015	Regnl shop. center	1287.5
Entrada 2010-2015	Electronic superstore	0
Entrada 2010-2015	Home improvement superstore	0
Entrada 2010-2015	Strip mall	0
Entrada 2010-2015	Hardware/paint store	0
Entrada 2010-2015	Supermarket	28.48
Entrada 2010-2015	Convenience market (24 hour)	0
Entrada 2010-2015	Convenience market with gas pumps	0
Entrada 2010-2015	Gasoline/service station	0
Entrada 2010-2015	Bank (with drive-through)	0
Entrada 2010-2015	General office building	0
Entrada 2010-2015	Office park	62.5
Entrada 2010-2015	Goverment office building	0
Entrada 2010-2015	Government (civic center)	0
Entrada 2010-2015	Pharmacy/drugstore with drive through	0
Entrada 2010-2015	Pharmacy/drugstore without drive through	0
Entrada 2010-2015	Medical office building	0
Entrada 2010-2015	Hospital	0
Entrada 2010-2015	Warehouse	0
Entrada 2010-2015	General light industry	0
Entrada 2010-2015	General heavy industry	0
Entrada 2010-2015	Industrial park	0
Entrada 2010-2015	Manufacturing	0
Entrada 2010-2015	Blank (Edit this description)	0
Entrada 2010-2015	Blank (Edit this description)	0
Entrada 2010-2015	Blank (Edit this description)	0
Entrada 2010-2015	Blank (Edit this description)	0
Entrada 2010-2015	Blank (Edit this description)	0

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Urbemis 2007 Version 9.2.2

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Entrada (5)\Entrada 2010-2015.urb9

Project Name: Entrada 2010-2015

Project Location: Los Angeles County

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)

	CO_2
2010	5,850.06
Asphalt 01/01/2010-04/06/2010	114.80
Paving Off-Gas	0.00
Paving Off Road Diesel	48.24
Paving On Road Diesel	61.28
Paving Worker Trips	5.28
Building 01/01/2010-12/31/2015	5,727.87
Building Off Road Diesel	294.84
Building Vendor Trips	1,389.31
Building Worker Trips	4,043.72
Coating 05/03/2010-12/31/2015	7.40
Architectural Coating	0.00
Coating Worker Trips	7.40
2011	5,716.06
Building 01/01/2010-12/31/2015	5,705.08
Building Off Road Diesel	293.71
Building Vendor Trips	1,384.01
Building Worker Trips	4,027.36
Coating 05/03/2010-12/31/2015	10.99
Architectural Coating	0.00
Coating Worker Trips	10.99
2012	5,737.33
Building 01/01/2010-12/31/2015	5,726.31
Building Off Road Diesel	294.84
Building Vendor Trips	1,389.33
Building Worker Trips	4,042.14
Coating 05/03/2010-12/31/2015	11.03
Architectural Coating	0.00
Coating Worker Trips	11.03
2013	5,736.84
Building 01/01/2010-12/31/2015	5,725.81
Building Off Road Diesel	294.84
Building Vendor Trips	1,389.36
Building Worker Trips	4,041.62
Coating 05/03/2010-12/31/2015	11.02
Architectural Coating	0.00
Coating Worker Trips	11.02
2014	5,736.42
Building 01/01/2010-12/31/2015	5,725.40
Building Off Road Diesel	294.84
Building Vendor Trips	1,389.37
Building Worker Trips	4,041.19
Coating 05/03/2010-12/31/2015	11.02
Architectural Coating	0.00
Coating Worker Trips	11.02
2015	5,736.10
Building 01/01/2010-12/31/2015	5,725.08
Building Off Road Diesel	294.84
Building Vendor Trips	1,389.40
Building Worker Trips	4,040.84
Coating 05/03/2010-12/31/2015	11.02
Architectural Coating	0.00
Coating Worker Trips	11.02

Phase Assumptions

Phase: Paving 01/01/2010 - 04/06/2010 - Default Paving Description
Acres to be Paved: 80.55
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/01/2010 - 12/31/2015 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 05/03/2010 - 12/31/2015 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

ENTRADA

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Entrada 2016-2018	Single family housing	0
Entrada 2016-2018	Apartments low rise	306
Entrada 2016-2018	Apartments mid rise	0
Entrada 2016-2018	Apartments high rise	0
Entrada 2016-2018	Condo/townhouse general	1127.3
Entrada 2016-2018	Condo/townhouse high rise	0
Entrada 2016-2018	Mobile home park	0
Entrada 2016-2018	Retirement community	0
Entrada 2016-2018	Congregate care (Assisted Living) Facility	0
Entrada 2016-2018	Day-care center	0
Entrada 2016-2018	Elementary school	0
Entrada 2016-2018	Junior high school	0
Entrada 2016-2018	High school	0
Entrada 2016-2018	Junior college (2 yrs)	0
Entrada 2016-2018	University/college (4 yrs)	0
Entrada 2016-2018	Library	0
Entrada 2016-2018	Place of worship	0
Entrada 2016-2018	City park	0
Entrada 2016-2018	Racquet club	0
Entrada 2016-2018	Racquetball/health	0
Entrada 2016-2018	Quality resturant	0
Entrada 2016-2018	High turnover (sit-down) rest.	0
Entrada 2016-2018	Fast food rest. w/ drive thru	0
Entrada 2016-2018	Fast food rest. w/o drive thru	0
Entrada 2016-2018	Hotel	0
Entrada 2016-2018	Motel	0
Entrada 2016-2018	Free-standing discount store	0
Entrada 2016-2018	Free-standing discount superstore	0
Entrada 2016-2018	Discount club	0
Entrada 2016-2018	Regnl shop. center	262.5
Entrada 2016-2018	Electronic superstore	0
Entrada 2016-2018	Home improvement superstore	0
Entrada 2016-2018	Strip mall	0
Entrada 2016-2018	Hardware/paint store	0
Entrada 2016-2018	Supermarket	0
Entrada 2016-2018	Convenience market (24 hour)	0
Entrada 2016-2018	Convenience market with gas pumps	0
Entrada 2016-2018	Gasoline/service station	0
Entrada 2016-2018	Bank (with drive-through)	0
Entrada 2016-2018	General office building	0
Entrada 2016-2018	Office park	187.5
Entrada 2016-2018	Goverment office building	0
Entrada 2016-2018	Government (civic center)	0
Entrada 2016-2018	Pharmacy/drugstore with drive through	0
Entrada 2016-2018	Pharmacy/drugstore without drive through	0
Entrada 2016-2018	Medical office building	0
Entrada 2016-2018	Hospital	0
Entrada 2016-2018	Warehouse	0
Entrada 2016-2018	General light industry	0
Entrada 2016-2018	General heavy industry	0
Entrada 2016-2018	Industrial park	0
Entrada 2016-2018	Manufacturing	0
Entrada 2016-2018	Blank (Edit this description)	0
Entrada 2016-2018	Blank (Edit this description)	0
Entrada 2016-2018	Blank (Edit this description)	0
Entrada 2016-2018	Blank (Edit this description)	0
Entrada 2016-2018	Blank (Edit this description)	0

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Urbemis 2007 Version 9.2.2

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

File Name: C:\Documents and Settings\bpayer\Desktop\Building Construction\Entrada (5)\Entrada 2016-2018.urb9

Project Name: Entrada 2016-2018

Project Location: Los Angeles County

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)

	CO_2
2016	3,493.29
Asphalt 01/01/2016-02/17/2016	47.73
Paving Off-Gas	0.00
Paving Off Road Diesel	24.12
Paving On Road Diesel	20.97
Paving Worker Trips	2.64
Building 01/01/2016-12/31/2018	3,434.71
Building Off Road Diesel	294.84
Building Vendor Trips	999.75
Building Worker Trips	2,140.12
Coating 01/01/2016-12/31/2018	10.86
Architectural Coating	0.00
Coating Worker Trips	10.86
2017	3,432.22
Building 01/01/2016-12/31/2018	3,421.40
Building Off Road Diesel	293.71
Building Vendor Trips	995.94
Building Worker Trips	2,131.75
Coating 01/01/2016-12/31/2018	10.82
Architectural Coating	0.00
Coating Worker Trips	10.82
2018	3,445.34
Building 01/01/2016-12/31/2018	3,434.48
Building Off Road Diesel	294.84
Building Vendor Trips	999.81
Building Worker Trips	2,139.83
Coating 01/01/2016-12/31/2018	10.86
Architectural Coating	0.00
Coating Worker Trips	10.86

Phase Assumptions

Phase: Paving 01/01/2016 - 02/17/2016 - Default Paving Description
Acres to be Paved: 27.56
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/01/2016 - 12/31/2018 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/01/2016 - 12/31/2018 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

ENTRADA

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Entrada 2019-2022	Single family housing	0
Entrada 2019-2022	Apartments low rise	0
Entrada 2019-2022	Apartments mid rise	0
Entrada 2019-2022	Apartments high rise	0
Entrada 2019-2022	Condo/townhouse general	133
Entrada 2019-2022	Condo/townhouse high rise	0
Entrada 2019-2022	Mobile home park	0
Entrada 2019-2022	Retirement community	0
Entrada 2019-2022	Congregate care (Assisted Living) Facility	0
Entrada 2019-2022	Day-care center	0
Entrada 2019-2022	Elementary school	0
Entrada 2019-2022	Junior high school	0
Entrada 2019-2022	High school	0
Entrada 2019-2022	Junior college (2 yrs)	0
Entrada 2019-2022	University/college (4 yrs)	0
Entrada 2019-2022	Library	0
Entrada 2019-2022	Place of worship	0
Entrada 2019-2022	City park	0
Entrada 2019-2022	Racquet club	0
Entrada 2019-2022	Racquetball/health	0
Entrada 2019-2022	Quality resturant	0
Entrada 2019-2022	High turnover (sit-down) rest.	0
Entrada 2019-2022	Fast food rest. w/ drive thru	0
Entrada 2019-2022	Fast food rest. w/o drive thru	0
Entrada 2019-2022	Hotel	0
Entrada 2019-2022	Motel	0
Entrada 2019-2022	Free-standing discount store	0
Entrada 2019-2022	Free-standing discount superstore	0
Entrada 2019-2022	Discount club	0
Entrada 2019-2022	Regnl shop. center	250
Entrada 2019-2022	Electronic superstore	0
Entrada 2019-2022	Home improvement superstore	0
Entrada 2019-2022	Strip mall	0
Entrada 2019-2022	Hardware/paint store	0
Entrada 2019-2022	Supermarket	0
Entrada 2019-2022	Convenience market (24 hour)	0
Entrada 2019-2022	Convenience market with gas pumps	0
Entrada 2019-2022	Gasoline/service station	0
Entrada 2019-2022	Bank (with drive-through)	0
Entrada 2019-2022	General office building	0
Entrada 2019-2022	Office park	0
Entrada 2019-2022	Goverment office building	0
Entrada 2019-2022	Government (civic center)	0
Entrada 2019-2022	Pharmacy/drugstore with drive through	0
Entrada 2019-2022	Pharmacy/drugstore without drive through	0
Entrada 2019-2022	Medical office building	0
Entrada 2019-2022	Hospital	0
Entrada 2019-2022	Warehouse	0
Entrada 2019-2022	General light industry	0
Entrada 2019-2022	General heavy industry	0
Entrada 2019-2022	Industrial park	0
Entrada 2019-2022	Manufacturing	0
Entrada 2019-2022	Blank (Edit this description)	0
Entrada 2019-2022	Blank (Edit this description)	0
Entrada 2019-2022	Blank (Edit this description)	0
Entrada 2019-2022	Blank (Edit this description)	0
Entrada 2019-2022	Blank (Edit this description)	0

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

File Name: C:\Documents and Settings\bpayer\Desktop\Building Construction\Entrada (5)\Entrada 2019-2022.urb9

Project Name: Entrada 2019-2022

Project Location: Los Angeles County

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)

	CO2
2019	818.16
Asphalt 01/01/2019-03/04/2019	41.97
Paving Off-Gas	0.00
Paving Off Road Diesel	31.91
Paving On Road Diesel	3.77
Paving Worker Trips	6.29
Building 01/01/2019-12/30/2022	774.63
Building Off Road Diesel	211.57
Building Vendor Trips	148.46
Building Worker Trips	414.60
Coating 01/01/2019-12/30/2022	1.56
Architectural Coating	0.00
Coating Worker Trips	1.56
2020	779.16
Building 01/01/2019-12/30/2022	777.59
Building Off Road Diesel	212.38
Building Vendor Trips	149.04
Building Worker Trips	416.17
Coating 01/01/2019-12/30/2022	1.57
Architectural Coating	0.00
Coating Worker Trips	1.57
2021	776.21
Building 01/01/2019-12/30/2022	774.65
Building Off Road Diesel	211.57
Building Vendor Trips	148.50
Building Worker Trips	414.58
Coating 01/01/2019-12/30/2022	1.56
Architectural Coating	0.00
Coating Worker Trips	1.56
2022	773.24
Building 01/01/2019-12/30/2022	771.68
Building Off Road Diesel	210.76
Building Vendor Trips	147.94
Building Worker Trips	412.99
Coating 01/01/2019-12/30/2022	1.56
Architectural Coating	0.00
Coating Worker Trips	1.56

Phase Assumptions

Phase: Paving 01/01/2019 - 03/04/2019 - Default Paving Description
Acres to be Paved: 4.95
Off-Road Equipment:
4 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
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 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 01/01/2019 - 12/30/2022 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day
2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day
1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/01/2019 - 12/30/2022 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

ENTRADA

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Entrada 2023-2025	Single family housing	0
Entrada 2023-2025	Apartments low rise	0
Entrada 2023-2025	Apartments mid rise	0
Entrada 2023-2025	Apartments high rise	0
Entrada 2023-2025	Condo/townhouse general	0
Entrada 2023-2025	Condo/townhouse high rise	0
Entrada 2023-2025	Mobile home park	0
Entrada 2023-2025	Retirement community	0
Entrada 2023-2025	Congregate care (Assisted Living) Facility	0
Entrada 2023-2025	Day-care center	0
Entrada 2023-2025	Elementary school	0
Entrada 2023-2025	Junior high school	0
Entrada 2023-2025	High school	0
Entrada 2023-2025	Junior college (2 yrs)	0
Entrada 2023-2025	University/college (4 yrs)	0
Entrada 2023-2025	Library	0
Entrada 2023-2025	Place of worship	0
Entrada 2023-2025	City park	0
Entrada 2023-2025	Racquet club	0
Entrada 2023-2025	Racquetball/health	0
Entrada 2023-2025	Quality resturant	0
Entrada 2023-2025	High turnover (sit-down) rest.	0
Entrada 2023-2025	Fast food rest. w/ drive thru	0
Entrada 2023-2025	Fast food rest. w/o drive thru	0
Entrada 2023-2025	Hotel	300
Entrada 2023-2025	Motel	0
Entrada 2023-2025	Free-standing discount store	0
Entrada 2023-2025	Free-standing discount superstore	0
Entrada 2023-2025	Discount club	0
Entrada 2023-2025	Regnl shop. center	338.3
Entrada 2023-2025	Electronic superstore	0
Entrada 2023-2025	Home improvement superstore	0
Entrada 2023-2025	Strip mall	0
Entrada 2023-2025	Hardware/paint store	0
Entrada 2023-2025	Supermarket	0
Entrada 2023-2025	Convenience market (24 hour)	0
Entrada 2023-2025	Convenience market with gas pumps	0
Entrada 2023-2025	Gasoline/service station	0
Entrada 2023-2025	Bank (with drive-through)	0
Entrada 2023-2025	General office building	0
Entrada 2023-2025	Office park	50
Entrada 2023-2025	Goverment office building	0
Entrada 2023-2025	Government (civic center)	0
Entrada 2023-2025	Pharmacy/drugstore with drive through	0
Entrada 2023-2025	Pharmacy/drugstore without drive through	0
Entrada 2023-2025	Medical office building	0
Entrada 2023-2025	Hospital	0
Entrada 2023-2025	Warehouse	0
Entrada 2023-2025	General light industry	0
Entrada 2023-2025	General heavy industry	0
Entrada 2023-2025	Industrial park	0
Entrada 2023-2025	Manufacturing	0
Entrada 2023-2025	Blank (Edit this description)	0
Entrada 2023-2025	Blank (Edit this description)	0
Entrada 2023-2025	Blank (Edit this description)	0
Entrada 2023-2025	Blank (Edit this description)	0
Entrada 2023-2025	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Entrada (5)\Entrada 2023-2025.urb9

Project Name: Entrada 2023-2025

Project Location: Los Angeles County

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)

	CO2
2023	942.13
Asphalt 01/02/2023-02/17/2023	28.86
Paving Off-Gas	0.00
Paving Off Road Diesel	19.81
Paving On Road Diesel	4.70
Paving Worker Trips	4.35
Building 01/02/2023-12/31/2025	910.49
Building Off Road Diesel	210.76
Building Vendor Trips	143.43
Building Worker Trips	556.30
Coating 01/02/2023-12/31/2025	2.78
Architectural Coating	0.00
Coating Worker Trips	2.78
2024	920.29
Building 01/02/2023-12/31/2025	917.50
Building Off Road Diesel	212.38
Building Vendor Trips	144.54
Building Worker Trips	560.58
Coating 01/02/2023-12/31/2025	2.80
Architectural Coating	0.00
Coating Worker Trips	2.80
2025	916.78
Building 01/02/2023-12/31/2025	914.00
Building Off Road Diesel	211.57
Building Vendor Trips	143.99
Building Worker Trips	558.44
Coating 01/02/2023-12/31/2025	2.79
Architectural Coating	0.00
Coating Worker Trips	2.79

Phase Assumptions

Phase: Paving 01/02/2023 - 02/17/2023 - Default Paving Description
Acres to be Paved: 6.18
Off-Road Equipment:
4 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
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

Phase: Building Construction 01/02/2023 - 12/31/2025 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day
2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day
1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/02/2023 - 12/31/2025 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

ENTRADA

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Entrada 2026-2030	Single family housing	0
Entrada 2026-2030	Apartments low rise	0
Entrada 2026-2030	Apartments mid rise	0
Entrada 2026-2030	Apartments high rise	0
Entrada 2026-2030	Condo/townhouse general	0
Entrada 2026-2030	Condo/townhouse high rise	0
Entrada 2026-2030	Mobile home park	0
Entrada 2026-2030	Retirement community	0
Entrada 2026-2030	Congregate care (Assisted Living) Facility	0
Entrada 2026-2030	Day-care center	0
Entrada 2026-2030	Elementary school	0
Entrada 2026-2030	Junior high school	0
Entrada 2026-2030	High school	0
Entrada 2026-2030	Junior college (2 yrs)	0
Entrada 2026-2030	University/college (4 yrs)	0
Entrada 2026-2030	Library	0
Entrada 2026-2030	Place of worship	0
Entrada 2026-2030	City park	0
Entrada 2026-2030	Racquet club	0
Entrada 2026-2030	Racquetball/health	0
Entrada 2026-2030	Quality resturant	0
Entrada 2026-2030	High turnover (sit-down) rest.	0
Entrada 2026-2030	Fast food rest. w/ drive thru	0
Entrada 2026-2030	Fast food rest. w/o drive thru	0
Entrada 2026-2030	Hotel	0
Entrada 2026-2030	Motel	0
Entrada 2026-2030	Free-standing discount store	0
Entrada 2026-2030	Free-standing discount superstore	115.21
Entrada 2026-2030	Discount club	0
Entrada 2026-2030	Regnl shop. center	250
Entrada 2026-2030	Electronic superstore	0
Entrada 2026-2030	Home improvement superstore	0
Entrada 2026-2030	Strip mall	0
Entrada 2026-2030	Hardware/paint store	0
Entrada 2026-2030	Supermarket	0
Entrada 2026-2030	Convenience market (24 hour)	0
Entrada 2026-2030	Convenience market with gas pumps	0
Entrada 2026-2030	Gasoline/service station	0
Entrada 2026-2030	Bank (with drive-through)	0
Entrada 2026-2030	General office building	0
Entrada 2026-2030	Office park	100
Entrada 2026-2030	Goverment office building	0
Entrada 2026-2030	Government (civic center)	0
Entrada 2026-2030	Pharmacy/drugstore with drive through	0
Entrada 2026-2030	Pharmacy/drugstore without drive through	0
Entrada 2026-2030	Medical office building	0
Entrada 2026-2030	Hospital	0
Entrada 2026-2030	Warehouse	0
Entrada 2026-2030	General light industry	0
Entrada 2026-2030	General heavy industry	0
Entrada 2026-2030	Industrial park	0
Entrada 2026-2030	Manufacturing	0
Entrada 2026-2030	Blank (Edit this description)	0
Entrada 2026-2030	Blank (Edit this description)	0
Entrada 2026-2030	Blank (Edit this description)	0
Entrada 2026-2030	Blank (Edit this description)	0
Entrada 2026-2030	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Entrada (5)\Entrada 2026-2030.urb9

Project Name: Entrada 2026-2030

Project Location: Los Angeles County

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)

	CO_2
2026	320.87
Asphalt 01/01/2026-03/20/2026	43.40
Paving Off-Gas	0.00
Paving Off Road Diesel	32.26
Paving On Road Diesel	4.06
Paving Worker Trips	7.08
Coating 01/01/2026-12/31/2030	1.45
Architectural Coating	0.00
Coating Worker Trips	1.45
Building 09/01/2026-08/30/2030	276.03
Building Off Road Diesel	71.33
Building Vendor Trips	41.96
Building Worker Trips	162.73
2027	820.11
Building 09/01/2026-08/30/2030	818.67
Building Off Road Diesel	211.57
Building Vendor Trips	124.46
Building Worker Trips	482.65
Coating 01/01/2026-12/31/2030	1.45
Architectural Coating	0.00
Coating Worker Trips	1.45
2028	816.97
Building 09/01/2026-08/30/2030	815.53
Building Off Road Diesel	210.76
Building Vendor Trips	123.98
Building Worker Trips	480.80
Coating 01/01/2026-12/31/2030	1.44
Architectural Coating	0.00
Coating Worker Trips	1.44
2029	820.11
Building 09/01/2026-08/30/2030	818.67
Building Off Road Diesel	211.57
Building Vendor Trips	124.46
Building Worker Trips	482.65
Coating 01/01/2026-12/31/2030	1.45
Architectural Coating	0.00
Coating Worker Trips	1.45
2030	547.22
Building 09/01/2026-08/30/2030	545.78
Building Off Road Diesel	141.04
Building Vendor Trips	82.97
Building Worker Trips	321.76
Coating 01/01/2026-12/31/2030	1.45
Architectural Coating	0.00
Coating Worker Trips	1.45

Phase Assumptions

Phase: Paving 01/01/2026 - 03/20/2026 - Default Paving Description
Acres to be Paved: 5.34
Off-Road Equipment:
4 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
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

Phase: Building Construction 09/01/2026 - 08/30/2030 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day
2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day
1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/01/2026 - 12/31/2030 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

HOMESTEAD

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Homestead 2011-2015	Single family housing	115.3
Homestead 2011-2015	Apartments low rise	0
Homestead 2011-2015	Apartments mid rise	0
Homestead 2011-2015	Apartments high rise	0
Homestead 2011-2015	Condo/townhouse general	1095.3
Homestead 2011-2015	Condo/townhouse high rise	0
Homestead 2011-2015	Mobile home park	0
Homestead 2011-2015	Retirement community	0
Homestead 2011-2015	Congregate care (Assisted Living) Facility	0
Homestead 2011-2015	Day-care center	0
Homestead 2011-2015	Elementary school	150
Homestead 2011-2015	Junior high school	0
Homestead 2011-2015	High school	0
Homestead 2011-2015	Junior college (2 yrs)	0
Homestead 2011-2015	University/college (4 yrs)	0
Homestead 2011-2015	Library	0
Homestead 2011-2015	Place of worship	0
Homestead 2011-2015	City park	8.7
Homestead 2011-2015	Racquet club	0
Homestead 2011-2015	Racquetball/health	0
Homestead 2011-2015	Quality resturant	0
Homestead 2011-2015	High turnover (sit-down) rest.	0
Homestead 2011-2015	Fast food rest. w/ drive thru	0
Homestead 2011-2015	Fast food rest. w/o drive thru	0
Homestead 2011-2015	Hotel	0
Homestead 2011-2015	Motel	0
Homestead 2011-2015	Free-standing discount store	0
Homestead 2011-2015	Free-standing discount superstore	0
Homestead 2011-2015	Discount club	0
Homestead 2011-2015	Regnl shop. center	0
Homestead 2011-2015	Electronic superstore	0
Homestead 2011-2015	Home improvement superstore	0
Homestead 2011-2015	Strip mall	0
Homestead 2011-2015	Hardware/paint store	0
Homestead 2011-2015	Supermarket	0
Homestead 2011-2015	Convenience market (24 hour)	0
Homestead 2011-2015	Convenience market with gas pumps	0
Homestead 2011-2015	Gasoline/service station	0
Homestead 2011-2015	Bank (with drive-through)	0
Homestead 2011-2015	General office building	0
Homestead 2011-2015	Office park	0
Homestead 2011-2015	Goverment office building	0
Homestead 2011-2015	Government (civic center)	0
Homestead 2011-2015	Pharmacy/drugstore with drive through	0
Homestead 2011-2015	Pharmacy/drugstore without drive through	0
Homestead 2011-2015	Medical office building	0
Homestead 2011-2015	Hospital	0
Homestead 2011-2015	Warehouse	0
Homestead 2011-2015	General light industry	0
Homestead 2011-2015	General heavy industry	0
Homestead 2011-2015	Industrial park	0
Homestead 2011-2015	Manufacturing	0
Homestead 2011-2015	Blank (Edit this description)	0
Homestead 2011-2015	Blank (Edit this description)	0
Homestead 2011-2015	Blank (Edit this description)	0
Homestead 2011-2015	Blank (Edit this description)	0
Homestead 2011-2015	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Homestead (4)\Homestead 2011-2015.urb9

Project Name: Homestead 2011-2015

Project Location: Los Angeles County

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)

	CO2
2011	2,918.69
Asphalt 01/03/2011-03/23/2011	67.73
Paving Off-Gas	0.00
Paving Off Road Diesel	41.15
Paving On Road Diesel	22.08
Paving Worker Trips	4.51
Building 01/03/2011-12/31/2015	2,847.51
Building Off Road Diesel	293.71
Building Vendor Trips	742.74
Building Worker Trips	1,811.07
Coating 05/02/2011-12/31/2015	3.45
Architectural Coating	0.00
Coating Worker Trips	3.45
2012	2,863.29
Building 01/03/2011-12/31/2015	2,858.14
Building Off Road Diesel	294.84
Building Vendor Trips	745.59
Building Worker Trips	1,817.72
Coating 05/02/2011-12/31/2015	5.15
Architectural Coating	0.00
Coating Worker Trips	5.15
2013	2,863.07
Building 01/03/2011-12/31/2015	2,857.92
Building Off Road Diesel	294.84
Building Vendor Trips	745.60
Building Worker Trips	1,817.48
Coating 05/02/2011-12/31/2015	5.15
Architectural Coating	0.00
Coating Worker Trips	5.15
2014	2,862.88
Building 01/03/2011-12/31/2015	2,857.73
Building Off Road Diesel	294.84
Building Vendor Trips	745.61
Building Worker Trips	1,817.29
Coating 05/02/2011-12/31/2015	5.15
Architectural Coating	0.00
Coating Worker Trips	5.15
2015	2,862.74
Building 01/03/2011-12/31/2015	2,857.59
Building Off Road Diesel	294.84
Building Vendor Trips	745.63
Building Worker Trips	1,817.13
Coating 05/02/2011-12/31/2015	5.15
Architectural Coating	0.00
Coating Worker Trips	5.15

Phase Assumptions

Phase: Paving 01/03/2011 - 03/23/2011 - Default Paving Description
Acres to be Paved: 29.02
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/03/2011 - 12/31/2015 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 05/02/2011 - 12/31/2015 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

HOMESTEAD

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Homestead 2016-2020	Single family housing	538.8
Homestead 2016-2020	Apartments low rise	0
Homestead 2016-2020	Apartments mid rise	0
Homestead 2016-2020	Apartments high rise	0
Homestead 2016-2020	Condo/townhouse general	1588.3
Homestead 2016-2020	Condo/townhouse high rise	0
Homestead 2016-2020	Mobile home park	0
Homestead 2016-2020	Retirement community	0
Homestead 2016-2020	Congregate care (Assisted Living) Facility	0
Homestead 2016-2020	Day-care center	0
Homestead 2016-2020	Elementary school	950
Homestead 2016-2020	Junior high school	0
Homestead 2016-2020	High school	650
Homestead 2016-2020	Junior college (2 yrs)	0
Homestead 2016-2020	University/college (4 yrs)	0
Homestead 2016-2020	Library	0
Homestead 2016-2020	Place of worship	0
Homestead 2016-2020	City park	15
Homestead 2016-2020	Racquet club	0
Homestead 2016-2020	Racquetball/health	0
Homestead 2016-2020	Quality resturant	0
Homestead 2016-2020	High turnover (sit-down) rest.	0
Homestead 2016-2020	Fast food rest. w/ drive thru	0
Homestead 2016-2020	Fast food rest. w/o drive thru	0
Homestead 2016-2020	Hotel	0
Homestead 2016-2020	Motel	0
Homestead 2016-2020	Free-standing discount store	0
Homestead 2016-2020	Free-standing discount superstore	0
Homestead 2016-2020	Discount club	0
Homestead 2016-2020	Regnl shop. center	0
Homestead 2016-2020	Electronic superstore	0
Homestead 2016-2020	Home improvement superstore	0
Homestead 2016-2020	Strip mall	0
Homestead 2016-2020	Hardware/paint store	0
Homestead 2016-2020	Supermarket	0
Homestead 2016-2020	Convenience market (24 hour)	0
Homestead 2016-2020	Convenience market with gas pumps	0
Homestead 2016-2020	Gasoline/service station	0
Homestead 2016-2020	Bank (with drive-through)	0
Homestead 2016-2020	General office building	0
Homestead 2016-2020	Office park	0
Homestead 2016-2020	Goverment office building	0
Homestead 2016-2020	Government (civic center)	0
Homestead 2016-2020	Pharmacy/drugstore with drive through	0
Homestead 2016-2020	Pharmacy/drugstore without drive through	0
Homestead 2016-2020	Medical office building	0
Homestead 2016-2020	Hospital	0
Homestead 2016-2020	Warehouse	0
Homestead 2016-2020	General light industry	0
Homestead 2016-2020	General heavy industry	0
Homestead 2016-2020	Industrial park	0
Homestead 2016-2020	Manufacturing	0
Homestead 2016-2020	Blank (Edit this description)	0
Homestead 2016-2020	Blank (Edit this description)	0
Homestead 2016-2020	Blank (Edit this description)	0
Homestead 2016-2020	Blank (Edit this description)	0
Homestead 2016-2020	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Homestead (4)\Homestead 2016-2020.urb9

Project Name: Homestead 2016-2020

Project Location: Los Angeles County

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)

	CO2
2016	5,435.81
Asphalt 01/01/2016-03/22/2016	102.65
Paving Off-Gas	0.00
Paving Off Road Diesel	41.15
Paving On Road Diesel	57.00
Paving Worker Trips	4.50
Building 01/01/2016-12/31/2020	5,323.03
Building Off Road Diesel	294.84
Building Vendor Trips	1,339.15
Building Worker Trips	3,689.05
Coating 01/01/2016-12/31/2020	10.12
Architectural Coating	0.00
Coating Worker Trips	10.12
2017	5,312.46
Building 01/01/2016-12/31/2020	5,302.38
Building Off Road Diesel	293.71
Building Vendor Trips	1,334.05
Building Worker Trips	3,674.62
Coating 01/01/2016-12/31/2020	10.08
Architectural Coating	0.00
Coating Worker Trips	10.08
2018	5,332.74
Building 01/01/2016-12/31/2020	5,322.62
Building Off Road Diesel	294.84
Building Vendor Trips	1,339.23
Building Worker Trips	3,688.55
Coating 01/01/2016-12/31/2020	10.12
Architectural Coating	0.00
Coating Worker Trips	10.12
2019	5,332.64
Building 01/01/2016-12/31/2020	5,322.52
Building Off Road Diesel	294.84
Building Vendor Trips	1,339.29
Building Worker Trips	3,688.40
Coating 01/01/2016-12/31/2020	10.12
Architectural Coating	0.00
Coating Worker Trips	10.12
2020	5,353.01
Building 01/01/2016-12/31/2020	5,342.85
Building Off Road Diesel	295.97
Building Vendor Trips	1,344.47
Building Worker Trips	3,702.41
Coating 01/01/2016-12/31/2020	10.16
Architectural Coating	0.00
Coating Worker Trips	10.16

Phase Assumptions

Phase: Paving 01/01/2016 - 03/22/2016 - Default Paving Description
Acres to be Paved: 74.93
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/01/2016 - 12/31/2020 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/01/2016 - 12/31/2020 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

HOMESTEAD

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Homestead 2021-2025	Single family housing	274
Homestead 2021-2025	Apartments low rise	0
Homestead 2021-2025	Apartments mid rise	0
Homestead 2021-2025	Apartments high rise	0
Homestead 2021-2025	Condo/townhouse general	2074.5
Homestead 2021-2025	Condo/townhouse high rise	0
Homestead 2021-2025	Mobile home park	0
Homestead 2021-2025	Retirement community	0
Homestead 2021-2025	Congregate care (Assisted Living) Facility	0
Homestead 2021-2025	Day-care center	0
Homestead 2021-2025	Elementary school	1700
Homestead 2021-2025	Junior high school	0
Homestead 2021-2025	High school	1350
Homestead 2021-2025	Junior college (2 yrs)	0
Homestead 2021-2025	University/college (4 yrs)	0
Homestead 2021-2025	Library	0
Homestead 2021-2025	Place of worship	0
Homestead 2021-2025	City park	20.8
Homestead 2021-2025	Racquet club	0
Homestead 2021-2025	Racquetball/health	0
Homestead 2021-2025	Quality resturant	0
Homestead 2021-2025	High turnover (sit-down) rest.	0
Homestead 2021-2025	Fast food rest. w/ drive thru	0
Homestead 2021-2025	Fast food rest. w/o drive thru	0
Homestead 2021-2025	Hotel	0
Homestead 2021-2025	Motel	0
Homestead 2021-2025	Free-standing discount store	0
Homestead 2021-2025	Free-standing discount superstore	0
Homestead 2021-2025	Discount club	0
Homestead 2021-2025	Regnl shop. center	0
Homestead 2021-2025	Electronic superstore	0
Homestead 2021-2025	Home improvement superstore	0
Homestead 2021-2025	Strip mall	0
Homestead 2021-2025	Hardware/paint store	0
Homestead 2021-2025	Supermarket	0
Homestead 2021-2025	Convenience market (24 hour)	0
Homestead 2021-2025	Convenience market with gas pumps	0
Homestead 2021-2025	Gasoline/service station	0
Homestead 2021-2025	Bank (with drive-through)	0
Homestead 2021-2025	General office building	0
Homestead 2021-2025	Office park	600
Homestead 2021-2025	Goverment office building	0
Homestead 2021-2025	Government (civic center)	0
Homestead 2021-2025	Pharmacy/drugstore with drive through	0
Homestead 2021-2025	Pharmacy/drugstore without drive through	0
Homestead 2021-2025	Medical office building	0
Homestead 2021-2025	Hospital	0
Homestead 2021-2025	Warehouse	0
Homestead 2021-2025	General light industry	0
Homestead 2021-2025	General heavy industry	0
Homestead 2021-2025	Industrial park	0
Homestead 2021-2025	Manufacturing	0
Homestead 2021-2025	Blank (Edit this description)	0
Homestead 2021-2025	Blank (Edit this description)	0
Homestead 2021-2025	Blank (Edit this description)	0
Homestead 2021-2025	Blank (Edit this description)	0
Homestead 2021-2025	Blank (Edit this description)	0

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

File Name: C:\Documents and Settings\bpayer\Desktop\Building Construction\Homestead (4)\Homestead 2021-2025.urb9

Project Name: Homestead 2021-2025

Project Location: Los Angeles County

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)

	CO2
2021	6,627.50
Asphalt 01/01/2021-03/23/2021	99.01
Paving Off-Gas	0.00
Paving Off Road Diesel	41.15
Paving On Road Diesel	53.36
Paving Worker Trips	4.50
Building 01/01/2021-12/31/2025	6,516.41
Building Off Road Diesel	294.84
Building Vendor Trips	1,667.49
Building Worker Trips	4,554.08
Coating 01/01/2021-12/31/2025	12.09
Architectural Coating	0.00
Coating Worker Trips	12.09
2022	6,503.49
Building 01/01/2021-12/31/2025	6,491.44
Building Off Road Diesel	293.71
Building Vendor Trips	1,661.10
Building Worker Trips	4,536.64
Coating 01/01/2021-12/31/2025	12.05
Architectural Coating	0.00
Coating Worker Trips	12.05
2023	6,503.49
Building 01/01/2021-12/31/2025	6,491.44
Building Off Road Diesel	293.71
Building Vendor Trips	1,661.10
Building Worker Trips	4,536.64
Coating 01/01/2021-12/31/2025	12.05
Architectural Coating	0.00
Coating Worker Trips	12.05
2024	6,553.51
Building 01/01/2021-12/31/2025	6,541.37
Building Off Road Diesel	295.97
Building Vendor Trips	1,673.87
Building Worker Trips	4,571.53
Coating 01/01/2021-12/31/2025	12.14
Architectural Coating	0.00
Coating Worker Trips	12.14
2025	6,528.50
Building 01/01/2021-12/31/2025	6,516.41
Building Off Road Diesel	294.84
Building Vendor Trips	1,667.49
Building Worker Trips	4,554.08
Coating 01/01/2021-12/31/2025	12.09
Architectural Coating	0.00
Coating Worker Trips	12.09

Phase Assumptions

Phase: Paving 01/01/2021 - 03/23/2021 - Default Paving Description
Acres to be Paved: 70.14
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/01/2021 - 12/31/2025 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/01/2021 - 12/31/2025 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

HOMESTEAD

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Homestead 2026-2030	Single family housing	0
Homestead 2026-2030	Apartments low rise	0
Homestead 2026-2030	Apartments mid rise	0
Homestead 2026-2030	Apartments high rise	0
Homestead 2026-2030	Condo/townhouse general	0
Homestead 2026-2030	Condo/townhouse high rise	0
Homestead 2026-2030	Mobile home park	0
Homestead 2026-2030	Retirement community	0
Homestead 2026-2030	Congregate care (Assisted Living) Facility	0
Homestead 2026-2030	Day-care center	0
Homestead 2026-2030	Elementary school	200
Homestead 2026-2030	Junior high school	0
Homestead 2026-2030	High school	400
Homestead 2026-2030	Junior college (2 yrs)	0
Homestead 2026-2030	University/college (4 yrs)	0
Homestead 2026-2030	Library	0
Homestead 2026-2030	Place of worship	0
Homestead 2026-2030	City park	0
Homestead 2026-2030	Racquet club	0
Homestead 2026-2030	Racquetball/health	0
Homestead 2026-2030	Quality resturant	0
Homestead 2026-2030	High turnover (sit-down) rest.	0
Homestead 2026-2030	Fast food rest. w/ drive thru	0
Homestead 2026-2030	Fast food rest. w/o drive thru	0
Homestead 2026-2030	Hotel	0
Homestead 2026-2030	Motel	0
Homestead 2026-2030	Free-standing discount store	0
Homestead 2026-2030	Free-standing discount superstore	0
Homestead 2026-2030	Discount club	0
Homestead 2026-2030	Regnl shop. center	0
Homestead 2026-2030	Electronic superstore	0
Homestead 2026-2030	Home improvement superstore	0
Homestead 2026-2030	Strip mall	0
Homestead 2026-2030	Hardware/paint store	0
Homestead 2026-2030	Supermarket	0
Homestead 2026-2030	Convenience market (24 hour)	0
Homestead 2026-2030	Convenience market with gas pumps	0
Homestead 2026-2030	Gasoline/service station	0
Homestead 2026-2030	Bank (with drive-through)	0
Homestead 2026-2030	General office building	0
Homestead 2026-2030	Office park	730
Homestead 2026-2030	Goverment office building	0
Homestead 2026-2030	Government (civic center)	0
Homestead 2026-2030	Pharmacy/drugstore with drive through	0
Homestead 2026-2030	Pharmacy/drugstore without drive through	0
Homestead 2026-2030	Medical office building	0
Homestead 2026-2030	Hospital	0
Homestead 2026-2030	Warehouse	0
Homestead 2026-2030	General light industry	0
Homestead 2026-2030	General heavy industry	0
Homestead 2026-2030	Industrial park	0
Homestead 2026-2030	Manufacturing	0
Homestead 2026-2030	Blank (Edit this description)	0
Homestead 2026-2030	Blank (Edit this description)	0
Homestead 2026-2030	Blank (Edit this description)	0
Homestead 2026-2030	Blank (Edit this description)	0
Homestead 2026-2030	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Homestead (4)\Homestead 2026-2030.urb9

Project Name: Homestead 2026-2030

Project Location: Los Angeles County

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)

	CO2
2026	1,289.75
Asphalt 01/01/2026-03/23/2026	46.85
Paving Off-Gas	0.00
Paving Off Road Diesel	32.83
Paving On Road Diesel	6.82
Paving Worker Trips	7.20
Building 01/01/2026-08/30/2030	1,230.78
Building Off Road Diesel	211.57
Building Vendor Trips	208.94
Building Worker Trips	810.27
Coating 01/01/2026-12/31/2026	12.13
Architectural Coating	0.00
Coating Worker Trips	12.13
2027	1,230.78
Building 01/01/2026-08/30/2030	1,230.78
Building Off Road Diesel	211.57
Building Vendor Trips	208.94
Building Worker Trips	810.27
2028	1,226.06
Building 01/01/2026-08/30/2030	1,226.06
Building Off Road Diesel	210.76
Building Vendor Trips	208.14
Building Worker Trips	807.17
2029	1,230.78
Building 01/01/2026-08/30/2030	1,230.78
Building Off Road Diesel	211.57
Building Vendor Trips	208.94
Building Worker Trips	810.27
2030	820.52
Building 01/01/2026-08/30/2030	820.52
Building Off Road Diesel	141.04
Building Vendor Trips	139.29
Building Worker Trips	540.18

Phase Assumptions

Phase: Paving 01/01/2026 - 03/23/2026 - Default Paving Description
Acres to be Paved: 8.96
Off-Road Equipment:
4 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
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

Phase: Building Construction 01/01/2026 - 08/30/2030 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day
2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day
1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/01/2026 - 12/31/2026 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

LANDMARK VILLAGE

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Landmark Village Construction 2008-2012	Single family housing	308
Landmark Village Construction 2008-2012	Apartments low rise	451
Landmark Village Construction 2008-2012	Apartments mid rise	0
Landmark Village Construction 2008-2012	Apartments high rise	0
Landmark Village Construction 2008-2012	Condo/townhouse general	685
Landmark Village Construction 2008-2012	Condo/townhouse high rise	0
Landmark Village Construction 2008-2012	Mobile home park	0
Landmark Village Construction 2008-2012	Retirement community	0
Landmark Village Construction 2008-2012	Congregate care (Assisted Living) Facility	0
Landmark Village Construction 2008-2012	Day-care center	0
Landmark Village Construction 2008-2012	Elementary school	750
Landmark Village Construction 2008-2012	Junior high school	0
Landmark Village Construction 2008-2012	High school	0
Landmark Village Construction 2008-2012	Junior college (2 yrs)	0
Landmark Village Construction 2008-2012	University/college (4 yrs)	0
Landmark Village Construction 2008-2012	Library	0
Landmark Village Construction 2008-2012	Place of worship	0
Landmark Village Construction 2008-2012	City park	16.1
Landmark Village Construction 2008-2012	Racquet club	0
Landmark Village Construction 2008-2012	Racquetball/health	0
Landmark Village Construction 2008-2012	Quality resturant	0
Landmark Village Construction 2008-2012	High turnover (sit-down) rest.	0
Landmark Village Construction 2008-2012	Fast food rest. w/ drive thru	0
Landmark Village Construction 2008-2012	Fast food rest. w/o drive thru	0
Landmark Village Construction 2008-2012	Hotel	0
Landmark Village Construction 2008-2012	Motel	0
Landmark Village Construction 2008-2012	Free-standing discount store	0
Landmark Village Construction 2008-2012	Free-standing discount superstore	252
Landmark Village Construction 2008-2012	Discount club	0
Landmark Village Construction 2008-2012	Regnl shop. center	0
Landmark Village Construction 2008-2012	Electronic superstore	0
Landmark Village Construction 2008-2012	Home improvement superstore	0
Landmark Village Construction 2008-2012	Strip mall	9.5
Landmark Village Construction 2008-2012	Hardware/paint store	0
Landmark Village Construction 2008-2012	Supermarket	76.1
Landmark Village Construction 2008-2012	Convenience market (24 hour)	0
Landmark Village Construction 2008-2012	Convenience market with gas pumps	0
Landmark Village Construction 2008-2012	Gasoline/service station	0
Landmark Village Construction 2008-2012	Bank (with drive-through)	0
Landmark Village Construction 2008-2012	General office building	0
Landmark Village Construction 2008-2012	Office park	695.4
Landmark Village Construction 2008-2012	Goverment office building	0
Landmark Village Construction 2008-2012	Government (civic center)	0
Landmark Village Construction 2008-2012	Pharmacy/drugstore with drive through	0
Landmark Village Construction 2008-2012	Pharmacy/drugstore without drive through	0
Landmark Village Construction 2008-2012	Medical office building	0
Landmark Village Construction 2008-2012	Hospital	0
Landmark Village Construction 2008-2012	Warehouse	0
Landmark Village Construction 2008-2012	General light industry	0
Landmark Village Construction 2008-2012	General heavy industry	0
Landmark Village Construction 2008-2012	Industrial park	0
Landmark Village Construction 2008-2012	Manufacturing	0
Landmark Village Construction 2008-2012	Blank (Edit this description)	0
Landmark Village Construction 2008-2012	Blank (Edit this description)	0
Landmark Village Construction 2008-2012	Blank (Edit this description)	0
Landmark Village Construction 2008-2012	Blank (Edit this description)	0
Landmark Village Construction 2008-2012	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Landmark (1)\Landmark 2008-2012.urb9

Project Name: Landmark Village Construction 2008-2012

Project Location: Los Angeles County

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)

	CO2
2008	1,624.03
Asphalt 10/01/2008-12/19/2008	97.32
Paving Off-Gas	0.00
Paving Off Road Diesel	41.15
Paving On Road Diesel	51.66
Paving Worker Trips	4.51
Building 10/01/2008-08/31/2012	1,526.71
Building Off Road Diesel	74.56
Building Vendor Trips	344.52
Building Worker Trips	1,107.64
2009	6,049.35
Building 10/01/2008-08/31/2012	6,035.39
Building Off Road Diesel	294.84
Building Vendor Trips	1,362.53
Building Worker Trips	4,378.02
Coating 02/02/2009-12/31/2012	13.96
Architectural Coating	0.00
Coating Worker Trips	13.96
2010	6,049.22
Building 10/01/2008-08/31/2012	6,033.99
Building Off Road Diesel	294.84
Building Vendor Trips	1,362.60
Building Worker Trips	4,376.55
Coating 02/02/2009-12/31/2012	15.24
Architectural Coating	0.00
Coating Worker Trips	15.24
2011	6,025.13
Building 10/01/2008-08/31/2012	6,009.95
Building Off Road Diesel	293.71
Building Vendor Trips	1,357.40
Building Worker Trips	4,358.85
Coating 02/02/2009-12/31/2012	15.18
Architectural Coating	0.00
Coating Worker Trips	15.18
2012	4,059.87
Building 10/01/2008-08/31/2012	4,044.64
Building Off Road Diesel	197.69
Building Vendor Trips	913.64
Building Worker Trips	2,933.32
Coating 02/02/2009-12/31/2012	15.23
Architectural Coating	0.00
Coating Worker Trips	15.23

Phase Assumptions

Phase: Paving 10/01/2008 - 12/19/2008 - Default Paving Description
Acres to be Paved: 67.91
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 10/01/2008 - 08/31/2012 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 02/02/2009 - 12/31/2012 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Mission Village 2009-2013	Single family housing	0
Mission Village 2009-2013	Apartments low rise	0
Mission Village 2009-2013	Apartments mid rise	0
Mission Village 2009-2013	Apartments high rise	0
Mission Village 2009-2013	Condo/townhouse general	1403
Mission Village 2009-2013	Condo/townhouse high rise	0
Mission Village 2009-2013	Mobile home park	0
Mission Village 2009-2013	Retirement community	0
Mission Village 2009-2013	Congregate care (Assisted Living) Facility	0
Mission Village 2009-2013	Day-care center	0
Mission Village 2009-2013	Elementary school	750
Mission Village 2009-2013	Junior high school	0
Mission Village 2009-2013	High school	0
Mission Village 2009-2013	Junior college (2 yrs)	0
Mission Village 2009-2013	University/college (4 yrs)	0
Mission Village 2009-2013	Library	0
Mission Village 2009-2013	Place of worship	0
Mission Village 2009-2013	City park	8.4
Mission Village 2009-2013	Racquet club	0
Mission Village 2009-2013	Racquetball/health	0
Mission Village 2009-2013	Quality resturant	0
Mission Village 2009-2013	High turnover (sit-down) rest.	0
Mission Village 2009-2013	Fast food rest. w/ drive thru	0
Mission Village 2009-2013	Fast food rest. w/o drive thru	0
Mission Village 2009-2013	Hotel	0
Mission Village 2009-2013	Motel	0
Mission Village 2009-2013	Free-standing discount store	0
Mission Village 2009-2013	Free-standing discount superstore	200
Mission Village 2009-2013	Discount club	0
Mission Village 2009-2013	Regnl shop. center	0
Mission Village 2009-2013	Electronic superstore	0
Mission Village 2009-2013	Home improvement superstore	0
Mission Village 2009-2013	Strip mall	16
Mission Village 2009-2013	Hardware/paint store	0
Mission Village 2009-2013	Supermarket	11.5
Mission Village 2009-2013	Convenience market (24 hour)	0
Mission Village 2009-2013	Convenience market with gas pumps	0
Mission Village 2009-2013	Gasoline/service station	0
Mission Village 2009-2013	Bank (with drive-through)	0
Mission Village 2009-2013	General office building	0
Mission Village 2009-2013	Office park	75
Mission Village 2009-2013	Goverment office building	0
Mission Village 2009-2013	Government (civic center)	0
Mission Village 2009-2013	Pharmacy/drugstore with drive through	0
Mission Village 2009-2013	Pharmacy/drugstore without drive through	0
Mission Village 2009-2013	Medical office building	0
Mission Village 2009-2013	Hospital	0
Mission Village 2009-2013	Warehouse	0
Mission Village 2009-2013	General light industry	0
Mission Village 2009-2013	General heavy industry	0
Mission Village 2009-2013	Industrial park	0
Mission Village 2009-2013	Manufacturing	0
Mission Village 2009-2013	Blank (Edit this description)	0
Mission Village 2009-2013	Blank (Edit this description)	0
Mission Village 2009-2013	Blank (Edit this description)	0
Mission Village 2009-2013	Blank (Edit this description)	0
Mission Village 2009-2013	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Mission (3)\Mission Village 2009-2013.urb9

Project Name: Mission Village 2009-2013

Project Location: Los Angeles County

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)

	CO_2
2009	4,783.84
Asphalt 07/01/2009-09/18/2009	116.65
Paving Off-Gas	0.00
Paving Off Road Diesel	41.15
Paving On Road Diesel	70.99
Paving Worker Trips	4.51
Building 07/01/2009-12/31/2013	4,665.29
Building Off Road Diesel	149.11
Building Vendor Trips	538.09
Building Worker Trips	3,978.09
Coating 11/02/2009-12/31/2013	1.90
Architectural Coating	0.00
Coating Worker Trips	1.90
2010	9,233.25
Building 07/01/2009-12/31/2013	9,221.95
Building Off Road Diesel	294.84
Building Vendor Trips	1,064.00
Building Worker Trips	7,863.12
Coating 11/02/2009-12/31/2013	11.29
Architectural Coating	0.00
Coating Worker Trips	11.29
2011	9,196.20
Building 07/01/2009-12/31/2013	9,184.95
Building Off Road Diesel	293.71
Building Vendor Trips	1,059.94
Building Worker Trips	7,831.30
Coating 11/02/2009-12/31/2013	11.25
Architectural Coating	0.00
Coating Worker Trips	11.25
2012	9,230.18
Building 07/01/2009-12/31/2013	9,218.89
Building Off Road Diesel	294.84
Building Vendor Trips	1,064.02
Building Worker Trips	7,860.04
Coating 11/02/2009-12/31/2013	11.29
Architectural Coating	0.00
Coating Worker Trips	11.29
2013	9,229.20
Building 07/01/2009-12/31/2013	9,217.91
Building Off Road Diesel	294.84
Building Vendor Trips	1,064.04
Building Worker Trips	7,859.03
Coating 11/02/2009-12/31/2013	11.29
Architectural Coating	0.00
Coating Worker Trips	11.29

Phase Assumptions

Phase: Paving 07/01/2009 - 09/18/2009 - Default Paving Description
Acres to be Paved: 93.32
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 07/01/2009 - 12/31/2013 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 11/02/2009 - 12/31/2013 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Mission Village 2014-2018	Single family housing	123
Mission Village 2014-2018	Apartments low rise	0
Mission Village 2014-2018	Apartments mid rise	0
Mission Village 2014-2018	Apartments high rise	0
Mission Village 2014-2018	Condo/townhouse general	2404
Mission Village 2014-2018	Condo/townhouse high rise	0
Mission Village 2014-2018	Mobile home park	0
Mission Village 2014-2018	Retirement community	0
Mission Village 2014-2018	Congregate care (Assisted Living) Facility	0
Mission Village 2014-2018	Day-care center	0
Mission Village 2014-2018	Elementary school	150
Mission Village 2014-2018	Junior high school	0
Mission Village 2014-2018	High school	0
Mission Village 2014-2018	Junior college (2 yrs)	0
Mission Village 2014-2018	University/college (4 yrs)	0
Mission Village 2014-2018	Library	0
Mission Village 2014-2018	Place of worship	0
Mission Village 2014-2018	City park	20.2
Mission Village 2014-2018	Racquet club	0
Mission Village 2014-2018	Racquetball/health	0
Mission Village 2014-2018	Quality resturant	0
Mission Village 2014-2018	High turnover (sit-down) rest.	0
Mission Village 2014-2018	Fast food rest. w/ drive thru	0
Mission Village 2014-2018	Fast food rest. w/o drive thru	0
Mission Village 2014-2018	Hotel	0
Mission Village 2014-2018	Motel	0
Mission Village 2014-2018	Free-standing discount store	0
Mission Village 2014-2018	Free-standing discount superstore	67.3
Mission Village 2014-2018	Discount club	0
Mission Village 2014-2018	Regnl shop. center	0
Mission Village 2014-2018	Electronic superstore	0
Mission Village 2014-2018	Home improvement superstore	0
Mission Village 2014-2018	Strip mall	0
Mission Village 2014-2018	Hardware/paint store	0
Mission Village 2014-2018	Supermarket	17.7
Mission Village 2014-2018	Convenience market (24 hour)	0
Mission Village 2014-2018	Convenience market with gas pumps	0
Mission Village 2014-2018	Gasoline/service station	0
Mission Village 2014-2018	Bank (with drive-through)	0
Mission Village 2014-2018	General office building	0
Mission Village 2014-2018	Office park	250
Mission Village 2014-2018	Goverment office building	0
Mission Village 2014-2018	Government (civic center)	0
Mission Village 2014-2018	Pharmacy/drugstore with drive through	0
Mission Village 2014-2018	Pharmacy/drugstore without drive through	0
Mission Village 2014-2018	Medical office building	0
Mission Village 2014-2018	Hospital	0
Mission Village 2014-2018	Warehouse	0
Mission Village 2014-2018	General light industry	0
Mission Village 2014-2018	General heavy industry	0
Mission Village 2014-2018	Industrial park	0
Mission Village 2014-2018	Manufacturing	0
Mission Village 2014-2018	Blank (Edit this description)	0
Mission Village 2014-2018	Blank (Edit this description)	0
Mission Village 2014-2018	Blank (Edit this description)	0
Mission Village 2014-2018	Blank (Edit this description)	0
Mission Village 2014-2018	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Mission (3)\Mission Village 2014-2018.urb9

Project Name: Mission Village 2014-2018

Project Location: Los Angeles County

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)

	CO2
2014	6,089.33
Asphalt 01/01/2014-03/21/2014	88.88
Paving Off-Gas	0.00
Paving Off Road Diesel	41.15
Paving On Road Diesel	43.23
Paving Worker Trips	4.50
Building 01/01/2014-12/31/2018	5,989.87
Building Off Road Diesel	294.84
Building Vendor Trips	1,642.85
Building Worker Trips	4,052.18
Coating 01/01/2014-12/31/2018	10.58
Architectural Coating	0.00
Coating Worker Trips	10.58
2015	6,000.13
Building 01/01/2014-12/31/2018	5,989.55
Building Off Road Diesel	294.84
Building Vendor Trips	1,642.89
Building Worker Trips	4,051.83
Coating 01/01/2014-12/31/2018	10.58
Architectural Coating	0.00
Coating Worker Trips	10.58
2016	5,999.68
Building 01/01/2014-12/31/2018	5,989.10
Building Off Road Diesel	294.84
Building Vendor Trips	1,642.91
Building Worker Trips	4,051.36
Coating 01/01/2014-12/31/2018	10.58
Architectural Coating	0.00
Coating Worker Trips	10.58
2017	5,976.41
Building 01/01/2014-12/31/2018	5,965.88
Building Off Road Diesel	293.71
Building Vendor Trips	1,636.66
Building Worker Trips	4,035.51
Coating 01/01/2014-12/31/2018	10.54
Architectural Coating	0.00
Coating Worker Trips	10.54
2018	5,999.23
Building 01/01/2014-12/31/2018	5,988.66
Building Off Road Diesel	294.84
Building Vendor Trips	1,643.01
Building Worker Trips	4,050.81
Coating 01/01/2014-12/31/2018	10.58
Architectural Coating	0.00
Coating Worker Trips	10.58

Phase Assumptions

Phase: Paving 01/01/2014 - 03/21/2014 - Default Paving Description
Acres to be Paved: 56.83
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/01/2014 - 12/31/2018 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/01/2014 - 12/31/2018 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Mission Village 2019-2024	Single family housing	168
Mission Village 2019-2024	Apartments low rise	0
Mission Village 2019-2024	Apartments mid rise	0
Mission Village 2019-2024	Apartments high rise	0
Mission Village 2019-2024	Condo/townhouse general	1233
Mission Village 2019-2024	Condo/townhouse high rise	0
Mission Village 2019-2024	Mobile home park	0
Mission Village 2019-2024	Retirement community	0
Mission Village 2019-2024	Congregate care (Assisted Living) Facility	0
Mission Village 2019-2024	Day-care center	0
Mission Village 2019-2024	Elementary school	0
Mission Village 2019-2024	Junior high school	0
Mission Village 2019-2024	High school	0
Mission Village 2019-2024	Junior college (2 yrs)	0
Mission Village 2019-2024	University/college (4 yrs)	0
Mission Village 2019-2024	Library	0
Mission Village 2019-2024	Place of worship	0
Mission Village 2019-2024	City park	0
Mission Village 2019-2024	Racquet club	0
Mission Village 2019-2024	Racquetball/health	0
Mission Village 2019-2024	Quality resturant	0
Mission Village 2019-2024	High turnover (sit-down) rest.	0
Mission Village 2019-2024	Fast food rest. w/ drive thru	0
Mission Village 2019-2024	Fast food rest. w/o drive thru	0
Mission Village 2019-2024	Hotel	0
Mission Village 2019-2024	Motel	0
Mission Village 2019-2024	Free-standing discount store	0
Mission Village 2019-2024	Free-standing discount superstore	0
Mission Village 2019-2024	Discount club	0
Mission Village 2019-2024	Regnl shop. center	0
Mission Village 2019-2024	Electronic superstore	0
Mission Village 2019-2024	Home improvement superstore	0
Mission Village 2019-2024	Strip mall	0
Mission Village 2019-2024	Hardware/paint store	0
Mission Village 2019-2024	Supermarket	0
Mission Village 2019-2024	Convenience market (24 hour)	0
Mission Village 2019-2024	Convenience market with gas pumps	0
Mission Village 2019-2024	Gasoline/service station	0
Mission Village 2019-2024	Bank (with drive-through)	0
Mission Village 2019-2024	General office building	0
Mission Village 2019-2024	Office park	661.5
Mission Village 2019-2024	Goverment office building	0
Mission Village 2019-2024	Government (civic center)	0
Mission Village 2019-2024	Pharmacy/drugstore with drive through	0
Mission Village 2019-2024	Pharmacy/drugstore without drive through	0
Mission Village 2019-2024	Medical office building	0
Mission Village 2019-2024	Hospital	0
Mission Village 2019-2024	Warehouse	0
Mission Village 2019-2024	General light industry	0
Mission Village 2019-2024	General heavy industry	0
Mission Village 2019-2024	Industrial park	0
Mission Village 2019-2024	Manufacturing	0
Mission Village 2019-2024	Blank (Edit this description)	0
Mission Village 2019-2024	Blank (Edit this description)	0
Mission Village 2019-2024	Blank (Edit this description)	0
Mission Village 2019-2024	Blank (Edit this description)	0
Mission Village 2019-2024	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Mission (3)\Mission Village 2019-2024.urb9

Project Name: Mission Village 2019-2024

Project Location: Los Angeles County

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)

	CO2
2019	3,170.60
Asphalt 01/01/2019-04/05/2019	78.47
Paving Off-Gas	0.00
Paving Off Road Diesel	48.95
Paving On Road Diesel	24.16
Paving Worker Trips	5.36
Building 01/01/2019-08/30/2024	3,087.07
Building Off Road Diesel	294.84
Building Vendor Trips	805.52
Building Worker Trips	1,986.72
Coating 01/01/2019-12/31/2024	5.07
Architectural Coating	0.00
Coating Worker Trips	5.07
2020	3,103.95
Building 01/01/2019-08/30/2024	3,098.87
Building Off Road Diesel	295.97
Building Vendor Trips	808.64
Building Worker Trips	1,994.26
Coating 01/01/2019-12/31/2024	5.09
Architectural Coating	0.00
Coating Worker Trips	5.09
2021	3,092.26
Building 01/01/2019-08/30/2024	3,087.19
Building Off Road Diesel	294.84
Building Vendor Trips	805.73
Building Worker Trips	1,986.63
Coating 01/01/2019-12/31/2024	5.07
Architectural Coating	0.00
Coating Worker Trips	5.07
2022	3,080.41
Building 01/01/2019-08/30/2024	3,075.36
Building Off Road Diesel	293.71
Building Vendor Trips	802.64
Building Worker Trips	1,979.01
Coating 01/01/2019-12/31/2024	5.05
Architectural Coating	0.00
Coating Worker Trips	5.05
2023	3,080.41
Building 01/01/2019-08/30/2024	3,075.36
Building Off Road Diesel	293.71
Building Vendor Trips	802.64
Building Worker Trips	1,979.01
Coating 01/01/2019-12/31/2024	5.05
Architectural Coating	0.00
Coating Worker Trips	5.05
2024	2,075.04
Building 01/01/2019-08/30/2024	2,069.96
Building Off Road Diesel	197.69
Building Vendor Trips	540.24
Building Worker Trips	1,332.03
Coating 01/01/2019-12/31/2024	5.09
Architectural Coating	0.00
Coating Worker Trips	5.09

Phase Assumptions

Phase: Paving 01/01/2019 - 04/05/2019 - Default Paving Description
Acres to be Paved: 31.76
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/01/2019 - 08/30/2024 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/01/2019 - 12/31/2024 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

POTRERO VILLAGE

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Potrero Village 2012-2016	Single family housing	370.5
Potrero Village 2012-2016	Apartments low rise	0
Potrero Village 2012-2016	Apartments mid rise	0
Potrero Village 2012-2016	Apartments high rise	0
Potrero Village 2012-2016	Condo/townhouse general	271
Potrero Village 2012-2016	Condo/townhouse high rise	0
Potrero Village 2012-2016	Mobile home park	0
Potrero Village 2012-2016	Retirement community	0
Potrero Village 2012-2016	Congregate care (Assisted Living) Facility	0
Potrero Village 2012-2016	Day-care center	0
Potrero Village 2012-2016	Elementary school	0
Potrero Village 2012-2016	Junior high school	0
Potrero Village 2012-2016	High school	0
Potrero Village 2012-2016	Junior college (2 yrs)	0
Potrero Village 2012-2016	University/college (4 yrs)	0
Potrero Village 2012-2016	Library	0
Potrero Village 2012-2016	Place of worship	0
Potrero Village 2012-2016	City park	0
Potrero Village 2012-2016	Racquet club	0
Potrero Village 2012-2016	Racquetball/health	0
Potrero Village 2012-2016	Quality resturant	0
Potrero Village 2012-2016	High turnover (sit-down) rest.	0
Potrero Village 2012-2016	Fast food rest. w/ drive thru	0
Potrero Village 2012-2016	Fast food rest. w/o drive thru	0
Potrero Village 2012-2016	Hotel	0
Potrero Village 2012-2016	Motel	0
Potrero Village 2012-2016	Free-standing discount store	0
Potrero Village 2012-2016	Free-standing discount superstore	0
Potrero Village 2012-2016	Discount club	0
Potrero Village 2012-2016	Regnl shop. center	0
Potrero Village 2012-2016	Electronic superstore	0
Potrero Village 2012-2016	Home improvement superstore	0
Potrero Village 2012-2016	Strip mall	0
Potrero Village 2012-2016	Hardware/paint store	0
Potrero Village 2012-2016	Supermarket	0
Potrero Village 2012-2016	Convenience market (24 hour)	0
Potrero Village 2012-2016	Convenience market with gas pumps	0
Potrero Village 2012-2016	Gasoline/service station	0
Potrero Village 2012-2016	Bank (with drive-through)	0
Potrero Village 2012-2016	General office building	0
Potrero Village 2012-2016	Office park	0
Potrero Village 2012-2016	Goverment office building	0
Potrero Village 2012-2016	Government (civic center)	0
Potrero Village 2012-2016	Pharmacy/drugstore with drive through	0
Potrero Village 2012-2016	Pharmacy/drugstore without drive through	0
Potrero Village 2012-2016	Medical office building	0
Potrero Village 2012-2016	Hospital	0
Potrero Village 2012-2016	Warehouse	0
Potrero Village 2012-2016	General light industry	0
Potrero Village 2012-2016	General heavy industry	0
Potrero Village 2012-2016	Industrial park	0
Potrero Village 2012-2016	Manufacturing	0
Potrero Village 2012-2016	Blank (Edit this description)	0
Potrero Village 2012-2016	Blank (Edit this description)	0
Potrero Village 2012-2016	Blank (Edit this description)	0
Potrero Village 2012-2016	Blank (Edit this description)	0
Potrero Village 2012-2016	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Potrero (4)\Potrero Village 2012-2016.urb9

Project Name: Potrero Village 2012-2016

Project Location: Los Angeles County

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)

	CO_2
2012	1,946.15
Asphalt 01/02/2012-03/22/2012	73.15
Paving Off-Gas	0.00
Paving Off Road Diesel	41.85
Paving On Road Diesel	26.71
Paving Worker Trips	4.58
Building 01/02/2012-12/30/2016	1,870.30
Building Off Road Diesel	294.84
Building Vendor Trips	393.58
Building Worker Trips	1,181.89
Coating 05/01/2012-12/30/2016	2.70
Architectural Coating	0.00
Coating Worker Trips	2.70
2013	1,874.19
Building 01/02/2012-12/30/2016	1,870.16
Building Off Road Diesel	294.84
Building Vendor Trips	393.59
Building Worker Trips	1,181.74
Coating 05/01/2012-12/30/2016	4.03
Architectural Coating	0.00
Coating Worker Trips	4.03
2014	1,874.07
Building 01/02/2012-12/30/2016	1,870.04
Building Off Road Diesel	294.84
Building Vendor Trips	393.59
Building Worker Trips	1,181.61
Coating 05/01/2012-12/30/2016	4.03
Architectural Coating	0.00
Coating Worker Trips	4.03
2015	1,873.97
Building 01/02/2012-12/30/2016	1,869.94
Building Off Road Diesel	294.84
Building Vendor Trips	393.60
Building Worker Trips	1,181.51
Coating 05/01/2012-12/30/2016	4.03
Architectural Coating	0.00
Coating Worker Trips	4.03
2016	1,873.84
Building 01/02/2012-12/30/2016	1,869.81
Building Off Road Diesel	294.84
Building Vendor Trips	393.61
Building Worker Trips	1,181.37
Coating 05/01/2012-12/30/2016	4.03
Architectural Coating	0.00
Coating Worker Trips	4.03

Phase Assumptions

Phase: Paving 01/02/2012 - 03/22/2012 - Default Paving Description
Acres to be Paved: 35.11
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/02/2012 - 12/30/2016 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 05/01/2012 - 12/30/2016 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

POTRERO VILLAGE

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Potrero Village 2017-2021	Single family housing	759
Potrero Village 2017-2021	Apartments low rise	398.3
Potrero Village 2017-2021	Apartments mid rise	0
Potrero Village 2017-2021	Apartments high rise	0
Potrero Village 2017-2021	Condo/townhouse general	1130.5
Potrero Village 2017-2021	Condo/townhouse high rise	0
Potrero Village 2017-2021	Mobile home park	0
Potrero Village 2017-2021	Retirement community	0
Potrero Village 2017-2021	Congregate care (Assisted Living) Facility	0
Potrero Village 2017-2021	Day-care center	0
Potrero Village 2017-2021	Elementary school	0
Potrero Village 2017-2021	Junior high school	0
Potrero Village 2017-2021	High school	0
Potrero Village 2017-2021	Junior college (2 yrs)	0
Potrero Village 2017-2021	University/college (4 yrs)	0
Potrero Village 2017-2021	Library	0
Potrero Village 2017-2021	Place of worship	0
Potrero Village 2017-2021	City park	135
Potrero Village 2017-2021	Racquet club	0
Potrero Village 2017-2021	Racquetball/health	0
Potrero Village 2017-2021	Quality resturant	0
Potrero Village 2017-2021	High turnover (sit-down) rest.	0
Potrero Village 2017-2021	Fast food rest. w/ drive thru	0
Potrero Village 2017-2021	Fast food rest. w/o drive thru	0
Potrero Village 2017-2021	Hotel	0
Potrero Village 2017-2021	Motel	0
Potrero Village 2017-2021	Free-standing discount store	0
Potrero Village 2017-2021	Free-standing discount superstore	300
Potrero Village 2017-2021	Discount club	0
Potrero Village 2017-2021	Regnl shop. center	0
Potrero Village 2017-2021	Electronic superstore	0
Potrero Village 2017-2021	Home improvement superstore	0
Potrero Village 2017-2021	Strip mall	0
Potrero Village 2017-2021	Hardware/paint store	0
Potrero Village 2017-2021	Supermarket	0
Potrero Village 2017-2021	Convenience market (24 hour)	0
Potrero Village 2017-2021	Convenience market with gas pumps	0
Potrero Village 2017-2021	Gasoline/service station	0
Potrero Village 2017-2021	Bank (with drive-through)	0
Potrero Village 2017-2021	General office building	0
Potrero Village 2017-2021	Office park	0
Potrero Village 2017-2021	Goverment office building	0
Potrero Village 2017-2021	Government (civic center)	0
Potrero Village 2017-2021	Pharmacy/drugstore with drive through	0
Potrero Village 2017-2021	Pharmacy/drugstore without drive through	0
Potrero Village 2017-2021	Medical office building	0
Potrero Village 2017-2021	Hospital	0
Potrero Village 2017-2021	Warehouse	0
Potrero Village 2017-2021	General light industry	0
Potrero Village 2017-2021	General heavy industry	0
Potrero Village 2017-2021	Industrial park	0
Potrero Village 2017-2021	Manufacturing	0
Potrero Village 2017-2021	Utilities	75
Potrero Village 2017-2021	Blank (Edit this description)	0
Potrero Village 2017-2021	Blank (Edit this description)	0
Potrero Village 2017-2021	Blank (Edit this description)	0
Potrero Village 2017-2021	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Potrero (4)\Potrero Village 2017-2021.urb9

Project Name: Potrero Village 2017-2021

Project Location: Los Angeles County

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)

	CO_2
2017	9,865.14
Asphalt 01/02/2017-03/23/2017	141.67
Paving Off-Gas	0.00
Paving Off Road Diesel	41.85
Paving On Road Diesel	95.23
Paving Worker Trips	4.58
Building 01/02/2017-12/31/2021	9,711.17
Building Off Road Diesel	293.71
Building Vendor Trips	1,498.27
Building Worker Trips	7,919.19
Coating 01/02/2017-12/31/2021	12.29
Architectural Coating	0.00
Coating Worker Trips	12.29
2018	9,760.48
Building 01/02/2017-12/31/2021	9,748.14
Building Off Road Diesel	294.84
Building Vendor Trips	1,504.08
Building Worker Trips	7,949.22
Coating 01/02/2017-12/31/2021	12.34
Architectural Coating	0.00
Coating Worker Trips	12.34
2019	9,760.21
Building 01/02/2017-12/31/2021	9,747.87
Building Off Road Diesel	294.84
Building Vendor Trips	1,504.15
Building Worker Trips	7,948.88
Coating 01/02/2017-12/31/2021	12.34
Architectural Coating	0.00
Coating Worker Trips	12.34
2020	9,797.40
Building 01/02/2017-12/31/2021	9,785.02
Building Off Road Diesel	295.97
Building Vendor Trips	1,509.97
Building Worker Trips	7,979.08
Coating 01/02/2017-12/31/2021	12.39
Architectural Coating	0.00
Coating Worker Trips	12.39
2021	9,760.23
Building 01/02/2017-12/31/2021	9,747.89
Building Off Road Diesel	294.84
Building Vendor Trips	1,504.54
Building Worker Trips	7,948.52
Coating 01/02/2017-12/31/2021	12.34
Architectural Coating	0.00
Coating Worker Trips	12.34

Phase Assumptions

Phase: Paving 01/02/2017 - 03/23/2017 - Default Paving Description
Acres to be Paved: 125.19
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/02/2017 - 12/31/2021 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/02/2017 - 12/31/2021 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

POTRERO VILLAGE

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Potrero Village 2022-2026	Single family housing	770.5
Potrero Village 2022-2026	Apartments low rise	859.2
Potrero Village 2022-2026	Apartments mid rise	0
Potrero Village 2022-2026	Apartments high rise	0
Potrero Village 2022-2026	Condo/townhouse general	1773.9
Potrero Village 2022-2026	Condo/townhouse high rise	0
Potrero Village 2022-2026	Mobile home park	0
Potrero Village 2022-2026	Retirement community	0
Potrero Village 2022-2026	Congregate care (Assisted Living) Facility	0
Potrero Village 2022-2026	Day-care center	0
Potrero Village 2022-2026	Elementary school	0
Potrero Village 2022-2026	Junior high school	0
Potrero Village 2022-2026	High school	0
Potrero Village 2022-2026	Junior college (2 yrs)	0
Potrero Village 2022-2026	University/college (4 yrs)	0
Potrero Village 2022-2026	Library	0
Potrero Village 2022-2026	Place of worship	0
Potrero Village 2022-2026	City park	45
Potrero Village 2022-2026	Racquet club	0
Potrero Village 2022-2026	Racquetball/health	0
Potrero Village 2022-2026	Quality resturant	0
Potrero Village 2022-2026	High turnover (sit-down) rest.	0
Potrero Village 2022-2026	Fast food rest. w/ drive thru	0
Potrero Village 2022-2026	Fast food rest. w/o drive thru	0
Potrero Village 2022-2026	Hotel	0
Potrero Village 2022-2026	Motel	0
Potrero Village 2022-2026	Free-standing discount store	0
Potrero Village 2022-2026	Free-standing discount superstore	591.4
Potrero Village 2022-2026	Discount club	0
Potrero Village 2022-2026	Regnl shop. center	0
Potrero Village 2022-2026	Electronic superstore	0
Potrero Village 2022-2026	Home improvement superstore	0
Potrero Village 2022-2026	Strip mall	0
Potrero Village 2022-2026	Hardware/paint store	0
Potrero Village 2022-2026	Supermarket	0
Potrero Village 2022-2026	Convenience market (24 hour)	0
Potrero Village 2022-2026	Convenience market with gas pumps	0
Potrero Village 2022-2026	Gasoline/service station	0
Potrero Village 2022-2026	Bank (with drive-through)	0
Potrero Village 2022-2026	General office building	0
Potrero Village 2022-2026	Office park	0
Potrero Village 2022-2026	Goverment office building	0
Potrero Village 2022-2026	Government (civic center)	0
Potrero Village 2022-2026	Pharmacy/drugstore with drive through	0
Potrero Village 2022-2026	Pharmacy/drugstore without drive through	0
Potrero Village 2022-2026	Medical office building	0
Potrero Village 2022-2026	Hospital	0
Potrero Village 2022-2026	Warehouse	0
Potrero Village 2022-2026	General light industry	0
Potrero Village 2022-2026	General heavy industry	0
Potrero Village 2022-2026	Industrial park	0
Potrero Village 2022-2026	Manufacturing	0
Potrero Village 2022-2026	Utilities	25
Potrero Village 2022-2026	Blank (Edit this description)	0
Potrero Village 2022-2026	Blank (Edit this description)	0
Potrero Village 2022-2026	Blank (Edit this description)	0
Potrero Village 2022-2026	Blank (Edit this description)	0

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Potrero (4)\Potrero Village 2022-2026.urb9

Project Name: Potrero Village 2022-2026

Project Location: Los Angeles County

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)

	CO2
2022	9,515.20
Asphalt 01/03/2022-03/23/2022	139.73
Paving Off-Gas	0.00
Paving Off Road Diesel	41.15
Paving On Road Diesel	94.09
Paving Worker Trips	4.50
Building 01/03/2022-12/31/2026	9,358.40
Building Off Road Diesel	293.71
Building Vendor Trips	2,245.34
Building Worker Trips	6,819.35
Coating 01/03/2022-12/31/2026	17.06
Architectural Coating	0.00
Coating Worker Trips	17.06
2023	9,375.46
Building 01/03/2022-12/31/2026	9,358.40
Building Off Road Diesel	293.71
Building Vendor Trips	2,245.34
Building Worker Trips	6,819.35
Coating 01/03/2022-12/31/2026	17.06
Architectural Coating	0.00
Coating Worker Trips	17.06
2024	9,447.58
Building 01/03/2022-12/31/2026	9,430.39
Building Off Road Diesel	295.97
Building Vendor Trips	2,262.61
Building Worker Trips	6,871.81
Coating 01/03/2022-12/31/2026	17.19
Architectural Coating	0.00
Coating Worker Trips	17.19
2025	9,411.52
Building 01/03/2022-12/31/2026	9,394.40
Building Off Road Diesel	294.84
Building Vendor Trips	2,253.98
Building Worker Trips	6,845.58
Coating 01/03/2022-12/31/2026	17.12
Architectural Coating	0.00
Coating Worker Trips	17.12
2026	9,412.23
Building 01/03/2022-12/31/2026	9,395.10
Building Off Road Diesel	294.84
Building Vendor Trips	2,254.32
Building Worker Trips	6,845.95
Coating 01/03/2022-12/31/2026	17.12
Architectural Coating	0.00
Coating Worker Trips	17.12

Phase Assumptions

Phase: Paving 01/03/2022 - 03/23/2022 - Default Paving Description
Acres to be Paved: 123.68
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/03/2022 - 12/31/2026 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/03/2022 - 12/31/2026 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

POTRERO VILLAGE

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Potrero Village 2027-2030	Single family housing	0
Potrero Village 2027-2030	Apartments low rise	941.6
Potrero Village 2027-2030	Apartments mid rise	0
Potrero Village 2027-2030	Apartments high rise	0
Potrero Village 2027-2030	Condo/townhouse general	1149.6
Potrero Village 2027-2030	Condo/townhouse high rise	0
Potrero Village 2027-2030	Mobile home park	0
Potrero Village 2027-2030	Retirement community	0
Potrero Village 2027-2030	Congregate care (Assisted Living) Facility	0
Potrero Village 2027-2030	Day-care center	0
Potrero Village 2027-2030	Elementary school	0
Potrero Village 2027-2030	Junior high school	0
Potrero Village 2027-2030	High school	0
Potrero Village 2027-2030	Junior college (2 yrs)	0
Potrero Village 2027-2030	University/college (4 yrs)	0
Potrero Village 2027-2030	Library	0
Potrero Village 2027-2030	Place of worship	0
Potrero Village 2027-2030	City park	0
Potrero Village 2027-2030	Racquet club	0
Potrero Village 2027-2030	Racquetball/health	0
Potrero Village 2027-2030	Quality resturant	0
Potrero Village 2027-2030	High turnover (sit-down) rest.	0
Potrero Village 2027-2030	Fast food rest. w/ drive thru	0
Potrero Village 2027-2030	Fast food rest. w/o drive thru	0
Potrero Village 2027-2030	Hotel	0
Potrero Village 2027-2030	Motel	0
Potrero Village 2027-2030	Free-standing discount store	0
Potrero Village 2027-2030	Free-standing discount superstore	365.6
Potrero Village 2027-2030	Discount club	0
Potrero Village 2027-2030	Regnl shop. center	0
Potrero Village 2027-2030	Electronic superstore	0
Potrero Village 2027-2030	Home improvement superstore	0
Potrero Village 2027-2030	Strip mall	0
Potrero Village 2027-2030	Hardware/paint store	0
Potrero Village 2027-2030	Supermarket	0
Potrero Village 2027-2030	Convenience market (24 hour)	0
Potrero Village 2027-2030	Convenience market with gas pumps	0
Potrero Village 2027-2030	Gasoline/service station	0
Potrero Village 2027-2030	Bank (with drive-through)	0
Potrero Village 2027-2030	General office building	0
Potrero Village 2027-2030	Office park	0
Potrero Village 2027-2030	Goverment office building	0
Potrero Village 2027-2030	Government (civic center)	0
Potrero Village 2027-2030	Pharmacy/drugstore with drive through	0
Potrero Village 2027-2030	Pharmacy/drugstore without drive through	0
Potrero Village 2027-2030	Medical office building	0
Potrero Village 2027-2030	Hospital	0
Potrero Village 2027-2030	Warehouse	0
Potrero Village 2027-2030	General light industry	0
Potrero Village 2027-2030	General heavy industry	0
Potrero Village 2027-2030	Industrial park	0
Potrero Village 2027-2030	Manufacturing	0
Potrero Village 2027-2030	Blank (Edit this description)	0
Potrero Village 2027-2030	Blank (Edit this description)	0
Potrero Village 2027-2030	Blank (Edit this description)	0
Potrero Village 2027-2030	Blank (Edit this description)	0
Potrero Village 2027-2030	Blank (Edit this description)	0

Urbemis 2007 Version 9.2.2

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

File Name: U:\Newhall Ranch\Construction\Building Construction\Potrero (4)\Potrero Village 2027-2030.urb9

Project Name: Potrero Village 2027-2030

Project Location: Los Angeles County

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)

	CO_2
2027	4,571.47
Asphalt 01/01/2027-03/05/2027	64.25
Paving Off-Gas	0.00
Paving Off Road Diesel	32.63
Paving On Road Diesel	28.05
Paving Worker Trips	3.57
Building 01/01/2027-08/30/2030	4,496.47
Building Off Road Diesel	294.84
Building Vendor Trips	1,381.56
Building Worker Trips	2,820.07
Coating 01/01/2027-12/31/2030	10.74
Architectural Coating	0.00
Coating Worker Trips	10.74
2028	4,489.95
Building 01/01/2027-08/30/2030	4,479.24
Building Off Road Diesel	293.71
Building Vendor Trips	1,376.27
Building Worker Trips	2,809.27
Coating 01/01/2027-12/31/2030	10.70
Architectural Coating	0.00
Coating Worker Trips	10.70
2029	4,507.22
Building 01/01/2027-08/30/2030	4,496.47
Building Off Road Diesel	294.84
Building Vendor Trips	1,381.56
Building Worker Trips	2,820.07
Coating 01/01/2027-12/31/2030	10.74
Architectural Coating	0.00
Coating Worker Trips	10.74
2030	3,008.39
Building 01/01/2027-08/30/2030	2,997.65
Building Off Road Diesel	196.56
Building Vendor Trips	921.04
Building Worker Trips	1,880.05
Coating 01/01/2027-12/31/2030	10.74
Architectural Coating	0.00
Coating Worker Trips	10.74

Phase Assumptions

Phase: Paving 01/01/2027 - 03/05/2027 - Default Paving Description
Acres to be Paved: 36.87
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/01/2027 - 08/30/2030 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 01/01/2027 - 12/31/2030 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Valencia Commerce Center 2008-2011	Single family housing	0
Valencia Commerce Center 2008-2011	Apartments low rise	0
Valencia Commerce Center 2008-2011	Apartments mid rise	0
Valencia Commerce Center 2008-2011	Apartments high rise	0
Valencia Commerce Center 2008-2011	Condo/townhouse general	0
Valencia Commerce Center 2008-2011	Condo/townhouse high rise	0
Valencia Commerce Center 2008-2011	Mobile home park	0
Valencia Commerce Center 2008-2011	Retirement community	0
Valencia Commerce Center 2008-2011	Congregate care (Assisted Living) Facility	0
Valencia Commerce Center 2008-2011	Day-care center	0
Valencia Commerce Center 2008-2011	Elementary school	0
Valencia Commerce Center 2008-2011	Junior high school	0
Valencia Commerce Center 2008-2011	High school	0
Valencia Commerce Center 2008-2011	Junior college (2 yrs)	0
Valencia Commerce Center 2008-2011	University/college (4 yrs)	0
Valencia Commerce Center 2008-2011	Library	0
Valencia Commerce Center 2008-2011	Place of worship	0
Valencia Commerce Center 2008-2011	City park	0
Valencia Commerce Center 2008-2011	Racquet club	0
Valencia Commerce Center 2008-2011	Racquetball/health	0
Valencia Commerce Center 2008-2011	Quality resturant	0
Valencia Commerce Center 2008-2011	High turnover (sit-down) rest.	0
Valencia Commerce Center 2008-2011	Fast food rest. w/ drive thru	0
Valencia Commerce Center 2008-2011	Fast food rest. w/o drive thru	0
Valencia Commerce Center 2008-2011	Hotel	0
Valencia Commerce Center 2008-2011	Motel	0
Valencia Commerce Center 2008-2011	Free-standing discount store	0
Valencia Commerce Center 2008-2011	Free-standing discount superstore	0
Valencia Commerce Center 2008-2011	Discount club	0
Valencia Commerce Center 2008-2011	Regnl shop. center	0
Valencia Commerce Center 2008-2011	Electronic superstore	0
Valencia Commerce Center 2008-2011	Home improvement superstore	0
Valencia Commerce Center 2008-2011	Strip mall	0
Valencia Commerce Center 2008-2011	Hardware/paint store	0
Valencia Commerce Center 2008-2011	Supermarket	0
Valencia Commerce Center 2008-2011	Convenience market (24 hour)	0
Valencia Commerce Center 2008-2011	Convenience market with gas pumps	0
Valencia Commerce Center 2008-2011	Gasoline/service station	0
Valencia Commerce Center 2008-2011	Bank (with drive-through)	0
Valencia Commerce Center 2008-2011	General office building	0
Valencia Commerce Center 2008-2011	Office park	0
Valencia Commerce Center 2008-2011	Goverment office building	0
Valencia Commerce Center 2008-2011	Government (civic center)	0
Valencia Commerce Center 2008-2011	Pharmacy/drugstore with drive through	0
Valencia Commerce Center 2008-2011	Pharmacy/drugstore without drive through	0
Valencia Commerce Center 2008-2011	Medical office building	0
Valencia Commerce Center 2008-2011	Hospital	0
Valencia Commerce Center 2008-2011	Warehouse	0
Valencia Commerce Center 2008-2011	General light industry	0
Valencia Commerce Center 2008-2011	General heavy industry	0
Valencia Commerce Center 2008-2011	Industrial park	0
Valencia Commerce Center 2008-2011	Manufacturing	0
Valencia Commerce Center 2008-2011	Industrial Park	1964.85
Valencia Commerce Center 2008-2011	Blank (Edit this description)	0
Valencia Commerce Center 2008-2011	Blank (Edit this description)	0
Valencia Commerce Center 2008-2011	Blank (Edit this description)	0
Valencia Commerce Center 2008-2011	Blank (Edit this description)	0

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Urbemis 2007 Version 9.2.2

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

File Name: U:\Newhall Ranch\Construction\Building Construction\VCC (2)\VCC 2008-2011.urb9

Project Name: Valencia Commerce Center 2008-2011

Project Location: Los Angeles County

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)

	CO_2
2008	2,934.53
Asphalt 01/01/2008-03/14/2008	55.71
Paving Off-Gas	0.00
Paving Off Road Diesel	34.36
Paving On Road Diesel	17.15
Paving Worker Trips	4.20
Building 01/01/2008-12/30/2011	2,873.23
Building Off Road Diesel	295.97
Building Vendor Trips	527.21
Building Worker Trips	2,050.05
Coating 05/01/2008-12/30/2011	5.59
Architectural Coating	0.00
Coating Worker Trips	5.59
2009	2,869.63
Building 01/01/2008-12/30/2011	2,861.30
Building Off Road Diesel	294.84
Building Vendor Trips	525.25
Building Worker Trips	2,041.21
Coating 05/01/2008-12/30/2011	8.33
Architectural Coating	0.00
Coating Worker Trips	8.33
2010	2,868.98
Building 01/01/2008-12/30/2011	2,860.65
Building Off Road Diesel	294.84
Building Vendor Trips	525.28
Building Worker Trips	2,040.53
Coating 05/01/2008-12/30/2011	8.33
Architectural Coating	0.00
Coating Worker Trips	8.33
2011	2,857.56
Building 01/01/2008-12/30/2011	2,849.26
Building Off Road Diesel	293.71
Building Vendor Trips	523.28
Building Worker Trips	2,032.27
Coating 05/01/2008-12/30/2011	8.30
Architectural Coating	0.00
Coating Worker Trips	8.30

Phase Assumptions

Phase: Paving 01/01/2008 - 03/14/2008 - Default Paving Description
Acres to be Paved: 22.55
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 01/01/2008 - 12/30/2011 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 05/01/2008 - 12/30/2011 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

ns1:ProjectName	ns1:LandUseDesc	ns1:UnitAmt
Valencia Commerce Center 2012-2015	Single family housing	0
Valencia Commerce Center 2012-2015	Apartments low rise	0
Valencia Commerce Center 2012-2015	Apartments mid rise	0
Valencia Commerce Center 2012-2015	Apartments high rise	0
Valencia Commerce Center 2012-2015	Condo/townhouse general	0
Valencia Commerce Center 2012-2015	Condo/townhouse high rise	0
Valencia Commerce Center 2012-2015	Mobile home park	0
Valencia Commerce Center 2012-2015	Retirement community	0
Valencia Commerce Center 2012-2015	Congregate care (Assisted Living) Facility	0
Valencia Commerce Center 2012-2015	Day-care center	0
Valencia Commerce Center 2012-2015	Elementary school	0
Valencia Commerce Center 2012-2015	Junior high school	0
Valencia Commerce Center 2012-2015	High school	0
Valencia Commerce Center 2012-2015	Junior college (2 yrs)	0
Valencia Commerce Center 2012-2015	University/college (4 yrs)	0
Valencia Commerce Center 2012-2015	Library	0
Valencia Commerce Center 2012-2015	Place of worship	0
Valencia Commerce Center 2012-2015	City park	0
Valencia Commerce Center 2012-2015	Racquet club	0
Valencia Commerce Center 2012-2015	Racquetball/health	0
Valencia Commerce Center 2012-2015	Quality resturant	0
Valencia Commerce Center 2012-2015	High turnover (sit-down) rest.	0
Valencia Commerce Center 2012-2015	Fast food rest. w/ drive thru	0
Valencia Commerce Center 2012-2015	Fast food rest. w/o drive thru	0
Valencia Commerce Center 2012-2015	Hotel	0
Valencia Commerce Center 2012-2015	Motel	0
Valencia Commerce Center 2012-2015	Free-standing discount store	0
Valencia Commerce Center 2012-2015	Free-standing discount superstore	0
Valencia Commerce Center 2012-2015	Discount club	0
Valencia Commerce Center 2012-2015	Regnl shop. center	0
Valencia Commerce Center 2012-2015	Electronic superstore	0
Valencia Commerce Center 2012-2015	Home improvement superstore	0
Valencia Commerce Center 2012-2015	Strip mall	0
Valencia Commerce Center 2012-2015	Hardware/paint store	0
Valencia Commerce Center 2012-2015	Supermarket	0
Valencia Commerce Center 2012-2015	Convenience market (24 hour)	0
Valencia Commerce Center 2012-2015	Convenience market with gas pumps	0
Valencia Commerce Center 2012-2015	Gasoline/service station	0
Valencia Commerce Center 2012-2015	Bank (with drive-through)	0
Valencia Commerce Center 2012-2015	General office building	0
Valencia Commerce Center 2012-2015	Office park	0
Valencia Commerce Center 2012-2015	Goverment office building	0
Valencia Commerce Center 2012-2015	Government (civic center)	0
Valencia Commerce Center 2012-2015	Pharmacy/drugstore with drive through	0
Valencia Commerce Center 2012-2015	Pharmacy/drugstore without drive through	0
Valencia Commerce Center 2012-2015	Medical office building	0
Valencia Commerce Center 2012-2015	Hospital	0
Valencia Commerce Center 2012-2015	Warehouse	0
Valencia Commerce Center 2012-2015	General light industry	0
Valencia Commerce Center 2012-2015	General heavy industry	0
Valencia Commerce Center 2012-2015	Industrial park	0
Valencia Commerce Center 2012-2015	Manufacturing	0
Valencia Commerce Center 2012-2015	Industrial Park	1964.85
Valencia Commerce Center 2012-2015	Blank	0
Valencia Commerce Center 2012-2015	Blank (Edit this description)	0
Valencia Commerce Center 2012-2015	Blank (Edit this description)	0
Valencia Commerce Center 2012-2015	Blank (Edit this description)	0

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Urbemis 2007 Version 9.2.2

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

File Name: U:\Newhall Ranch\Construction\Building Construction\VCC (2)\VCC 2012-2015.urb9

Project Name: Valencia Commerce Center 2012-2015

Project Location: Los Angeles County

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)

	CO2
2012	2,923.20
Asphalt 01/02/2012-03/15/2012	55.70
Paving Off-Gas	0.00
Paving Off Road Diesel	34.36
Paving On Road Diesel	17.15
Paving Worker Trips	4.19
Building 01/02/2012-08/31/2015	2,859.86
Building Off Road Diesel	294.84
Building Vendor Trips	525.30
Building Worker Trips	2,039.73
Coating 01/02/2012-12/31/2015	7.63
Architectural Coating	0.00
Coating Worker Trips	7.63
2013	2,867.24
Building 01/02/2012-08/31/2015	2,859.61
Building Off Road Diesel	294.84
Building Vendor Trips	525.31
Building Worker Trips	2,039.47
Coating 01/02/2012-12/31/2015	7.63
Architectural Coating	0.00
Coating Worker Trips	7.63
2014	2,867.03
Building 01/02/2012-08/31/2015	2,859.40
Building Off Road Diesel	294.84
Building Vendor Trips	525.32
Building Worker Trips	2,039.25
Coating 01/02/2012-12/31/2015	7.63
Architectural Coating	0.00
Coating Worker Trips	7.63
2015	1,902.83
Building 01/02/2012-08/31/2015	1,895.21
Building Off Road Diesel	195.43
Building Vendor Trips	348.21
Building Worker Trips	1,351.57
Coating 01/02/2012-12/31/2015	7.63
Architectural Coating	0.00
Coating Worker Trips	7.63

Phase Assumptions

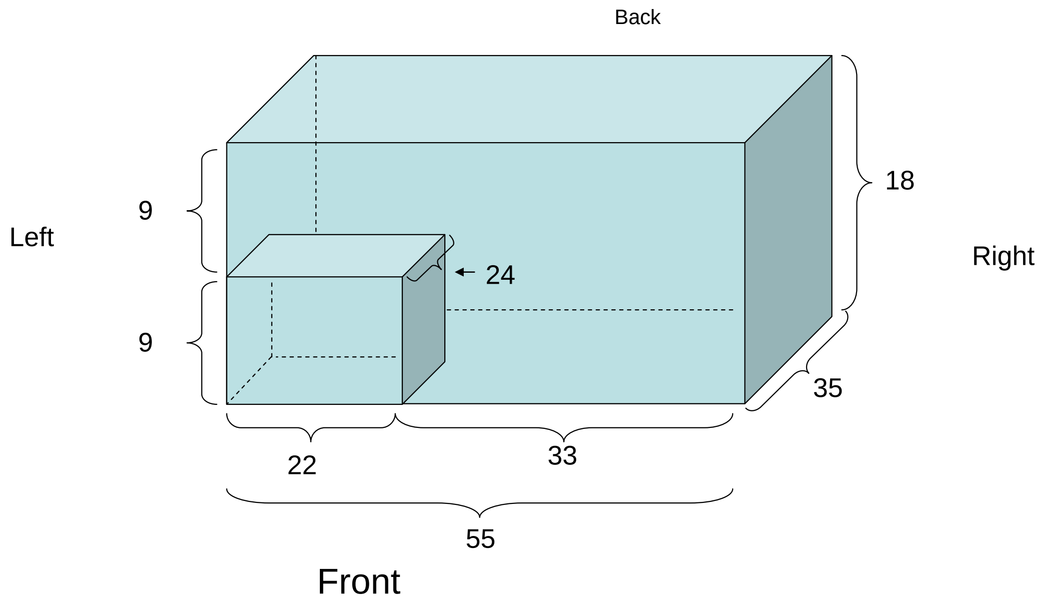
Phase: Paving 01/02/2012 - 03/15/2012 - Default Paving Description
Acres to be Paved: 22.55
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

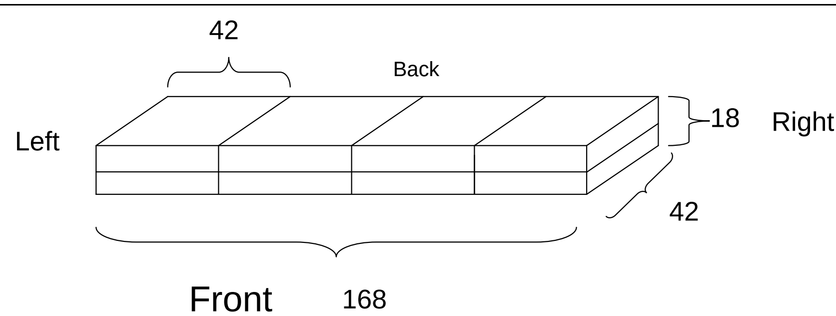
Phase: Building Construction 01/02/2012 - 08/31/2015 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day
1 Generator Sets (49 hp) operating at a 0.74 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
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

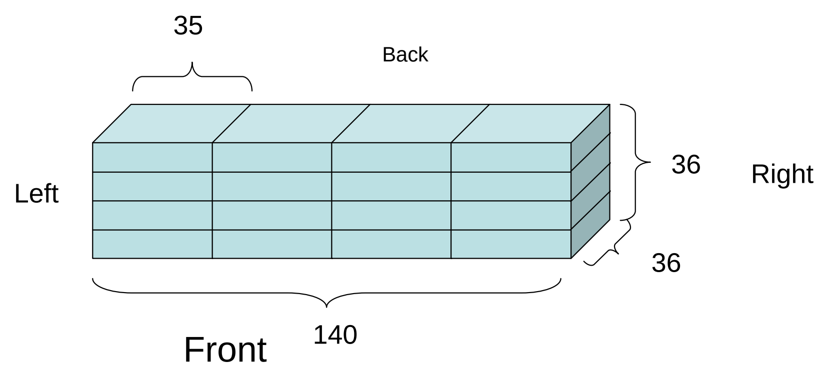
Phase: Architectural Coating 01/02/2012 - 12/31/2015 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 100
Rule: Residential Interior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 50
Rule: Residential Exterior Coatings begins 01/01/2005 ends 06/30/2008 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 07/01/2008 ends 12/31/2040 specifies a VOC of 100
Rule: Nonresidential Interior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 01/01/2005 ends 12/31/2040 specifies a VOC of 250

APPENDIX B
Schematic Drawings of Residential Buildings Modeled in Micropas 7.3

Appendix B
Drawings of Buildings
(Not to Scale. All Dimensions are in Feet)

<table>
<tr>
<td>Single Family with Attached Garage:
20% of wall space is windows</td>
<td>


</td>
</tr>
<tr>
<td>8 Dwelling Unit Apartment:
25% of wall space is windows</td>
<td>


</td>
</tr>
<tr>
<td>16 Dwelling Unit Apartment:
25% of wall space is windows</td>
<td>


</td>
</tr>
</table>

APPENDIX C
Micropas Input Files for Residential Buildings

```
================================================================================
|      MICROPAS7 v7.30  File-TEDSF2  Wth-CTZ09S05  Program-FORMAT              |
|                 Run-TedSFam  Project-TedSFam  Date-09/27/07                   |
--------------------------------------------------------------------------------
```

Input file 'TEDSF2' last edited on 09/27/07

```
BUILDING
========

RUN FEATURES

RUN
 1> RUN TITLE (25 char) ............................ TedSFam
 2> PROJECT TITLE (25 char) ........................ TedSFam
 3> DOCUMENTATION AUTHOR (25 char) ................. Ted Bowie
BUILDING
 4> TYPE (Single, SingleAttached, MultiFamily) ...... Single
 5> CONSTRUCTION (New, Existing+Add+Alter, etc) ..... New
 6> FRONT ORIENTATION (Compass deg or Cardinal) ..... Cardinal
 7> NUMBER OF STORIES (1 or more) .................. 2
 8> FUEL TYPE (NaturalGas, Propane) ................ NaturalGas
 9> COMPLIANCE RUN (Compliance, Research, C-HERS) ... Compliance

SITE AND WEATHER DATA

 1> WEATHER DATA TYPE (FullYear) .................... FullYear
 2> CEC CLIMATE ZONE (01 thru 16) .................. 09

HVAC SIZING

 1> SIZING LOCATION (25 char) ...................... NEWHALL SOLEDAD

CALCULATIONS AND REPORTS

CALCULATIONS
 1> COMPUTER PERFORMANCE TYPE (Both,Stand,Prop) ..... Both
 2> COMPUTER PERFORMANCE CALCULATION (Yes, No) ...... Yes
 3> WATER HEATING CALCULATION (Yes, No) ............ Yes
 4> HVAC SIZING CALCULATION (Yes, No) .............. Yes
COMPLIANCE REPORTS
 5> PRINT CF-1R REPORT (Yes, No) ................... Yes
 6> PRINT MF-1R REPORT (Yes, No, Name) ............. Yes
 7> PRINT WS-5R LIGHTING WORKSHEET (Yes, No, Name) .. Yes
 9> PRINT HVAC SIZING REPORT (Yes, No, Detailed) .... Yes
OTHER
 10> PRINT INPUT DATA (Yes, No, Unformatted) ........ Yes
 12> STANDARD DESIGN INPUT DATA (Save, NoSave) ...... Save

ZONE
====

ZONES

 #> NUMBER OF ZONES (15 maximum) ................... 1
```

| MICROPAS7 v7.30 File-TEDSF2 Wth-CTZ09S05 Program-FORMAT |
| Run-TedSFam Project-TedSFam Date-09/27/07 |

ZONE 'HOUSE'
1> ZONE NAME .... HOUSE
2> CONDITIONED (Yes, No) .... Yes
3> ZONE TYPE .... Residence
4> FLOOR AREA (sf) 3322
5> VOLUME (cuft) 29898
6> NUMBER OF DWELLING UNITS 1
CREDITS
7> HOUSEWRAP/VERIFIED AIR LEAKAGE (Yes,No,SLA) ..... No
8> RADIANT BARRIER (Yes, No, CoolRoof) .... Yes
9> VERIFIED INSULATION QUALITY (Yes, No) .... No
HVAC SYSTEM
10> NUMBER OF SYSTEMS SERVING ZONE 1
11> HEATING SYSTEM NAME .... FURN
12> COOLING SYSTEM NAME .... AC
13> DUCT SYSTEM NAME .... DUCT
14> NATURAL VENTILATION SYSTEM NAME .... VENT
15> FAN VENTILATION SYSTEM NAME .... None
16> THERMOSTAT NAME .... Setback
HVAC SIZING
17> NUMBER OF PEOPLE/UNIT (occupants/unit) 4

OPAQUE
======

OPAQUE SURFACES

#> NUMBER OF SURFACES (100 maximum) 11

	OPAQUE SURFACE NAME	AREA OR LENGTH	TILT	PLAN AZIMUTH	SOLAR GAINS (Y/N)	OPAQUE CHARAC-TERISTICS	ZONE OR OPAQUE NAME	LOCATION/ COMMENTS
	---1----	--2---	--3--	---4---	--5--	------6------	---7----	------8-------
1>	RWALL	630	Vert	Right	Yes	WALL.R13	HOUSE	Right Wall
2>	FWALL	792	Vert	Front	Yes	WALL.R13	HOUSE	Front Wall
3>	LWALL	414	Vert	Left	Yes	WALL.R13	HOUSE	Left Wall
4>	BWALL	990	Vert	Back	Yes	WALL.R13	HOUSE	Back Wall
5>	RWALLI	216	Vert	Right	No	WALL.R13	HOUSE	Right Int Wall
6>	BWALLI	198	Vert	Right	No	WALL.R13	HOUSE	Rear Int Wall
7>	ACEIL	1925	Horz	n/a	Yes	ROOF.R30	HOUSE	Attic Ceiling
8>	FDOOR	24.5	Vert	Front	Yes	DOOR	FWALL	Front Door
9>	BDOOR	24.5	Vert	Back	Yes	DOOR	BWALL	Back Door
10>	GFLOOR	528	Horz	n/a	No	FLOORX.R19	HOUSE	Garage Floor
11>	EDGE	180	n/a	n/a	No	EDGE	HOUSE	Exposed Edge

OPAQUE CHARACTERISTICS

#> NUMBER OF CHARACTERISTICS (50 maximum) 11

	OPAQUE CHARAC-TERISTIC	OPAQUE SURFACE TYPE	FRAME TYPE	CAV-ITY R-VAL	SHEATH-ING R-VAL	U-FAC OR F-VAL	APP IV LOOKUP	APPENDIX IV LOOKUP NAME
	------1------	----2-----	--3--	--4--	---5---	--6---	--7---	------8-------
1>	WALL.R13	Wall	Wood	13	n/a	0.102	Yes	W.13.2X4.16
2>	WALL.R19	Wall	Wood	19	n/a	0.074	Yes	W.19.2X6.16
3>	WALL.R21	Wall	Wood	21	n/a	0.069	Yes	W.21.2X6.16
4>	ROOF.R19	Roof	Wood	19	n/a	0.049	Yes	R.19.16
5>	ROOF.R30	Roof	Wood	30	n/a	0.032	Yes	R.30.16
6>	ROOF.R38	Roof	Wood	38	n/a	0.026	Yes	R.38.16
7>	DOOR	Door	n/a	0	n/a	0.50	Yes	DOOR
8>	FLOORX.R13	FloorExt	Wood	13	n/a	0.046	Yes	FX.13.2X6.16
9>	FLOORX.R19	FloorExt	Wood	19	n/a	0.037	Yes	FX.19.2X8.16
10>	EDGE	SlabEdge	n/a	0	n/a	0.73	Yes	EDGE.EXT
11>	EDGE.R7	SlabEdge	n/a	0	n/a	0.56	Yes	EDGE.EXT.R7

GLAZING

GLAZING SURFACES

#> NUMBER OF SURFACES (100 maximum) 4

	GLAZING SURFACE NAME	AREA (sf)	TILT	PLAN AZIMUTH	GLAZING CHARAC-TERISTICS	OVERHANG SIDE FIN NAME	INT/EXT SHADE NAME	ZONE OR OPAQUE NAME
	---1----	--2---	-3--	---4---	------5------	----6----	----7----	---8----
1>	RGLASS	126	Vert	Right	WINDOW	None	None	RWALL
2>	FGLASS	158.4	Vert	Front	WINDOW	None	None	FWALL
3>	LGLASS	82.8	Vert	Left	WINDOW	None	None	LWALL
4>	BGLASS	198	Vert	Back	WINDOW	None	None	BWALL

GLAZING CHARACTERISTICS

#> NUMBER OF CHARACTERISTICS (100 maximum) 1

	GLAZING CHARAC-TERISTICS	GLAZING SURFACE TYPE	U-FACTOR	SHGC	DESCRIPTION
	-----1------	---2----	---3---	---4---	--------------5---------------
1>	WINDOW	Window	0.67	0.40	

MASS

MASS SURFACES

#> NUMBER OF SURFACES (50 maximum) 3

	MASS SURFACE NAME	AREA (sf)	MASS CHARAC-TERISTICS	ZONE NAME	LOCATION/COMMENTS
	----1----	---2---	------3------	----4----	------------5------------
1>	ESLAB	279	SLAB.EXP	HOUSE	Exposed Slab
2>	CSLAB	1118	SLAB.CVR	HOUSE	Covered Slab
3>	RMASS	0	RAISED.MASS	HOUSE	Raised Floor Mass

MASS CHARACTERISTICS

#> NUMBER OF CHARACTERISTICS (25 maximum) 3

	MASS CHARAC-TERISTIC	MASS TYPE	THICK NESS (in)	SURF-ACE R-VAL	VOLUME HEAT CAP	CON-DUCT-IVITY	UIMC
	------1------	------2-------	--3--	--4--	--5---	--6---	--7--
1>	SLAB.EXP	SlabOnGrade	3.5	0.0	28	0.98	4.6
2>	SLAB.CVR	SlabOnGrade	3.5	2.0	28	0.98	1.8
3>	RAISED.MASS	InteriorHorz	2.0	0.0	28	0.98	2.5

HVAC
====

HEATING SYSTEMS

#> NUMBER OF HEATING SYSTEMS (25 maximum) 1

	HEATING SYSTEM NAME	HEATING SYSTEM TYPE	GAS AFUE	HEATPUMP ELECTRIC HSPF	HYDRONIC WATER HEATING SYSTEM NAME
	-----1------	----2----	--3---	----4-----	------5------
1>	FURN	Furnace	0.78	n/a	None

COOLING SYSTEMS

#> NUMBER OF COOLING SYSTEMS (25 maximum) 1

	COOLING SYSTEM NAME	COOLING SYSTEM TYPE	SEER	VERIF EER	VERIF REFRIG OR TXV	VERIF AIR FLOW	VERIF FAN	VERIF COOL CAP
	-----1------	----2----	-3--	--4--	--5---	--6--	--7--	--8--
1>	AC	ACSplit	13	No	Yes	No	No	No

DUCT SYSTEMS

#> NUMBER OF DUCTS (25 maximum) 1

	DUCT SYSTEM NAME	DUCT INSUL R-VALUE	HEATING DUCT LOCATION	COOLING DUCT LOCATION	VERIF LEAKAGE	VERIF SURFACE AREA	VERIF BURIED DUCT
	------1------	---2---	------3------	------4------	---5----	---6---	--7---
1>	DUCT	6	Attic	Attic	Yes	No	No

NATURAL VENTILATION SYSTEMS

```
==============================================================================
|      MICROPAS7 v7.30  File-TEDSF2  Wth-CTZ09S05  Program-FORMAT            |
|                 Run-TedSFam  Project-TedSFam  Date-09/27/07                 |
------------------------------------------------------------------------------

      NATURAL       NATURAL      INLET     HEIGHT
      VENTILATION   VENTILATION  AREA      DIFF
      SYSTEM NAME   TYPE         PER ZONE  (ft)
      ------1------ -----2------ ----3---- ---4---
 1>   VENT          Standard     0         8.0

WATER HEATING
=============

WATER HEATING SYSTEMS

 #> NUMBER OF WATER HEATING SYSTEMS (25 maximum) .... 1
      WATER         WATER                       # OF            HYDRONIC/
      HEATING       HEATING       HEATER/BOILER HEATERS/BOILERS RECIRC
      NAME          TYPE          SYSTEM NAME   INSTALLED       SYSTEM NAME
      ------1------ ------2------ ------3------ -------4------- ------5------
 1>   WH1           DHW           GAS.STOR      1               None

HEATER/BOILER SYSTEMS

 #> NUMBER OF HEATER/BOILER SYSTEMS (25 maximum) .... 1

HEATER/BOILER SYSTEM 'GAS.STOR'

 1> HEATER/BOILER SYSTEM NAME ...................... GAS.STOR
 2> TANK TYPE (Storage, Instantaneous, etc.) ........ Storage
 3> HEATER ELEMENT TYPE (Electric, Gas, HeatPump) ... Gas
 4> DISTRIBUTION TYPE (Standard, PointOfUse, etc.) .. Standard
 5> ENERGY FACTOR .................................. 0.575
 6> TANK VOLUME (gallons) .......................... 50
 7> RATED INPUT (Btu/hr) ........................... n/a
 12> RECOVERY EFFICIENCY (fraction) ................. n/a
 13> STANDBY LOSS (fraction) ....................... n/a
WATER HEATING CREDIT
 14> CREDIT TYPE (None, Solar, WoodStove) .......... None

HYDRONIC/RECIRCULATION SYSTEMS

 #> NUMBER OF HYDRONIC/RECIRC SYSTEMS (25 maximum) .. 0
```

```
================================================================================
|                  MICROPAS7 v7.30  Date-10/09/07  Program-MENU                |
|          Run-09 MF 8DU QA  Project-8 Unit Apartment QA  Date-10/09/07        |
--------------------------------------------------------------------------------

Input file '09MF8DUQ' last edited on 10/09/07

BUILDING
========

RUN FEATURES

RUN
 1> RUN TITLE (25 char) ............................ 09 MF 8DU QA
 2> PROJECT TITLE (25 char) ........................ 8 Unit Apartment QA
 3> DOCUMENTATION AUTHOR (25 char) ................. Loren Bentley
BUILDING
 4> TYPE (Single, SingleAttached, MultiFamily) ...... MultiFamily
 5> CONSTRUCTION (New, Existing+Add+Alter, etc) ..... New
 6> FRONT ORIENTATION (Compass deg or Cardinal) ..... Cardinal
 7> NUMBER OF STORIES (1 or more) .................. 2
 8> FUEL TYPE (NaturalGas, Propane) ................ NaturalGas
 9> COMPLIANCE RUN (Compliance, Research, C-HERS) ... Compliance

SITE AND WEATHER DATA

 1> WEATHER DATA TYPE (FullYear) .................... FullYear
 2> CEC CLIMATE ZONE (01 thru 16) ................... 09

HVAC SIZING

 1> SIZING LOCATION (25 char) ....................... NEWHALL SOLEDAD

CALCULATIONS AND REPORTS

CALCULATIONS
 1> COMPUTER PERFORMANCE TYPE (Both,Stand,Prop) ..... Both
 2> COMPUTER PERFORMANCE CALCULATION (Yes, No) ...... Yes
 3> WATER HEATING CALCULATION (Yes, No) ............ Yes
 4> HVAC SIZING CALCULATION (Yes, No) .............. Yes
COMPLIANCE REPORTS
 5> PRINT CF-1R REPORT (Yes, No) ................... Yes
 6> PRINT MF-1R REPORT (Yes, No, Name) ............. No
 7> PRINT WS-5R LIGHTING WORKSHEET (Yes, No, Name) .. Yes
 9> PRINT HVAC SIZING REPORT (Yes, No, Detailed) .... No
OTHER
 10> PRINT INPUT DATA (Yes, No, Unformatted) ........ No
 12> STANDARD DESIGN INPUT DATA (Save, NoSave) ...... NoSave

ZONE
====

ZONES

 #> NUMBER OF ZONES (15 maximum) ................... 1
```

```
===============================================================================
|                MICROPAS7 v7.30  Date-10/09/07  Program-MENU                 |
|        Run-09 MF 8DU QA  Project-8 Unit Apartment QA  Date-10/09/07         |
-------------------------------------------------------------------------------
```

ZONE 'HOUSE'

```
 1> ZONE NAME ......................................... HOUSE
 2> CONDITIONED (Yes, No) ............................. Yes
 3> ZONE TYPE ......................................... Residence
 4> FLOOR AREA (sf) ................................... 14112
 5> VOLUME (cuft) ..................................... 127008
 6> NUMBER OF DWELLING UNITS .......................... 8
CREDITS
 7> HOUSEWRAP/VERIFIED AIR LEAKAGE (Yes,No,SLA) ..... No
 8> RADIANT BARRIER (Yes, No, CoolRoof) ............ Yes
 9> VERIFIED INSULATION QUALITY (Yes, No) .......... No
HVAC SYSTEM
 10> NUMBER OF SYSTEMS SERVING ZONE ................. 8
 11> HEATING SYSTEM NAME ............................ FURN
 12> COOLING SYSTEM NAME ............................ AC
 13> DUCT SYSTEM NAME ............................... DUCT
 14> NATURAL VENTILATION SYSTEM NAME ................ VENT
 15> FAN VENTILATION SYSTEM NAME .................... None
 16> THERMOSTAT NAME ................................ Setback
HVAC SIZING
 17> NUMBER OF PEOPLE/UNIT (occupants/unit) ......... 3
```

OPAQUE
======

OPAQUE SURFACES

#> NUMBER OF SURFACES (100 maximum) 9

#	OPAQUE SURFACE NAME	AREA OR LENGTH	TILT	PLAN AZIMUTH	SOLAR GAINS (Y/N)	OPAQUE CHARAC-TERISTICS	ZONE OR OPAQUE NAME	LOCATION/ COMMENTS
	---1----	--2---	--3--	---4---	--5--	------6------	---7----	------8-------
1>	RWALL	756	Vert	Right	Yes	WALL.R13	HOUSE	Right Wall
2>	FWALL	3024	Vert	Front	Yes	WALL.R13	HOUSE	Front Wall
3>	LWALL	756	Vert	Left	Yes	WALL.R13	HOUSE	Left Wall
4>	BWALL	3024	Vert	Back	Yes	WALL.R13	HOUSE	Back Wall
5>	ACEIL	7056	Horz	n/a	Yes	ROOF.R30	HOUSE	Attic Ceiling
6>	FDOOR	196	Vert	Front	Yes	DOOR	FWALL	Front Doors
7>	FLOOR	0	Horz	n/a	No	FLOORX.R19	HOUSE	Floor
8>	EDGE	420	n/a	n/a	No	EDGE	HOUSE	Exposed Edge
9>	BDOOR	196	Vert	Back	Yes	DOOR	BWALL	Back Doors

OPAQUE CHARACTERISTICS

#> NUMBER OF CHARACTERISTICS (50 maximum) 11

#	OPAQUE CHARAC-TERISTIC	OPAQUE SURFACE TYPE	FRAME TYPE	CAV-ITY R-VAL	SHEATH-ING R-VAL	U-FAC OR F-VAL	APP IV LOOKUP	APPENDIX IV LOOKUP NAME
	------1------	----2-----	--3--	--4--	---5---	--6---	--7---	------8-------
1>	WALL.R13	Wall	Wood	13	n/a	0.102	Yes	W.13.2X4.16
2>	WALL.R19	Wall	Wood	19	n/a	0.074	Yes	W.19.2X6.16

```
==============================================================================
|                 MICROPAS7 v7.30  Date-10/09/07  Program-MENU                 |
|         Run-09 MF 8DU QA  Project-8 Unit Apartment QA  Date-10/09/07         |
------------------------------------------------------------------------------
```

3>	WALL.R21	Wall	Wood	21	n/a	0.069	Yes	W.21.2X6.16
4>	ROOF.R19	Roof	Wood	19	n/a	0.049	Yes	R.19.16
5>	ROOF.R30	Roof	Wood	30	n/a	0.032	Yes	R.30.16
6>	ROOF.R38	Roof	Wood	38	n/a	0.026	Yes	R.38.16
7>	DOOR	Door	n/a	0	n/a	0.50	Yes	DOOR
8>	FLOORX.R13	FloorExt	Wood	13	n/a	0.046	Yes	FX.13.2X6.16
9>	FLOORX.R19	FloorExt	Wood	19	n/a	0.037	Yes	FX.19.2X8.16
10>	EDGE	SlabEdge	n/a	0	n/a	0.73	Yes	EDGE.EXT
11>	EDGE.R7	SlabEdge	n/a	0	n/a	0.56	Yes	EDGE.EXT.R7

GLAZING
=======

GLAZING SURFACES

#> NUMBER OF SURFACES (100 maximum) 4

	GLAZING SURFACE NAME ---1----	AREA (sf) --2---	TILT -3--	PLAN AZIMUTH ---4---	GLAZING CHARAC-TERISTICS ------5------	OVERHANG SIDE FIN NAME ----6----	INT/EXT SHADE NAME ----7----	ZONE OR OPAQUE NAME ---8----
1>	RGLASS	189	Vert	Right	WINDOW	None	None	RWALL
2>	FGLASS	756	Vert	Front	WINDOW	None	None	FWALL
3>	LGLASS	189	Vert	Left	WINDOW	None	None	LWALL
4>	BGLASS	756	Vert	Back	WINDOW	None	None	BWALL

GLAZING CHARACTERISTICS

#> NUMBER OF CHARACTERISTICS (100 maximum) 1

	GLAZING CHARAC-TERISTICS -----1------	GLAZING SURFACE TYPE ---2----	U-FACTOR ---3---	SHGC ---4---	DESCRIPTION --------------5---------------
1>	WINDOW	Window	0.67	0.40	

MASS
====

MASS SURFACES

#> NUMBER OF SURFACES (50 maximum) 2

	MASS SURFACE NAME ----1----	AREA (sf) ---2---	MASS CHARAC-TERISTICS ------3------	ZONE NAME ----4----	LOCATION/COMMENTS ------------5------------
1>	ESLAB	1411	SLAB.EXP	HOUSE	Exposed Slab
2>	CSLAB	5645	SLAB.CVR	HOUSE	Covered Slab

MASS CHARACTERISTICS

#> NUMBER OF CHARACTERISTICS (25 maximum) 3

MICROPAS7 v7.30 Date-10/09/07 Program-MENU

Run-09 MF 8DU QA Project-8 Unit Apartment QA Date-10/09/07

	MASS CHARACTERISTIC	MASS TYPE	THICKNESS (in)	SURFACE R-VAL	VOLUME HEAT CAP	CONDUCTIVITY	UIMC
	1	2	3	4	5	6	7
1>	SLAB.EXP	SlabOnGrade	3.5	0.0	28	0.98	4.6
2>	SLAB.CVR	SlabOnGrade	3.5	2.0	28	0.98	1.8
3>	RAISED.MASS	InteriorHorz	2.0	0.0	28	0.98	2.5

HVAC

HEATING SYSTEMS

#> NUMBER OF HEATING SYSTEMS (25 maximum) 1

	HEATING SYSTEM NAME	HEATING SYSTEM TYPE	GAS AFUE	HEATPUMP ELECTRIC HSPF	HYDRONIC WATER HEATING SYSTEM NAME
	1	2	3	4	5
1>	FURN	Furnace	0.78	n/a	None

COOLING SYSTEMS

#> NUMBER OF COOLING SYSTEMS (25 maximum) 1

	COOLING SYSTEM NAME	COOLING SYSTEM TYPE	SEER	VERIF EER	VERIF REFRIG OR TXV	VERIF AIR FLOW	VERIF FAN	VERIF COOL CAP
	1	2	3	4	5	6	7	8
1>	AC	ACSplit	13	No	Yes	No	No	No

DUCT SYSTEMS

#> NUMBER OF DUCTS (25 maximum) 1

	DUCT SYSTEM NAME	DUCT INSUL R-VALUE	HEATING DUCT LOCATION	COOLING DUCT LOCATION	VERIF LEAKAGE	VERIF SURFACE AREA	VERIF BURIED DUCT
	1	2	3	4	5	6	7
1>	DUCT	6	Attic	Attic	Yes	No	No

NATURAL VENTILATION SYSTEMS

	NATURAL VENTILATION SYSTEM NAME	NATURAL VENTILATION TYPE	INLET AREA PER ZONE	HEIGHT DIFF (ft)
	1	2	3	4
1>	VENT	Standard	0	8.0

WATER HEATING

WATER HEATING SYSTEMS

```
================================================================================
|                 MICROPAS7 v7.30  Date-10/09/07  Program-MENU                 |
|         Run-09 MF 8DU QA  Project-8 Unit Apartment QA  Date-10/09/07         |
--------------------------------------------------------------------------------

 #> NUMBER OF WATER HEATING SYSTEMS (25 maximum) .... 1
     WATER         WATER                         # OF            HYDRONIC/
     HEATING       HEATING       HEATER/BOILER HEATERS/BOILERS RECIRC
     NAME          TYPE          SYSTEM NAME   INSTALLED       SYSTEM NAME
     ------1------ ------2------ ------3------ -------4------- ------5------
 1>   WH1          DHW           GAS.STOR      8               None

HEATER/BOILER SYSTEMS

 #> NUMBER OF HEATER/BOILER SYSTEMS (25 maximum) .... 1

HEATER/BOILER SYSTEM 'GAS.STOR'

 1> HEATER/BOILER SYSTEM NAME ....................... GAS.STOR
 2> TANK TYPE (Storage, Instantaneous, etc.) ........ Storage
 3> HEATER ELEMENT TYPE (Electric, Gas, HeatPump) ... Gas
 4> DISTRIBUTION TYPE (Standard, PointOfUse, etc.) .. Standard
 5> ENERGY FACTOR ................................... 0.575
 6> TANK VOLUME (gallons) ........................... 50
 7> RATED INPUT (Btu/hr) ............................ n/a
 12> RECOVERY EFFICIENCY (fraction) ................. n/a
 13> STANDBY LOSS (fraction) ........................ n/a
WATER HEATING CREDIT
 14> CREDIT TYPE (None, Solar, WoodStove) ........... None

HYDRONIC/RECIRCULATION SYSTEMS

 #> NUMBER OF HYDRONIC/RECIRC SYSTEMS (25 maximum) .. 0
```

```
===============================================================================
|                MICROPAS7 v7.30  Date-10/10/07  Program-MENU                 |
|            Run-20KFinlA  Project-20160sft 16DU  Date-10/10/07               |
-------------------------------------------------------------------------------
```

Input file '20KFINLA' last edited on 10/10/07

```
BUILDING
========

RUN FEATURES

RUN
 1> RUN TITLE (25 char) ............................ 20KFinlA
 2> PROJECT TITLE (25 char) ........................ 20160sft 16DU
 3> DOCUMENTATION AUTHOR (25 char) ................. David Weaver
BUILDING
 4> TYPE (Single, SingleAttached, MultiFamily) ...... MultiFamily
 5> CONSTRUCTION (New, Existing+Add+Alter, etc) ..... New
 6> FRONT ORIENTATION (Compass deg or Cardinal) ..... Cardinal
 7> NUMBER OF STORIES (1 or more) .................. 3
 8> FUEL TYPE (NaturalGas, Propane) ................ NaturalGas
 9> COMPLIANCE RUN (Compliance, Research, C-HERS) ... Compliance

SITE AND WEATHER DATA

 1> WEATHER DATA TYPE (FullYear) .................... FullYear
 2> CEC CLIMATE ZONE (01 thru 16) ................... 09

HVAC SIZING

 1> SIZING LOCATION (25 char) ....................... NEWHALL SOLEDAD

CALCULATIONS AND REPORTS

CALCULATIONS
 1> COMPUTER PERFORMANCE TYPE (Both,Stand,Prop) ..... Both
 2> COMPUTER PERFORMANCE CALCULATION (Yes, No) ...... Yes
 3> WATER HEATING CALCULATION (Yes, No) ............ Yes
 4> HVAC SIZING CALCULATION (Yes, No) .............. Yes
COMPLIANCE REPORTS
 5> PRINT CF-1R REPORT (Yes, No) ................... Yes
 6> PRINT MF-1R REPORT (Yes, No, Name) ............. Yes
 7> PRINT WS-5R LIGHTING WORKSHEET (Yes, No, Name) .. Yes
 9> PRINT HVAC SIZING REPORT (Yes, No, Detailed) .... Yes
OTHER
 10> PRINT INPUT DATA (Yes, No, Unformatted) ........ Yes
 12> STANDARD DESIGN INPUT DATA (Save, NoSave) ...... NoSave

ZONE
====

ZONES

 #> NUMBER OF ZONES (15 maximum) ................... 1
```

```
==============================================================================
|                MICROPAS7 v7.30  Date-10/10/07  Program-MENU                |
|            Run-20KFinlA  Project-20160sft 16DU  Date-10/10/07                |
------------------------------------------------------------------------------

ZONE 'HOUSE'
 1> ZONE NAME ...................................... HOUSE
 2> CONDITIONED (Yes, No) .......................... Yes
 3> ZONE TYPE ...................................... Residence
 4> FLOOR AREA (sf) ................................ 20160
 5> VOLUME (cuft) .................................. 181440
 6> NUMBER OF DWELLING UNITS ....................... 16
CREDITS
 7> HOUSEWRAP/VERIFIED AIR LEAKAGE (Yes,No,SLA) ..... No
 8> RADIANT BARRIER (Yes, No, CoolRoof) ............ Yes
 9> VERIFIED INSULATION QUALITY (Yes, No) .......... No
HVAC SYSTEM
 10> NUMBER OF SYSTEMS SERVING ZONE ................ 16
 11> HEATING SYSTEM NAME ........................... FURN
 12> COOLING SYSTEM NAME ........................... AC
 13> DUCT SYSTEM NAME .............................. DUCT
 14> NATURAL VENTILATION SYSTEM NAME ............... VENT
 15> FAN VENTILATION SYSTEM NAME ................... None
 16> THERMOSTAT NAME ............................... Setback
HVAC SIZING
 17> NUMBER OF PEOPLE/UNIT (occupants/unit) ......... 3

OPAQUE
======

OPAQUE SURFACES

 #> NUMBER OF SURFACES (100 maximum) ................ 10
      OPAQUE   AREA                SOLAR OPAQUE        ZONE OR
      SURFACE  OR           PLAN   GAINS CHARAC-       OPAQUE   LOCATION/
      NAME     LENGTH TILT  AZIMUTH (Y/N) TERISTICS    NAME     COMMENTS
      ---1---- --2--- --3-- ---4--- --5-- ------6------ ---7---- ------8-------
 1>   RWALL    1296   Vert  Right   Yes   WALL.R13     HOUSE    Right Wall
 2>   FWALL    5040   Vert  Front   Yes   WALL.R13     HOUSE    Front Wall
 3>   LWALL    1296   Vert  Left    Yes   WALL.R13     HOUSE    Left Wall
 4>   BWALL    5040   Vert  Back    Yes   WALL.R13     HOUSE    Back Wall
 5>   ACEIL    5040   Horz  n/a     Yes   ROOF.R30     HOUSE    Attic Ceiling
 6>   RDOOR    0      Vert  Right   Yes   DOOR         RWALL    North Door
 7>   LDOOR    0      Vert  Left    Yes   DOOR         LWALL    North Door
 8>   FDOOR    392    Vert  Front   Yes   DOOR         FWALL    North Door
 9>   BDOOR    392    Vert  Back    Yes   DOOR         BWALL    North Door
 10>  EDGE     352    n/a   n/a     No    EDGE         HOUSE    Exposed Edge

OPAQUE CHARACTERISTICS

 #> NUMBER OF CHARACTERISTICS (50 maximum) .......... 11
```

MICROPAS7 v7.30 Date-10/10/07 Program-MENU
Run-20KFinlA Project-20160sft 16DU Date-10/10/07

	OPAQUE CHARAC-TERISTIC	OPAQUE SURFACE TYPE	FRAME TYPE	CAV-ITY R-VAL	SHEATH-ING R-VAL	U-FAC OR F-VAL	APP IV LOOKUP	APPENDIX IV LOOKUP NAME
	------1------	----2-----	--3--	--4--	---5---	--6---	--7---	------8-------
1>	WALL.R13	Wall	Wood	13	n/a	0.102	Yes	W.13.2X4.16
2>	WALL.R19	Wall	Wood	19	n/a	0.074	Yes	W.19.2X6.16
3>	WALL.R21	Wall	Wood	21	n/a	0.069	Yes	W.21.2X6.16
4>	ROOF.R19	Roof	Wood	19	n/a	0.049	Yes	R.19.16
5>	ROOF.R30	Roof	Wood	30	n/a	0.032	Yes	R.30.16
6>	ROOF.R38	Roof	Wood	38	n/a	0.026	Yes	R.38.16
7>	DOOR	Door	n/a	0	n/a	0.50	Yes	DOOR
8>	FLOORX.R13	FloorExt	Wood	13	n/a	0.046	Yes	FX.13.2X6.16
9>	FLOORX.R19	FloorExt	Wood	19	n/a	0.037	Yes	FX.19.2X8.16
10>	EDGE	SlabEdge	n/a	0	n/a	0.73	Yes	EDGE.EXT
11>	EDGE.R7	SlabEdge	n/a	0	n/a	0.56	Yes	EDGE.EXT.R7

GLAZING
=======

GLAZING SURFACES

#> NUMBER OF SURFACES (100 maximum) 4

	GLAZING SURFACE NAME	AREA (sf)	TILT	PLAN AZIMUTH	GLAZING CHARAC-TERISTICS	OVERHANG SIDE FIN NAME	INT/EXT SHADE NAME	ZONE OR OPAQUE NAME
	---1----	--2---	-3--	---4---	------5------	----6----	----7----	---8----
1>	RGLASS	324	Vert	Right	WINDOW	None	None	RWALL
2>	FGLASS	1260	Vert	Front	WINDOW	None	None	FWALL
3>	LGLASS	324	Vert	Left	WINDOW	None	None	LWALL
4>	BGLASS	1260	Vert	Back	WINDOW	None	None	BWALL

GLAZING CHARACTERISTICS

#> NUMBER OF CHARACTERISTICS (100 maximum) 1

	GLAZING CHARAC-TERISTICS	GLAZING SURFACE TYPE	U-FACTOR	SHGC	DESCRIPTION
	-----1------	---2----	---3---	---4---	--------------5---------------
1>	WINDOW	Window	0.67	0.40	

MASS
====

MASS SURFACES

#> NUMBER OF SURFACES (50 maximum) 2

	MASS SURFACE NAME	AREA (sf)	MASS CHARAC-TERISTICS	ZONE NAME	LOCATION/COMMENTS
	----1----	---2---	------3------	----4----	------------5------------
1>	CSLAB	4032	SLAB.CVR	HOUSE	Covered Slab
2>	ESLAB	1008	SLAB.EXP	HOUSE	Covered Slab

MASS CHARACTERISTICS

#> NUMBER OF CHARACTERISTICS (25 maximum) 3

	MASS CHARAC-TERISTIC	MASS TYPE	THICK NESS (in)	SURF-ACE R-VAL	VOLUME HEAT CAP	CON-DUCT-IVITY	UIMC
	------1------	------2-------	--3--	--4--	--5---	--6---	--7--
1>	SLAB.EXP	SlabOnGrade	3.5	0.0	28	0.98	4.6
2>	SLAB.CVR	SlabOnGrade	3.5	2.0	28	0.98	1.8
3>	RAISED.MASS	InteriorHorz	2.0	0.0	28	0.98	2.5

HVAC
====

HEATING SYSTEMS

#> NUMBER OF HEATING SYSTEMS (25 maximum) 1

	HEATING SYSTEM NAME	HEATING SYSTEM TYPE	GAS AFUE	HEATPUMP ELECTRIC HSPF	HYDRONIC WATER HEATING SYSTEM NAME
	-----1------	----2----	--3---	----4-----	------5------
1>	FURN	Furnace	0.78	n/a	None

COOLING SYSTEMS

#> NUMBER OF COOLING SYSTEMS (25 maximum) 1

	COOLING SYSTEM NAME	COOLING SYSTEM TYPE	SEER	VERIF EER	VERIF REFRIG OR TXV	VERIF AIR FLOW	VERIF FAN	VERIF COOL CAP
	-----1------	----2----	-3--	--4--	--5---	--6--	--7--	--8--
1>	AC	ACSplit	13	No	Yes	No	No	No

DUCT SYSTEMS

#> NUMBER OF DUCTS (25 maximum) 1

	DUCT SYSTEM NAME	DUCT INSUL R-VALUE	HEATING DUCT LOCATION	COOLING DUCT LOCATION	VERIF LEAKAGE	VERIF SURFACE AREA	VERIF BURIED DUCT
	------1------	---2---	------3------	------4------	---5----	---6---	--7---
1>	DUCT	6	Attic	Attic	Yes	No	No

NATURAL VENTILATION SYSTEMS

```
==============================================================================
|                MICROPAS7 v7.30  Date-10/10/07  Program-MENU                |
|            Run-20KFinlA  Project-20160sft 16DU  Date-10/10/07              |
------------------------------------------------------------------------------

      NATURAL       NATURAL      INLET     HEIGHT
      VENTILATION   VENTILATION  AREA      DIFF
      SYSTEM NAME   TYPE         PER ZONE  (ft)
      ------1------ -----2------ ----3---- ---4---
 1>   VENT          Standard     0         8.0

WATER HEATING
=============

WATER HEATING SYSTEMS

 #> NUMBER OF WATER HEATING SYSTEMS (25 maximum) .... 1
      WATER         WATER                       # OF            HYDRONIC/
      HEATING       HEATING       HEATER/BOILER HEATERS/BOILERS RECIRC
      NAME          TYPE          SYSTEM NAME   INSTALLED       SYSTEM NAME
      ------1------ ------2------ ------3------ -------4------- ------5------
 1>   WH1           DHW           GAS.STOR      16              None

HEATER/BOILER SYSTEMS

 #> NUMBER OF HEATER/BOILER SYSTEMS (25 maximum) .... 1

HEATER/BOILER SYSTEM 'GAS.STOR'

 1> HEATER/BOILER SYSTEM NAME ...................... GAS.STOR
 2> TANK TYPE (Storage, Instantaneous, etc.) ........ Storage
 3> HEATER ELEMENT TYPE (Electric, Gas, HeatPump) ... Gas
 4> DISTRIBUTION TYPE (Standard, PointOfUse, etc.) .. Standard
 5> ENERGY FACTOR ................................. 0.575
 6> TANK VOLUME (gallons) ......................... 50
 7> RATED INPUT (Btu/hr) .......................... n/a
 12> RECOVERY EFFICIENCY (fraction) ................ n/a
 13> STANDBY LOSS (fraction) ....................... n/a
WATER HEATING CREDIT
 14> CREDIT TYPE (None, Solar, WoodStove) .......... None

HYDRONIC/RECIRCULATION SYSTEMS

 #> NUMBER OF HYDRONIC/RECIRC SYSTEMS (25 maximum) .. 0
```

APPENDIX D
Operational URBEMIS Runs and Supporting Documents

APPENDIX D1
SCAG Model Reference Documents

Table 5-3

YEAR 2000 AVERAGE AUTO PERSON TRIP LENGTHS BY COUNTY

AM-Peak Period:

County	Trip Purpose	HBW	HBO	HBSch	OBO	WBO
LA	Time (minutes) Distance (miles)	21.44 11.28	13.02 6.81	11.00 5.40	13.41 7.15	15.57 8.89
ORA	Time (minutes) Distance (miles)	20.51 11.60	12.51 6.92	10.14 5.16	12.79 7.20	14.28 8.37
RIV	Time (minutes) Distance (miles)	29.51 18.33	14.89 9.19	9.86 5.53	12.39 7.55	15.78 10.09
SBD	Time (minutes) Distance (miles)	26.49 16.42	16.25 10.03	9.23 5.30	12.63 7.74	16.23 10.41
VEN	Time (minutes) Distance (miles)	21.75 13.30	13.03 7.77	8.82 4.90	10.69 6.43	13.13 8.19
ALL	Time (minutes) Distance (miles)	22.49 12.58	13.41 7.42	10.46 5.34	12.98 7.22	15.26 8.97

Midday Period:

County	Trip Purpose	HBW	HBO	HBSch	OBO	WBO
LA	Time (minutes) Distance (miles)	18.63 11.85	11.53 7.06	9.84 5.44	12.00 7.21	13.82 8.86
ORA	Time (minutes) Distance (miles)	18.58 12.23	11.30 7.00	9.38 5.18	11.76 7.27	13.13 8.55
RIV	Time (minutes) Distance (miles)	22.59 16.68	13.03 8.98	9.31 5.53	11.41 7.57	14.39 10.37
SBD	Time (minutes) Distance (miles)	20.96 15.21	13.70 9.53	8.85 5.31	11.67 7.79	14.72 10.62
VEN	Time (minutes) Distance (miles)	17.54 12.19	10.66 7.05	8.39 4.85	9.92 6.40	11.95 6.19
ALL	Time (minutes) Distance (miles)	19.11 12.66	11.79 7.46	9.54 5.37	11.77 7.28	13.71 9.04

2003 Trip Length Distribution

AM Peak Period:

County	Trip Purpose	Home Based Work	Home-Based Non Work	Home Based School	Other Based Others	Work Based Others
Imperial	Time (Minutes)	13.57	8.80	5.96	7.45	12.37
(	Distance miles)	9.39	6.11	3.85	4.82	8.55
Los Angeles	Time (Minutes)	27.54	16.16	9.39	15.60	22.27
	Distance (miles)	12.48	7.49	4.23	7.12	10.34
Orange	Time (Minutes)	23.85	15.43	8.08	14.55	20.47
	Distance (miles)	11.86	7.82	3.95	7.30	10.47
Riverside	Time (Minutes)	32.55	21.74	9.34	16.38	25.17
	Distance (miles)	18.22	12.55	5.38	9.60	15.01
San Bernardino	Time (Minutes)	34.79	20.78	8.42	17.39	26.82
	Distance (miles)	19.93	12.05	4.78	10.15	15.95
Ventura	Time (Minutes)	25.86	16.14	6.68	13.47	21.34
	Distance (miles)	14.46	8.97	3.58	7.57	12.23
All	**Time (Minutes)**	**27.80**	**17.03**	**8.91**	**15.48**	**22.40**
	Distance (miles)	**13.67**	**8.60**	**4.33**	**7.67**	**11.24**

Midday Period:

County	Trip Purpose	Home Based Work	Home-Based Non Work	Home Based School	Other Based Others	Work Based Others
Imperial	Time (Minutes)	12.98	8.83	5.36	7.62	9.14
(	Distance miles)	9.23	6.29	3.51	5.23	6.17
Los Angeles	Time (Minutes)	23.64	13.79	7.50	13.74	17.28
	Distance (miles)	12.79	7.34	3.73	7.28	9.08
Orange	Time (Minutes)	21.79	13.82	6.50	13.43	16.18
	Distance (miles)	12.49	7.83	3.45	7.54	9.14
Riverside	Time (Minutes)	28.34	19.03	7.99	16.50	17.78
	Distance (miles)	19.10	12.72	4.76	10.99	11.75
San Bernardino	Time (Minutes)	30.10	18.38	7.09	17.77	19.57
	Distance (miles)	20.59	12.23	4.16	11.83	12.90
Ventura	Time (Minutes)	23.16	14.66	5.65	13.59	15.21
	Distance (miles)	15.06	9.26	3.17	8.54	9.71
All	**Time (Minutes)**	**24.24**	**14.81**	**7.24**	**14.25**	**17.15**
	Distance (miles)	**14.14**	**8.57**	**3.82**	**8.13**	**9.61**

2003 Trip Generation Results

YEAR 2003 TRIP GENERATION COMPARATIVE STATISTICS							
Home Based Work Trips	**Imperial**	**Los Angeles**	**Orange**	**Riverside**	**San Bernardino**	**Ventura**	**Total**
TRIPS	85,537	6,373,271	2,136,243	1,012,238	1,082,147	559,912	11,249,349
TRIPS per HOUSEHOLD	2.06	2.01	2.22	1.81	1.95	2.20	2.03
TRIPS per VEHICLE	1.18	1.22	1.18	1.00	1.04	1.12	1.16
TRIPS per WORKER	1.57	1.58	1.54	1.50	1.51	1.56	1.56
% Home-Based Work Trips	19.0%	19.3%	20.3%	18.3%	18.5%	20.9%	19.4%
Home-Based Non Work Trips	**Imperial**	**Los Angeles**	**Orange**	**Riverside**	**San Bernardino**	**Ventura**	**Total**
TRIPS	254,430	16,854,127	5,012,646	3,022,069	3,225,586	1,365,002	29,733,860
TRIPS per HOUSEHOLD	6.12	5.31	5.20	5.39	5.83	5.36	5.36
TRIPS per VEHICLE	3.52	3.22	2.77	2.98	3.11	2.73	3.07
TRIPS per Person	1.65	1.68	1.67	1.73	1.72	1.71	1.69
% Home-Based Non-Work Trips	56.4%	51.0%	47.6%	54.6%	55.2%	51.0%	51.2%
Non Home Based Trips	**Imperial**	**Los Angeles**	**Orange**	**Riverside**	**San Bernardino**	**Ventura**	**Total**
TRIPS	110,998	9,834,957	3,374,279	1,497,380	1,538,297	750,077	17,105,987
TRIPS per HOUSEHOLD	2.67	3.10	3.50	2.67	2.78	2.95	3.08
TRIPS per VEHICLE	1.54	1.88	1.86	1.48	1.49	1.50	1.77
TRIPS per Person	0.72	0.98	1.13	0.86	0.82	0.94	0.97
% Non-Home-Based Trips	24.6%	29.7%	32.1%	27.1%	26.3%	28.0%	29.4%
Total Trips	**Imperial**	**Los Angeles**	**Orange**	**Riverside**	**San Bernardino**	**Ventura**	**Total**
TRIPS	450,966	33,062,356	10,523,168	5,531,687	5,846,030	2,674,991	58,089,196
TRIPS per HOUSEHOLD	10.84	10.41	10.92	9.87	10.56	10.51	10.47
TRIPS per VEHICLE	6.24	6.31	5.81	5.46	5.64	5.34	6.00
TRIPS per PERSON	2.92	3.30	3.51	3.16	3.12	3.35	3.30

2003 Home-Based Non-Work Trip Distribution

YEAR 2003 HOME-BASED NON-WORK PERSON TRIP DISTRIBUTION							
From\To	Imperial	Los Angeles	Orange	Riverside	San Bernardino	Ventura	Total Productions
Imperial	**250,603** ***98.50%***	143 *0.06%*	80 *0.03%*	3,295 *1.30%*	305 *0.12%*	4 *0.00%*	254,430 *100.00%*
Los Angeles	828 *0.00%*	**15,974,361** ***94.78%***	514,821 *3.05%*	57,577 *0.34%*	178,772 *1.06%*	127,772 *0.76%*	16,854,131 *100.00%*
Orange	712 *0.01%*	479,521 *9.57%*	**4,437,350** ***88.52%***	45,877 *0.92%*	43,865 *0.88%*	5,320 *0.11%*	5,012,645 *100.00%*
Riverside	8,791 *0.29%*	126,643 *4.19%*	105,352 *3.49%*	**2,581,281** ***85.41%***	197,900 *6.55%*	2,104 *0.07%*	3,022,069 *100.00%*
San Bernardino	1,593 *0.05%*	273,738 *8.49%*	82,460 *2.56%*	170,181 *5.28%*	**2,693,733** ***83.51%***	3,881 *0.12%*	3,225,586 *100.00%*
Ventura	49 *0.00%*	141,269 *10.35%*	6,174 *0.45%*	1,389 *0.10%*	2,834 *0.21%*	**1,213,287** ***88.89%***	1,365,001 *100.00%*
Total Attractions	**262,575** **0.88%**	**16,995,675** **57.16%**	**5,146,236** **17.31%**	**2,859,600** **9.62%**	**3,117,409** **10.48%**	**1,352,368** **4.55%**	**29,733,863** **100.00%**

2003 Home-Based Work Trip Distribution

YEAR 2003 HOME-BASED WORK PERSON TRIP DISTRIBUTION

From\To	Imperial	Los Angeles	Orange	Riverside	San Bernardino	Ventura	Total Productions
Imperial	**83,846** ***98.02%***	31 *0.04%*	18 *0.02%*	1,577 *1.84%*	64 *0.07%*	1 *0.00%*	85,537 *100.00%*
Los Angeles	73 *0.00%*	**5,721,749** ***89.78%***	437,270 *6.86%*	30,437 *0.48%*	103,564 *1.62%*	80,179 *1.26%*	6,373,271 *100.00%*
Orange	44 *0.00%*	382,879 *17.92%*	**1,699,960** ***79.58%***	25,971 *1.22%*	25,894 *1.21%*	1,494 *0.07%*	2,136,243 *100.00%*
Riverside	2,527 *0.25%*	80,273 *7.93%*	92,129 *9.10%*	**694,147** ***68.58%***	142,529 *14.08%*	633 *0.06%*	1,012,238 *100.00%*
San Bernardino	429 *0.04%*	201,533 *18.62%*	75,220 *6.95%*	130,165 *12.03%*	**673,013** ***62.19%***	1,788 *0.17%*	1,082,147 *100.00%*
Ventura	2 *0.00%*	139,856 *24.98%*	3,023 *0.54%*	367 *0.07%*	939 *0.17%*	**415,725** ***74.25%***	559,912 *100.00%*
Total Attractions	**86,922** **0.77%**	**6,526,321** **58.02%**	**2,307,621** **20.51%**	**882,664** **7.85%**	**946,002** **8.41%**	**499,819** **4.44%**	**11,249,349** **100.00%**

2003 Socioeconomic Data

YEAR 2003 SCAG MODEL SOCIOECONOMIC INPUT DATA

POPULATION AND WORKERS

COUNTY	RESIDENT POPULATION	GROUP QUARTERED POPULATION**	TOTAL POPULATION	RESIDENT WORKERS
Imperial	142,647	11,917	154,564	54,405
Los Angeles	9,846,198	183,786	10,029,984	4,024,830
Orange	2,951,175	44,495	2,995,670	1,385,731
Riverside	1,702,739	45,098	1,747,837	674,903
San Bernardino	1,828,843	47,264	1,876,107	717,695
Ventura	783,472	13,877	797,349	358,179
TOTAL	**17,255,074**	**346,437**	**17,601,511**	**7,215,743**

SCHOOL ENROLLMENT

COUNTY	K THRU 12 ENROLLMENT	COLLEGE AND UNIVERSITY ENROLLMENT
Imperial	37,380	11,419
Los Angeles	2,104,364	747,161
Orange	582,863	248,703
Riverside	383,272	66,366
San Bernardino	440,633	123,473
Ventura	166,272	57,700
TOTAL	**3,714,784**	**1,254,822**

EMPLOYMENT

COUNTY	RETAIL EMPLOYMENT	SERVICE EMPLOYMENT	OTHER EMPLOYMENT	TOTAL EMPLOYMENT
Imperial	7,173	16,016	32,365	55,554
Los Angeles	437,706	2,162,675	1,759,180	4,359,561
Orange	162,722	779,635	621,351	1,563,708
Riverside	75,147	282,496	231,796	589,439
San Bernardino	77,425	312,851	248,660	638,936
Ventura	37,721	146,287	150,481	334,489
TOTAL	**797,894**	**3,699,960**	**3,043,833**	**7,541,687**

HOUSEHOLDS

COUNTY	LOW INCOME***	MEDIUM INCOME	HIGH INCOME	TOTAL	SIZE
Imperial	16,829	11,943	12,832	41,604	3.43
Los Angeles	942,654	863,624	1,369,727	3,176,005	3.10
Orange	166,020	234,648	562,732	963,400	3.06
Riverside	156,165	160,251	244,291	560,707	3.04
San Bernardino	157,411	161,524	234,639	553,574	3.30
Ventura	43,678	60,588	150,215	254,481	3.08
TOTAL	**1,482,757**	**1,492,578**	**2,574,436**	**5,549,771**	**3.11**

Source: SCAG growth forecast

APPENDIX D2
SCAG Model Calculations

Calculation of Approximate VMT / Capita for LA County from SCAG Model

	HBW	**HBNW**	**HBS**
Trip length AM[1]	12.48	7.49	4.23
Trip Length Midday[1]	12.79	7.34	3.73
Trips[2]	6,373,271	8,427,064	8,427,064
VMT[3]	80,526,279	62,486,676	33,539,713
VMT Total[4]	176,552,668		
LA residents[5]	9,846,198		
VMT/capita[6]	**6,545**		

Notes:

1. From SCAG model slides.

2. The total of 16,854,127 HBNW trips were assumed to be 50% for school and 50% non-shool.

3. VMT = trips * average of the midday and AM trip lengths.

4. Sum of all VMT.

5. From SCAG model slides.

6. VMT from above divided by the total number of residents.

Abbreviations:

HBNW - Home Based Non-Work

HBS - Home Based School

HBW - Home Based Work Trip

LA - Los Angeles

SCAG - Southern California Association of Governments

VMT - Vehicle Miles Traveled

APPENDIX D3
Calculations Based Upon Department of Transportation Study

Calculation of Per Capita VMT and VFC
Department of Transportation Data

		2004	2005	2020
	Total All Vehicle VMT - California [1] (Billion Miles)	328.641	329.641	451.66
	Total Autos VMT - California [1] (Billion Miles)	235.804	236.589	325.597
	% Autos VMT	71.75%	71.77%	72.09%
LOS ANGELES	All Vehicle VMT[2] (Billion Miles)	82.69	82.40	101.88
	Total Autos VMT (Billion Miles)	59.33	59.14	73.45
	Total Gasoline VFC[3] (Billion Gallons)	-	3.91	4.65
	Population [4 & 5]	9,917,331	9,935,475	11,584,800
	VMT per capita (miles/yr)	5982.7	5952.6	6339.9
	VFC per capita (gallons/yr)	-	393.3	401.3
	CO_2 Emissions per capita[8] (kg/year)	-	3362.6	3431.4
CALIFORNIA	Total Autos VMT[1] (Billion Miles)	235.804	236.589	325.597
	Total Gasoline VFC[3] (Billion Gallons)	-	15.29	20.14
	Population [6 & 7]	35,842,038	36,132,147	42,206,743
	VMT per capita (miles/yr)	6579.0	6547.9	7714.3
	VFC per capita (gallons/yr)	-	423.2	477.1
	CO_2 Emissions per capita[8] (kg/year)	-	3618.4	4079.3

References:

1 Department of Transportation. Table 2

2 Appendix B ibid

3 Appendix C ibid

4 Population for 2004 & 2005 (http://www.census.gov/popest/counties/tables/CO-EST2005-01-06.xls)

5 Population for 2006 (http://www.scrtpa.org/2004rtpfinal-appdx-f-county%20population.pdf)

6 Population for 2004 & 2005 (http://www.census.gov/popest/states/tables/NST-EST2005-01.xls)

7 Population for 2006 (http://www.census.gov/population/projections/SummaryTabA1.pdf)

8 Calculated based on 8.55 kg/gallon of CO2 from CA gasoline usage from Table C.3(http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007_web.pdf)

Abbreviations:
VFC - Vehicle Fuel Consumption
VMT - Vehicle Miles Traveled

Source:

California Motor Vehicle Stock, Travel and Fuel Forecast. California Department of Transportation. Division of Transportation System Information. December 30, 2005. http://www.dot.ca.gov/hq/tsip/smb/documents/mvstaff/mvstaff05.pdf

Table-2: CALIFORNIA TOTAL VEHICLE MILES OF TRAVEL (BILLIONS)

	CAL. YEAR	AUTOS	TRK1	TRK2	TRK3	TRK4	M.C.	TOTAL
				BODY TYPE				
	2004	235.804	34.807	37.023	11.510	8.141	1.357	328.641
	2005	236.589	34.242	37.275	11.664	8.497	1.373	329.641
	2006	241.535	34.862	37.911	11.968	8.827	1.376	336.479
	2007	247.030	35.611	38.515	12.269	9.149	1.378	343.952
T	2008	252.302	36.390	39.058	12.530	9.448	1.378	351.106
O	2009	257.383	37.179	39.538	12.769	9.734	1.379	357.982
T	2010	262.957	38.092	40.089	13.012	10.033	1.378	365.562
A	2011	269.751	39.204	40.821	13.285	10.368	1.375	374.805
L	2012	276.729	40.413	41.662	13.561	10.715	1.372	384.453
	2013	283.241	41.525	42.420	13.821	11.053	1.370	393.430
	2015	295.972	43.635	43.895	14.364	11.727	1.368	410.961
	2020	325.597	48.239	47.383	15.792	13.283	1.367	451.660
	2025	353.804	52.427	51.291	17.274	14.604	1.367	490.766
	2030	385.163	56.797	55.625	19.067	16.081	1.367	534.100
	2004	234.397	34.785	33.152	1.902	0.012	1.357	305.604
	2005	235.381	34.225	33.471	1.980	0.014	1.373	306.444
	2006	240.432	34.846	34.152	2.072	0.016	1.376	312.895
	2007	246.005	35.597	34.792	2.163	0.018	1.378	319.953
G	2008	251.343	36.377	35.371	2.247	0.020	1.378	326.736
A	2009	256.479	37.167	35.887	2.327	0.022	1.379	333.261
S	2010	262.099	38.081	36.461	2.409	0.024	1.378	340.452
O	2011	268.925	39.194	37.194	2.497	0.026	1.375	349.210
L	2012	275.929	40.404	38.021	2.584	0.028	1.372	358.337
I	2013	282.466	41.516	38.766	2.666	0.029	1.370	366.814
N	2015	295.240	43.628	40.208	2.827	0.033	1.368	383.302
E	2020	324.917	48.234	43.547	3.191	0.039	1.367	421.295
	2025	353.123	52.423	47.177	3.510	0.043	1.367	457.643
	2030	384.446	56.794	51.169	3.887	0.048	1.367	497.710
	2004	1.406	0.022	3.871	9.608	8.129	0.000	23.036
	2005	1.208	0.017	3.804	9.684	8.483	0.000	23.196
	2006	1.103	0.015	3.758	9.896	8.811	0.000	23.583
	2007	1.025	0.014	3.723	10.106	9.131	0.000	23.999
D	2008	0.960	0.013	3.687	10.283	9.428	0.000	24.371
I	2009	0.904	0.012	3.651	10.442	9.712	0.000	24.721
E	2010	0.858	0.011	3.628	10.603	10.010	0.000	25.110
S	2011	0.827	0.010	3.627	10.788	10.342	0.000	25.594
E	2012	0.800	0.009	3.642	10.977	10.687	0.000	26.116
L	2013	0.775	0.009	3.653	11.156	11.023	0.000	26.616
	2015	0.733	0.007	3.687	11.538	11.694	0.000	27.659
	2020	0.679	0.005	3.835	12.601	13.244	0.000	30.365
	2025	0.680	0.004	4.115	13.764	14.560	0.000	33.123
	2030	0.718	0.003	4.456	15.181	16.033	0.000	36.390

Table3: CALIFORNIA ON-ROAD VEHICLE FUEL CONSUMPTION (BILLIONS)

	CAL.			BODY TYPE				
	YEAR	AUTOS	TRK1	TRK2	TRK3	TRK4	M.C.	TOTAL
	2004	10.865	1.878	2.521	1.454	1.381	0.027	18.127
	2005	10.883	1.849	2.517	1.471	1.434	0.027	18.182
	2006	11.063	1.877	2.539	1.508	1.483	0.028	18.497
	2007	11.263	1.911	2.567	1.544	1.530	0.028	18.842
T	2008	11.448	1.946	2.593	1.575	1.572	0.028	19.162
O	2009	11.624	1.982	2.615	1.603	1.613	0.028	19.465
T	2010	11.824	2.026	2.644	1.633	1.656	0.028	19.810
A	2011	12.078	2.079	2.687	1.666	1.705	0.028	20.243
L	2012	12.344	2.139	2.737	1.700	1.754	0.027	20.703
	2013	12.593	2.194	2.782	1.732	1.802	0.027	21.131
	2015	13.090	2.299	2.871	1.799	1.899	0.027	21.985
	2020	14.294	2.529	3.089	1.977	2.118	0.027	24.034
	2025	15.481	2.746	3.342	2.161	2.300	0.027	26.057
	2030	16.824	2.973	3.623	2.385	2.505	0.027	28.337
	2004	10.814	1.877	2.301	0.262	0.002	0.027	15.285
	2005	10.841	1.848	2.300	0.273	0.002	0.027	15.291
	2006	11.024	1.876	2.325	0.285	0.003	0.028	15.540
	2007	11.227	1.910	2.354	0.297	0.003	0.028	15.819
G	2008	11.414	1.945	2.382	0.308	0.003	0.028	16.081
A	2009	11.592	1.982	2.407	0.319	0.004	0.028	16.331
S	2010	11.794	2.025	2.437	0.330	0.004	0.028	16.617
O	2011	12.049	2.079	2.479	0.342	0.004	0.028	16.981
L	2012	12.316	2.139	2.529	0.353	0.005	0.027	17.369
I	2013	12.566	2.194	2.573	0.364	0.005	0.027	17.730
N	2015	13.065	2.299	2.660	0.386	0.006	0.027	18.442
E	2020	14.270	2.528	2.870	0.435	0.007	0.027	20.137
	2025	15.457	2.746	3.107	0.479	0.007	0.027	21.823
	2030	16.799	2.973	3.368	0.530	0.008	0.027	23.705
	2004	0.050	0.001	0.220	1.192	1.379	0.000	2.842
	2005	0.043	0.001	0.217	1.199	1.432	0.000	2.891
	2006	0.039	0.001	0.214	1.223	1.480	0.000	2.957
	2007	0.036	0.001	0.212	1.247	1.527	0.000	3.023
	2008	0.034	0.001	0.211	1.267	1.569	0.000	3.081
D	2009	0.032	0.001	0.209	1.284	1.610	0.000	3.135
I	2010	0.030	0.000	0.207	1.303	1.652	0.000	3.193
E	2011	0.029	0.000	0.207	1.325	1.700	0.000	3.262
S	2012	0.029	0.000	0.208	1.347	1.750	0.000	3.334
E	2013	0.027	0.000	0.209	1.368	1.797	0.000	3.401
L	2015	0.026	0.000	0.211	1.414	1.893	0.000	3.543
	2020	0.024	0.000	0.219	1.541	2.111	0.000	3.896
	2025	0.024	0.000	0.235	1.682	2.292	0.000	4.234
	2030	0.025	0.000	0.255	1.856	2.497	0.000	4.633

2004 ANNUAL STATEWIDE VMT DISTRIBUTION BY COUNTY (MILLIONS)

COUNTY	SHS	OTHER	TOTAL
ALAMEDA	8745.204	5701.647	14446.852
ALPINE	48.100	12.913	61.013
AMADOR	305.900	108.145	414.045
BUTTE	692.800	1102.677	1795.477
CALAVERAS	281.300	145.191	426.491
COLUSA	485.500	118.525	604.025
CONTRA COSTA	4727.302	3913.391	8640.693
DEL NORTE	141.600	89.180	230.780
EL DORADO	880.500	783.400	1663.900
FRESNO	3349.402	4303.136	7652.537
GLENN	362.900	144.208	507.108
HUMBOLDT	725.800	517.515	1243.316
IMPERIAL	1222.101	567.255	1789.356
INYO	404.400	111.682	516.082
KERN	4748.402	3129.627	7878.029
KINGS	781.500	539.235	1320.736
LAKE	336.800	199.242	536.042
LASSEN	297.700	294.104	591.804
LOS ANGELES	40065.219	42626.078	82691.297
MADERA	1050.700	441.666	1492.367
MARIN	1582.601	1259.713	2842.313
MARIPOSA	130.700	141.513	272.213
MENDOCINO	714.700	464.084	1178.785
MERCED	1750.201	784.591	2534.792
MODOC	83.000	103.724	186.724
MONO	248.300	53.362	301.662
MONTEREY	2140.601	1590.685	3731.286
NAPA	697.800	458.824	1156.625
NEVADA	669.300	418.488	1087.789
ORANGE	14096.407	13046.248	27142.656
PLACER	1858.501	1582.677	3441.178
PLUMAS	175.900	177.198	353.098
RIVERSIDE	10807.205	6535.147	17342.352
SACRAMENTO	5465.802	6206.255	11672.057
SAN BENITO	329.100	170.137	499.237
SAN BERNARDINO	12309.406	7327.349	19636.755
SAN DIEGO	16492.508	12060.873	28553.381
SAN FRANCISCO	1306.001	2336.939	3642.940
SAN JOAQUIN	3981.302	2454.608	6435.910
SAN LUIS OBISPO	1867.801	1001.457	2869.258
SAN MATEO	4743.402	2437.042	7180.444
SANTA BARBARA	2326.101	1321.883	3647.984
SANTA CLARA	7883.004	7403.348	15286.351
SANTA CRUZ	1051.100	1042.248	2093.348
SHASTA	1164.201	846.241	2010.442
SIERRA	63.400	44.538	107.938
SISKIYOU	591.900	298.653	890.554
SOLANO	3282.901	1433.675	4716.576
SONOMA	2102.801	1797.234	3900.035
STANISLAUS	1865.701	2131.723	3997.424
SUTTER	466.100	339.139	805.239
TEHAMA	630.200	278.501	908.701
TRINITY	121.300	63.713	185.013
TULARE	1774.301	1640.006	3414.307
TUOLUMNE	335.900	268.643	604.543
VENTURA	3756.502	3111.195	6867.697
YOLO	1304.901	685.827	1990.728
YUBA	329.100	321.546	650.646
TOTAL	180153.078	148487.844	328640.922

2005 ANNUAL STATEWIDE VMT DISTRIBUTION BY COUNTY (MILLIONS)

COUNTY	SHS	OTHER	TOTAL
ALAMEDA	8780.583	5729.410	14509.992
ALPINE	47.899	12.870	60.769
AMADOR	305.540	108.106	413.646
BUTTE	694.628	1106.494	1801.123
CALAVERAS	284.178	146.797	430.975
COLUSA	488.394	119.329	607.723
CONTRA COSTA	4766.945	3949.446	8716.391
DEL NORTE	141.122	88.952	230.073
EL DORADO	886.370	789.270	1675.641
FRESNO	3374.148	4338.484	7712.631
GLENN	363.004	144.367	507.371
HUMBOLDT	722.553	515.622	1238.175
IMPERIAL	1234.803	573.621	1808.424
INYO	400.976	110.827	511.803
KERN	4785.723	3156.813	7942.536
KINGS	788.783	544.707	1333.490
LAKE	338.754	200.563	539.317
LASSEN	296.372	293.032	589.404
LOS ANGELES	39908.844	42494.539	82403.383
MADERA	1061.056	446.385	1507.441
MARIN	1569.780	1250.533	2820.313
MARIPOSA	130.840	141.781	272.621
MENDOCINO	713.803	463.882	1177.685
MERCED	1778.208	797.800	2576.008
MODOC	82.028	102.594	184.622
MONO	248.801	53.513	302.314
MONTEREY	2146.266	1596.203	3742.469
NAPA	702.134	462.052	1164.186
NEVADA	672.729	420.977	1093.706
ORANGE	14088.285	13049.426	27137.711
PLACER	1886.296	1607.664	3493.960
PLUMAS	174.281	175.711	349.992
RIVERSIDE	10950.920	6627.483	17578.404
SACRAMENTO	5533.844	6288.669	11822.513
SAN BENITO	331.510	171.524	503.034
SAN BERNARDINO	12384.372	7378.021	19762.393
SAN DIEGO	16541.148	12106.367	28647.516
SAN FRANCISCO	1296.034	2321.008	3617.042
SAN JOAQUIN	4049.764	2498.865	6548.630
SAN LUIS OBISPO	1870.757	1003.864	2874.621
SAN MATEO	4729.077	2431.675	7160.752
SANTA BARBARA	2318.447	1318.614	3637.061
SANTA CLARA	7885.165	7411.452	15296.617
SANTA CRUZ	1048.068	1040.094	2088.162
SHASTA	1172.499	852.972	2025.472
SIERRA	63.231	44.456	107.686
SISKIYOU	587.334	296.592	883.926
SOLANO	3318.313	1450.328	4768.641
SONOMA	2119.349	1812.863	3932.211
STANISLAUS	1879.922	2149.733	4029.655
SUTTER	469.076	341.585	810.661
TEHAMA	630.551	278.885	909.436
TRINITY	120.182	63.178	183.360
TULARE	1792.978	1658.629	3451.606
TUOLUMNE	335.702	268.705	604.407
VENTURA	3755.208	3112.675	6867.883
YOLO	1322.102	695.438	2017.540
YUBA	331.657	324.310	655.967
TOTAL	180701.344	148939.750	329641.156

2005 ANNUAL STATEWIDE VFC DISTRIBUTION BY COUNTY (MILLION GALLONS)

COUNTY	GASOLINE	DIESEL	TOTAL
ALAMEDA	670.123	99.525	769.649
ALPINE	2.680	0.442	3.123
AMADOR	18.407	3.289	21.696
BUTTE	87.140	13.878	101.017
CALAVERAS	19.668	2.874	22.542
COLUSA	24.572	14.254	38.826
CONTRA COSTA	410.319	49.372	459.691
DEL NORTE	10.470	2.199	12.670
EL DORADO	78.728	11.692	90.421
FRESNO	360.561	97.466	458.027
GLENN	21.293	10.546	31.840
HUMBOLDT	56.486	13.046	69.532
IMPERIAL	78.703	27.594	106.297
INYO	22.194	5.599	27.793
KERN	342.356	168.322	510.678
KINGS	58.639	23.646	82.285
LAKE	24.459	5.148	29.607
LASSEN	27.082	7.698	34.780
LOS ANGELES	3907.487	593.794	4501.281
MADERA	64.266	27.583	91.849
MARIN	133.010	13.475	146.485
MARIPOSA	13.086	1.293	14.379
MENDOCINO	53.900	10.280	64.180
MERCED	110.435	46.059	156.494
MODOC	8.538	2.697	11.235
MONO	13.036	3.050	16.086
MONTEREY	171.465	37.942	209.407
NAPA	53.910	7.440	61.350
NEVADA	49.231	12.863	62.094
ORANGE	1282.929	166.318	1449.247
PLACER	161.579	34.380	195.959
PLUMAS	16.386	3.254	19.640
RIVERSIDE	787.361	217.765	1005.126
SACRAMENTO	561.427	91.035	652.462
SAN BENITO	22.093	7.346	29.439
SAN BERNARDINO	879.529	267.260	1146.789
SAN DIEGO	1335.816	177.344	1513.160
SAN FRANCISCO	179.112	13.831	192.943
SAN JOAQUIN	290.549	95.412	385.961
SAN LUIS OBISPO	129.705	27.243	156.949
SAN MATEO	330.276	31.312	361.588
SANTA BARBARA	166.248	27.020	193.268
SANTA CLARA	725.990	83.422	809.411
SANTA CRUZ	99.599	10.531	110.130
SHASTA	91.305	26.878	118.184
SIERRA	4.813	1.576	6.388
SISKIYOU	37.575	18.419	55.994
SOLANO	215.431	33.211	248.643
SONOMA	184.507	26.595	211.103
STANISLAUS	186.763	52.546	239.309
SUTTER	37.399	6.821	44.220
TEHAMA	39.040	15.880	54.921
TRINITY	8.224	1.923	10.147
TULARE	155.245	57.671	212.916
TUOLUMNE	28.220	4.237	32.457
VENTURA	322.297	43.573	365.870
YOLO	89.170	27.257	116.427
YUBA	30.298	7.750	38.048
TOTAL	15291.135	2890.875	18182.010

APPENDIX D4
Newhall Trip Lengths – Austin Foust Study

Home-Based Production Trip Length Averages by Purpose

Newhall Land & Lennar Westside Area

Purpose	Total Trips	Trip-Miles	Ave. Trip Length (Miles)
Home-Based Work Productions	44,708	478,200	*10.7*
Home-Based Shopping Productions	37,002	191,640	*5.2*
Home-Based Other Productions	72,555	510,780	*7.0*
Total Home-Based Productions	*154,265*	*1,180,620*	*7.7*

Non-Westside Area (Remainder of Santa Clarita Valley)

Purpose	Total Trips	Trip-Miles	Ave. Trip Length (Miles)
Home-Based Work Productions	281,950	4,672,380	*16.6*
Home-Based Shopping Productions	281,204	3,035,400	*10.8*
Home-Based Other Productions	488,749	5,411,700	*11.1*
Total Home-Based Productions	*1,051,903*	*13,119,480*	*12.5*

source: SCVCTM LRC 4.1.b

APPENDIX D5
NRSP and Entrada Population Calculations

Estimated Population of Entrada and Newhall Ranch

Housing Type[1]	Population Factor[2]	Newhall[1] DU's	Entrada[1] DU's	Newhall Population[3]	Entrada Population[3]
Single family housing	3.17	6,683	552	21,186	1,750
Attached	2.73	11,069	914	30,219	2,496
Apartment	2.38	3,133	259	7,456	616
Total		**20,885**	**1,725**	**58,860**	**4,862**

1. Housing type and quantities of each type provided by Newhall.
2. Population factor is the number of persons per dwelling unit. From page 5-31 of the Newhall Ranch Specific Plan.
3. Population is calculated as the product of the population factor and the number of dwelling units.

APPENDIX D6
Operational URBEMIS Runs

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Urbemis 2007 Version 9.2.2

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

File Name: U:\Newhall Ranch\Operational\Newhall Ranch\Newhall Operational & Area Emissions.urb9

Project Name: Landmark Village Operational and Area Emissions

Project Location: Los Angeles County

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Single family housing	58.72	75.17	638.64	0.60	102.17	19.95	59,605.74
Apartments low rise	22.07	27.23	231.39	0.22	37.02	7.23	21,595.88
Condo/townhouse general	88.41	111.54	947.64	0.88	151.60	29.60	88,444.95
TOTALS (tons/year, unmitigated)	169.20	213.94	1,817.67	1.70	290.79	56.78	169,646.57

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2010 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	2,227.73	6.34	dwelling units	6,683.20	42,371.49	323,760.55
Apartments low rise	195.81	4.90	dwelling units	3,133.00	15,351.70	117,302.34
Condo/townhouse general	691.82	5.68	dwelling units	11,069.05	62,872.20	480,406.48
					120,595.39	921,469.37

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	53.6	1.1	98.7	0.2
Light Truck < 3750 lbs	6.8	2.9	94.2	2.9
Light Truck 3751-5750 lbs	22.8	0.4	99.6	0.0
Med Truck 5751-8500 lbs	10.0	1.0	99.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	1.5	0.0	86.7	13.3
Lite-Heavy Truck 10,001-14,000 lbs	0.5	0.0	60.0	40.0
Med-Heavy Truck 14,001-33,000 lbs	0.9	0.0	22.2	77.8
Heavy-Heavy Truck 33,001-60,000 lbs	0.5	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.3	69.6	30.4	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			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.7	5.2	7.0	10.3	5.5	5.5
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	40.0	40.0	40.0
% of Trips - Residential	29.0	24.0	47.0			

% of Trips - Commercial (by land use)

Operational Changes to Defaults

Home-based work urban trip length changed from 12.7 miles to 10.7 miles

Home-based shop urban trip length changed from 7 miles to 5.2 miles

Home-based other urban trip length changed from 9.5 miles to 7 miles

Commercial-based commute average speed changed from 30 mph to 40 mph

Commercial-based commute urban trip length changed from 13.3 miles to 10.3 miles

Commercial-based non-work average speed changed from 30 mph to 40 mph

Commercial-based non-work urban trip length changed from 7.4 miles to 5.5 miles

Commercial-based customer average speed changed from 30 mph to 40 mph

Commercial-based customer urban trip length changed from 8.9 miles to 5.5 miles

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Urbemis 2007 Version 9.2.2

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

File Name: U:\Newhall Ranch\Operational\Entrada\Entrada Operational & Area Emissions.urb9

Project Name: Landmark Village Operational and Area Emissions

Project Location: Los Angeles County

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO_2
Single family housing	4,923.15
Apartments low rise	1,785.30
Condo/townhouse general	7,303.13
TOTALS (tons/year, unmitigated)	14,011.58

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2010 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	184.00	6.34	dwelling units	552.00	3,499.68	26,741.06
Apartments low rise	16.19	4.90	dwelling units	259.00	1,269.10	9,697.19
Condo/townhouse general	57.12	5.68	dwelling units	914.00	5,191.52	39,668.40
					9,960.30	76,106.65

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	53.6	1.1	98.7	0.2
Light Truck < 3750 lbs	6.8	2.9	94.2	2.9
Light Truck 3751-5750 lbs	22.8	0.4	99.6	0.0
Med Truck 5751-8500 lbs	10.0	1.0	99.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	1.5	0.0	86.7	13.3
Lite-Heavy Truck 10,001-14,000 lbs	0.5	0.0	60.0	40.0
Med-Heavy Truck 14,001-33,000 lbs	0.9	0.0	22.2	77.8
Heavy-Heavy Truck 33,001-60,000 lbs	0.5	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.3	69.6	30.4	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			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.7	5.2	7.0	10.3	5.5	5.5
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	40.0	40.0	40.0
% of Trips - Residential	29.0	24.0	47.0			
% of Trips - Commercial (by land use)						

Operational Changes to Defaults

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Home-based work urban trip length changed from 12.7 miles to 10.7 miles

Home-based shop urban trip length changed from 7 miles to 5.2 miles

Home-based other urban trip length changed from 9.5 miles to 7 miles

Commercial-based commute average speed changed from 30 mph to 40 mph

Commercial-based commute urban trip length changed from 13.3 miles to 10.3 miles

Commercial-based non-work average speed changed from 30 mph to 40 mph

Commercial-based non-work urban trip length changed from 7.4 miles to 5.5 miles

Commercial-based customer average speed changed from 30 mph to 40 mph

Commercial-based customer urban trip length changed from 8.9 miles to 5.5 miles

APPENDIX E
Area Source URBEMIS Run

12/11/2007 10:35:37 AM

Urbemis 2007 Version 9.2.2

Detail Report for Annual Area Source Unmitigated Emissions (Tons/Year)

File Name: U:\Newhall Ranch\From Impact Sciences\URBEMIS\Newhall Ranch Alternatives\Newhall Ranch Alternative 2.urb9

Project Name: Newhall Ranch Alternative 2

Project Location: Los Angeles County

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO_2
Natural Gas	
Hearth	2,694.38
Landscape	123.40
Consumer Products	
Architectural Coatings	
TOTALS (tons/year, unmitigated)	2,817.78

Area Source Changes to Defaults

12/11/2007 10:37:02 AM

Urbemis 2007 Version 9.2.2

Detail Report for Annual Area Source Unmitigated Emissions (Tons/Year)

File Name: U:\Newhall Ranch\From Impact Sciences\URBEMIS\Newhall Ranch Alternatives\Newhall Ranch Alternative 3.urb9

Project Name: Newhall Ranch Alternative 3

Project Location: Los Angeles County

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO_2
Natural Gas	
Hearth	2,636.24
Landscape	122.38
Consumer Products	
Architectural Coatings	
TOTALS (tons/year, unmitigated)	2,758.62

Area Source Changes to Defaults

12/11/2007 10:40:33 AM

Urbemis 2007 Version 9.2.2

Detail Report for Annual Area Source Unmitigated Emissions (Tons/Year)

File Name: U:\Newhall Ranch\From Impact Sciences\URBEMIS\Newhall Ranch Alternatives\Newhall Ranch Alternative 4.urb9

Project Name: Newhall Ranch Alternative 4

Project Location: Los Angeles County

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO2
Natural Gas	
Hearth	2,673.28
Landscape	122.97
Consumer Products	
Architectural Coatings	
TOTALS (tons/year, unmitigated)	2,796.25

Area Source Changes to Defaults

12/11/2007 10:41:44 AM

Urbemis 2007 Version 9.2.2

Detail Report for Annual Area Source Unmitigated Emissions (Tons/Year)

File Name: U:\Newhall Ranch\From Impact Sciences\URBEMIS\Newhall Ranch Alternatives\Newhall Ranch Alternative 5.urb9

Project Name: Newhall Ranch Alternative 5

Project Location: Los Angeles County

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO_2
Natural Gas	
Hearth	2,605.67
Landscape	121.03
Consumer Products	
Architectural Coatings	
TOTALS (tons/year, unmitigated)	2,726.70

Area Source Changes to Defaults

12/11/2007 10:43:01 AM

Urbemis 2007 Version 9.2.2

Detail Report for Annual Area Source Unmitigated Emissions (Tons/Year)

File Name: U:\Newhall Ranch\From Impact Sciences\URBEMIS\Newhall Ranch Alternatives\Newhall Ranch Alternative 6.urb9

Project Name: Newhall Ranch Alternative 6

Project Location: Los Angeles County

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO_2
Natural Gas	
Hearth	2,552.87
Landscape	118.39
Consumer Products	
Architectural Coatings	
TOTALS (tons/year, unmitigated)	2,671.26

Area Source Changes to Defaults

12/11/2007 10:44:44 AM

Urbemis 2007 Version 9.2.2

Detail Report for Annual Area Source Unmitigated Emissions (Tons/Year)

File Name: U:\Newhall Ranch\From Impact Sciences\URBEMIS\Newhall Ranch Alternatives\Newhall Ranch Alternative 7.urb9

Project Name: Newhall Ranch Alternative 7

Project Location: Los Angeles County

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO2
Natural Gas	
Hearth	2,125.10
Landscape	99.84
Consumer Products	
Architectural Coatings	
TOTALS (tons/year, unmitigated)	2,224.94

Area Source Changes to Defaults

12/11/2007 10:50:29 AM

Urbemis 2007 Version 9.2.2

Detail Report for Annual Area Source Unmitigated Emissions (Tons/Year)

File Name: U:\Newhall Ranch\From Impact Sciences\URBEMIS\Entrada and VCC\Entrada Operational.urb9

Project Name: Entrada Operational Emissions

Project Location: Los Angeles County

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO_2
Natural Gas	
Hearth	415.45
Landscape	11.07
Consumer Products	
Architectural Coatings	
TOTALS (tons/year, unmitigated)	426.52

Area Source Changes to Defaults

12/11/2007 10:53:21 AM

Urbemis 2007 Version 9.2.2

Detail Report for Annual Area Source Unmitigated Emissions (Tons/Year)

File Name: U:\Newhall Ranch\From Impact Sciences\URBEMIS\Entrada and VCC\VCC Operational.urb9

Project Name: Valencia Commerce Center

Project Location: Los Angeles County

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO_2
Natural Gas	
Hearth	0.00
Landscape	0.51
Consumer Products	
Architectural Coatings	
TOTALS (tons/year, unmitigated)	0.51

Area Source Changes to Defaults

APPENDIX F
Supporting Calculations

Additional Calculations

	Tonnes / Year	%
2004 World Emissions	2.68E+10	0.0013%
2004 USA Emissions	7.00E+09	0.0049%
2004 CA Emissions	4.80E+08	0.0718%
Total Project Emissions	3.45E+05	

CA 2004 CO_2e emissions	4.80E+08	tonnes
CA 1990 CO_2e emissions	4.27E+08	tonnes
Difference	5.30E+07	tonnes
% reduction / increase	11%	%
CA 2004 population	3.58E+07	people
CA 2020 population	4.22E+07	people
2004 emissions / 2004 population	13.4	tonnes / capita
1990 emissions / 2020 population	10.1	tonnes / capita
% decrease (per capita)	24%	

NRSP + Entrada Population	63,722

	Tonnes CO_2 / year	Tonnes / capita / year
NRSP + Entrada D2 Mobile Emissions	175,381	2.8
NRSP + Entrada D2 Residential Emissions	64,183	1.0
NRSP + Entrada D2 Mobile + Residential	239,564	3.8

APPENDIX G
Life Cycle Greenhouse Gas Emissions from Building Materials

Life Cycle Greenhouse Gas Emissions from Building Materials

Prepared for:

Newhall Land
Valencia, CA

Prepared by:

ENVIRON International Corporation
Emeryville, CA

November 2008

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Acronyms

AP-42	Compilation of Air Pollutant Emission Factors
$CaCO_3$	limestone
CaO	calcium oxide
CCAR	California Climate Action Registry
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DOE	Department of Energy
EERE	Energy Efficiency and Renewable Energy
EIA	Energy Information Administration
ENVIRON	ENVIRON International Corporation
ft^2	square feet
GHG	greenhouse gas
GRP	General Reporting Protocol
kWh/m^2	kilowatt hour per square meter
LCA	life cycle analyses
MMBTU	million British thermal units
NRSP	Newhall Ranch Specific Plan
VCC	Valencia Commerce Center
WRP	water reclamation plant

1.0 EXECUTIVE SUMMARY

This report evaluates the life cycle greenhouse gas (GHG) emissions associated with the building materials used in the construction of Newhall Ranch. The life cycle GHG emissions include the embodied energy from the materials manufacture and the energy used to transport those materials to the site. This report then compares the life cycle GHG emissions to the overall annual operational emissions of Newhall Ranch.[1] The materials analyzed in this report include materials for 1) residential and non-residential buildings, 2) site infrastructure and 3) the water reclamation plant. This report calculates the overall life cycle emissions from construction materials to be 4,000 – 27,000 tonnes per year, or 1.3 – 8.9% of the overall Newhall Ranch project emissions.

ENVIRON estimated the life cycle GHG emissions for buildings by conducting an analysis of available literature on life cycle analyses (LCA) for buildings. According to these studies, approximately 75 - 97% of GHG emissions from buildings are associated with energy usage during the operational phase; the other 3 - 25% of the GHG emissions are due to material manufacture and transport. Using the GHG emissions from the operation of Newhall buildings, 3% to 25% corresponds to 3,100 to 26,100 tonnes CO_2 per year or 1.0 – 8.6% of the NRSP project emissions.

ENVIRON calculated the life cycle GHG emissions for infrastructure (roads, storm drains, utilities, gas, electricity, cable) to be equal to a one time emission of 31,600 tonnes CO_2. This analysis considered the manufacture and transport of concrete and asphalt. Based on this analysis, the transport of the materials leads to 2,100 tonnes of CO_2 emissions and the manufacture of the materials leads to 29,500 tonnes of emissions. Because the manufacture of concrete has a higher CO_2 emission factor and Newhall estimates higher quantities of concrete than asphalt, the majority of the emissions for infrastructure result from the manufacture of concrete. Because the asphalt and concrete are locally sourced, the transportation emissions are relatively small. If a 40 year lifespan of the infrastructure is assumed, the total annualized emissions are 800 tonnes per year or 0.3% of the Newhall Ranch project emissions.

ENVIRON calculated the life cycle GHG emissions for the water reclamation plant (WRP) based upon the estimated amount of concrete used to construct the WRP. Based on this analysis, the transport of the concrete for the WRP leads to 100 tonnes of CO_2 emissions and the manufacture of the materials leads to 2,200 tonnes of CO_2 emissions, the combination of which represent 0.02% of the NRSP project emissions. Because the concrete is locally sourced, the transportation emissions are relatively small.

The overall life cycle emissions from embodied energy in the Newhall Ranch building materials, annualized by 40 years, are 4,000 – 27,000 tonnes CO_2 / year. This represents 1.3 – 8.9% of the annualized GHG emissions from the NRSP area. The bulk of these emissions (1.0% to 8.6%) are from general life cycle analysis studies and do not reflect the details of Newhall Ranch.

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[1] ENVIRON estimated life cycle GHG emissions from materials in the NRSP and did not include estimates for Entrada and VCC because data was not readily available. The percentages reflect the portion of life cycle GHG emissions compared to the total emissions for the NRSP area.

2.0 INTRODUCTION

This report evaluates the life cycle greenhouse gas (GHG) emissions associated with the building materials used in the construction of Newhall Ranch. The life cycle GHG emissions include the embodied energy from the materials manufacture and the energy used to transport those materials to the site. This report then compares the life cycle GHG emissions to the overall annual operational emissions of Newhall Ranch. The materials analyzed in this report include materials for 1) residential and non-residential buildings, 2) site infrastructure and 3) the water reclamation plant.

2.1 Background on Life Cycle Analysis

LCA is a method developed to evaluate the mass balance of inputs and outputs of systems and to organize and convert those inputs and outputs into environmental themes or categories. In this case, the LCA is related to GHG emissions associated with the different stages of a life cycle. The LCA field is still relatively new, and while there are general standards for goals and general practices for LCAs[2] the specific methodologies and, in particular, the boundaries chosen for the LCA makes inter-comparison of various studies difficult. Simple choices such as the useful life of a building or road, for example, can change the LCA outcome substantially. Additionally, the geographic location, climatic zone and building type significantly influence patterns of energy consumption (and energy efficiency) and therefore determine life cycle GHG emissions, which makes comparisons among different studies difficult.

The calculations and results presented in this report are estimates and should be used only for a general comparison to the overall GHG emissions estimated in the Climate Change Technical Report. LCA emissions vary based on input assumptions and assessment boundaries (e.g., how far back to trace the origin of a material). Assumptions made in this report are generally conservative. However, due to the open-ended nature of LCAs, the analysis is not exact and may be highly uncertain.

3.0 EMISSIONS ESTIMATES

3.1 Life Cycle GHG Emissions from Building Materials

ENVIRON estimated the life cycle GHG emissions for building materials by conducting an analysis of available literature on life cycle analyses (LCA) for buildings. According to these studies, approximately 75 - 97% of GHG emissions from buildings are associated with energy usage during the operational phase; the other 3 - 25% of the GHG emissions are due to building material manufacture and transport. Based on the GHG emissions from the operation of Newhall buildings[3], 3% to 25% corresponds to 3,100 to 26,100 tonnes CO_2 per year, as shown in Table 1. The specific LCA studies used are discussed in the next section.

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[2] ISO 14044 and ISO 14040

[3] Climate Change Technical Report: Newhall Ranch. ENVIRON. January 2008.

With the current energy generation mix in the US which relies heavily on fossil fuel based sources, focusing on energy efficiency measures (which ultimately reduces lifetime GHG emissions) is more effective in reducing the overall GHG footprint than focusing on materials with low embodied energy. As the energy generation measures reduce their GHG intensity (shift away from fossil fuel to renewable fuels), material selection will be a more critical factor in a building's GHG emissions over its life cycle.

3.1.1 LCA Studies for Buildings

The LCA literature studies tend to compare the energy used to make and transport building materials, or the embodied energy, with the operational energy use. In this manner, the relative importance of the embodied energy can be assessed. ENVIRON discusses several studies that compare the embodied energy and the operational energy.

A life cycle assessment of a 66,000 ft^2 sustainably-designed university building[4] in the US Mid-west[5] estimated that the GHG emissions associated with its energy use over a 100-year time horizon to be 135,000 metric tones of carbon dioxide equivalent (CO_2e), 96.5% of which result from operations phase activities, 3% from material production (of which ⅓ is cement production) and 0.5% from transportation and decommissioning combined. The study also notes that the GHG emissions closely matches the distribution of life cycle energy distributions, indicating that operational energy requirements are the key factor determining overall GHG emissions, especially when considering fossil fuel based energy generation. This building has a longer estimated life than the Newhall Ranch buildings, which would lead to a lower comparison of embodied energy to operational energy.

A study of single-family homes in the US Mid-west,[6] one built using standard construction techniques and the second incorporating energy efficiency measures, reached similar conclusions. Over the life cycle of the homes (assumed to be 50 years), the conventional home uses 15,000 MMBTU and the energy efficient configuration uses 6,000 MMBTU of energy, representing a 60% reduction in overall energy. As GHG emissions closely match the distribution of life cycle energy distributions, the energy efficient variant resulted in 63% fewer emissions. Of the total energy use over the structure's life cycle, 91% of the conventional house total energy results from energy consumed in the use stage (e.g., operating energy). This value drops to 74% in the energy efficient home as the energy embodied in the building materials stays the same or is slightly higher than that in the conventional home and operating energy is reduced.

Similarly, a review of 60 case studies of homes from nine European countries in a variety of climates[7] indicated that operating energy represents the largest part of energy demand by a building during its life cycle. In one evaluation the operating energy is reported as between 92 -

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[4] Includes 4 floors of classroom and open-plan offices and 3 floors of hotel rooms, in this evaluation used as a surrogate for a generic commercial structure.

[5] Scheuer, C., G.A. Keoleian, and P. Reppe. (2003) Life cycle energy and environmental performance of a new university building: Modeling challenges and design implications. *Energy and Buildings*, **35**(10): p. 1049.

[6] Keoleian, G.A., S. Blanchard, and P. Reppe. (2000) Life-cycle energy, costs, and strategies for improving a single-family house. *Journal of Industrial Ecology*, **4**(2): p. 135.

[7] Sartori, I. and A.G. Hestnes. (2007) Energy use in the life cycle of conventional and low-energy buildings: A review article. *Energy and Buildings*, **39**(3): p. 249.

95% for conventional construction and 72 - 90% for low-energy buildings[8] (which are also consistent with other literature references[9]). Sartori and Hestnes[26] also note that buildings constructed with energy efficiency measures may have a higher energy (and concomitant GHG emissions) embodied by the materials used in construction (e.g., more insulation, higher thermal mass), but over the lifespan of the building the overall energy use (operating and embodied energy) is dramatically lower due to the large reductions in operating energy. As an example, the embodied energy was estimated to be 1171 kWh/m^2 for a conventional house and 1391 kWh/m^2 for a passive, energy efficient home, an increase of 220 kWh/m^2 or 19%. Over the lifetime of the building, however, the total energy (operating and embodied) of the conventional house was approximately 22,500 kWh/m^2, while the passive house was roughly 5,500 kWh/m^2, a four-fold decrease in the total energy over an assumed 80 year life cycle.

3.1.2 Energy Efficiency vs. Embodied Energy in Buildings

From our analysis of these assessments, we note the following major conclusions:

- To minimize GHG lifetime emissions, optimization of energy efficiency (both thermal and electrical) for the operational phase of a building should be the primary emphasis for design, especially when the energy supplied is generated from fossil fuel sources.

- Passive design measures such as the orientation of structure to maximize solar heating and daylighting as well as natural ventilation; heavy construction to increase the thermal mass of the structure with materials that have a high capacity for absorbing heat and change temperature slowly; and solar control like window shading[10] should be emphasized[11,12,13] as they have a negligible increase in embodied energy (GHG emissions from material production) and can reduce total energy substantially.[14]

- Active energy efficiency measures (e.g., mechanical ventilation, artificial cooling, free cooling) may as much as double the embodied energy of the structure, but can halve overall energy usage.

- With the current energy generation mix in the US which relies heavily on fossil fuel based sources, focusing on energy efficiency measures (which ultimately reduces lifetime GHG emissions) is more effective in reducing the overall GHG footprint than focusing on materials with low embodied energy. As the energy generation measures

[8] Winther, B.N. and A.G. Hestnes. (1999) Solar versus green: The analysis of a Norwegian row house. *Solar Energy*, **66**(6): p. 387.

[9] Adalberth, K., A. Almgren, and E.H. Petersen. (2001) Life Cycle Assessment of Four Multi-Family Buildings. *International Journal of Low Energy and Sustainable Buildings*, **2**.

[10] United Nations Environment Program 2007 Buildings and Climate Change report whole-house system measures are recommended for the Mediterranean and desert climate zones

[11] Browning, W.D. and J.J. Romm. (1998) *Greening the Building and the Bottom Line*. Snowmass, Colorado: Rocky Mountain Institute.

[12] United Nations Environment Program. (2007) *Buildings and Climate Change: Status, Challenges and Opportunities.*

[13] US Department of Energy Building Technologies Program. (2007) www.eere.energy.gov/buildings/. October.

[14] Sartori, I. and A.G. Hestnes. (2007) Energy use in the life cycle of conventional and low-energy buildings: A review article. *Energy and Buildings*, **39**(3): p. 249.

reduce their GHG intensity (shift away from fossil fuel to renewable), material selection will be a more critical factor in a building's GHG emissions over its life cycle.

One can not evaluate the life cycle emissions of a building product independent of the impact that the building product has on energy use. For example, studies that evaluate the relative embodied energy and GHG emissions associated with the production of structural materials such as steel, concrete or wood generally indicate that the wood products have the lowest GHG emissions as it is produced from a renewable resource that may actually remove CO_2 during its production phase and sequester it during its use phase.[15,16] However, these studies do not account for the effect of the material on overall building energy efficiency, which is often heavily dependent on the climate in which the building is located. In desert climates, the thermal mass of the structure is important for energy savings, as the thermal mass cools at night and keep the house cool during the day during hot weather and conversely heats during the day keeps the house warm during the evening during cool weather. To increase thermal mass, concrete is much more effective than wood. In other types of climates (cooler with less solar heating), wood with insulation has a greater impact at improving overall building efficiency.

For some building products or systems, the net energy savings during the operational portion of the building's life cycle are comparable. If this is the case, then the alternative with the lowest embodied GHG emissions will result in the lowest life cycle GHG emissions.

Building materials with high replacement rates, like carpeting and wiring, can often have a high contribution to the overall GHG emissions as their impact is dependent on renovation schedules. For example, if two building materials have the same embodied energy but one is replaced every 5 years and the second is replaced every 25 years then the first will have five times the embodied energy over the lifetime of the building. As such Scheuer et al.[17] indicate that "[d]esign strategies that maximize the service life of building materials should be maximized." These strategies include designing the structure for minimal material use and choosing materials with low embodied energy, high recycled content, and long life spans.

From our analysis of these product or system specific assessments, we note the following major conclusions:

- Products or systems which have the greatest impact in improving overall building energy efficiency over the building's life cycle should be selected to minimize life cycle GHG emissions. These alternatives may not necessarily have the lowest embodied GHG emissions.

[15] Borjesson, P. and L. Gustavsson. (2000) Greenhouse gas balances in building construction: Wood versus concrete from life-cycle and forest land-use perspectives. *Energy Policy*, **28**(9): p. 575.

[16] Lenzen, M. and G. Treloar. (2002) Embodied energy in buildings: Wood versus concrete - Reply to Borjesson and Gustavsson. *Energy Policy*, **30**(3): p. 249.

[17] Scheuer, C., G.A. Keoleian, and P. Reppe. (2003) Life cycle energy and environmental performance of a new university building: Modeling challenges and design implications. *Energy and Buildings*, **35**(10): p. 1049.

- When evaluating products or systems that have similar impacts on overall building energy efficiency, alternatives with the lowest embodied GHG emissions should be selected to minimize GHG emissions.

- Materials with high replacement rates (e.g., carpeting, wiring) tend to have higher embodied energy due to their short life cycle, therefore minimizing embodied GHG emissions is most critical for these types of products or systems to minimize overall GHG emissions. Materials with low replacement rates (e.g., piping, air ducts) tend to have lower embodied energy over the life cycle of the building, therefore differences in overall GHG emissions between several alternative are likely to be small.

3.2 GHG Emissions from Manufacture of Infrastructure Materials

ENVIRON evaluated the embodied energies of materials likely to be found in the infrastructure (roads, storm drains, utilities, gas, electricity, cable) of the Newhall development. The embodied energies of different materials vary based upon the transportation distance and manufacturing processes. A material that is locally-sourced may require a large amount of energy to be produced and, on the contrary, a material with a relatively low energy intensity may be sourced from farther away. ENVIRON assumed that concrete and asphalt will be among the dominant materials used in the infrastructure and estimated the embodied energies of these two materials. The manufacture of these materials results in overall CO_2 emissions of 29,500 tonnes. 89% of these emissions (26,200 tonnes) result from the manufacture of concrete because concrete has a higher CO_2 emission factor and is predicted to be used in higher quantities than asphalt.

3.2.1 Embodied Energy in Concrete Production

Concrete is composed primarily of cement, water, and aggregate such as sand and gravel, with small amounts of chemical admixtures. A typical concrete mix contains approximately 15% cement by volume.[18] Because the remaining 85% of concrete is composed of water and aggregate, ENVIRON assumed that all of the manufacture-related embodied energy in concrete stems from the production of cement.

There are two main sources of CO_2 emissions from the production of cement: "calcining" emissions and fossil fuel combustion emissions. Calcining emissions result from the chemical conversion of limestone ($CaCO_3$) to calcium oxide (CaO) and carbon dioxide (CO_2). CaO is a precursor to cement and CO_2 is released to the atmosphere. The emissions from fossil fuel combustion vary based on fuel type, but in general slightly more than half of the emissions associated with cement production are attributed to calcining emissions and the remainder result from fossil fuel combustion. [19]

[18] Portland Cement Association. Cement and Concrete Basics. http://www.cement.org/basics/concretebasics_concretebasics.asp

[19] USGS 2005 Minerals Yearbook: Cement. February 2007. pg 16.1-16.2. http://minerals.usgs.gov/minerals/pubs/commodity/cement/cemenmyb05.pdf

ENVIRON used three sources to estimate CO_2 emission factors for the production of cement. The Energy Information Administration (EIA)[20] and AP-42[21] estimate that 0.5 tonnes of CO_2 are emitted from the calcining process for every 1 tonne of cement produced. AP-42 also provides a range (0.75 – 1.19 tonnes CO_2 / tonne cement) of total CO_2 emission factors (including calcining emissions and fossil fuel combustion emissions). The consulting group Battelle[22] estimates a total CO_2 emission factor for cement production in North America of 0.99 tonnes CO_2 / tonne cement. These emission factors are presented in Table 2.

3.2.2 Embodied Energy in Asphalt Production

The manufacture of asphalt is less energy intensive than the manufacture of cement. Asphalt is composed of asphalt cement and aggregate; the aggregate typically constitutes 92% by weight of the asphalt mixture.[23] AP-42 estimates CO_2 emission factors for batch mix (37 pounds CO_2 / short ton asphalt) and drum mix (33 pounds CO_2 / short ton asphalt) hot mix asphalt plants based on fuel usage within the plants.[24] ENVIRON used the average of these two values to represent the embodied energy of asphalt for the Newhall Ranch infrastructure.

3.2.3 Embodied Energy in Infrastructure

ENVIRON used the CO_2 emission factors from cement and asphalt to estimate the embodied energy of the infrastructure materials in Newhall Ranch. Predicted amounts of concrete and asphalt for the infrastructure were provided by Newhall and are shown in Table 3. The estimated emissions from the manufacture of the infrastructure materials are presented in Table 4. Because concrete is 15% cement by volume,[25] the total volume of concrete in Table 3 is multiplied by 15% to yield the volume of cement presented in Table 4. The emissions from the cement manufacture are assumed to be equal to the emissions from concrete manufacture. One-time emissions from concrete and asphalt manufacture for infrastructure materials are estimated to be 26,200 and 3,300 tonnes CO_2, respectively.

3.3 Embodied Energy in Water Reclamation Plant Construction Materials

The Water Reclamation Plant (WRP) will require building materials that are not accounted for in the estimates presented in section 3.1 or in the estimated amounts of concrete and asphalt used to determine the embodied energy of the infrastructure. Thus, a separate

[20] EIA Energy Market and Economic Impacts of S.280, the Climate Stewardship and Innovation Act of 2007. August 2007. http://www.eia.doe.gov/oiaf/servicerpt/csia/special_topics.html

[21] EPA AP42 Section 11.6: Portland Cement Manufacturing. http://www.epa.gov/ttn/chief/ap42/ch11/final/c11s06.pdf

[22] Battelle. Humphreys, K. and Mahasenan, M. Climate Change: Toward a Sustainable Cement Industry. March 2002.

[23] EPA AP42 section 11.1: Hot Mix Asphalt Plants. pg 11.1-1. http://www.epa.gov/ttn/chief/ap42/ch11/final/c11s01.pdf

[24] EPA AP42 section 11.1: Hot Mix Asphalt Plants. Tables 11.1-5 and 11.1-7. http://www.epa.gov/ttn/chief/ap42/ch11/final/c11s01.pdf

[25] Portland Cement Association. Cement and Concrete Basics. http://www.cement.org/basics/concretebasics_concretebasics.asp

analysis of the embodied energy in the WRP is presented here. For simplicity, ENVIRON considered only concrete in this first-order approximation; additional building materials such as steel will contribute to the embodied energy.

In order to estimate the embodied energy of the WRP, ENVIRON used the CO_2 emission factor for cement (explained in section 3.2.1) and Newhall's estimate of the amount of concrete required (12,895 cubic yards or 23,400 tonnes) for a 6.8 MGD WRP. As with the infrastructure calculations described previously, the volume of concrete is multiplied by 15% to yield the volume of cement required. The manufacture of this cement will emit approximately 2,200 tonnes of CO_2, as shown in Table 4. These emissions are assumed to be equal to the emissions from the concrete manufacture.

The emissions associated with transport of these materials will be addressed in a later section of this report.

3.4 Transportation of Materials for Infrastructure and Water Reclamation Plant

ENVIRON estimated the emissions from the transportation of the infrastructure and WRP. Newhall provided approximate distances between the materials' source locations and the development site. Using the infrastructure material quantities specified in Table 3 and the quantity of concrete required for the WRP provided by Newhall, ENVIRON estimated emissions of 2,200 tonnes CO_2 from the transportation of the concrete and asphalt in the infrastructure and WRP.[26] Details of the calculations are outlined in Table 5.

3.4.1 Calculation of Emissions from Transportation of Materials for Buildings

Although each particular shipper operates with greater or lesser efficiencies, ENVIRON assumed an average GHG emission rate per tonne-mile[27] for each mode of transportation. Although it is likely that more dense material has a slightly lower GHG shipping intensity than does less dense material, this analysis developed a single emission factor per tonne-mile of material moved, regardless of density, for each mode of transportation.

3.4.1.1 Emissions associated with transporting the material

Emission factors were calculated from DOE EERE energy intensity indicators.[28] EERE data is presented in terms of energy per mile traveled. These were converted using AP-42 conversion factors[29] for energy in different types of fuel, and California Climate Action Registry (CCAR) General Reporting Protocol (GRP)[30] emission factors for mass of CO_2 emitted per gallon of fuel. Trains and trucks are assumed to run on diesel. These emission factors are listed in Table 5. The emission factors developed above were multiplied by the distances traveled by each type of transportation.

[26] For the estimates of emissions from material transportation, ENVIRON conservatively assumed that the entire concrete mix, not just cement, is transported from the source locations to the development site.

[27] A tonne-mile refers to the amount of material (in tonnes) moved a distance of one mile.

[28] Grams CO_2 / tonne mile. See http://intensityindicators.pnl.gov/trend_data.stm Transportation sector data.

[29] AP42 conversions available at http://www.epa.gov/ttn/chief/ap42/appendix/appa.pdf

[30] The GRP is available online at http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007_web.pdf

3.5 Summary of Emissions from Buildings, Infrastructure, and Water Reclamation Plant

Table 6 presents the summary of the life cycle greenhouse gas (GHG) emissions associated with the building materials used in the construction of Newhall Ranch. The life cycle GHG emissions include the embodied energy from the materials manufacture and the energy used to transport those materials to the site. The materials analyzed include materials for 1) residential and non-residential buildings, 2) site infrastructure and 3) the water reclamation plant. This report calculates the overall life cycle emissions from construction materials to be 4,000 – 27,000 tonnes per year, or 1 – 9% of the overall Newhall Ranch project emissions.

Table 1
Life Cycle Greenhouse Gas (GHG) Emissions From Materials[1] Used for Buildings
Newhall Land
Newhall California

Residential and Non-Residential Buildings[2]	Embodied Energy as Percentage of Overall Energy[3]	
	3%	25%
(tonnes CO_2 / year)		
104,494	3,135	26,124

Notes:
1. All materials were analyzed. See references below for more details.
2. Represents CO_2 emissions from electricity and natural gas use. From the Newhall Ranch Climate Change Technical Report for Design Alternative 2.
3. Percentages are based upon LCA studies below. The studies compared energy used in the manufacture and transport of materials to energy use from electricity and natural gas. Varying lifetimes of homes were assumed in each study. As homes become more energy efficient, the portion of GHGs from embodied energy increases.

Abbreviations:
CO_2 = Carbon Dioxide
GHG = Greenhouse Gas
LCA = Life Cycle Analysis

Sources:

Scheuer, C., G.A. Keoleian, and P. Reppe. (2003) Life cycle energy and environmental performance of a new university building: Modeling challenges and design implications. *Energy and Buildings* , **35**(10): p. 1049.
Keoleian, G.A., S. Blanchard, and P. Reppe. (2000) Life-cycle energy, costs, and strategies for improving a single-family house. *Journal of Industrial Ecology* , **4**(2): p. 135.
Sartori, I. and A.G. Hestnes. (2007) Energy use in the life cycle of conventional and low-energy buildings: A review article. *Energy and Buildings* , **39**(3): p. 249.

Winther, B.N. and A.G. Hestnes. (1999) Solar versus green: The analysis of a Norwegian row house. *Solar Energy* , **66**(6): p. 387.

Adalberth, K., A. Almgren, and E.H. Petersen. (2001) Life Cycle Assessment of Four Multi-Family Buildings. *International Journal of Low Energy and Sustainable Buildings* , **2**.

Table 2
Greenhouse Gas (GHG) Emission Factors for the Manufacture of Cement
Newhall Land
Newhall Ranch, California

Data Source	Calcining Emissions[4]	Fossil Fuel Emissions[5]
	(tonnes CO_2/tonne cement)	
EIA[1]	0.5	NA
EPA AP-42[2]	0.5	NA
	0.75 - 1.19	
	0.92	
Battelle[3]	0.99	

Notes:
1. From the Energy Market and Economic Impacts of S.280, the Climate Stewardship and Innovation Act of 2007. Calculations are detailed in the Documentation for Emissions of Greenhouse Gases in the United States 2004, pg 35 - 38.
2. From AP-42 section 11.6: Portland Cement Manufacturing. Approximately 500 kg of CO_2 are released per Mg of cement produced during the calcining process; total manufacturing emissions depend on energy consumption (pg 11.6-6). Table 11.6-8 specifies 2,100 lbs CO_2 per ton of clinker produced (ENVIRON used the higher value instead of 1,800 lbs / ton to be conservative). Clinker is a precursor to cement. Using a clinker factor of 0.88 lb clinker/lb cement (from the Battelle report) yields an emission factor of 0.92 tonnes CO_2/tonne cement.
3. From Table 1-2 of the Battelle report. The North American average emission factor is 0.99 kg CO_2/kg cement; the global average is 0.87 kg CO_2/kg cement.
4. There are two main sources of CO_2 emissions from the manufacture of cement: the calcining process and fossil fuel combustion. Calcining emissions result from the chemical reaction of converting limestone ($CaCO_3$) to calcium oxide (CaO) and carbon dioxide (CO_2). CaO is a precursor to concrete and CO_2 is released to the atmosphere.
5. Fossil fuel combustion usually provides the energy necessary to manufacture cement. The emissions from the fossil fuel combustion vary depending on the type of fuel used; in general the combustion accounts for slightly less than half of the CO_2 emissions from the manufacture of cement.

Abbreviations:
AP-42 = Compilation of Air Pollutant Emission Factors
CO_2 = carbon dioxide
EIA = Energy Information Administration
EPA = Environmental Protection Agency
kg = kilogram
NA = Not Available
Mg = megagram = 1,000 kg

Sources:
EIA Energy Market and Economic Impacts of S.280, the Climate Stewardship and Innovation Act of 2007. August 2007. http://www.eia.doe.gov/oiaf/servicerpt/csia/special_topics.html
EPA AP42 Section 11.6: Portland Cement Manufacturing.
http://www.epa.gov/ttn/chief/ap42/ch11/final/c11s06.pdf
Battelle. Humphreys, K. and Mahasenan, M. Climate Change: Toward a Sustainable Cement Industry. March 2002.

Table 3
Quantities of Infrastructure Materials
Newhall Land
Newhall Ranch, California

CONCRETE				
Material[1]	**Length[1] (ft/acre)**	**Pipe Diameter[1] (in)**	**Approximate Weight[2] (lb/ft)**	**Total Weight[4] (tonnes/acre)**
Concrete Sewer	125	8	32	1.79
	75	12	100	3.40
Concrete Storm Drain	25	18	180	2.04
	40	30	405	7.35
	40	24	300	5.44
	40	42	672	12.20
	20	48	854	7.74
	20	54	1047	9.50
	20	60	1277	11.59
Material[1]	**Size[1] (sq ft/acre)**	**Base[1] (ft)**	**Density[2] (lb/ft^3)**	**Total Weight[4] (tonnes/acre)**
Concrete Block	2,400	0.29	150	47.63
			Total Concrete (tonnes/acre)	108.67
			TOTAL Concrete (tonnes)[5]	**282,551**
			TOTAL Concrete (yd^3)[6]	**155,730**
ASPHALT				
Material[1]	**Size[1] (sq ft/acre)**	**Base[1] (ft)**	**Density[3] (lb/ft^3)**	**Total Weight[4] (tonnes/acre)**
Asphalt Block	10,000	0.25	64.11	72.70
			Total Asphalt (tonnes/acre)	72.70
			TOTAL Asphalt (tonnes)[5]	**189,013**
			TOTAL Asphalt (yd^3)[6]	**240,741**

Notes:

1. Materials and sizes are provided by Newhall.
2. Weights and density of concrete provided by the American Concrete Pipe Association Concrete Pipe Design Manual.
3. Density of asphalt and conversion factors provided by AP-42 Appendix A.
4. Total weight (tonnes/acre) calculated by multiplying approximate weight by material length/size.
5. Total material quantities (tonnes) are calculated assuming a total development size of 2,600 acres (data provided by Newhall).
6. Total material quantities (yd^3) are calculated using densities provided by AP-42.

Abbreviations:

ft = foot
in = inch
lb = pound
sq ft = square foot

Sources:

American Concrete Pipe Association. Concrete Design Manual. Illustration 5.2, pgs 84-86. http://www.concrete-pipe.org/pdf/cp-manual.pdf
AP-42 conversions available at http://www.epa.gov/ttn/chief/ap42/appendix/appa.pdf

Table 4
Greenhouse Gas (GHG) Emissions from Manufacture of Materials
Newhall Land
Newhall Ranch, California

Material	**Emission Factor**	**Volume of Material**	**Mass of Material**	**Emissions from Manufacture of Material**[5]
	(tonnes CO_2/tonne material)	**(yd^3)**	**(tonnes)**	**(tonnes CO_2)**
Infrastructure[1]				
Cement (in concrete)[2]	0.990	23,359	26,489	26,224
Asphalt[3]	0.018	240,741	189,013	3,308
Water Reclamation Plant[4]				
Cement (in concrete)[2]	0.990	1,934	2,193	2,171
TOTAL				**31,703**

Notes:
1. Quantity of material for infrastructure is provided by Newhall.
2. Concrete is composed of cement, water, aggregate, and chemical admixtures; concrete mixtures are approximately 15% cement by volume (Portland Cement Association). Cement accounts for almost all of the CO_2 emissions associated with the manufacture of conrete. The cement emission factors provided by AP-42 cover a wide range of processing technologies and emission factors, so ENVIRON used the cement emission factor provided by the Battelle report.
3. From AP-42 section 11.1: Hot Mix Asphalt Plants. Tables 11.1-5 and 11.1-7. ENVIRON assumed an average emission factor from batch mix hot asphalt plants and drum mix hot asphalt plants.
4. Mass of material for the Water Reclamation Plant (WRP) is provided by Newhall.
5. Because the manufacture of cement is the main contributor to CO_2 emissions in the production of concrete, ENVIRON assumed that the emissions from the manufacture of cement are equal to the emissions from the overall manufacture of concrete.

Abbreviations:
CO_2 = carbon dioxide
yd^3 = cubic yard
MGD = million gallons per day

Sources:

Battelle. Humphreys, K. and Mahasenan, M. Climate Change: Toward a Sustainable Cement Industry. March 2002.
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Portland Cement Association. Cement and Concrete Basics. http://www.cement.org/basics/concretebasics_concretebasics.asp
Zhang, Z. and Wilson, F. Life-Cycle Assessment of a Sewage-Treatment Plant in South-East Asia. J.CIWEM, 2000, 14, February.
Kiewit. South Bay Water Reclamation Plant. http://www.kiewit.com/markets/pro_2098031.html
AP-42 conversions available at http://www.epa.gov/ttn/chief/ap42/appendix/appa.pdf

Table 5
Greenhouse Gas (GHG) Emissions from Transportation of Infrastructure and Water Reclamation Plant Construction Raw Materials
Newhall Land
Newhall Ranch, CA

Material	Total Mass Transported[2]	Distance from Source Location: Santa Clarita Valley[3]	Distance from Source Location: San Fernando Valley[3]	Distance from Source Location: Port of Los Angeles[4]	Mass-Distance[5]: Santa Clarita Valley	Mass-Distance[5]: San Fernando Valley	Mass-Distance[5]: Port of Los Angeles	Emission Factor[6]: Rail	Emission Factor[6]: Trucks	Emissions to Transport to Construction Site[7]: Santa Clarita Valley	Emissions to Transport to Construction Site[7]: San Fernando Valley	Emissions to Transport to Construction Site[7]: Port of Los Angeles	Total
	(tonnes material)	(miles)			(tonne-miles)			(grams CO_2/tonne-mile)		(tonnes CO_2)			
Infrastructure													
Concrete[1]	282,551	12	20	50	1,695,307	2,825,512	--	26	253	430	716	--	**1,146**
Asphalt	189,013	12	20	50	1,134,078	1,890,130	756,052			287	479	192	**958**
Water Reclamation Plant													
Concrete[1]	23,396	12	20	50	140,378	233,963	--	26	253	36	59	--	**95**
TOTAL													**2,199**

Notes:

1. For manufacturing emissions, only the amount of cement is considered; however, for transportation emissions, the entire mass of concrete is considered because the concrete mix is transported from the source locations.
2. Mass of material is provided by Newhall for infrastructure quantities. Moving a tonne of asphalt is assumed to be as energy intensive as moving a tonne of concrete.
3. Distances from the Santa Clarita Valley and San Fernando locations are provided by Newhall.
4. Distance from the Port of Los Angeles is estimated using Google Earth.
5. Mass distance is the mass of material multipled by the distance traveled. Newhall estimates that half of the concrete and asphalt come from the Santa Clarita Valley source and the other half come from the San Fernando Valley Source. The petroleum used in the asphalt comes from the Port of Los Angeles. Asphalt is roughly 92% by weight aggregate, so ENVIRON assumed that the remaining 8% is representative of the mass of petroleum transported from the Port of Los Angeles.
6. Emission factors for rail and truck calculated from DOE EERE energy intensity indicators. EERE data is presented in Btu / ton mile. These were converted using AP-42 conversion factors for energy in different types of fuel, and CCAR GRP emission factors for mass CO_2 emitted per gallon of fuel. Rail and Trucks are assumed to run on diesel.
7. Emissions calculated by multiplying the mass-distance by the emission factor. Because of the close proximity of the source locations to Newhall, ENVIRON conservatively assumed that all materials will be transported by truck. The emission factor for rail transportation is significantly lower; transporting materials by rail instead of truck will result in lower emissions.

Sources:

DOE EERE energy intensity indicators. http://intensityindicators.pnl.gov/trend_data.stm Transportation sector data.

AP42 conversions available at http://www.epa.gov/ttn/chief/ap42/appendix/appa.pdf

Table 6
Summary of Life Cycle Greenhouse Gas (GHG) Emissions from Buildings, Infrastructure, and the Water Reclamation Plant
Newhall Land
Newhall Ranch, California

Emissions Source[1]		Emissions from Manufacture of Materials[3]	Emissions from Transportation of Materials[4]	Total Emissions	Assumed Lifetime of Emissions Source[5]	Total Annualized Emissions[6]	Total Annual Emissions from NRSP[7]	LCA Fraction of Total Emissions[8]
		(tonnes CO_2)			(years)	(tonnes CO_2 / year)	(tonnes CO_2 / year)	(%)
Buildings[2]	Low Estimate	125,393		125,393	40	3,135	303,353	1.0%
	High Estimate	1,044,944		1,044,944		26,124		8.6%
Infrastructure		29,532	2,104	31,636		791		0.3%
Water Reclamation Plant		2,171	95	2,266		57		0.0%
TOTAL		159,296 - 1,078,846		159,296 - 1,078,846		3,982 - 26,971		1.3% - 8.9%

Notes:
1. ENVIRON estimated LCA emissions from three sources: buildings, infrastructure, and the water reclamation plant (WRP).
2. Emissions from buildings are shown as a range from a low to a high estimate based on the range presented in Table 1. The values in Table 1 are multiplied by the assumed lifetime of of 40 years to yield total emissions in tonnes CO_2.
3. Emissions from the manufacture of materials for infrastructure and the WRP are from Table 4.
4. Emissions from the transportation of materials for infrastructure and the WRP are from Table 5.
5. The assumed lifetime of emissions source may be adjusted; here ENVIRON has assumed a conservatively short lifetime of 40 years.
6. Total emissions are divided by the assumed lifetime of emissions sources to yield the total annualized emissions.
7. From the Climate Change Technical Report. This total includes emissions from NRSP only.
8. The LCA fraction of total emissions is calculated by dividing the total annualized emissions by the total emissions from NRSP.

Abbreviations:
CO_2 = carbon dioxide
LCA = Life Cycle Assessment
NRSP = Newhall Ranch Specific Plan
VCC = Valencia Commerce Center

Sources:
Values are calculated using Tables 1 through 5 and the emissions presented in the Climate Change Technical Report.

APPENDIX H
Utilities Technical Appendix for the RMDP and SCP Climate Change Technical Report

Utilities Technical Appendix
For The RMDP And SCP Climate Change Technical Report

February 2009

Prepared for:

The Newhall Land And Farming Company
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1.0 EXECUTIVE SUMMARY

The Proposed Project analyzed is the Newhall Ranch Resource Management Development Plan (RMDP) and the Spineflower Conservation Plan (SCP). The RMDP is a conservation, mitigation, and permitting plan for sensitive biological resources within the previously approved 11,999-acre Newhall Ranch Specific Plan (NRSP) area. The SCP is a conservation and management plan to permanently protect and manage a system of preserves designed to maximize the long-term persistence of the San Fernando Valley spineflower, a federal candidate and a state-listed endangered plant species. The Project applicant and landowner is The Newhall Land and Farming Company, and the lead agencies for the Proposed Project, under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA), are the California Department of Fish and Game and U.S. Army Corps of Engineers.

Approval of the Proposed Project will facilitate build-out within the NRSP area, Entrada planning area, and Valencia Commerce Center (VCC) planning area. These three planning areas are located in a northern, unincorporated portion of Los Angeles County and within the Santa Clarita Valley Planning Area. The NRSP area will accommodate single-family and multi-family residential units, as well as commercial and mixed-use space, an elementary school, fire station, public and private recreation facilities, trails, and various road improvements. The Entrada planning area will accommodate single-family and multi-family residential units, as well as commercial space. Finally, the VCC planning area will accommodate commercial space. The build-out of these three planning areas will result in one-time and annual (direct and indirect) emissions of greenhouse gases (GHGs).

In this report, ENVIRON calculates the overall electricity and natural gas use for the Proposed Project, and specifically the development within the three planning areas that would be enabled by Project approval, based upon methodologies that are comparable to those used when preparing the Climate Change Technical Report (CCTR), dated February 2009, to which this analysis is attached as an appendix.[1] Build-out within the three planning areas would place new demands on electrical and natural gas services provided by Southern California Edison (SCE) and Southern California Gas Company (SCGC). (Close reference to the CCTR should be made when reviewing this report to better understand the energy use estimations presented below.)

2.0 EXISTING CONDITIONS

Electricity. California has the lowest electricity per capita in the nation.[2] While the United States' per capita usage has increased by nearly 50 percent over the last thirty years, California's per capita usage has remained almost flat, due to vigorous energy efficiency mandates discussed below.[3] Accordingly, increases in California's overall demand for electricity resources are not attributable to increasing per capita demands, but population growth.[4]

[1] Although the CCTR calculated electricity and natural gas use for different building types, and greenhouse gas emissions for buildings that are 15% better than Title 24 (2005 standards), it did not explicitly calculate electricity use and natural gas use for the 15% better than Title 24 scenario. Therefore, this appendix expands upon the analysis provided in the CCTR.

[2] *Summary of the 2007 Integrated Energy Policy Report*, California Energy Commission, p. 3.

[3] *Ibid*.

[4] *Id*. at p. 12.

Approximately 78 percent of California's electricity is produced in-state, with the remaining 22 percent coming from the Pacific Northwest and Southwest.[5] The state's electricity generation system provides over 290,000 gigawatt hours per year, which are transported over 32,000 miles of transmission lines.[6]

Natural Gas. Approximately 13.5 percent of California's natural gas is produced in-state; the remaining portion of the natural gas supply comes from the Southwest (40 percent), the Rocky Mountains (23 percent), and Canada (23.5 percent).[7] According to the 2008 California Gas Report, natural gas demand in California is "expected to grow at a modest rate of just 0.1 percent per year from 2008 to 2030."[8] Residential demand, in particular, is expected to increase at an annual average rate of 0.3 percent, which is half the rate that was projected in the 2006 California Gas Report.[9] Commercial demand is expected to remain unchanged, whereas industrial demand is estimated to decline by 1.0 percent on an annual basis.[10] As provided in the 2008 California Gas Report, the state is projected to have adequate natural gas resources to meet the statewide demand during the 2008 to 2030 time frame.[11]

With regards to the SCGC service area, gas demand for all market sectors is expected to grow at an annual average rate of just 0.02 percent from 2008 to 2030.[12] In comparison, the 2006 California Gas Report projected an annual growth rate of 0.15 percent from 2006 to 2025.[13] According to the 2008 California Gas Report, the "difference between the two forecasts is caused by the slump in the housing market for the next few years, a reduced employment forecast, and aggressive energy efficiency savings goals."[14]

Energy Conservation. The California Energy Commission was created as the state's principal energy planning organization in 1974, in order to meet the energy challenges facing the state in response to the 1973 oil embargo. The CEC is charged with six (6) basic responsibilities when designing state energy policy: (1) forecasting statewide electricity needs; (2) licensing power plants to meet those needs; (3) promoting energy conservation and efficiency measures; (4) developing renewable energy resources and alternative energy technologies; (5) promoting research, development and demonstration; and (6) planning for and directing state response to energy emergencies.[15]

Title 24, part 6, of the California Code of Regulations contains the CEC's Energy Efficiency Standards for Residential and Nonresidential Buildings. Title 24 was first established in 1978, in response to a legislative mandate to reduce California's energy consumption. Since that time, Title

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5 *Id*. at p. 11.

6 *Id*. at p. 12.

7 *Id*. at p. 11.

8 *2008 California Gas Report*, California Gas and Electric Utilities, p. 7.

9 *Ibid*.

10 *Ibid*.

11 *Id*. at pp. 14, 15, and 18.

12 *Id*. at p. 62.

13 *Ibid*.

14 *Ibid*.

15 *Summary of the 2007 Integrated Energy Policy Report*, California Energy Commission, p. 2.

24 has been updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods.

In addition to Title 24, the Global Warming Solutions Act of 2006 (AB 32) is anticipated to result in the future regulation of energy resources in California. AB 32 requires California to reduce its carbon footprint (*i.e.*, its greenhouse gas emissions) to 1990 levels by 2020. In order to achieve these emission reductions, it is generally accepted that California will need to improve its overall energy efficiency, which includes the use of more renewable energy resources. Pursuant to AB 32, the California Air Resources Board will work with other state agencies (including the CEC), to implement feasible programs and regulations that reduce emissions and improve energy efficiency.[16]

3.0 ESTIMATION OF ANNUAL ELECTRICITY AND NATURAL GAS USAGE FROM NON-RESIDENTIAL BUILDINGS

Non-residential buildings include all structures, except residences, that may exist in a development, such as government, municipal, commercial, retail, and office space. This section describes the methods used to estimate the electricity and natural gas use associated with activities in those buildings.

The square footage of each specific building type was calculated based upon general building areas. Each building type has a specific breakdown of energy end-use. Since energy end-uses regulated by Title 24 are limited to cooling, lighting, and ventilation, summing the percentages of these three end-uses yields the percentage of energy use that is included in and regulated by Title 24. These energy end-uses and building areas were used to calculate the electricity and natural gas use from each non-residential building type for the entire development.

Total Title 24 compliant electricity and natural gas use per square foot was taken directly from the CCTR. In addition, the Title 24 electricity (built environment only) for buildings modeled with eQUEST was taken directly from the CCTR. The Title 24 electricity (built environment only) for buildings modeled by EIA data was calculated based upon the end-use profiles.

Tables 3-A through 3-F present the electricity and natural gas usage for the non-residential building types associated with Design Alternative 2 (i.e., the Proposed Project) and Design Alternatives 3 through 7. Table 4 provides a summary of the non-residential energy consumption.

4.0 ESTIMATION OF ANNUAL ELECTRICITY AND NATURAL GAS USAGE FROM RESIDENTIAL BUILDINGS

Residential buildings include single-family homes, attached homes, apartments, and condominiums. This section describes the methods used to estimate the electricity and natural gas use associated with activities in those buildings.

The annual electricity and natural gas use for each type of residential building was taken from the CCTR. ENVIRON incorporated the assumption that the dwelling units' energy efficiency exceeds

[16] See http://www.arb.ca.gov/cc/ghgsectors/ghgsectors.htm#electric, last visited on February 10, 2009 [highlights targeted improvements for the energy sector].

Title 24 (2005 standards) by 15%, but did not account for renewable energy, as it is uncertain if the renewable energy commitment made by Newhall Land would come from the utility provider or from local distributed generation. If this renewable energy was to come from the utility provider, the transmission and distribution systems needed to deliver the electricity would be the same as if there were no renewable electricity. Therefore, in an effort to be conservative, ENVIRON estimated the electricity use assuming the renewable portion would come from the utility provider. To calculate overall electricity and natural gas usage, ENVIRON multiplied the number of dwelling units for each housing type by the annual electricity and natural gas usage per dwelling unit.

Tables 6-A through 6-F present the electricity and natural gas usage for the residential building types associated with Design Alternative 2 (i.e., the Proposed Project) and Design Alternatives 3 through 7. Table 7 provides a summary of the residential energy consumption.

5.0 CONCLUSIONS

Table 8 summarizes the total energy consumption of Design Alternatives 2 through 7 for both standard Title 24 (2005 standards) compliant buildings and buildings that exceed Title 24 (2005 standards) by 15 percent. Assuming that the non-residential buildings and residential dwelling units are minimally Title 24 (2005 standards) compliant, the future electricity and natural gas use for Design Alternative 2 would be 3.18×10^8 kW-hr/year and 1.01×10^7 ccf/year, respectively. Assuming that the non-residential buildings and residential dwelling units would be 15 percent more efficient than required by Title 24 (2005 standards), the future electricity and natural gas use for Design Alternative 2 would be 2.98×10^8 kW-hr/year and 8.60×10^6 ccf/year, respectively.

It should be noted that that the calculations presented above rely on assumptions made in the CCTR. These assumptions, and the uncertainties that result from them, are restated below:

Commercial

- The EIA energy use data for electricity end-uses uses values from all climate zones and buildings built in all years. Data for new buildings broken down by climate zone is not yet available from the EIA. While it is not clear that plug-in energy use would change substantially with climate zone, the percent of energy represented by plug-in uses does vary with climate zone. To the extent that more energy is used in the built environment in less temperate zones, this may serve to underestimate the plug-in energy use slightly.

- The eQUEST modeling assumes Title 24-compliant default parameters for windows, insulation, HVAC, etc. Although all non-residential buildings in the project would be Title 24 compliant, Title 24 does not specify building dimensions (e.g. size, height, or orientation). Title 24 also provides significant flexibility for window types, window amounts, insulation choice, and other parameters. This uncertainty is not expected to over- or under-estimate energy demand. Title 24 grants enough flexibility that if a developer puts in more windows than is “allowed” under the prescriptive measures, the energy losses can be offset by improving the window quality or installing a more efficient HVAC system, for example. Although it is unknown how exactly the non-residential buildings would be designed, each building would be Title 24 compliant; therefore, all design features of the building that make it less energy efficient would be offset by design features that make it more energy efficient.

Residential

- o Although all dwelling units would be Title 24 compliant, as required by law, Title 24 does not specify building dimensions (e.g. size, height, or orientation). Title 24 also provides significant flexibility with respect to window types and amounts, insulation choice, and other parameters. However, these variables are not expected to over- or underestimate energy demand. Title 24 grants enough flexibility that if a developer puts in more windows than is "allowed" under the prescriptive measures, the energy efficiency losses can be offset by improving the window quality or installing a more efficient HVAC system, for example. Although it is unknown how exactly the dwelling units would be designed, each would be Title 24 compliant; therefore, all design features that would make the dwelling unit less energy efficient would be offset by design features that make it more energy efficient.

- o Energy use varies considerably depending upon the design of the home. The residential units that would be facilitated by the Proposed Project would vary considerably in size, layout, and overall design. The parameters used here are intended to represent the upper quartile of homes relative to sizes in each category. As such, energy use from the homes that would actually be built are reasonably anticipated to be lower.

- o Built environment energy use varies considerably depending upon the homeowners' personal habits, which are beyond the control of the project applicant. For instance, homeowners determine the set point of thermostats, the duration of showers, the usage of lights, if they are to have a second refrigerator, and the temperature of the refrigerator, among other things. Current median behavior attributes are presented here. To the extent that individuals are becoming more energy conscious, this will tend to overestimate energy use in the future.

- o Plug-in energy use varies considerably, depending upon the appliances, lights, and other plug-ins installed by the homeowner. The project applicant has little, if any, influence over the homeowner's choices. The current median behavioral attributes are presented here. To the extent that individuals are becoming more energy conscious, or appliances are becoming more energy efficient, this report would tend to overestimate energy use in the future. However, to the extent that consumers are using more appliances in the future, this may tend to underestimate energy use.

Table 1
Percentage of Electricity Included in and Regulated by Title 24 for Various Building Types From United States Energy Information Administration
Newhall Land
Newhall Ranch, California

Principal Building Activity	Cooling[1]	Lighting[1]	Office Equipment[2]	Refrigeration[2]	Ventilation[1]	Space Heating[2]	Cooking[2]	Water Heating[2]	Other[2]	% Title 24 Electricity[3]
Grocery Store	14%	13%	17%	44%	4%	2%	2%	1%	4%	30%
Admin/Professional Office	29%	22%	26%	1%	7%	6%	1%	1%	8%	58%
Fast Food	12%	9%	14%	38%	3%	2%	18%	0%	3%	24%
Restaurant/Cafeteria	12%	9%	14%	38%	3%	2%	18%	0%	3%	24%
Retail Store	24%	25%	19%	6%	7%	7%	1%	1%	9%	56%
Strip Mall	25%	20%	20%	13%	7%	6%	2%	1%	7%	52%
Distribution/Shipping Center	15%	38%	9%	4%	13%	3%	Q	1%	18%	66%
Fire/Police Station	30%	28%	13%	Q	8%	3%	Q	Q	13%	70%
High School	26%	26%	20%	4%	7%	5%	1%	1%	10%	59%
Elementary/Middle	26%	26%	20%	4%	7%	5%	1%	1%	10%	59%
Preschool/Daycare	26%	26%	20%	4%	7%	5%	1%	1%	10%	59%
Library	26%	26%	20%	4%	7%	5%	1%	1%	10%	59%

Notes:
Title 24 - California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Cooling, Lighting, and Ventilation are included in and regulated by California Title 24.
2. Non-built energy uses such as Office Equipment, Refrigeration, Space Heating, Cooking, Water Heating, and Other are not regulated by California Title 24 but still contribute to energy consumption.
3. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. Here, this is the percentage of electricity that is included in and regulated by Title 24 for various building types.

Abbreviations:
Q - data withheld, fewer than 20 buildings sampled.

Source:
US Energy Information Administration. 2003 Commercial Buildings Energy Consumption Survey: Calculated from data from Tables 3a and 3b of: http://www.eia.doe.gov/emeu/cbecs/enduse_consumption/pba.html

Table 2
Calculation of Energy Consumption Rates for General Building Categories
Newhall Land
Newhall Ranch, California

General Building Type[1, 13]	%[2]	Refined Building Type[3]	%[4]	Modeled Building Category[5]	eQUEST[6] or EIA[7]	Final % of General Building Type[8]	Electricity (Title 24)[9] (kW-hr / sqft / yr)		Title 24 Compliant[10]: Electricity (Total)[12] (kW-hr / sqft / yr)		Title 24 Compliant[10]: Natural Gas (Total)[12] (ccf / sqft / yr)		15% Better than Title 24[11]: Electricity (Total)[12] (kW-hr / sqft / yr)		15% Better than Title 24[11]: Natural Gas (Total)[12] (ccf / sqft / yr)	
Grocery	100%	Grocery Store	100%	Grocery Store	EIA	100%	16.26	**16.26**	53.97	**53.97**	0.19	**0.19**	51.53	**51.53**	0.16	**0.16**
Misc Retail / Commercial / Office	25%	Office	100%	Admin/Professional Office	EIA	25%	9.05	**9.56**	15.58	**24.24**	0.15	**0.48**	14.22	**22.81**	0.13	**0.41**
	20%	Restaurant	25%	Fast Food	EIA	5%	25.80		106.68		1.71		102.81		1.45	
			75%	Restaurant/Cafeteria	EIA	15%	10.91		45.13		1.74		43.49		1.48	
	55%	Retail	50%	Retail Store	EIA	28%	5.46		9.81		0.10		8.99		0.08	
			50%	Strip Mall	EIA	28%	10.43		20.18		0.26		18.62		0.22	
Hotel	100%	Hotel	100%	Lodging, High-Rise Hotel	eQUEST	100%	12.19	**12.19**	21.14	**21.14**	0.29	**0.29**	19.31	**19.31**	0.25	**0.25**
Business Park / Industrial	30%	Office	100%	Admin/Professional Office	EIA	30%	9.05	**7.49**	15.58	**9.82**	0.15	**0.11**	14.22	**8.70**	0.13	**0.09**
	20%	Storage	100%	Distribution/Shipping Center	EIA	20%	3.57		5.41		0.24		4.88		0.20	
	50%	Research and Development	100%	Manufacturing, High Tech/Bio Tech	eQUEST	50%	8.13		8.13		0.02		6.91		0.02	
Public Safety	100%	Fire Station	100%	Fire/Police Station	EIA	100%	6.00	**6.00**	8.54	**8.54**	0.24	**0.24**	7.64	**7.64**	0.20	**0.20**
Institutional (schools, library, etc.)	75%	Schools	33%	High School	EIA	25%	6.25	**7.40**	10.60	**12.56**	0.12	**0.28**	9.67	**11.45**	0.10	**0.24**
			33%	Elementary/Middle	EIA	25%	7.46		12.67		0.32		11.55		0.27	
			33%	Preschool/Daycare	EIA	25%	6.17		10.47		0.35		9.54		0.29	
	25%	Library	100%	Library	EIA	25%	9.73		16.51		0.34		15.05		0.29	

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Five main building types provided by Newhall.
2. The percentage of each Refined Building Type present in the General Building Type.
3. The subcategories of General Building Type provided by Newhall.
4. The percentage of each Modeled Building Category present in the Refined Building Type.
5. The building type used in modeling that represents each Refined Building Type. It is selected from either the eQUEST or EIA data as it best maps to the Newhall specifications.
6. eQUEST is an energy modeling software approved by the California Energy Commission as a 2005 Title 24 non-residential Alternative Compliance Method (ACM). Buildings in the model are assumed to be minimally Title 24 compliant; default parameters specific to each building type are used for building area, number of floors, cooling/heating equipment type, etc.
7. The source of the energy usage value (eQUEST or EIA), as listed in the NRCCTR.
8. The percentage of each Modeled Building Category present in the General Building Type.
9. Consumption rate for electricity regulated under Title 24.
10. Emission factors assuming buildings are Title 24-compliant, without the 15% improvements.
11. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These emission factors represent the 15% improvements.
12. The total energy consumption rate for each Modeled Building Category (non-bold), and the final energy consumption rate for each General Building Type (bold).
13. The breakdown of "Miscellaneous Retail / Commercial / Office" is assumed to be the same for the NRSP area, Entrada and VCC. Likewise, the breakdown of the other building categories is assumed to be the same for each development area.

Abbreviations:
EIA = Energy Information Administration
kW-hr = kilowatt-hour
ccf = hundred cubic feet
sqft = square foot
yr = year
NRCCTR = Newhall Ranch Climate Change Technical Report

Sources:
Land use breakdown provided by Newhall, as shown in the NRCCTR.
eQUEST: The Quick Energy Simulation Tool. http://www.doe2.com/equest/
US Energy Information Administration. 2003 Commercial Buildings Energy Consumption Survey: http://www.eia.doe.gov/emeu/cbecs/contents.html

Table 3-A
Electricity and Natural Gas Usage for Non-Residential Building Types in Newhall Ranch (Non-Residential D2)
Newhall Land
Newhall Ranch, California

Development	Type[1]	Building Area (sqft)	Electricity (Title 24)[2] (kW-hr / yr)		Title 24 Compliant[3]: Electricity (Total)[5] (kW-hr / yr)		Title 24 Compliant[3]: Natural Gas (Total)[5] (ccf / yr)		15% Better than Title 24[4]: Electricity (Total)[5] (kW-hr / yr)		15% Better than Title 24[4]: Natural Gas (Total)[5] (ccf / yr)	
NRSP	Grocery[6]	180,000	2,926,104	**56,511,584**	9,714,665	**130,826,846**	33,328	**2,350,478**	9,275,749	**122,350,109**	28,329	**1,997,907**
	Misc Retail / Commercial / Office[6]	4,170,000	39,852,439		#########		2,008,749		95,122,726		1,707,437	
	Hotel[6]	100,000	1,218,833		2,114,083		29,152		1,931,258		24,780	
	Business Park / Industrial	1,100,000	8,243,187		10,804,341		115,939		9,567,863		98,548	
	Public Safety[7]	95,000	569,939		811,067		22,343		725,576		18,992	
	Institutional (schools, library, etc.)[8]	500,000	3,701,081		6,282,099		140,967		5,726,937		119,822	
Entrada	Grocery[6]	45,000	731,526	**6,092,548**	2,428,666	**13,599,933**	8,332	**207,509**	2,318,937	**12,686,051**	7,082	**176,383**
	Misc Retail / Commercial / Office[6]	250,000	2,389,235		6,061,187		120,429		5,702,801		102,364	
	Hotel[6]	200,000	2,437,667		4,228,165		58,305		3,862,515		49,559	
	Business Park / Industrial	0	0		0		0		0		0	
	Public Safety[7]	15,000	89,990		128,063		3,528		114,565		2,999	
	Institutional (schools, library, etc.)[8]	60,000	444,130		753,852		16,916		687,232		14,379	
VCC	Grocery[6]	0	0	**26,228,322**	0	**34,377,450**	0	**368,897**	0	**30,443,201**	0	**313,563**
	Misc Retail / Commercial / Office[6]	0	0		0		0		0		0	
	Hotel[6]	0	0		0		0		0		0	
	Business Park / Industrial	3,500,000	26,228,322		34,377,450		368,897		30,443,201		313,563	
	Public Safety[7]	0	0		0		0		0		0	
	Institutional (schools, library, etc.)[8]	0	0		0		0		0		0	

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Consumption of energy regulated under Title 24.
3. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
5. The total energy consumption for each General Building Type (non-bold), and the final energy consumption rate for each Development (bold).
6. Building Area values are scaled based on land distribution proportions provided by Newhall.
7. Building Area data provided by Newhall.
8. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
VCC = Valencia Commerce Center
kW-hr = kilowatt-hour
sqft = square foot
ccf = hundred cubic feet
yr = year

Sources:
Land use areas provided by Newhall.

Table 3-B
Electricity and Natural Gas Usage for Non-Residential Building Types in Newhall Ranch (Non-Residential D3)
Newhall Land
Newhall Ranch, California

					Title 24 Compliant[3]				**15% Better than Title 24[4]**			
Development	**Type[1]**	**Building Area (sqft)**	**Electricity (Title 24)[2] (kW-hr / yr)**		**Electricity (Total)[5] (kW-hr / yr)**		**Natural Gas (Total)[5] (ccf / yr)**		**Electricity (Total)[5] (kW-hr / yr)**		**Natural Gas (Total)[5] (ccf / yr)**	
NRSP	Grocery[6]	180,000	2,926,104	**55,842,598**	9,714,665	**129,129,714**	33,328	**2,316,758**	9,275,749	**120,753,325**	28,329	**1,969,245**
	Misc Retail / Commercial / Office[6]	4,100,000	39,183,453		99,403,460		1,975,029		93,525,942		1,678,775	
	Hotel[6]	100,000	1,218,833		2,114,083		29,152		1,931,258		24,780	
	Business Park / Industrial	1,100,000	8,243,187		10,804,341		115,939		9,567,863		98,548	
	Public Safety[7]	95,000	569,939		811,067		22,343		725,576		18,992	
	Institutional (schools, library, etc.)[8]	500,000	3,701,081		6,282,099		140,967		5,726,937		119,822	
Entrada	Grocery[6]	45,000	731,526	**6,092,548**	2,428,666	**13,599,933**	8,332	**207,509**	2,318,937	**12,686,051**	7,082	**176,383**
	Misc Retail / Commercial / Office[6]	250,000	2,389,235		6,061,187		120,429		5,702,801		102,364	
	Hotel[6]	200,000	2,437,667		4,228,165		58,305		3,862,515		49,559	
	Business Park / Industrial	0	0		0		0		0		0	
	Public Safety[7]	15,000	89,990		128,063		3,528		114,565		2,999	
	Institutional (schools, library, etc.)[8]	60,000	444,130		753,852		16,916		687,232		14,379	
VCC	Grocery[6]	0	0	**26,228,322**	0	**34,377,450**	0	**368,897**	0	**30,443,201**	0	**313,563**
	Misc Retail / Commercial / Office[6]	0	0		0		0		0		0	
	Hotel[6]	0	0		0		0		0		0	
	Business Park / Industrial	3,500,000	26,228,322		34,377,450		368,897		30,443,201		313,563	
	Public Safety[7]	0	0		0		0		0		0	
	Institutional (schools, library, etc.)[8]	0	0		0		0		0		0	

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Consumption of energy regulated under Title 24.
3. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
5. The total energy consumption for each General Building Type (non-bold), and the final energy consumption rate for each Development (bold).
6. Building Area values are scaled based on land distribution proportions provided by Newhall.
7. Data provided by Newhall.
8. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
VCC = Valencia Commerce Center
kW-hr = kilowatt-hour
sqft = square foot
ccf = hundred cubic feet
yr = year

Sources:
Land use areas provided by Newhall.

Table 3-C
Electricity and Natural Gas Usage for Non-Residential Building Types in Newhall Ranch (Non-Residential D4)
Newhall Land
Newhall Ranch, California

					Title 24 Compliant[3]				15% Better than Title 24[4]			
Development	**Type[1]**	**Building Area (sqft)**	**Electricity (Title 24)[2] (kW-hr / yr)**		**Electricity (Total)[5] (kW-hr / yr)**		**Natural Gas (Total)[5] (ccf / yr)**		**Electricity (Total)[5] (kW-hr / yr)**		**Natural Gas (Total)[5] (ccf / yr)**	
NRSP	Grocery[6]	180,000	2,926,104	**56,033,737**	9,714,665	**129,614,609**	33,328	**2,326,393**	9,275,749	**121,209,549**	28,329	**1,977,434**
	Misc Retail / Commercial / Office[6]	4,120,000	39,374,592		99,888,355		1,984,663		93,982,166		1,686,964	
	Hotel[6]	100,000	1,218,833		2,114,083		29,152		1,931,258		24,780	
	Business Park / Industrial	1,100,000	8,243,187		10,804,341		115,939		9,567,863		98,548	
	Public Safety[7]	95,000	569,939		811,067		22,343		725,576		18,992	
	Institutional (schools, library, etc.)[8]	500,000	3,701,081		6,282,099		140,967		5,726,937		119,822	
Entrada	Grocery[6]	45,000	731,526	**6,092,548**	2,428,666	**13,599,933**	8,332	**207,509**	2,318,937	**12,686,051**	7,082	**176,383**
	Misc Retail / Commercial / Office[6]	250,000	2,389,235		6,061,187		120,429		5,702,801		102,364	
	Hotel[6]	200,000	2,437,667		4,228,165		58,305		3,862,515		49,559	
	Business Park / Industrial	0	0		0		0		0		0	
	Public Safety[7]	15,000	89,990		128,063		3,528		114,565		2,999	
	Institutional (schools, library, etc.)[8]	60,000	444,130		753,852		16,916		687,232		14,379	
VCC	Grocery[6]	0	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**
	Misc Retail / Commercial / Office[6]	0	0		0		0		0		0	
	Hotel[6]	0	0		0		0		0		0	
	Business Park / Industrial	0	0		0		0		0		0	
	Public Safety[7]	0	0		0		0		0		0	
	Institutional (schools, library, etc.)[8]	0	0		0		0		0		0	

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Consumption of energy regulated under Title 24.
3. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
5. The total energy consumption for each General Building Type (non-bold), and the final energy consumption rate for each Development (bold).
6. Building Area values are scaled based on land distribution proportions provided by Newhall.
7. Data provided by Newhall.
8. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
VCC = Valencia Commerce Center
kW-hr = kilowatt-hour
sqft = square foot
ccf = hundred cubic feet
yr = year

Sources:
Land use areas provided by Newhall.

Table 3-D
Electricity and Natural Gas Usage for Non-Residential Building Types in Newhall Ranch (Non-Residential D5)
Newhall Land
Newhall Ranch, California

Development	Type[1]	Building Area (sqft)	Electricity (Title 24)[2] (kW-hr / yr)		Title 24 Compliant[3] Electricity (Total)[5] (kW-hr / yr)		Title 24 Compliant[3] Natural Gas (Total)[5] (ccf / yr)		15% Better than Title 24[4] Electricity (Total)[5] (kW-hr / yr)		15% Better than Title 24[4] Natural Gas (Total)[5] (ccf / yr)	
NRSP	Grocery[6]	180,000	2,926,104	**55,173,612**	9,714,665	**127,432,582**	33,328	**2,283,038**	9,275,749	**119,156,540**	28,329	**1,940,583**
	Misc Retail / Commercial / Office[6]	4,030,000	38,514,468		97,706,327		1,941,309		91,929,157		1,650,113	
	Hotel[6]	100,000	1,218,833		2,114,083		29,152		1,931,258		24,780	
	Business Park / Industrial	1,100,000	8,243,187		10,804,341		115,939		9,567,863		98,548	
	Public Safety[7]	95,000	569,939		811,067		22,343		725,576		18,992	
	Institutional (schools, library, etc.)[8]	500,000	3,701,081		6,282,099		140,967		5,726,937		119,822	
Entrada	Grocery[6]	45,000	731,526	**6,092,548**	2,428,666	**13,599,933**	8,332	**207,509**	2,318,937	**12,686,051**	7,082	**176,383**
	Misc Retail / Commercial / Office[6]	250,000	2,389,235		6,061,187		120,429		5,702,801		102,364	
	Hotel[6]	200,000	2,437,667		4,228,165		58,305		3,862,515		49,559	
	Business Park / Industrial	0	0		0		0		0		0	
	Public Safety[7]	15,000	89,990		128,063		3,528		114,565		2,999	
	Institutional (schools, library, etc.)[8]	60,000	444,130		753,852		16,916		687,232		14,379	
VCC	Grocery[6]	0	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**
	Misc Retail / Commercial / Office[6]	0	0		0		0		0		0	
	Hotel[6]	0	0		0		0		0		0	
	Business Park / Industrial	0	0		0		0		0		0	
	Public Safety[7]	0	0		0		0		0		0	
	Institutional (schools, library, etc.)[8]	0	0		0		0		0		0	

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Consumption of energy regulated under Title 24.
3. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
5. The total energy consumption for each General Building Type (non-bold), and the final energy consumption rate for each Development (bold).
6. Building Area values are scaled based on land distribution proportions provided by Newhall.
7. Data provided by Newhall.
8. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
VCC = Valencia Commerce Center
kW-hr = kilowatt-hour
sqft = square foot
ccf = hundred cubic feet
yr = year

Sources:
Land use areas provided by Newhall.

Table 3-E
Electricity and Natural Gas Usage for Non-Residential Building Types in Newhall Ranch (Non-Residential D6)
Newhall Land
Newhall Ranch, California

					Title 24 Compliant[3]				15% Better than Title 24[4]			
Development	**Type[1]**	**Building Area (sqft)**	**Electricity (Title 24)[2] (kW-hr / yr)**		**Electricity (Total)[5] (kW-hr / yr)**		**Natural Gas (Total)[5] (ccf / yr)**		**Electricity (Total)[5] (kW-hr / yr)**		**Natural Gas (Total)[5] (ccf / yr)**	
NRSP	Grocery[6]	180,000	2,926,104	**54,409,057**	9,714,665	**125,493,002**	33,328	**2,244,501**	9,275,749	**117,331,644**	28,329	**1,907,826**
	Misc Retail / Commercial / Office[6]	3,950,000	37,749,912		95,766,748		1,902,772		90,104,261		1,617,356	
	Hotel[6]	100,000	1,218,833		2,114,083		29,152		1,931,258		24,780	
	Business Park / Industrial	1,100,000	8,243,187		10,804,341		115,939		9,567,863		98,548	
	Public Safety[7]	95,000	569,939		811,067		22,343		725,576		18,992	
	Institutional (schools, library, etc.)[8]	500,000	3,701,081		6,282,099		140,967		5,726,937		119,822	
Entrada	Grocery[6]	45,000	731,526	**6,092,548**	2,428,666	**13,599,933**	8,332	**207,509**	2,318,937	**12,686,051**	7,082	**176,383**
	Misc Retail / Commercial / Office[6]	250,000	2,389,235		6,061,187		120,429		5,702,801		102,364	
	Hotel[6]	200,000	2,437,667		4,228,165		58,305		3,862,515		49,559	
	Business Park / Industrial	0	0		0		0		0		0	
	Public Safety[7]	15,000	89,990		128,063		3,528		114,565		2,999	
	Institutional (schools, library, etc.)[8]	60,000	444,130		753,852		16,916		687,232		14,379	
VCC	Grocery[6]	0	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**
	Misc Retail / Commercial / Office[6]	0	0		0		0		0		0	
	Hotel[6]	0	0		0		0		0		0	
	Business Park / Industrial	0	0		0		0		0		0	
	Public Safety[7]	0	0		0		0		0		0	
	Institutional (schools, library, etc.)[8]	0	0		0		0		0		0	

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Consumption of energy regulated under Title 24.
3. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
5. The total energy consumption for each General Building Type (non-bold), and the final energy consumption rate for each Development (bold).
6. Building Area values are scaled based on land distribution proportions provided by Newhall.
7. Data provided by Newhall.
8. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
VCC = Valencia Commerce Center
kW-hr = kilowatt-hour
sqft = square foot
ccf = hundred cubic feet
yr = year

Sources:
Land use areas provided by Newhall.

Table 3-F
Electricity and Natural Gas Usage for Non-Residential Building Types in Newhall Ranch (Non-Residential D7)
Newhall Land
Newhall Ranch, California

Development	Type[1]	Building Area (sqft)	Electricity (Title 24)[2] (kW-hr / yr)		Title 24 Compliant[3]: Electricity (Total)[5] (kW-hr / yr)		Title 24 Compliant[3]: Natural Gas (Total)[5] (ccf / yr)		15% Better than Title 24[4]: Electricity (Total)[5] (kW-hr / yr)		15% Better than Title 24[4]: Natural Gas (Total)[5] (ccf / yr)	
NRSP	Grocery[6]	180,000	2,926,104	**39,404,662**	9,714,665	**87,428,751**	33,328	**1,488,210**	9,275,749	**81,518,051**	28,329	**1,264,978**
	Misc Retail / Commercial / Office[6]	2,380,000	22,745,517		57,702,496		1,146,480		54,290,669		974,508	
	Hotel[6]	100,000	1,218,833		2,114,083		29,152		1,931,258		24,780	
	Business Park / Industrial	1,100,000	8,243,187		10,804,341		115,939		9,567,863		98,548	
	Public Safety[7]	95,000	569,939		811,067		22,343		725,576		18,992	
	Institutional (schools, library, etc.)[8]	500,000	3,701,081		6,282,099		140,967		5,726,937		119,822	
Entrada	Grocery[6]	0	0	**477,847**	0	**1,212,237**	0	**24,086**	0	**1,140,560**	0	**20,473**
	Misc Retail / Commercial / Office[6]	50,000	477,847		1,212,237		24,086		1,140,560		20,473	
	Hotel[6]	0	0		0		0		0		0	
	Business Park / Industrial	0	0		0		0		0		0	
	Public Safety[7]	0	0		0		0		0		0	
	Institutional (schools, library, etc.)[8]	0	0		0		0		0		0	
VCC	Grocery[6]	0	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**
	Misc Retail / Commercial / Office[6]	0	0		0		0		0		0	
	Hotel[6]	0	0		0		0		0		0	
	Business Park / Industrial	0	0		0		0		0		0	
	Public Safety[7]	0	0		0		0		0		0	
	Institutional (schools, library, etc.)[8]	0	0		0		0		0		0	

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Building Type and Area provided by Newhall.
2. Consumption of energy regulated under Title 24.
3. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.
4. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
5. The total energy consumption for each General Building Type (non-bold), and the final energy consumption rate for each Development (bold).
6. Building Area values are scaled based on land distribution proportions provided by Newhall.
7. Data provided by Newhall.
8. Newhall Land estimates 375,000 square feet of schools in Newhall Ranch (personal communication, based upon 500,000 sqft of institutional space of which 75% is schools).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
VCC = Valencia Commerce Center
kW-hr = kilowatt-hour
sqft = square foot
ccf = hundred cubic feet
yr = year

Sources:
Land use areas provided by Newhall.

Table 4
Summary of Non-Residential Energy Consumption
Newhall Land
Newhall Ranch, CA

Design Alternative	Efficiency Scenario	Electricity Consumption (kW-hr / yr)				Natural Gas Consumption (ccf / yr)			
		NRSP	Entrada	VCC	Total	NRSP	Entrada	VCC	Total
Design Alternative 2	Title 24 Compliant[1]	130,826,846	13,599,933	34,377,450	**178,804,229**	2,350,478	207,509	368,897	**2,926,885**
	15% Better than Title 24[2]	122,350,109	12,686,051	30,443,201	**165,479,361**	1,997,907	176,383	313,563	**2,487,852**
Design Alternative 3	Title 24 Compliant[1]	129,129,714	13,599,933	34,377,450	**177,107,097**	2,316,758	207,509	368,897	**2,893,165**
	15% Better than Title 24[2]	120,753,325	12,686,051	30,443,201	**163,882,577**	1,969,245	176,383	313,563	**2,459,190**
Design Alternative 4	Title 24 Compliant[1]	129,614,609	13,599,933	0	**143,214,542**	2,326,393	207,509	0	**2,533,902**
	15% Better than Title 24[2]	121,209,549	12,686,051	0	**133,895,600**	1,977,434	176,383	0	**2,153,817**
Design Alternative 5	Title 24 Compliant[1]	127,432,582	13,599,933	0	**141,032,515**	2,283,038	207,509	0	**2,490,548**
	15% Better than Title 24[2]	119,156,540	12,686,051	0	**131,842,591**	1,940,583	176,383	0	**2,116,965**
Design Alternative 6	Title 24 Compliant[1]	125,493,002	13,599,933	0	**139,092,935**	2,244,501	207,509	0	**2,452,010**
	15% Better than Title 24[2]	117,331,644	12,686,051	0	**130,017,695**	1,907,826	176,383	0	**2,084,209**
Design Alternative 7	Title 24 Compliant[1]	87,428,751	1,212,237	0	**88,640,988**	1,488,210	24,086	0	**1,512,295**
	15% Better than Title 24[2]	81,518,051	1,140,560	0	**82,658,612**	1,264,978	20,473	0	**1,285,451**

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.
2. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.

Abbreviations:
NRSP = Newhall Ranch Specific Plan
VCC = Valencia Commerce Center
kW-hr = kilowatt-hour
ccf = hundred cubic feet

Table 5
Energy Consumption Rates for Residential Buildings
Newhall Land
Newhall Ranch, California

Efficiency Scenario	Building Type[3]	Electricity Delivered[4] (kW-hr / DU / yr)	Natural Gas Delivered[5] (ccf / DU / yr)
Title 24 Compliant[1]	Single Family	8,052	449
	Attached	5,580	264
	Apartment	4,413	231
15% Better than Title 24[2]	Single Family	7,590	381
	Attached	5,327	224
	Apartment	4,201	197

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.

2. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
3. Building Types specified by Newhall.

4. As listed in the NRCCTR. Note that these usage rates do not take into account savings from renewables.

5. As listed in the NRCCTR.

Abbreviations:
DU = dwelling unit
NRCCTR = Newhall Ranch Climate Change Technical Report
kW-hr = kilowatt-hour
ccf = hundred cubic feet

Table 6-A
Electricity and Natural Gas Usage for Residential Buildings Types in Newhall Ranch (Residential D2)
Newhall Land
Newhall Ranch, California

			Title 24 Compliant[2]				15% Better than Title 24[3]			
Development	**Building Type[1]**	**# Dwelling Units**	**Electricity (Total)[4] (kW-hr / yr)**		**Natural Gas (Total)[4] (ccf / yr)**		**Electricity (Total)[4] (kW-hr / yr)**		**Natural Gas (Total)[4] (ccf / yr)**	
NRSP	Single Family	6,683	53,811,706	**129,405,632**	2,997,959	**6,644,732**	50,726,447	**122,850,350**	2,548,265	**5,648,022**
	Attached	11,069	61,769,673		2,921,675		58,962,237		2,483,424	
	Apartment	3,133	13,824,253		725,098		13,161,666		616,333	
Entrada	Single Family	552	4,444,587	**10,688,279**	247,617	**548,823**	4,189,759	**10,146,845**	210,474	**466,499**
	Attached	914	5,101,876		241,316		4,869,996		205,119	
	Apartment	259	1,141,816		59,890		1,087,090		50,906	

Notes:
1. Building Type and Number of Dwelling Units provided by Newhall.
2. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.

3. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
4. The total energy consumption for each Building Type (non-bold), and the final energy consumption rate for each Development (bold).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
kW-hr = kilowatt-hour
ccf = hundred cubic feet

Table 6-B
Electricity and Natural Gas Usage for Residential Buildings Types in Newhall Ranch (Residential D3)
Newhall Land
Newhall Ranch, California

			Title 24 Compliant[2]				15% Better than Title 24[3]			
Development	**Building Type[1]**	**# Dwelling Units**	**Electricity (Total)[4] (kW-hr / yr)**		**Natural Gas (Total)[4] (ccf / yr)**		**Electricity (Total)[4] (kW-hr / yr)**		**Natural Gas (Total)[4] (ccf / yr)**	
NRSP	Single Family	6,539	52,647,096	**126,604,993**	2,933,076	**6,500,924**	49,628,609	**120,191,582**	2,493,115	**5,525,786**
	Attached	10,829	60,432,833		2,858,444		57,686,157		2,429,677	
	Apartment	3,065	13,525,064		709,405		12,876,817		602,994	
Entrada	Single Family	360	2,898,644	**6,970,617**	161,489	**357,928**	2,732,452	**6,617,507**	137,266	**304,239**
	Attached	596	3,327,311		157,380		3,176,084		133,773	
	Apartment	169	744,663		39,058		708,972		33,200	

Notes:
1. Building Type and Number of Dwelling Units provided by Newhall.
2. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.

3. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
4. The total energy consumption for each Building Type (non-bold), and the final energy consumption rate for each Development (bold).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
kW-hr = kilowatt-hour
ccf = hundred cubic feet

Table 6-C
Electricity and Natural Gas Usage for Residential Buildings Types in Newhall Ranch (Residential D4)
Newhall Land
Newhall Ranch, California

Development	Building Type[1]	# Dwelling Units	Title 24 Compliant[2] Electricity (Total)[4] (kW-hr / yr)		Title 24 Compliant[2] Natural Gas (Total)[4] (ccf / yr)		15% Better than Title 24[3] Electricity (Total)[4] (kW-hr / yr)		15% Better than Title 24[3] Natural Gas (Total)[4] (ccf / yr)	
NRSP	Single Family	6,631	53,389,149	**128,389,471**	2,974,417	**6,592,554**	50,328,116	**121,885,664**	2,528,255	**5,603,671**
	Attached	10,982	61,284,625		2,898,733		58,499,234		2,463,923	
	Apartment	3,108	13,715,697		719,404		13,058,314		611,493	
Entrada	Single Family	360	2,898,644	**6,970,617**	161,489	**357,928**	2,732,452	**6,617,507**	137,266	**304,239**
	Attached	596	3,327,311		157,380		3,176,084		133,773	
	Apartment	169	744,663		39,058		708,972		33,200	

Notes:
1. Building Type and Number of Dwelling Units provided by Newhall.
2. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.

3. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
4. The total energy consumption for each Building Type (non-bold), and the final energy consumption rate for each Development (bold).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
kW-hr = kilowatt-hour
ccf = hundred cubic feet

Table 6-D
Electricity and Natural Gas Usage for Residential Buildings Types in Newhall Ranch (Residential D5)
Newhall Land
Newhall Ranch, California

			Title 24 Compliant[2]				15% Better than Title 24[3]			
Development	**Building Type[1]**	**# Dwelling Units**	**Electricity (Total)[4] (kW-hr / yr)**		**Natural Gas (Total)[4] (ccf / yr)**		**Electricity (Total)[4] (kW-hr / yr)**		**Natural Gas (Total)[4] (ccf / yr)**	
NRSP	Single Family	6,463	52,036,448	**125,136,516**	2,899,056	**6,425,521**	49,052,972	**118,797,494**	2,464,197	**5,461,693**
	Attached	10,704	59,731,880		2,825,289		57,017,062		2,401,495	
	Apartment	3,029	13,368,188		701,176		12,727,460		596,000	
Entrada	Single Family	307	2,470,933	**5,942,064**	137,661	**305,114**	2,329,263	**5,641,057**	117,012	**259,347**
	Attached	508	2,836,347		134,158		2,707,435		114,034	
	Apartment	144	634,784		33,295		604,359		28,301	

Notes:
1. Building Type and Number of Dwelling Units provided by Newhall.
2. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.

3. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
4. The total energy consumption for each Building Type (non-bold), and the final energy consumption rate for each Development (bold).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
kW-hr = kilowatt-hour
ccf = hundred cubic feet

Table 6-E
Electricity and Natural Gas Usage for Residential Buildings Types in Newhall Ranch (Residential D6)
Newhall Land
Newhall Ranch, California

Development	Building Type[1]	# Dwelling Units	Title 24 Compliant[2] Electricity (Total)[4] (kW-hr / yr)		Title 24 Compliant[2] Natural Gas (Total)[4] (ccf / yr)		15% Better than Title 24[3] Electricity (Total)[4] (kW-hr / yr)		15% Better than Title 24[3] Natural Gas (Total)[4] (ccf / yr)	
NRSP	Single Family	6,332	50,982,630	**122,602,310**	2,840,345	**6,295,394**	48,059,574	**116,391,663**	2,414,294	**5,351,085**
	Attached	10,487	58,522,218		2,768,072		55,862,379		2,352,861	
	Apartment	2,968	13,097,462		686,977		12,469,710		583,930	
Entrada	Single Family	136	1,095,043	**2,707,777**	61,007	**137,289**	1,032,260	**2,571,695**	51,856	**116,695**
	Attached	289	1,612,734		76,282		1,539,435		64,839	
	Apartment	0	0		0		0		0	

Notes:
1. Building Type and Number of Dwelling Units provided by Newhall.
2. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.

3. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
4. The total energy consumption for each Building Type (non-bold), and the final energy consumption rate for each Development (bold).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
kW-hr = kilowatt-hour
ccf = hundred cubic feet

Table 6-F
Electricity and Natural Gas Usage for Residential Buildings Types in Newhall Ranch (Residential D7)
Newhall Land
Newhall Ranch, California

Development	Building Type[1]	# Dwelling Units	Title 24 Compliant[2] Electricity (Total)[4] (kW-hr / yr)		Title 24 Compliant[2] Natural Gas (Total)[4] (ccf / yr)		15% Better than Title 24[3] Electricity (Total)[4] (kW-hr / yr)		15% Better than Title 24[3] Natural Gas (Total)[4] (ccf / yr)	
NRSP	Single Family	5,271	42,438,718	**102,056,029**	2,364,347	**5,240,382**	40,005,521	**96,886,192**	2,009,695	**4,454,325**
	Attached	8,730	48,714,785		2,304,186		46,500,694		1,958,558	
	Apartment	2,471	10,902,526		571,850		10,379,976		486,072	
Entrada	Single Family	273	2,195,239	**5,279,081**	122,301	**271,071**	2,069,377	**5,011,659**	103,956	**230,410**
	Attached	452	2,519,883		119,189		2,405,354		101,311	
	Apartment	128	563,958		29,580		536,928		25,143	

Notes:
1. Building Type and Number of Dwelling Units provided by Newhall.
2. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.

3. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.
4. The total energy consumption for each Building Type (non-bold), and the final energy consumption rate for each Development (bold).

Abbreviations:
NRSP = Newhall Ranch Specific Plan
kW-hr = kilowatt-hour
ccf = hundred cubic feet

Table 7
Summary of Residential Energy Consumption
Newhall Land
Newhall Ranch, CA

Design Alternative	Efficiency Scenario	Electricity Consumption (kW-hr / yr)			Natural Gas Consumption (ccf / yr)		
		NRSP	Entrada	Total	NRSP	Entrada	Total
Design Alternative 2	Title 24 Compliant[1]	129,405,632	10,688,279	**140,093,911**	6,644,732	548,823	**7,193,554**
	15% Better than Title 24[2]	122,850,350	10,146,845	**132,997,195**	5,648,022	466,499	**6,114,521**
Design Alternative 3	Title 24 Compliant[1]	126,604,993	6,970,617	**133,575,610**	6,500,924	357,928	**6,858,852**
	15% Better than Title 24[2]	120,191,582	6,617,507	**126,809,090**	5,525,786	304,239	**5,830,024**
Design Alternative 4	Title 24 Compliant[1]	128,389,471	6,970,617	**135,360,088**	6,592,554	357,928	**6,950,482**
	15% Better than Title 24[2]	121,885,664	6,617,507	**128,503,172**	5,603,671	304,239	**5,907,909**
Design Alternative 5	Title 24 Compliant[1]	125,136,516	5,942,064	**131,078,580**	6,425,521	305,114	**6,730,634**
	15% Better than Title 24[2]	118,797,494	5,641,057	**124,438,552**	5,461,693	259,347	**5,721,039**
Design Alternative 6	Title 24 Compliant[1]	122,602,310	2,707,777	**125,310,087**	6,295,394	137,289	**6,432,683**
	15% Better than Title 24[2]	116,391,663	2,571,695	**118,963,357**	5,351,085	116,695	**5,467,780**
Design Alternative 7	Title 24 Compliant[1]	102,056,029	5,279,081	**107,335,109**	5,240,382	271,071	**5,511,453**
	15% Better than Title 24[2]	96,886,192	5,011,659	**101,897,851**	4,454,325	230,410	**4,684,735**

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.
2. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.

Abbreviations:
NRSP = Newhall Ranch Specific Plan
kW-hr = kilowatt-hour
ccf = hundred cubic feet

Table 8
Summary of Residential and Non-Residential Energy Consumption
Newhall Land
Newhall Ranch, CA

Design Alternative	Efficiency Scenario	Electricity Consumption (kW-hr / yr)			Natural Gas Consumption (ccf / yr)		
		Residential	Non-Residential	Total	Residential	Non-Residential	Total
Design Alternative 2	Title 24 Compliant[1]	140,093,911	178,804,229	**318,898,140**	7,193,554	2,926,885	**10,120,439**
	15% Better than Title 24[2]	132,997,195	165,479,361	**298,476,556**	6,114,521	2,487,852	**8,602,373**
	Percent Improvement	5.1%	7.5%	**6.4%**	15.0%	15.0%	**15.0%**
Design Alternative 3	Title 24 Compliant[1]	133,575,610	177,107,097	**310,682,707**	6,858,852	2,893,165	**9,752,017**
	15% Better than Title 24[2]	126,809,090	163,882,577	**290,691,667**	5,830,024	2,459,190	**8,289,214**
	Percent Improvement	5.1%	7.5%	**6.4%**	15.0%	15.0%	**15.0%**
Design Alternative 4	Title 24 Compliant[1]	135,360,088	143,214,542	**278,574,630**	6,950,482	2,533,902	**9,484,384**
	15% Better than Title 24[2]	128,503,172	133,895,600	**262,398,771**	5,907,909	2,153,817	**8,061,726**
	Percent Improvement	5.1%	6.5%	**5.8%**	15.0%	15.0%	**15.0%**
Design Alternative 5	Title 24 Compliant[1]	131,078,580	141,032,515	**272,111,095**	6,730,634	2,490,548	**9,221,182**
	15% Better than Title 24[2]	124,438,552	131,842,591	**256,281,143**	5,721,039	2,116,965	**7,838,005**
	Percent Improvement	5.1%	6.5%	**5.8%**	15.0%	15.0%	**15.0%**
Design Alternative 6	Title 24 Compliant[1]	125,310,087	139,092,935	**264,403,022**	6,432,683	2,452,010	**8,884,693**
	15% Better than Title 24[2]	118,963,357	130,017,695	**248,981,052**	5,467,780	2,084,209	**7,551,989**
	Percent Improvement	5.1%	6.5%	**5.8%**	15.0%	15.0%	**15.0%**
Design Alternative 7	Title 24 Compliant[1]	107,335,109	88,640,988	**195,976,097**	5,511,453	1,512,295	**7,023,748**
	15% Better than Title 24[2]	101,897,851	82,658,612	**184,556,462**	4,684,735	1,285,451	**5,970,186**
	Percent Improvement	5.1%	6.7%	**5.8%**	15.0%	15.0%	**15.0%**

Notes:
Title 24 = California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code.
1. Consumption assuming buildings are Title 24-compliant, without the 15% improvements.
2. Newhall has committed to being 15% more efficient than Title 24 standards for non-residential buildings. This 15% improvement applies to the built environment only, as Title 24 does not regulate non-built electricity such as plug-in appliances. These consumption values represent the 15% improvements.

Abbreviations:
NRSP = Newhall Ranch Specific Plan
kW-hr = kilowatt-hour
ccf = hundred cubic feet