Greenhouse Gas Report

Lake Jennings Market Place

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Table of Contents

SECTION 1.0 – INTRODUCTION 1
1.1. REPORT PURPOSE 1
1.2. PROJECT LOCATION 1
1.3. PROJECT DESCRIPTION 1
1.3.1 Project Access 1
1.3.2 Commercial Shopping Center 1
1.3.3 Trail Component / Walls and Signage 1
1.3.4 Parking and Landscaping 2

SECTION 2.0 – EXISTING CONDITIONS 6
2.1. GREENHOUSE GASES 6
2.1.1 GHG Emission Levels 8
2.1.2 Potential Environmental Effects 8
2.1.3 California Implications 9

SECTION 3.0 – REGULATORY CONTEXT 10
3.1. CLIMATE CHANGE 10
3.1.1 Federal Climate Change Legislation 10
3.1.2 State Climate Change Legislation 10
3.1.3 County of San Diego 12

SECTION 4.0 – SIGNIFICANCE CRITERIA 13
4.1. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) 13
4.1.1 California Air Pollution Control Officers Association (CAPCOA) Screening Thresholds 13

SECTION 5.0 – IMPACT ANALYSIS 14
5.1. ANALYSIS METHODOLOGY 14
5.1.1 Short-Term Construction GHG Emissions 14
5.1.2 Operational GHG Emissions 15
5.2. REDUCTIONS FROM STATE REGULATORY MEASURES 19
5.3. SUMMARY OF GHG EMISSIONS 20
5.4. MITIGATIONS AND DESIGN CONSIDERATIONS INVESTIGATION 20
5.4.1 Mitigations/Design Considerations Proposed 21
5.4.2 Infeasible Mitigations 30
5.4.3 Mitigations Not Applicable 30
5.5. POST-MITIGATION SIGNIFICANCE EVALUATION 31

LIST OF TABLES

Table 1 – Lake Jennings Market Place Project Components 2
Table 2 – Global Warming Potentials 6
Table 3 – Anticipated Construction Grading Phasing Plan 15
Table 4 – Construction Vehicle GHG Emissions 15
Table 5 – Unmitigated Scenario Operational Vehicle GHG Levels 16
Table 6 – Unmitigated Scenario Water & Wastewater GHG Emissions 18
Table 7 – Percent Reduction from Pavley II + LCFS 19
Table 8 – Pavley II + LCFS Vehicular Emissions (Pavley II + LCFS) 19
Table 9 – Estimated Project GHG Emissions 21
Table 10 – Mitigated Project GHG Emissions 31

LIST OF FIGURES

Figure 1 - Vicinity Map 3
Figure 2 – Project Location Map 4
Figure 3 - Surrounding Land Uses 5
Figure 4 - Formula for GHG Emissions from Natural Gas Combustion 17

APPENDIX A – GHG Calculations

Acronyms and Abbreviations

AB	Assembly Bill
ADT	average daily trips
AQIA	Air Quality Impact Assessment
BAU	business as usual
C2ES	Center for Climate and Energy Solutions
CalEEMod™	California Emissions Estimator Model
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Control Board
CAT	Climate Action Team
CBECS	2012 Commercial Buildings Energy Consumption Survey
CCR	California Code of Regulations
CC&R	Covenants, Conditions, and Restrictions
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CEUS	California Commercial End-Use Survey
CFC	chlorofluorocarbon
CH_4	methane
CNRA	California Natural Resources Agency
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
EIA	U.S. Energy Information Administration
EPA	U. S. Environmental Agency
ESRL	Earth System Research Laboratory
ft^2	square feet
GHG	greenhouse gas
GHGA	Greenhouse Gas Assessment
GWP	global warming potential
HFC	hydrofluorocarbon
HVAC	heating, ventilation, and air conditioning *(*HVAC*)*
IPCC	International Panel on Climate Change
ITS	Intelligent Transportation Systems
kWh	kilowatt hours
LCFS	Low Carbon Fuel Standard
LED	light emitting diode
LJMP	Lake Jennings Market Place
LEV	low emission vehicle
M	Million or 10^6
MG	million gallons

Acronyms and Abbreviations

mph	miles per hour
$MtCO_2e$	million tonnes of carbon dioxide equivalents
MWD	Metropolitan Water District
MWh	megawatt hours
N_2O	nitrous oxide
NO	nitric oxide
NOAA	National Oceanic and Atmospheric Administration
OPR	Office of Planning and Research
PDMWD	Padre Dam Municipal Water District
PFC	perfluorocarbon
PPV	percent by volume
PV	photovoltaic
RPS	Renewable Portfolio Standard
SB	Senate Bill
SDAPCD	San Diego Air Pollution Control District
SDCWA	San Diego County Water Authority
SDG&E	San Diego Gas and Electric
SF_6	sulfur hexafluoride
t	abbreviation for tonne (or metric ton)
tCO_2e	tonne of carbon dioxide equivalents
TDV	total daily valuation
UNFCCC	United Nations Framework Convention on Climate Change
VMT	Vehicle miles traveled
WRI	World Resources Institute
yd^3	cubic yards

SECTION 1.0 – INTRODUCTION

1.1. Report Purpose

The purpose of this Greenhouse Gas Assessment (GHGA) is to analyze the potential climate change impacts that could occur with the construction and operation of the Lake Jennings Market Place Project (LJMP), in San Diego County, California. This assessment was conducted within the context of the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000 et seq.).

1.2. Project Location

The LJMP project site consists of approximately 13.1 gross acres located within the eastern portion of San Diego County, as shown in Figure 1. More specifically, the project site is located on the extreme eastern border of the USGS 7.5' El Cajon Quadrangle, can be seen in Figure 2. The site parallels an approximately 1,000-foot stretch of Olde Highway 80 adjacent to the north, and is bordered on the west by Ridge Hill Road and on the east by Rios Canyon Road. The Los Coches Creek flood line marks the southern boundary of the project area. The site and surrounding community consists of semi-rural land with the immediate project vicinity consisting of vacant undisturbed land, and several local businesses north of the site. The LJMP project site is currently zoned Village Residential (Vr-15) and is directly adjacent to commercial zoning, which can be seen in Figure 3. Land uses to the east and south of the project site include the Pecan Park Mobile Home Park and the proposed Rio Vista housing development, respectively.

1.3. Project Description

The proposed LJMP project would consist of a mix of commercial uses. Applicant improvements to the site would include infrastructure such as sewer, road improvements and utilities, the vacation of an existing paved road, and dedication of a biological open space easement, on the 13.1-acre site. Specifics of the plan are detailed below as follows:

1.3.1 Project Access

The proposed LJMP project requires four access points for proper traffic flow. These ingress/egress points are from Ridge Hill Road located on the west side of the project, a right-in (only) approximately 200 feet east of the intersection of Olde Highway 80 and Lake Jennings Park Road, a full signalized project entry half-way along the project frontage of Olde Highway 80, and a second non-signalized project entry (right in – right out only) near the northeast corner of the property.

1.3.2 Commercial Shopping Center

The project proposes to construct a commercial shopping center with 76,100 square feet (ft^2) of building area. The project would include six structures, all of which will be located on individually parceled lots according to the breakdown shown in Table 1.

1.3.3 Trail Component / Walls and Signage

The project will construct a multi-use trail suitable for pedestrians and equestrian users. The trail will be 10 feet wide and constructed of decomposed granitic material. The trail segments are proposed as standard pathways per the Park Lands Dedication Ordinance. The trail segment within the open space lot will run along the southern edge of the development area footprint within a 20-foot-wide trail easement.

There will be a comprehensive sign program for the project. It would include a Freeway Pylon Display, Monument Center ID Displays, Monument Signage at the signalized entrance on Olde Highway 80, and a State of California Gas Pricing Sign.

Table 1 – Lake Jennings Market Place Project Components

Structure	Indicated on Site Plan As	Size	Location
Market Building	Building A	43,000 ft^2	Along the east side of the project site adjacent to Rios Canyon Road
Financial Building	Building B	4,500 ft^2	On the northeast intersection of Olde Highway 80 at the proposed signalized project entrance.
Restaurant	Building C	3,500 ft^2	Same as Building B above.
Restaurant-Retail Building	Building D	9,600 ft^2	Along the southern boundary of the project's developed area
Gas Station with convenience store and car wash	Building E	3,000 ft^2	At the intersection of Olde Highway 80 and Lake Jennings Park Road.
Restaurant-Retail Building	Building F	12,500 ft^2	Along the southern boundary of the developed area.

1.3.4 Parking and Landscaping

The project proposes 389 parking spaces in accordance with the County of San Diego Zoning Ordinance located almost entirely within the central portion of the site, and out of the casual view of surface street traffic. Therefore, the project meets the parking requirements of the County of San Diego Zoning Ordinance.

Finally, a landscape plan has been prepared for the project that incorporates a variety of species intended to provide a visual buffer from Interstate 8, and be compatible with the Los Coches Creek riparian zone. The plant palette reflects a selection of Southern California native plant material.

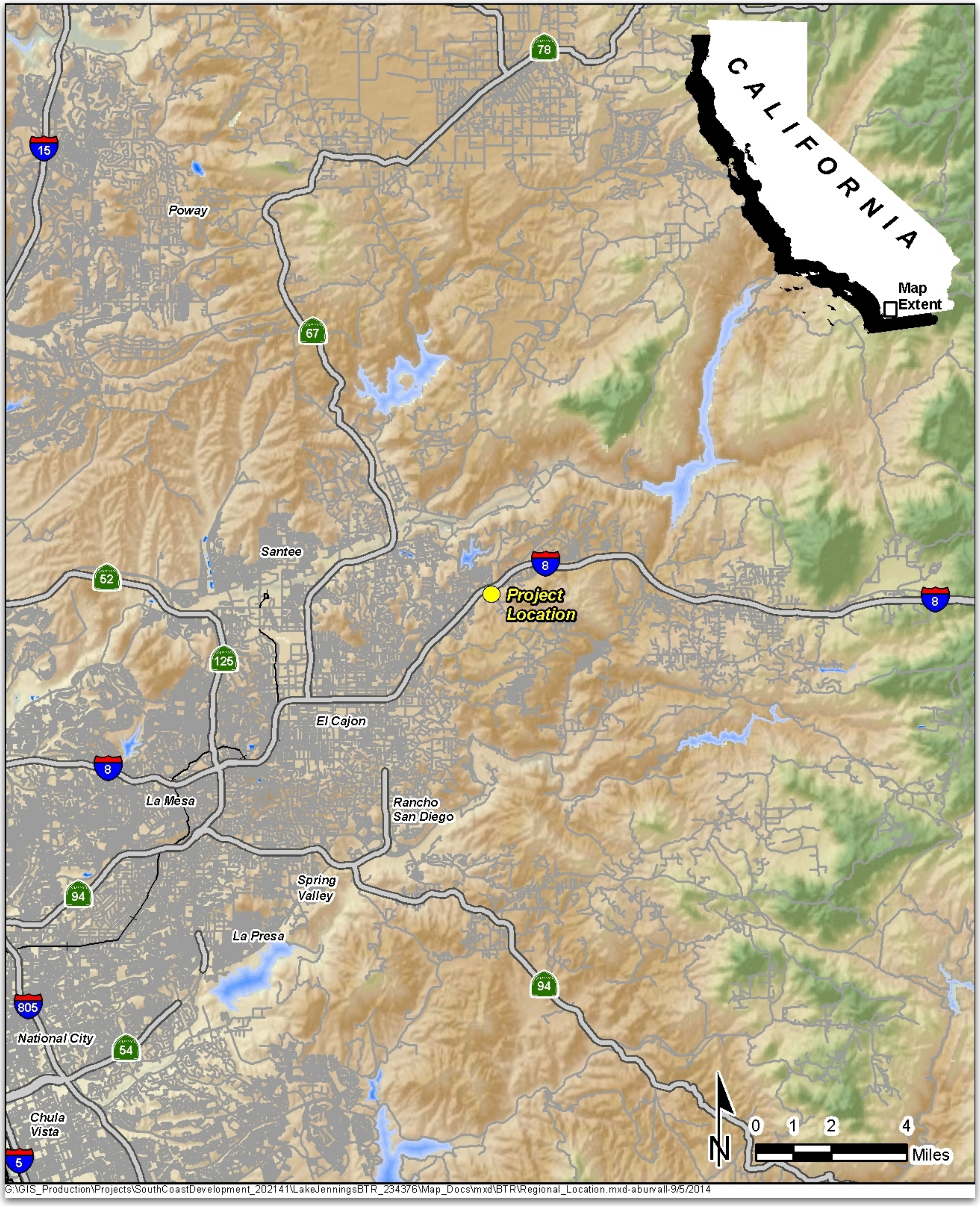

Figure 1 - Vicinity Map

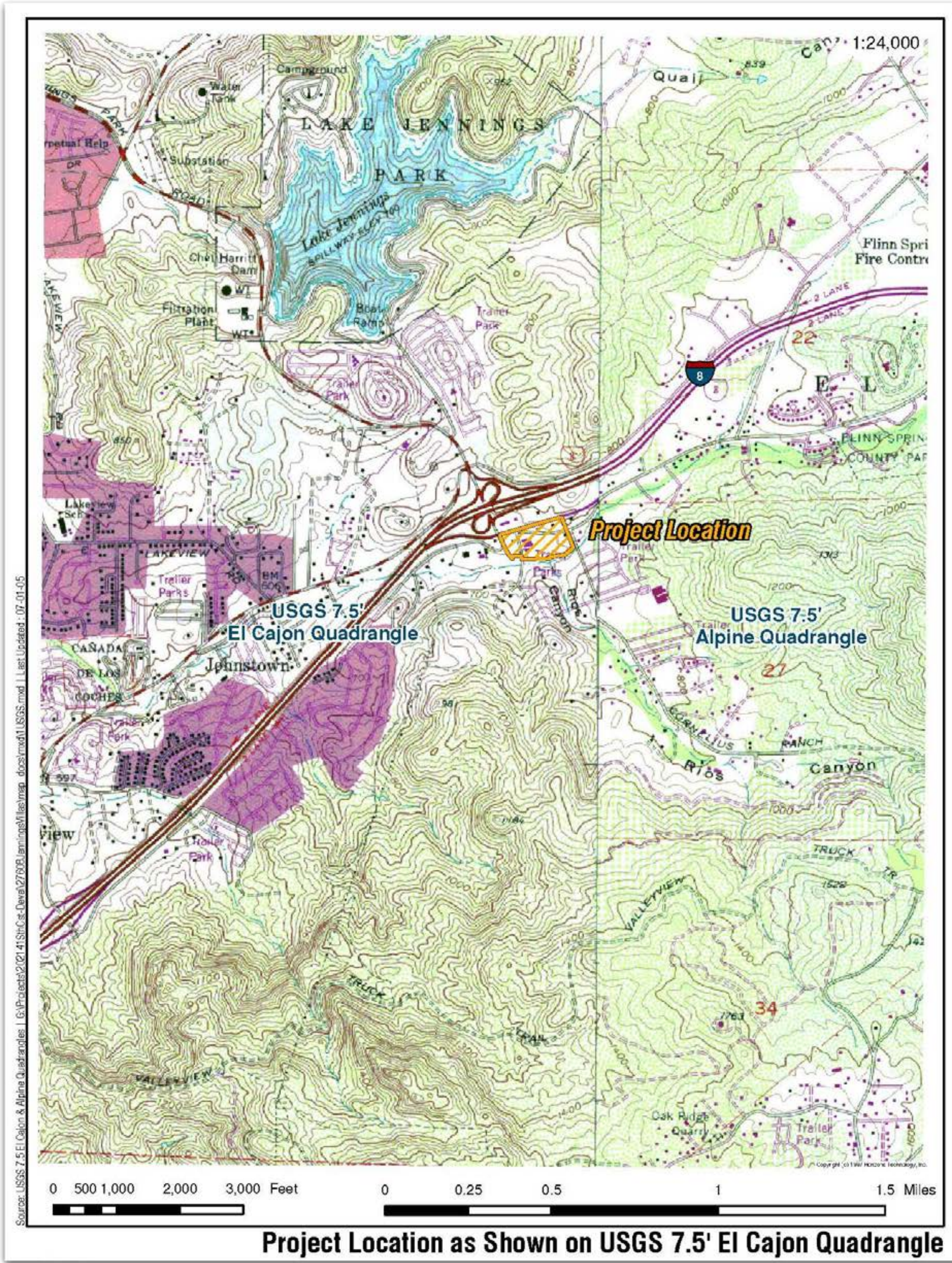

Figure 2 – Project Location Map

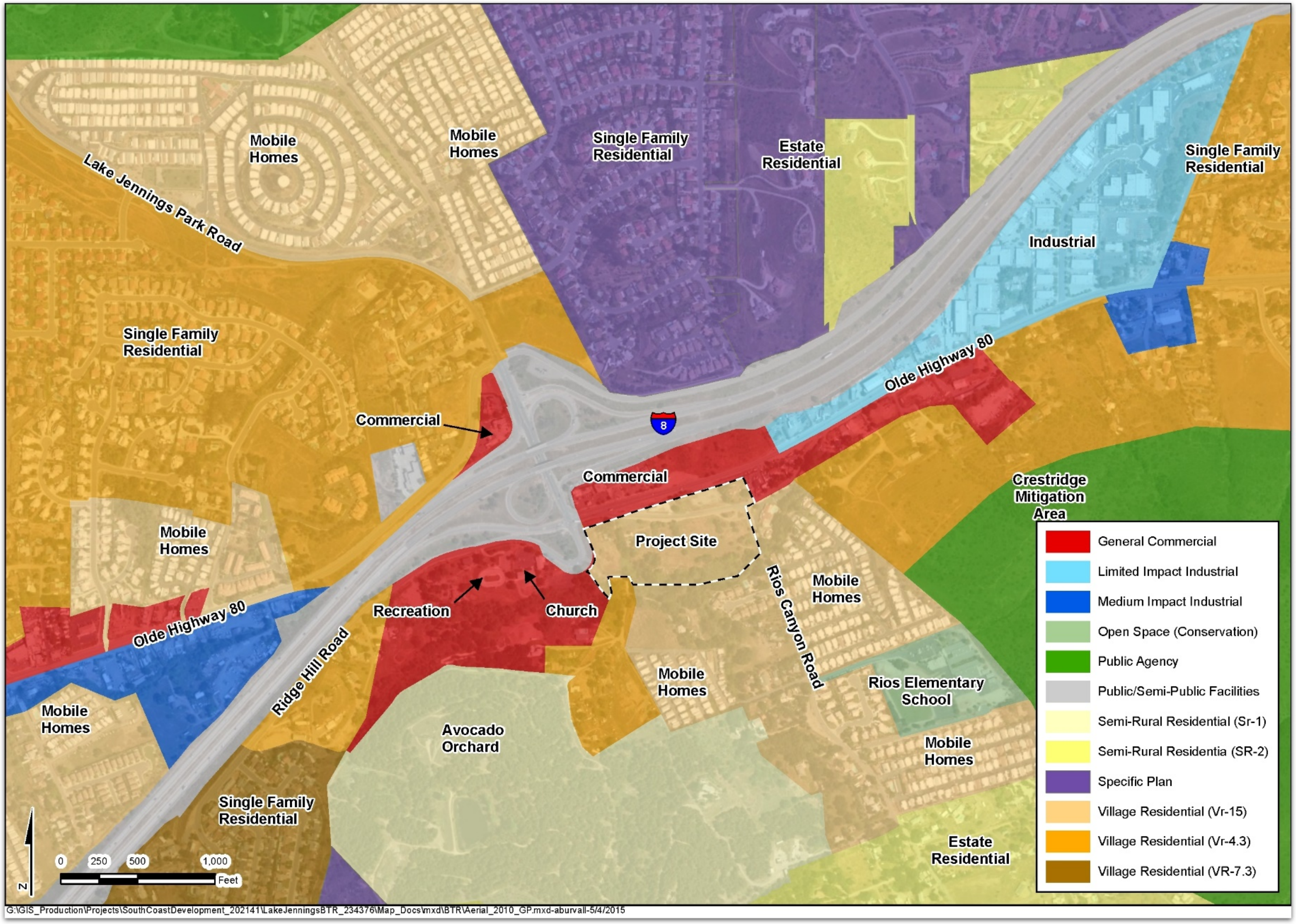

Figure 3 - Surrounding Land Uses

SECTION 2.0 – EXISTING CONDITIONS

2.1. Greenhouse Gases

Constituent gases that trap heat in the Earth's atmosphere are called greenhouse gases (GHGs), analogous to the way a greenhouse retains heat. GHGs play a critical role in the Earth's radiation budget by trapping infrared radiation emitted from the Earth's surface, which would otherwise have escaped into space. Prominent GHGs contributing to this process include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and chlorofluorocarbons (CFCs). Without the natural heat-trapping effect of GHG, the earth's surface would be about 34 °F cooler[1]. This is a natural phenomenon, known as the "Greenhouse Effect," and is responsible for maintaining a habitable climate. However, anthropogenic emissions of these GHGs in excess of natural ambient concentrations are responsible for the enhancement of the "Greenhouse Effect", and have led to a trend of unnatural warming of the Earth's natural climate known as global warming or climate change, or more accurately Global Climate Disruption. Emissions of these gases that induce global climate disruption are attributable to human activities associated with industrial/manufacturing/commercial, utilities, transportation, residential, and agricultural sectors.

The global warming potential (GWP) is the potential of a gas or aerosol to trap heat in the atmosphere. Individual GHG compounds have varying GWP and atmospheric lifetimes. The reference gas for the GWP is CO_2; CO_2 has a GWP of one. The calculation of the CO_2 equivalent (CO_2e) is a consistent methodology for comparing GHG emissions since it normalizes various GHG emissions to a consistent metric. CH_4's warming potential of 25 indicates that CH_4 has a 25 times greater warming affect than CO_2 on a molecular basis. The larger the GWP, the more that a given gas warms the Earth compared to CO_2 over that period. The period usually used for GWPs is 100 years. GWPs for the three GHGs produced by the LJMP are presented in Table 2. A CO_2e is the mass emissions of an individual GHG multiplied by its GWP. GHGs are often presented in units called tonnes (t) (i.e. metric tons) of CO_2e (tCO_2e).

Table 2 – Global Warming Potentials[2]

Pollutant	GWP for 100-year time horizon	
	Second assessment report[3]	4th assessment report[4]
Carbon dioxide (CO_2)	1	1
Methane (CH_4)	21	25
Nitrous oxide (N_2O)	310	298

Note: Current protocol is to use the 4th assessment values, however, the second assessment report values are also provided since they are the values used by many inventories and public documents.

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1 *Climate Action Team Report to Governor Schwarzenegger and the California Legislature.* California Environmental Protection Agency, Climate Action Team. March 2006.

2 *Global Warming Potentials. Greenhouse Gas Protocol.* World Resources Institute and World Business Council on Sustainable Development. http://www.ghgprotocol.org/files/ghgp/tools/Global-Warming-Potential-Values.pdf. Accessed May 2015.

3 *Second Assessment Report. Climate Change 1995: WG I - The Science of Climate Change*. Intergovernmental Panel on Climate Change. 1996

4 *Climate Change 2007: The Physical Science Basis.* Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. 2007

Carbon Dioxide (CO_2) is a colorless, odorless gas consisting of molecules made up of two oxygen atoms and one carbon atom. CO_2 is produced when an organic carbon compound (such as wood) or fossilized organic matter, (such as coal, oil, or natural gas) is burned in the presence of oxygen. CO_2 is removed from the atmosphere by CO_2 "sinks", such as absorption by seawater and photosynthesis by ocean-dwelling plankton and land plants, including forests and grasslands. However, seawater is also a source of CO_2 to the atmosphere, along with land plants, animals, and soils, when CO_2 is released during respiration. Whereas the natural production and absorption of CO_2 is achieved through the terrestrial biosphere and the ocean, humankind has altered the natural carbon cycle by burning coal, oil, natural gas, and wood. Since the industrial revolution began in the mid-1700s, each of these activities has increased in scale and distribution. Prior to the industrial revolution, concentrations CO_2 were stable at a range of 275 to 285 ppm[5]. The National Oceanic and Atmospheric Administration (NOAA's) Earth System Research Laboratory (ESRL)[6] indicates that global concentration of CO_2 were 396.72 ppm in April 2013. In addition, the CO_2 levels at Mauna Loa[7] averaged over 400 ppm for the first time during the week of May 26, 2013. These concentrations of CO_2 exceed by far the natural range over the last 650,000 years (180 to 300 ppm) as determined from ice cores.

Methane (CH_4) is a colorless, odorless non-toxic gas consisting of molecules made up of four hydrogen atoms and one carbon atom. CH_4 is combustible, and it is the main constituent of natural gas-a fossil fuel. CH_4 is released when organic matter decomposes in low oxygen environments. Natural sources include wetlands, swamps and marshes, termites, and oceans. Human sources include the mining of fossil fuels and transportation of natural gas, digestive processes in ruminant animals such as cattle, rice paddies and the buried waste in landfills. Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of CH_4. Other anthropogenic sources include fossil-fuel combustion and biomass burning.

Nitrous Oxide (N_2O) is a colorless, non-flammable gas with a sweetish odor, commonly known as "laughing gas", and sometimes used as an anesthetic. N_2O is naturally produced in the oceans and in rainforests. Man-made sources of N_2O include the use of fertilizers in agriculture, nylon and nitric acid production, cars with catalytic converters and the burning of organic matter. Concentrations of N_2O also began to rise at the beginning of the industrial revolution.

Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in CH_4 or ethane with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble, and chemically un-reactive in the troposphere (the level of air at the Earth's surface). CFCs have no natural source but were first synthesized in 1928. It was used for refrigerants, aerosol propellants, and cleaning solvents. Because of the discovery that they are able to destroy stratospheric ozone, an ongoing global effort to halt their production was undertaken and has been extremely successful, so much so that levels of the major CFCs are now remaining steady or declining. However, their long atmospheric lifetimes mean that some of the CFCs will

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5 *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007*. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

6 *Trends in Atmospheric Carbon Dioxide.* Earth System Research Laboratory. National Oceanic and Atmospheric Administration. http://www.esrl.noaa.gov/gmd/ccgg/trends/global.html. Accessed June 2013.

7 ibid

remain in the atmosphere for over 100 years.

Hydrofluorocarbons (HFCs) are synthesized chemicals that are used as a substitute for CFCs. Out of all the GHGs; HFCs are one of three groups with the highest GWP. HFCs are synthesized for applications such as automobile air conditioners and refrigerants.

Perfluorocarbons (PFCs) have stable molecular structures and do not break down through the chemical processes in the lower atmosphere. High-energy ultraviolet rays about 60 kilometers above Earth's surface are able to destroy the compounds. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

Sulfur Hexafluoride (SF_6) is an extremely potent greenhouse gas. SF_6 is very persistent, with an atmospheric lifetime of more than a thousand years. Thus, a relatively small amount of SF_6 can have a significant long-term impact on global climate change. SF_6 is human-made, and the primary user of SF_6 is the electric power industry. Because of its inertness and dielectric properties, it is the industry's preferred gas for electrical insulation, current interruption, and arc quenching (to prevent fires) in the transmission and distribution of electricity. SF_6 is used extensively in high voltage circuit breakers and switchgear, and in the magnesium metal casting industry.

2.1.1 GHG Emission Levels

According to the World Resources Institute[8] (WRI) in 2005, total worldwide GHG emissions were estimated to be 37,797 million (M) t of CO_2e ($MtCO_2e$) and GHG emissions per capita worldwide was 5.9 tCO_2e. These emissions exclude GHG emissions associated with the land use, land-use change, and forestry sector and bunker fuels. The WRI reports that in 2009, total GHG emissions in the U.S. were 6,469 $MtCO_2e$, with average GHG emissions per capita of 21.09 tCO_2e and total GHG emissions in California were 446.07 $MtCO_2e$, with average GHG emissions per capita of 12.07 tCO_2e.

California has a larger percentage of its total GHG emissions coming from the transportation sector (50%) than the U.S. emissions (29%) and a smaller percentage of its total GHG emissions from the electricity generation sector, i.e. California have 11 percent but the U.S. has 32 percent.

2.1.2 Potential Environmental Effects

Worldwide, average temperatures are likely to increase by 3 °F to 7 °F by the end of the 21st century[9]. However, a global temperature increase does not directly translate to a uniform increase in temperature in all locations on the earth. Regional climate changes are dependent on multiple variables, such as topography. One region of the Earth may experience increased temperature, increased incidents of drought, and similar warming effects, whereas another region may experience a relative cooling. According to the International Panel on Climate Change's (IPCC's) Working Group II Report[10], climate change impacts to North America may include diminishing snowpack, increasing evaporation, exacerbated shoreline erosion, exacerbated inundation from sea level rising, increased risk and frequency of wildfire, increased risk of insect outbreaks, increased experiences of heat waves, and

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[8] Climate Analysis Indicators Tool. International Dataset. World Resources Institute. http://www.wri.org/tools/cait/. Accessed June 2013.

[9] Climate Change 2007: Impacts, Adaptation, and Vulnerability. Website http://www.ipcc.ch/ipccreports/ar4-wg2.htm. Accessed March 2013.

[10] ibid

rearrangement of ecosystems, as species and ecosystem zones shift northward and to higher elevations.

2.1.3 California Implications

Even though climate change is a global problem and GHGs are global pollutants, the specific potential effects of climate change on California have been studied. The third assessment produced by the California Natural Resources Agency (CNRA)[11] explores local and statewide vulnerabilities to climate change, highlighting opportunities for taking concrete actions to reduce climate-change impacts. Projected changes for the remainder of this century in California include:

- **Temperatures –** By 2050, California is projected to warm by approximately 2.7 °F above 2000 averages, a threefold increase in the rate of warming over the last century and springtime warming — a critical influence on snowmelt — will be particularly pronounced.
- **Rainfall** – Even though model projections continue to show the Mediterranean pattern of wet winters and dry summers with seasonal, year-to-year, and decade-to-decade variability, improved climate models shift towards drier conditions by the mid-to-late 21st century in Central, and most notably, Southern California.
- **Wildfire** - Earlier snowmelt, higher temperatures, and longer dry periods over a longer fire season will directly increase wildfire risk. Indirectly, wildfire risk will also be influenced by potential climate-related changes in vegetation and ignition potential from lightning, with human activities continuing to be the biggest factor in ignition risk. Models are showing that estimated property damage from wildfire risk could be as much as 35 percent lower if smart growth policies were adopted and followed than if there is no change in growth policies and patterns.

The third assessment by CNRA not only defines projected vulnerabilities to climatic changes but analyzes potential impacts from adaptation measures used to minimize harm and take advantage of beneficial opportunities that may arise from climate change.

The report highlights important new insights and data, using probabilistic and detailed climate projections and refined topographic, demographic, and land use information. The findings include:

- The state's electricity system is more vulnerable than was previously understood.
- The Sacramento-San Joaquin Delta is sinking, putting levees at growing risk.
- Wind and waves, in addition to faster rising seas, will worsen coastal flooding.
- Animals and plants need connected "migration corridors" to allow them to move to habitats that are more suitable to avoid serious impacts.
- Native freshwater fish are particularly threatened by climate change.
- Minority and low-income communities face the greatest risks from climate change.

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[11] *Our Changing Climate 2012: Vulnerability & Adaptation to the Increasing Risks from Climate Change in California.* California Natural Resources Agency. July 2012 / CEC-500-2012-007

SECTION 3.0 – REGULATORY CONTEXT

3.1. Climate Change

3.1.1 Federal Climate Change Legislation

In June of 2013, the President enacted a national Climate Action Plan[12] (Plan) that consisted of a wide variety of executive actions and had three pillars; 1) cut carbon in America, 2) prepare the U.S. for impacts of climate change, and 3) lead international efforts to combat global climate change and prepare for its impacts. The Plan outlines 75 goals within the three main pillars.

3.1.1.1 Cut Carbon in America

The Plan consists of actions to help cut carbon by deploying clean energy such as cutting carbon from power plants, promoting renewable energy, and unlocking long-term investment in clean energy innovation. In addition, the Plan includes actions designed to help build a 21st century transportation sector; cut energy waste in homes, businesses, and factories; and reducing other GHG emissions, such as HFCs and methane. The Plan commits to lead in clean energy and energy efficiency at the federal level.

3.1.1.2 Prepare the U.S. for Impacts of Climate Change

The Plan consists of actions to help prepare for the impacts through building stronger and safer communities and infrastructure by supporting climate resilient investments, supporting communities and tribal areas as they prepare for impacts, and boosting resilience of building and infrastructure; protecting the economy and natural resources by identifying vulnerabilities, promoting insurance leadership, conserving land and water resources, managing drought, reducing wildfire risks, and preparing for future floods; and using sound science to manage climate impacts.

3.1.1.3 Lead International Efforts

The Plan consists of actions to help the U.S. lead international efforts through working with other countries to take action by enhancing multilateral engagements with major economies, expanding bilateral cooperation with major emerging economies, combating short-lived climate pollutants, reducing deforestation and degradation, expanding clean energy use and cutting energy waste, global free trade in environmental goods and services, and phasing out subsidies that encourage wasteful use of fossil fuels and by leading efforts to address climate change through international negotiations.

In June of 2014, the Center for Climate and Energy Solutions (C2ES) published a one-year review of progress in implementation of the Plan. The C2ES found that the administration had made marked progress in its initial implementation. The administration made at least some progress on most of the Plan's 75 goals; many of the specific tasks outlined had been completed. Notable areas of progress included steps to limit carbon pollution from power plants; improve energy efficiency; reduce CH_4 and HFC emissions; help communities and industry become more resilient to climate change impacts; and end U.S. lending for coal-fired power plants overseas.

3.1.2 State Climate Change Legislation

3.1.2.1 Executive Order S 3-05

On June 1, 2005, the Governor issued Executive Order S 3-05 which set the following GHG emission reduction targets:

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[12] *Presidents Obama's Climate Action Plan: One Year Later.* Center for Climate and Energy Solutions. June 2014.

- By 2010, reduce GHG emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels;
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

To meet these targets, the Climate Action Team (CAT) prepared a report to the Governor in 2006 that contains recommendations and strategies to help ensure the targets in Executive Order S-3-05 are met.

3.1.2.2 Assembly Bill 32 (AB 32)

In 2006, the California State Legislature enacted the California Global Warming Solutions Act of 2006, also known as Assemble Bill (AB) 32. AB 32 focuses on reducing GHG emissions in California. GHGs, as defined under AB 32, include CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6. AB 32 requires that GHGs emitted in California be reduced to 1990 levels by the year 2020. The California Air Resources Board (CARB) is the state agency charged with monitoring and regulating sources of emissions of GHGs that cause global warming in order to reduce emissions of GHGs. AB 32 also requires that by January 1, 2008, the CARB must determine what the statewide GHG emissions level was in 1990, and it must approve a statewide GHG emissions limit so it may be applied to the 2020 benchmark. CARB approved a 1990 GHG emissions level of 427 $MtCO_2e$, on December 6, 2007 in its Staff Report. Therefore, in 2020, emissions in California are required to be at or below 427 $MtCO_2e$.

Under the "business as usual or (BAU)" scenario established in 2008, Statewide emissions were increasing at a rate of approximately 1 percent per year as noted below. It was estimated that the 2020 estimated BAU of 596 $MtCO_2e$ would have required a 28 percent reduction to reach the 1990 level of 427 $MtCO_2e$.

3.1.2.3 Climate Change Scoping Plan

The Scoping Plan[13] released by CARB in 2008 outlined the State's strategy to achieve the AB-32 goals. This Scoping Plan, developed by CARB in coordination with the CAT, proposed a comprehensive set of actions designed to reduce overall GHG emissions in California, improve the environment, reduce dependence on oil, diversify our energy sources, save energy, create new jobs, and enhance public health. It was adopted by CARB at its meeting in December 2008. According to the Scoping Plan, the 2020 target of 427 $MtCO_2e$ requires the reduction of 169 $MtCO_2e$, or approximately 28.3 percent, from the State's projected 2020 BAU emissions level of 596 $MtCO_2e$.

However, in August 2011, the Scoping Plan was re-approved by the Board and includes the Final Supplement to the Scoping Plan Functional Equivalent Document[14]. This document includes expanded analysis of project alternatives as well as updates the 2020 emission projections in light of the current economic forecasts. Considering the updated 2020 BAU estimate of 507 $MtCO_2e$, only a 16 percent reduction below the estimated new BAU levels would be necessary to return to 1990 levels by 2020. The 2011 Scoping Plan expands the list of nine Early Action Measures into a list of 39 Recommended Actions contained in Appendices C and E of the Plan.

However, in May 2014, CARB developed; in collaboration with the CAT, the First Update to California's Climate Change Scoping Plan[15] (Update), which shows that California is on track to meet the near-term 2020 greenhouse gas limit and is well positioned to maintain and continue reductions beyond 2020 as required by AB-32. In accordance

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[13] *Climate Change Scoping Plan: a framework for change.* California Air Resources Board. December 2008.

[14] *Final Supplement to the AB 32 Scoping Plan Functional Equivalent Document.* California Air Resources Board. August 19, 2011.

[15] *First Update to the Climate Change Scoping Plan, Building on the Framework.* California Air Resources Board. May 2014.

with the United Nations Framework Convention on Climate Change (UNFCCC), CARB is beginning to transition to the use of the AR4's 100-year GWPs in its climate change programs. CARB has recalculated the 1990 GHG emissions level with the AR4 GWPs to be 431 $MtCO_2e$, therefore the 2020 GHG emissions limit established in response to AB-32 is now slightly higher than the 427 $MtCO_2e$ in the initial Scoping Plan.

3.1.2.4 Senate Bill 375 (SB 375)

Senate Bill (SB) 375 passed the Senate on August 30, 2008 and was signed by the Governor on September 30, 2008. According to SB 375, the transportation sector is the largest contributor of GHG emissions and contributes over 40 percent of the GHG emissions in California, with automobiles and light trucks alone contributing almost 30 percent. SB 375 indicates that GHGs from automobiles and light trucks can be reduced by new vehicle technology. However, significant reductions from changed land use patterns and improved transportation also are necessary. SB 375 states, "Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32." SB 375 does the following: (1) requires metropolitan planning organizations to include sustainable community strategies in their regional transportation plans for reducing GHG emissions, (2) aligns planning for transportation and housing, and (3) creates specified incentives for the implementation of the strategies.

3.1.3 County of San Diego

The County's General Plan Update[16] includes smart growth and land use planning principles designed to reduce vehicle miles traveled (VMT) and result in a reduction in GHG emissions. As discussed in the General Plan Update, climate change and GHG reduction policies are addressed in plans and programs in multiple elements of the General Plan. The strategies for reduction of GHG emissions in the General Plan Update are as follows:

- Strategy A-1: Reduce vehicle trips generated, gasoline/energy consumption, and greenhouse gas emissions.
- Strategy A-2: Reduce non-renewable electrical and natural gas energy consumption and generation (energy efficiency).
- Strategy A-3: Increase generation and use of renewable energy sources.
- Strategy A-4: Reduce water consumption.
- Strategy A-5: Reduce and maximize reuse of solid wastes.
- Strategy A-6: Promote carbon dioxide consuming landscapes.
- Strategy A-7: Maximize preservation of open spaces, natural areas, and agricultural lands.

The General Plan Update also includes climate adaptation strategies to deal with potential adverse effects of climate change. The climate adaptation strategies include the following:

- Strategy B-1: Reduce risk from wildfire, flooding, and other hazards resulting from climate change.
- Strategy B-2: Conserve and improve water supply due to shortages from climate change.
- Strategy B-3: Promote agricultural lands for local food production.
- Strategy B-4: Provide education and leadership.

The County has also implemented a number of outreach programs such as the Green Building Program, lawn mower trade-in program, and reduction of solid waste by recycling to reduce air quality impacts as well as GHG emissions.

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[16] *San Diego County General Plan: A Plan for Growth, Conservation, and Sustainability*. San Diego County Planning and Development Services. August 2011.

SECTION 4.0 – SIGNIFICANCE CRITERIA

4.1. California Environmental Quality Act (CEQA)

The State of California has developed guidelines to address the significance of climate change impacts based on Appendix G of the CEQA Guidelines, which provides guidance that a project would have a significant environmental impact if it would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

Neither the State of California nor the San Diego Air Pollution Control District (SDAPCD) has adopted emission-based thresholds for GHG emissions under CEQA. Office of Planning and Research (OPR)'s Technical Advisory titled CEQA and Climate Change: Addressing Climate Change through CEQA Review states, "public agencies are encouraged, but not required to adopt thresholds of significance for environmental impacts. Even in the absence of clearly defined thresholds for GHG emissions, the law requires that such emissions from CEQA projects must be disclosed and mitigated to the extent feasible whenever the lead agency determines that the project contributes to a significant, cumulative climate change impact".[17] Furthermore, the advisory document indicates, "in the absence of regulatory standards for GHG emissions or other scientific data to clearly define what constitutes a 'significant impact,' individual lead agencies may undertake a project-by-project analysis, consistent with available guidance and current CEQA practice."

4.1.1 <u>California Air Pollution Control Officers Association (CAPCOA) Screening Thresholds</u>

CAPCOA has recommended screening thresholds based on various land use densities and project types[18]. Using CAPCOA guidance, projects that meet or fall below the screening thresholds are expected to result in 900 tCO_2e per year of GHG emissions or less and would not require additional analysis and the climate change impacts would be considered less than significant. Projects that exceed the 900 tCO_2e per year screening level must conduct further analysis.

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17 *Technical Advisory – CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review*. California Governor's Office of Planning and Research. 2008.

18 *CEQA & Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act.* California Air Pollution Control Officers Association. January 2008. Available at http://www.capcoa.org/wp-content/uploads/downloads/2010/05/CAPCOA-White-Paper.pdf.

SECTION 5.0 – IMPACT ANALYSIS

5.1. Analysis Methodology

GHG impacts associated with the proposed LJMP project are related to emissions from short-term construction and long-term operations. Construction may generate GHG emissions because of construction equipment emissions and emissions from vehicles driven to/from the LJMP site by construction workers and material and water delivery trucks. Construction emissions may be amortized over the expected (long-term) operational life of a project, which can conservatively be estimated at 20 years.

Operational emissions would result primarily from both direct and indirect sources. Direct emissions refer to emissions produced from onsite combustion of energy, such as natural gas used in furnaces and boilers, emissions from industrial processes, and fuel combustion from mobile sources. Indirect emissions are emissions produced offsite from energy production and water conveyance due to a project's energy use and water consumption. Operational GHG emissions should include energy use (including electricity, natural gas and water and wastewater), transportation VMT, area sources, and solid waste.

5.1.1 Short-Term Construction GHG Emissions

Construction of the LJMP project would result in temporary emissions associated with construction worker trips, diesel engine combustion from mass grading and site preparation construction equipment will be assumed to occur for engines running at the correct fuel-to-air ratios.[19] Of principal interest are the emission factors for CO_2 and NO_X[20]. For a four-stroke diesel-cycle engine, the combustion byproducts are approximately 1.5-percent-by-volume (PPV) O_2, 0.5 PPV CO, and 13.5 PPV CO_2.[21] Thus, the ratio of CO_2 to CO production in a properly mixed diesel stroke would be 13.5/0.5, or 27:1.

The County Department of Planning and Development Service recommend that the construction emissions be amortized over 20 years and added to operational emissions, as appropriate. The proposed LJMP project site would be cleared and graded over the course of approximately eight months (240 days) as shown in Table 3.

In order to estimate GHG emissions from off-road equipment, this GHGA uses stoichiometric formulas that derive the CO_2 emissions by multiplying the CO emissions estimated in the LJMP's Air Quality Impact Assessment (AQIA)[22] by 27. In addition, NO_X emissions are stoichiometrically composed of roughly 30% N_2O, and 70% nitric oxide (NO). Therefore, N_2O emissions ware estimated by multiplying the estimated NO_X emissions by 0.3. On-road vehicular emissions related to construction activity would come from employee commute and vendor activity. On-road emissions for these activities were estimated using the recognized methodologies established by the U. S. Environmental Agency (EPA) and CARB based on the off-road construction activity. Table 4 quantifies the expected GHG emissions from construction activities.

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19 The ratio whereby complete combustion of the diesel fuel occurs.

20 It will be assumed that the project would generate trace, if not negligible, levels of CH_4 and/or constituent compounds. NO_X emissions are stoichiometrically composed of roughly 30-percent nitrous oxide (N_2O) by volume and 70-percent nitric oxide (NO), which is the free radical form that immediately combines with ozone to form nitrogen dioxide more commonly known as smog.

21 *The Significance of Diesel-Exhaust-Gas Analysis*. Holtz, J.C., Elliott, M.A. Transactions of the ASME, Vol. 63. February 1941.

22 *Air Quality Impact Assessment, Lake Jennings Market Place,* San Diego, CA, ISE Project #14-003, 4/30/15

Table 3 – Anticipated Construction Grading Phasing Plan

Phase	Operation	Duration (Months)	Activities Completed
1	Clearing and Grubbing of Site	0.5	Removal of all site debris. Demolition of existing infrastructure. Removal of all vegetation.
2	Alluvial Excavation	3.0	Excavate center section of project site to a depth of 18-feet to remove unconsolidated alluvial materials. Stockpile materials in southern portion of project site. Cover sensitive archeological area with GeoGrid material, and backfill to approximately three feet.
3	Drill, Blast, and Excavate Existing Rock	1.0	Drill and blast at eastern rock removal locations. Mechanical excavation of rock material at western locations.
4	Backfill Excavation Areas with Rock	1.0	Backfill alluvial excavation area with oversized rock spoils.
5	Finish Rough Grading Operations and Underground Work	2.5	Complete rough grading operations by removal of alluvial excavation and placement onsite. Bring final site to rough pad elevation. Complete underground utility placement and terminations.

Table 4 – Construction Vehicle GHG Emissions

Equipment Type Model	Daily pounds from AQIA		Duration (days)	Total pounds		Direct Stoichiometric GHG Emissions (tonnes)		
	CO	NO_X		CO	NO_X	CO_2	N_2O	CO_2e
Push Dozer D11T w/ Breaker	23.4	62.1	240	5,613	14,896	68.7	2.027	672.8
Push Dozer D10T	10.6	28.2	240	2,553	6,776	31.3	0.922	306.0
Dozer D9R	9.4	24.9	240	2,256	5,987	27.6	0.815	270.4
Dozer D6T LGP	3.7	9.7	240	880	2,337	10.8	0.318	105.5
Scraper- 657G Tractor	14.4	38.3	240	3,467	9,200	42.5	1.252	415.5
Motor Grader 120K	8.2	15.2	240	1,958	3,651	24.0	0.497	172.0
Water Truck	3.7	9.7	240	880	2,337	10.8	0.318	105.5
Hydraulic Excavator 349EL	11.0	29.2	240	2,641	7,010	32.3	0.954	316.6
ECM 590 Rock Drill	10.1	26.8	240	2,421	6,426	29.7	0.874	290.2
OFF-ROAD TOTALS	**94.5**	**244.2**		**22,670**	**58,619**	**277.6**	**7.977**	**2,654.7**
ON-ROAD TOTALS								**53.7**
PROJECT CONSTRUCTION TOTALS								**2,708.5**
Amortized over 20 years								**135.4**

5.1.2 Operational GHG Emissions

Whereas construction emissions are short-term, operation of the project also emits GHG emissions from operation of motor vehicles, energy consumption, solid waste disposal, water and wastewater energy use, and from various area sources over the long term.

5.1.2.1 Motor Vehicles

To calculate emissions associated with vehicle trips generated by the proposed project, the trip generation rates from the project's AQIA were used. To evaluate project trips, the total trip generation rate of 4,683 average daily trips (ADT) for buildout conditions was used. The average vehicle trip length would be 3.5 miles as sourced in the AQIA as coming from the Lake Jennings Market Place Traffic Impact Study by KOA Corporation in April 2015, with a median running speed of 45 miles per hour (mph). For the current analysis, the EMFAC 2011 was run using input conditions specific to the San Diego air basin to predict operational vehicle emissions from the project, based upon a project completion scenario year of 2020.[23] Of principal interest are the emission factors for CO_2 and NO_X. Again, N_2O is stoichiometrically determined by multiplying NO_X by 0.3. GHG emissions estimates are presented in Table 5. A vehicle fleet mix ratio consistent with the 2010 Caltrans Intelligent Transportation Systems (ITS) Transportation Project-Level Carbon Monoxide Protocol was used.[24]

Table 5 – Unmitigated Scenario Operational Vehicle GHG Levels

Vehicle Classification	Trip ADT	Annual VMT	Pounds per Year		GHG Emissions in tonnes		
			Direct CO_2	Calc N_2O	Direct CO_2	Calc N_2O	CO_2e
Light Duty Auto (LDA)	3,231	4,127,603	2,577,521	239.8	1,169.1	0.109	1,201.6
Light Duty Truck (LDT1)	909	1,161,248	838,624	117.2	380.4	0.053	396.2
Medium Duty Truck (LHD1)	300	383,250	381,571	99.6	173.1	0.045	186.5
Heavy Duty Truck Gasoline (MH GAS)	56	71,540	71,540	26.3	32.4	0.012	36.0
Heavy Duty Truck Diesel (MH DSL)	169	215,898	508,372	823.4	230.6	0.374	341.9
Motorcycle (MCY)	19	24,273	7,337	18.6	3.3	0.008	5.8
TOTALS	**4,683**	**5,983,810**	**4,384,964**	**1,325.0**	**1,989.0**	**0.601**	**2,168.1**

5.1.2.2 Energy Consumption

The LJMP project site would require a maximum load demand of 1,000 kilowatt-hours (kWh) to account for peak usage, startup transients, and a requisite margin of safety.[25] Since that is the maximum, the overall average energy usage would be roughly 40% of this value or 400 kWh. At 8,760 hours per year, this would equate to a yearly energy consumption of 3,504,000 kWh/year, or approximately 46 kWh/ft^2/year for the LJMP project. Using San Diego Gas and Electric (SDG&E's) intensity factor of 641.86 lbs CO_2/Megawatt-hours (MWh), which was derived by scaling the SDG&E 2009 CO_2 intensity factor to account for a State required 20% Renewable Portfolio Standard (RPS). Using this intensity factor would give an annual CO_2e GHG emission rate for the LJMP site due to electrical usage of **1,020.2 tonnes/year.**

Natural gas combustion is another source of energy-related emissions. Different from the electricity energy sources,

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23 This is a worst-case assumption, since implementation of cleaner vehicle controls ultimately reduces emissions under future year conditions. By applying near-term emission factors to the complete project, an upper bound on project-related emissions is obtained.

24 This consisted of the following air standard Otto-Cycle engine vehicle distribution percentages: Light Duty Auto (LDA) = 69.0%, Light Duty Truck (LDT1) = 19.4%, Medium Duty Truck (LHD1) = 6.4%, Heavy Duty Truck Gasoline (MH GAS) = 1.2%, Heavy Duty Truck Diesel (MH DSL) = 3.6%, Motorcycle (MCY) = 0.4%.

25 *Electrical Service Standards & Guide Manual*, Section 5300 (Load Density), San Diego Gas & Electric Company, 2015.

natural gas sources are direct emissions, taking place onsite. Natural gas consumption (typically due to usage of water heaters, stoves, and central heating units for this type of proposed use) would produce the CO_2 and N_2O emissions. GHG emissions related to natural gas combustion was estimated using the formula shown as Figure 4.

$$GHG_{combustion} = ER \times \left[\frac{NU \times UR}{30} \right] \times 10^{-6}$$

Figure 4 - Formula for GHG Emissions from Natural Gas Combustion

In the formula presented above:

- GHG = The greenhouse gas under examination (i.e., CO_2 or N_2O)
- ER = Emissions rate of criteria pollutant per million-cubic-feet ($10^6 ft^3$) of natural gas consumed (e.g., CO_2 = 116,765 pounds/$10^6 ft^3$, N_2O = 28.2 pounds/$10^6 ft^3$),
- NU = Total number of units per land use type (commercial unit = $10^3 ft^2$)
- UR = Specific natural gas usage rate per development type (Retail Space = 2.9 ft^3/ft^2/month).

The free and complete burning of natural gas, which is primarily composed of CH_4. From a mass balance standpoint, one pound of CH_4 can produce 2.75 pounds of CO_2 by the above chemical equation. Since, one cubic-foot of CH_4 weighs 0.04246 pounds, the amount of CO_2 produced per ft^3 of natural gas burned would therefore be 0.1167 pounds. N_2O generation will be assumed to be a fractional component of total NO_X generation as previously discussed (i.e., $N_2O = 0.3NO_X$).

The commercial emission rate for CO_2 is 116,765 lbs/$10^3 ft^2$ and for N_2O it is 26.2 lbs/$10^3 ft^2$. Retail spaces typically have a natural gas usage rate of 2.9 cubic feet (ft^3) of natural gas per ft^2 of retail space per month. Using CO_2 and N_2O emission factors of 116,765 and 26.2 pounds per million ft^3, respectively, the annual CO_2e emissions from natural gas combustion is **151.7 tonnes CO_2e per year**.

5.1.2.3 Solid Waste Disposal

The disposal of solid waste produces GHG emissions from anaerobic decomposition in landfills, incineration, transportation of waste, and disposal. The LJMP project site would have an onsite solid trash waste storage capacity of 33 cubic yards (yd^3), with an average weight of 200 pounds per yd^3. Assuming three trash pickups per week in accordance with commercial site requirements, the aggregate total solid waste removed from the site would be 1,029,600 pounds per year (or 514.8 short tons).

According to the IPCC, landfill CO_2 generation due to trash is approximately 0.1450 kilograms (or 0.3196 pounds) per pound of trash per year. Thus, with the estimated 1,029,600 pounds of trash per year generated by the site, the landfill CO_2e contribution level would be **149.3 tonnes per year.**

5.1.2.4 Water and Wastewater GHG Emissions

The amount of water used and wastewater generated by a project has indirect GHG emissions associated with it. These emissions are a result of the energy used to supply, distribute, and treat the water and wastewater. In general, water treatment and wastewater treatment occur outside of the project area. In this case, it is still important to quantify the energy and associated GHG emissions attributable to the water use. In addition to the indirect GHG emissions associated with energy use, wastewater treatment can directly emit both methane and nitrous oxide.

Calculation of water and wastewater electrical intensity is presented in California Emissions Estimator Model (CalEEMod™) User Guide, Appendix D, Table 9.2. In San Diego County, it is estimated that electricity needed to supply water to the County is 9,727 kWh/ 10^6 gallons. An additional 1,272 kWh/10^6 gallons is required for the distribution of water and 1,911 kWh/10^6 gallons is used for wastewater treatment. An additional 111 kWh/10^6 gallons is used to treat the water. The combined energy intensity for the system of water and wastewater is 13,021 kWh/10^6 gallons.

Water use rates for commercial and industrial land uses are presented in Table 9.1 of CalEEMod User Guide, Appendix D. These use rates were mostly obtained from Appendices E and F of the Pacific Institute's "Waste Not Want Not" report.[26] Total gallons of water used per day per metric were reported but the total daily water use was converted to annual water use based on the number of days of operation for that land use. The water use rates for the individual components of the LJMP site are presented in Table 6, along with CO_2e estimate based on the intensity factor for SDG&E of 641.9 lbs of CO_2e/MWh. As shown in Table 6, annual CO_2e emissions from the supply, distribution, and treatment of water and wastewater is **37.8 tCO_2e per year**.

Table 6 – Unmitigated Scenario Water & Wastewater GHG Emissions

Proposed Use	Size	Metric	Use Rate Factor (gal/metric)		Water Use (gal/yr)			CO_2e (tonnes/yr)
			Indoor	Outdoor	Indoor	Outdoor	total	
Bank w/ drive thru	4.5	10^3ft^2	39,622.92	24,285.01	178,303.1	109,282.5	287,586	1.09
Convenience market w/ pumps	3.0	10^3ft^2	74,072.52	45,399.29	222,217.6	136,197.9	358,415	1.36
Fast food rest w/ drive thru	3.5	10^3ft^2	303,533.71	19,374.49	1,062,368.0	67,810.7	1,130,179	4.28
Strip Mall	22.1	10^3ft^2	74,072.52	45,399.29	1,637,002.7	1,003,324.3	2,640,327	10.01
Supermarket	43.0	10^3ft^2	123,268.21	3,812.42	5,300,533.0	163,934.1	5,464,467	20.72
Drive thru car wash	102,200	gal/yr			102,200	0	102,200	0.39
				TOTALS	**8,502,624**	**1,480,549**	**9,983,174**	**37.8**

5.1.2.5 Area Sources

Landscape maintenance includes fuel combustion emissions from equipment such as lawn mowers, roto tillers, shredders/grinders, blowers, trimmers, chain saws, and hedge trimmers, as well as air compressors, generators, and pumps. Landscaping equipment utilized in the course of maintenance of the LJMP lots typically would consist of five-horsepower, four-stroke lawnmowers, and small weed trimmers having two-stroke engines with an approximate 30 to 50 cubic-centimeter displacement. Assuming the ultimate user purchases cleaner burning engines new from the store, the emissions rates specified by CARB. For the purposes of assessment, the project site will be treated as a CARB-classified commercial area consisting of an aggregate of 15 retail business spaces. The emission factors for commercial land uses are 33.99111 lbs of CO_2/unit/day and 0.00150 lbs of N_2O/unit/day. Therefore, the retail use of landscaping operations would generate **42.8 tCO_2e per year**.

Other area sources associated with the Project either do not emit GHG emissions (e.g., consumer products and architectural coatings) or is not appropriate for a commercial project (e.g., hearths).

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[26] *Waste Not, Want Not: The Potential for Urban Water Conservation in California*. Gleick, P.H.; Haasz, D.; Henges-Jeck, C.; Srinivasan, V.; Cushing, K.K.; Mann, A. 2003. Pacific Institute for Studies in Development, Environment, and Security. Full report available online at: http://www.pacinst.org/reports/urban_usage/waste_not_want_not_full_report.pdf. And appendices are available online at: http://www.pacinst.org/reports/urban_usage/appendices.htm.

5.2. Reductions from State Regulatory Measures

The LJMP project site would be eligible to take credit for the State of California implementation of adopted standards; such as Pavley II Clean Car Standards (AB 1493 *et. seq*.); the Low Carbon Fuel Standard (LCFS), pursuant to the California Assembly Bill AB-32 and the Governor's Executive Order S-01-07[27]; the 33% RPS, mandated by the State of California for the year 2020[28]; and 2013 California Code of Regulations (CCR) Title 24. Estimated amounts of credit for the LJMP are calculated below.

5.2.1.1 Pavley II + LCFS Implementation (CO_2 Running Emissions)

Since the AQIA used EMFAC2011 emission factors for on-road sources, and EMFAC2011 factors did not include the effects of Pavley and LCFS in future year, the Pavley II standards, also known as the Low Emission Vehicle (LEV) III standards, are applied only to automobile and light truck classes for model years 2017 through 2025, would reduce overall vehicle emissions by an additional 3.0 percent above the 2009 Pavley I standards. LCFS applies to all vehicular activity, Table 7 presents estimated percent reductions that can be expected with the implementation of Pavley II and LCFS.

Table 7 – Percent Reduction from Pavley II + LCFS

Vehicle Classification	Standard Year 2020 Emission Rates (g/mi)	Pavley II + LCFS Year 2020 Emission Rates (g/mi)	Percentage Reduction (Standard vs. Pavley I + LCFS)
Light Duty Auto (LDA)	283.23	194.62	31.3%
Light Duty Truck (LDT)	327.75	237.41	27.6%
Medium Duty Trucks (MDT)	452.06	406.85	10.0%
Heavy Duty Trucks (HDT)	452.06	406.85	10.0%
Buses (UBUS)	1070.66	963.60	10.0%
Motorcycle (MCY)	138.86	124.97	10.0%

Table 8 shows the effect of Pavley II and LCFS implementation on the proposed vehicular emissions. As a result, the total vehicular CO_2e emission levels can be reduced by **542.5 tonnes per year**.

Table 8 – Pavley II + LCFS Vehicular Emissions (Pavley II + LCFS)

Vehicle Classification	Annual VMT	CO_2e Reduction (t/y)
Light Duty Auto (LDA)	4,127,603	376.1
Light Duty Truck (LDT1)	1,161,248	109.4
Medium Duty Truck (LHD1)	383,250	18.7
Heavy Duty Truck Gasoline (MH GAS)	71,540	3.6
Heavy Duty Truck Diesel (MH DSL)	215,898	34.2
Motorcycle (MCY)	24,273	0.6
TOTALS	**5,983,810**	**542.5**

27 These adjusted emission factors are obtained from the CARB EMFAC 2011 model.

28 The energy conversion factor is 537.56 lb-CO_2/MWh for the baseline case. This is derived by scaling the unmitigated 20% RPS CO_2 intensity factor to account for the State required 33% RPS by the year 2020.

5.2.1.2 Energy Sector 33% RPS Standard

Since the calculations used in the AQIA were based on the current renewable fuels energy requirements of 20% and the LJMP Project will mainly be in the post 2020 RPS level of 33%, the proposed project would be eligible to take credit for the ultimate 33 percent RPS mandated by the State of California for the year 2020. As previously stated, the LJMP project site would have a yearly energy consumption of 3,504,000 kWh/year; thus, using the 33% RPS brings the effective CO_2 reduction to 83.8% of unmitigated levels, or an annual equivalent CO_2e GHG load for the LJMP project site, due to electrical usage, of 683.5 tonnes per year, a **reduction of 336.7 tonnes per year**.

In addition, electricity-related emissions associated with water demand and wastewater treatment would be reduced to 25.4 tonnes of CO_2e per year, a **reduction of 12.5 tonnes per year**.

5.2.1.3 2013 CCR Title 24 Efficiency

Finally, since the calculations in the document used existing energy standards, the fact that when this project builds, they will be under 2013 Title 24, the LJMP project site would be eligible to take credit for utilizing the latest efficiency reductions available through implementation of the 2013 CCR Title 24 standards. These reductions are in addition to previously mentioned RPS reductions, as they would be implemented by the applicant at the project level. Currently, the 2013 CCR Title 24 provides improved electrical energy reductions of 21.8%, and an improved natural gas efficiency of 16.8%.[29]

Given this, the CO_2e for electrical consumption at the project site under 2013 CCR Title 24 standards would be **reduced another 149.0 tonnes CO_2e per year**, while the CO_2e for the natural gas consumption would be **reduced 25.5 tonnes per year**.

5.3. Summary of GHG Emissions

The projected greenhouse gas emission budget for the proposed project would be the summation of the individual sources previously identified and credits applied due to applying adopted State regulations is summarized in Table 9. Emissions due to the proposed project action (i.e., traffic generation, onsite uses including maintenance, natural gas and electricity consumption, waste generation, and water consumption) reduced by adopted State regulations would equate to **2,631 tCO_2e per year**.

5.4. Mitigations and Design Considerations Investigation

CEQA Statutes Section 21002 says “public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects”. Since the LJMP Project increases GHG emissions as compared to the existing environmental setting, a thorough investigation of available mitigation measures related was performed.

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[29] *Impact Analysis Report, California 2013 Building Energy Efficiency Standards*, California Energy Commission, 2013.

Table 9 – Estimated Project GHG Emissions

Sector	CO_2e Emissions (t/y)
Amortized Construction	135.4
Motor Vehicles	2,168.1
Electricity	1,020.2
Natural Gas	151.7
Solid Waste	149.3
Water & Wastewater	37.9
Area Sources	42.8
Pavley II + LCFS	-542.5
33% RPS	-349.2
2013 CCR Title 24 Efficiency	-182.8
Total	***2,631***

5.4.1 Mitigations/Design Considerations Proposed

In 2010, CAPCOA with the Northeast States for Coordinated Air Use Management and the National Association of Clean Air Agencies produced a comprehensive document[30] focused on the quantification of project-level mitigation of GHG emissions associated with land use, transportation, energy use, and other related project areas. An evaluation of the 14 energy measures; 50 transportation measures; 9 water measures; and 18 other measures detailed in the CAPCOA document found the following measures as feasible for the LJMP project.

5.4.1.1 Building Energy Use (Measure **BE-1**)

Range of Effectiveness:

- Non-residential: 0.2-5.5% of GHG emissions from electricity use and 0.7-10% of GHG emissions from natural gas use.

Measure Applicability:

- Electricity and natural gas use in commercial buildings subject to California's Title 24 building requirements.
- This measure is part of a grouped measure.

New California buildings must be designed to meet the building energy efficiency standards of Title 24, also known as the California Building Standards Code. Title 24 Part 6 regulates energy uses including space heating and cooling, hot water heating, and ventilation. By committing to a percent improvement over Title 24, a development reduces its energy use and resulting GHG emissions.

The Applicant is ground-leasing most of the property, which will result in individual construction to be completed by separate entities, the lessees. However, the Project Applicant will require all buildings to go beyond Title 24 building envelope energy efficiency standards by 20% as a condition on their Covenants, Conditions, and

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30 *Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures*. California Air Pollution Control Officers Association. August 2010.

Restrictions (CC&Rs) and lease documentation.

Compliance with Title 24 is determined from the total daily valuation (TDV) of energy use in the built environment (on a per square foot per year basis) and TDV energy use is a parameter that reflects the burden that a building imposes on an electricity supply system. Since a TDV analysis requires significant knowledge about the actual building which is not typically available during the CEQA process, this requirement allows the lessees flexibility in choosing which specific measures it will pursue to achieve the percent reductions (for example, installing higher quality building insulation, or installing a more efficient water heating system), while still making the mitigation commitment at the time of CEQA analysis.

The LJMP Project is estimated to use 3,504 MWh/yr for buildings. The U.S. Energy Information Administration (EIA) surveyed both building owners and energy suppliers in a two-phase process over at least four years and presented the results in their Commercial Buildings Energy Consumption Survey[31] (CBECS). Data included consumption and expenditure data for electricity, natural gas, fuel oil, and district heat consumption disaggregated by end uses (heating, cooling, lighting, etc.). Since the CBECS data incorporates energy end-uses that are not included in the State's Title 24 regulations, the percentage of total usage that would relate to Title 24 for each data aggregation was developed and a weighted-average Title 24 percentage based on principle building activity was generated, yielding 41 percent of the total power for the LJMP Project is related to Title 24.

The Title 24 portion of energy for the LJMP Project would be 1,436 MWh/yr and a 20 percent reduction in this energy demand would yield 287 MWh/yr. Using SDG&E's 33RPS carbon intensity of 537.6 lbs CO_2e/MWh, this mitigation would produce a reduction of **70.0 tCO_2e/yr**.

This measure could include combinations of several individual measures such as install programmable thermostat timers; obtain third-party heating, ventilation, and air conditioning (HVAC) commissioning and verification of energy savings; install energy efficient boilers; install low-flow water fixtures; adopt a water conservation strategy; design water-efficient landscapes; use water-efficient landscape irrigation systems; reduce turf in landscapes and lawns; and plant native or drought-resistant trees and vegetation.

5.4.1.2 Install Energy Efficient Appliances (Measure **BE-4**)

Range of Effectiveness:

- Grocery Stores: 17-22% of GHG emissions from electricity use.

Measure Applicability:

- Electricity use in commercial grocery stores.
- This mitigation measure applies only when appliance installation can be specified as part of the Project.

Using energy-efficient appliances reduces a building's energy consumption as well as the associated GHG emissions from natural gas combustion and electricity production. To take credit for this mitigation measure, the Project Applicant (or contracted builder) would need to ensure that energy efficient appliances are installed. For commercial land uses, energy-efficient refrigerators have been evaluated for grocery stores.

The California Commercial End-Use Survey (CEUS)[32] lists the electric energy intensity for refrigeration in food stores is 22.42 kWh/ft^2/yr. Since the grocery store component of the LJMP Project is 43,000 ft^2, refrigeration would

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31 Energy Assessor Experiment in the 2012 Commercial Buildings Energy Consumption Survey. U.S. Energy Information Administration. May 17, 2016. http://www.eia.gov/consumption/commercial/

32 California Commercial End-Use Survey. California Energy Commission. CEC-400-2006-005. March 2006.

expect to use 964,060 kWh/yr, or 964 MWh/yr. The CAPCOA document states that the reduction associated with the use of ENERGY STAR refrigeration in grocery stores in Climate Zone 10 would be 18 percent, yielding a savings of 173.5 MWh/yr. Using SDG&E's 33RPS carbon intensity of 537.6 lbs CO_2e/MWh, the usage of ENERGY STAR refrigeration would produce a reduction of **42.3 tCO_2e/yr**.

5.4.1.3 Limit Outdoor Lighting Requirements (Measure **LE-2**)

Range of Effectiveness:

- Best Management Practice, but may be quantified.

Measure Applicability:

- Outdoor lighting.
- Best Management Practice unless Project Applicant supplies substantial evidence.

Strategies for reducing the operational hours of outdoor lights include programming lights in public facilities (parks, swimming pools, or recreational centers) to turn off after-hours, or installing motion sensors on pedestrian pathways. Since literature guidance for quantifying these reductions does not exist, this mitigation measure would be employed as a Best Management Practice. Limiting the hours of operation of outdoor lights in turn limits the indirect GHG emissions associated with their electricity usage.

The LJMP Project will have 29 outdoor light emitting diodes (LED) lights that have the capability of dimming to 12 percent of the lumens (brightness). Each light uses 180 watts of electricity for a total of 5.22 kW necessary. If running at full capacity for all hours of darkness, which the CAPCOA document estimated to be 4,280 hours per year, the outdoor lighting would use 22.34 MW/yr. At full brightness, the lights emit roughly 17,000 lumens and can be dimmed to only 2,080 lumens, for an 88 percent reduction. Applying that reduction to one half of the 22.34 MW/yr electricity demand would result in an overall reduction of 9.83 MW/yr of electrical demand. Using SDG&E's 33RPS carbon intensity of 537.6 lbs CO_2e/MWh, the dimming of the outdoor lights for one half the hours of darkness would produce a reduction of **2.4 tCO_2e/yr**.

5.4.1.4 Establish Onsite Renewable Energy Systems-Solar Power (Measure **AE-2**)

Range of Effectiveness:

- 0-100% of GHG emissions associated with electricity use.

Measure Applicability:

- Electricity use.

Using electricity generated from photovoltaic (PV) systems displaces electricity demand which would ordinarily be supplied by the local utility. Since zero GHG emissions are associated with electricity generation from PV systems, the GHG emissions reductions from this mitigation measure are equivalent to the emissions that would have been produced had electricity been supplied by the local utility.

The project architect has identified the potential of PV Panels as the percentage of roof area available for solar panel installation. Assuming 45% of roof dedicated to panels on the grocery store and 5% each on the other 5 buildings, the usable roof space would be 21,005 ft^2. (Note, the 5 percent commitment on the five smaller commercial buildings could occur through any combination of use of portions of one, or all the five smaller commercial buildings, to allow for flexibility in placement of the panels around other required rooftop equipment and structures). The number of 3 foot by 5 foot panels that could be placed on the roofs of the six buildings would be approximately 1,400. The average solar panel is rated for 0.19 kW per panel[33], which would yield a total of 268.8 kW from all panels. San Diego's solar efficiency is rated 2,000 kWh/kW-yr, so the collection of panels is rated to be able to generate 531.6 MWh/yr. However, since there is an expected capture rate of 78 percent that accounts for inverter efficiency, panel performance, and losses from wiring, the effective power generated would be 414.7 MWh/yr, which would represent 11.8 percent of their power needs. Using SDG&E's 33RPS carbon intensity of 537.6 lbs CO_2e/MWh, the PV solar power would produce a reduction of **101.1 tCO_2e/yr**.

5.4.1.5 Provide Pedestrian Network Improvements (Measure **SDT-1**)

Range of Effectiveness:

- 0 – 2% reduction in GHG emissions.

Measure Applicability:

- Urban, suburban, and rural context
- Appropriate for residential, retail, office, industrial, and mixed-use projects.
- Reduction benefit only occurs if the project has both pedestrian network improvements on site and connections to the larger off-site network.

Providing a pedestrian access network to link areas of the Project site encourages people to walk instead of drive. This mode-shift results in people driving less and thus a reduction in VMT. The project will provide a pedestrian access network that internally links all uses and connects to all existing or planned external streets and pedestrian facilities contiguous with the project site. The project will minimize barriers to pedestrian access and interconnectivity. Physical barriers such as walls, landscaping, and slopes that impede pedestrian circulation will be eliminated.

The LJMP Project includes enhanced pedestrian access from Ridge Hill Road and Rios Canyon Road and a combination equestrian/pedestrian trail along the southern border of the site. Literature for this Measure does not speak directly to a rural context, but an assumption was made that the benefits will likely be lower than a suburban/urban context. Quantification is not necessary per this Measure as that less than 1 percent reduction in VMT is assumed.

5.4.1.6 Provide Traffic Calming Measures (Measure **SDT-2**)

Range of Effectiveness:

- 0.25 – 1.00% reduction in GHG emissions.

Measure Applicability:

- Urban, suburban, and rural context
- Appropriate for residential, retail, office, industrial and mixed-use projects.

Providing traffic calming measures encourages people to walk or bike instead of using a vehicle. This mode shift will result in a decrease in VMT. Traffic calming features may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.

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[33] How many square feet do I need for solar panels on my roof? Solar Power Rocks. https://solarpowerrocks.com/square-feet-solar-roof/#/sqftsolarcalc. Accessed June 2016.

Even though general traffic calming methods are not usually appropriate for a single retail site, a roundabout is planned at the main off-ramp of Interstate 8 and Lake Jennings Road, Ridge Hill Road, and Olde Highway 80. Quantification is not attempted because specific information regarding the effectiveness of this roundabout on traffic calming is limited and calming methods work best as a component of methods of calming that take place in the neighborhood, for which data is not readily available. It should be noted that other project features, such as the construction of new sidewalks and a trail will be provided as part of the project, consistent with Traffic Calming Measures.

5.4.1.7 Incorporate Bike Lane Street Design (on-site) (Measure **SDT-5**)

Range of Effectiveness:

- Grouped strategy. [See LUT-9]

Measure Applicability:

- Urban and rural context
- Appropriate for residential, retail, office, industrial, and mixed-use projects.

These on-street bike accommodations will be created to provide a continuous network of routes, facilitated with markings and signage. These improvements can help reduce peak-hour vehicle trips by making commuting by bike easier and more convenient for more people. In addition, improved bicycle facilities can increase access to and from transit hubs, thereby expanding the "catchment area" of the transit stop or station and increasing ridership. The benefits of Bike Lane Street Design are small and should be grouped with the Improve Design of Development strategy to strengthen street network characteristics and enhance multi-modal environments.

All trails and bike paths will have numerous ingress/egress access to the site, to enhance bicycle accessibility. Quantification was not attempted since this Measure determines that benefits of Bike Lane Street Design are small and should be grouped with the Improve Design of Development strategy to strengthen street network characteristics and enhance multi-modal environments.

5.4.1.8 Provide Bike Parking in Non-Residential Projects (Measure **SDT-6**)

Range of Effectiveness:

- Grouped strategy. [See LUT-9]

Measure Applicability:

- Urban, suburban, and rural context
- Appropriate for residential, retail, office, industrial and mixed-use projects.

A non-residential project will provide short-term and long-term bicycle parking facilities to meet peak season maximum demand. Refer to Improve Design of Development (LUT-9) strategy for overall effectiveness ranges. Bike Parking in Non-Residential Projects has minimal impacts as a standalone strategy and should be grouped with the Improve Design of Development strategy to encourage bicycling by providing strengthened street network characteristics and bicycle facilities.

There are 40 bicycle stalls planned for the entire site and there is a new transit stop planned for Olde Highway 80 at Rios Canyon Road. Quantification was not attempted since Bike Parking in Non-Residential Projects has minimal impacts as a standalone strategy and should be grouped with the Improve Design of Development strategy to encourage bicycling by providing strengthened street network characteristics and bicycle facilities.

5.4.1.9 Provide Electric Vehicle Parking (Measure **SDT-8**)

Range of Effectiveness:

- Grouped strategy. [See SDT-3]

Measure Applicability:

- Urban or suburban context
- Appropriate for residential, retail, office, industrial and mixed-use projects.

This project will implement accessible electric vehicle parking. The project will provide conductive/inductive electric vehicle charging stations and signage prohibiting parking for non-electric vehicles.

The Project is proposing 16 stalls that would be designated for low-emitting, fuel efficient, and carpool/van pool, EV charging stations. No literature was identified that specifically looks at the quantitative impact of implementing electric vehicle parking.

5.4.1.10 Dedicate Land for Bike Trails (Measure **SDT-9**)

Range of Effectiveness:

- Grouped strategy. [See LUT-9]

Measure Applicability:

- Urban, suburban, and rural context
- Appropriate for residential, retail, office, industrial and mixed-use projects.

Larger projects may be required to provide for, contribute to, or dedicate land for the provision of off-site bicycle trails linking the project to designated bicycle commuting routes. The benefits of Land Dedication for Bike Trails have not been quantified and should be grouped with the Improve Design of Development strategy to strengthen street network characteristics and improve connectivity to off-site bicycle networks.

In addition to bike paths planned for Lake Jennings Road and Olde Highway 80, the Project has extensive trails and walkways, including 10-foot-wide pedestrian walkways on east and west boundaries and a 10-foot-wide equestrian trail on the southern border separating designated open space/wetlands. All these trails are proposed to be of sufficient width to be multi-use compatible. No literature was identified that specifically looks at the quantitative impact of implementing land dedication for bike trails.

5.4.1.11 Implement Transit Access Improvements (Measure **TST-2**)

Range of Effectiveness:

- Grouped strategy. [See TST-3]

Measure Applicability:

- Urban or suburban context
- Appropriate for residential, retail, office, industrial and mixed-use projects.

This project will improve access to transit facilities through sidewalk/ crosswalk safety enhancements and bus shelter improvements. The benefits of Transit Access Improvements alone have not been quantified and should be grouped with Transit Network Expansion (TST-3).

The Project plans to remove an existing transit station and build a new one with transit site amenities. No literature was identified that specifically looks at the quantitative impact of improving transit facilities as a standalone strategy.

5.4.1.12 Provide Bike Parking Near Transit (Measure **TST-5**)

Range of Effectiveness:

- Grouped strategy. [See TST-3]

Measure Applicability:

- Urban or suburban context
- Appropriate for residential, retail, office, industrial and mixed-use projects.

Provide short-term and long-term bicycle parking near rail stations, transit stops, and freeway access points. The benefits of Station Bike Parking have no quantified impacts as a standalone strategy and should be grouped with Transit Network Expansion (TST-3) to encourage multimodal use in the area and provide ease of access to nearby transit for bicyclists. There are 40 bicycle stalls planned for the entire site and there is a new transit stop planned for Olde Highway 80 at Rios Canyon Road. No literature was identified that specifically looks at the quantitative impact of including transit station bike parking.

5.4.1.13 Use Locally Sourced Water Supply (Measure **WSW-3**)

Range of Effectiveness:

- 11 – 75% for Southern California.

Measure Applicability:

- Indoor (potable) and outdoor (non-potable) water use

This measure describes GHG reductions from using local or less energy intensive water sources instead of water from the typical mix of Southern California sources. According to the 2006 California Energy Commission (CEC) report[34], water imported from the State Water Project is Southern California's dominant water source. The electricity required to supply, treat, and distribute water (and for indoor uses, the electricity required to treat the resulting wastewater) are an average 13,022 kWh/million gallons (MG) for indoor use and 11,111 kWh/MG for outdoor use.

The LJMP Project would obtain water service from the Padre Dam Municipal Water District (PDMWD). PDMWD imports 100 percent of their potable water supply from the San Diego County Water Authority (SDCWA). According to the SDCWA website[35] the estimated supply diversity for water acquisition in San Diego in 2020 is 26% from the Metropolitan Water District (MWD); 32% from the Imperial Irrigation District; 14% from the All American & Coachella Canal Lining; 7% from recycled water; 8% from seawater desalination; 5% from groundwater; and 8% local surface water.

The primary portion of the water-energy intensity formula that affects the change due to local sourcing is the amount of energy necessary to supply and convey. Since the primary source of State water is located in the northern area, where conveyance and supply can be largely due to gravitational flow, Southern California locations have to spend a

[34] *Refining Estimates of Water-Related Energy Use in California. PIER Final Project Report.* California Energy Commission. Prepared by Navigant Consulting, Inc. CEC-5002006-118. December 2006. Available online at: http://www.energy.ca.gov/2006publications/CEC-500-2006-118/CEC-500-2006-118.PDF.

[35] *Enhancing Water Supply Reliability*. San Diego County Water Authority. http://www.sdcwa.org/enhancing-water-supply-reliability. Accessed May 2016.

larger energy budget to transport he water from its source. Since the SDCWA has achieved a strong proportion of water sources located much closer, the relative energy needs to transport are greatly reduced. SDCWA's diverse local sourcing reduces the water-energy intensity for indoor use by 39 percent and for outdoor use by 46 percent.

Water use for the LJMP Project was presented in Table 6 with approximately 8.5 MG of indoor use and 1.5 MG of outdoor use for a total of 10 MG/yr for the entire project. Using the San Diego County Water Authority's water-energy intensity, the energy needed for water use would be 75.88 MW/yr. Using SDG&E's 33RPS carbon intensity of 537.6 lbs CO_2e/MWh, the GHG emissions associated with water usage would be only 18.5 tCO_2e/yr instead of the estimated 37.9 tCO_2e/yr presented in Section 5.1.2.4, which would result in a reduction of **19.4 tCO_2e/yr**.

5.4.1.14 Design Water-Efficient Landscapes (Measure **WUW-3**)

Range of Effectiveness:

- 0 – 70% reduction in GHG emissions from outdoor water use.

Measure Applicability:

- Outdoor water use

Water use contributes to GHG emissions indirectly, via the production of the electricity that is used to pump, treat, and distribute the water. Designing water-efficient landscapes for a project site reduces water consumption and the associated indirect GHG emissions. Examples of measures which a Project Applicant should consider when designing landscapes are reducing lawn sizes, planting vegetation with minimal water needs such as California native species, choosing vegetation appropriate for the climate of the project site, and choosing complimentary plants with similar water needs or which can provide each other with shade and/or water.

According to the Project's landscape architects[36], the preliminary landscape plan is designed as water efficient, with drought tolerant plants, smart evapotranspiration irrigation systems, and no turf. Changes in water usage, which will result in reduced energy demand, would be included in Measure BE-1 (Beyond Title 24) and nor individually quantified here.

5.4.1.15 Use Water-Efficient Landscape Irrigation Systems (Measure **WUW-4**)

Range of Effectiveness:

- 6.1% reduction in GHG emissions from outdoor water.

Measure Applicability:

- Outdoor water use

Water use contributes to GHG emissions indirectly, via the production of the electricity that is used to pump, treat, and distribute the water. Using water-efficient landscape irrigation techniques such as "smart" irrigation technology reduces outdoor water demand, energy demand, and the associated GHG emissions. "Smart" irrigation control systems use weather, climate, and/or soil moisture data to automatically adjust watering schedules in response to environmental and climate changes, such as changes in temperature or precipitation levels. Many companies which design and install smart irrigation systems, such as Calsense, ET Water, and EPA-certified WaterSense Irrigation Partners, may be able to provide a site-specific estimate of the percent reduction in outdoor water use that can be expected from installing a smart irrigation system.

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[36] Personal communication. James P. Benedetti, owner and principal of JPBLA, Inc. May 13, 2016.

According to the Project's landscape architects, the preliminary landscape plan is strongly designed as water efficient, with drought tolerant plants, smart evapotranspiration irrigation systems, and limited turf. Changes in water usage, which will result in reduced energy demand, would be included in Measure BE-1 (Beyond Title 24) and nor individually quantified here.

5.4.1.16 Reduce Turf in Landscapes and Lawns (Measure **WUW-5**)

Range of Effectiveness:

- Varies and is equal to the percent commitment to turf reduction, assuming no other outdoor water uses.

Measure Applicability:

- Outdoor water use

Water use contributes to GHG emissions indirectly, via the production of the electricity that is used to pump, treat, and distribute the water. Turf grass (i.e. lawn grass) has relatively high-water needs compared to most other types of vegetation. Reducing the turf size of landscapes and lawns reduces water consumption and the associated indirect GHG emissions.

According to the Project's landscape architects, the preliminary landscape plan is strongly designed as water efficient, with drought tolerant plants, smart evapotranspiration irrigation systems, and limited turf. Changes in water usage, which will result in reduced energy demand, would be included in Measure BE-1 (Beyond Title 24) and nor individually quantified here.

5.4.1.17 Plant Native or Drought-Resistant Trees and Vegetation (Measure **WUW-6**)

Range of Effectiveness:

- Best Management Practice; may be quantified if substantial evidence is available.

Measure Applicability:

- Outdoor water use

Water use contributes to GHG emissions indirectly, via the production of the electricity that is used to pump, treat, and distribute the water. Turf grass (i.e. lawn grass) has relatively high-water needs compared to most other types of vegetation. Reducing the turf size of landscapes and lawns reduces water consumption and the associated indirect GHG emissions.

According to the Project's landscape architects, the preliminary landscape plan is strongly designed as water efficient, with drought tolerant plants, smart evapotranspiration irrigation systems, and limited turf. Changes in water usage, which will result in reduced energy demand, would be included in Measure BE-1 (Beyond Title 24) and nor individually quantified here.

5.4.1.18 Use Local and Sustainable Building Materials (Measure **Misc-3**)

Range of Effectiveness:

- Varies depending on Project Applicant and strategies selected. Best Management Practice.

Measure Applicability:

- Life cycle emissions from building materials

Using building materials which are sourced and processed locally (i.e. close to the project site, as opposed to in another state or country) reduces transportation distances and therefore reduces GHG emissions from fuel combustion. Using sustainable building materials, such as recycled concrete or sustainably harvested wood, also contributes to GHG emissions reductions due to the less carbon-intensive nature of the production and harvesting of these materials. Unlike measures which reduce GHG emissions during the operational lifetime of a project, such as reducing building electricity and water usage, these mitigation efforts are realized prior to the actual operational lifetime of a project.

Whereas the applicant will require the use of sustainable building materials where available and feasible to obtain, CEQA does not require further analysis of a mitigation or impact if methods of quantification are speculative. The South Coast Air Quality Management District recommends[37] that, since the science to calculate life cycle emissions is not yet established or well defined, quantification would be speculative. In support, the CAPCOA Document states that the "long chain of economic production resulting in materials manufacture, for example, involves numerous parties, each of which in turn is responsible for the GHG emissions associated with their particular activity."

5.4.2 Infeasible Mitigations

These measures were determined to be infeasible:

- Install higher efficacy public street and area lighting
- Utilize a combined heat and power system
- Limit parking supply or unbundle parking costs from property cost
- Implement market price public parking (on-street)
- Implement commute trip reduction or ride-sharing program
- Implement subsidized or discounted transit program
- Encourage telecommuting and alternative work schedules
- Implement commute trip reduction marketing
- Provide employer-sponsored vanpool/shuttle or local shuttles
- Prohibit gas powered landscape equipment.

5.4.3 Mitigations Not Applicable

These measures were determined to be not applicable or not the responsibility of the applicant:

- Replace traffic lights with LED traffic lights
- Establish methane recovery in landfills or wastewater treatment plants
- Increase density, location efficiency, diversity of urban and suburban developments (mixed use)
- Integrate affordable and below market rate housing
- Implement a neighborhood electric vehicle network or urban non-motorized zones
- Provide bike parking with multi-unit residential projects
- Require residential area parking permits
- Implement car-sharing or school pool program

37 Minutes for the GHG CEQA Significance Threshold Stakeholder Working Group Meeting #2. South Coast Air Quality Management District. Wednesday, May 28, 2008.

- Road pricing/management

5.5. Post-mitigation Significance Evaluation

Applying all the quantifiable mitigations establish a reduction of 235.2 tCO_2e/yr from solar power, efficient refrigeration, and limiting outdoor lighting. The resultant mitigated Project GHG emissions are presented in Table 10.

Table 10 – Mitigated Project GHG Emissions

Category	tCO_2e Emissions
Total Unmitigated Project	2,631
20% Better that Title 24	-70
Refrigeration	-42
Limit Outdoor Lighting	-2
Solar Power	-101
Locally Sourced Water	-19
Mitigated Total	***2,396***

Construction Vehicle GHG Emissions

Equipment Type Model	Daily pounds from AQIA		Duration (days)	Total pounds from AQIA		Direct Stoichiometric GHG Emissions				
						(pounds)		(tonnes)		
	CO	NO_X		CO	NO_X	CO_2	N_2O	CO_2	N_2O	CO_2e
Push Dozer D11T w/ Breaker	23.4	62.1	240	5,613	14,896	151,551	4,468.8	68.7	2.027	672.8
Push Dozer D10T	10.6	28.2	240	2,553	6,776	68,931	2,032.8	31.3	0.922	306.0
Dozer D9R	9.4	24.9	240	2,256	5,987	60,912	1,796.1	27.6	0.815	270.4
Dozer D6T LGP	3.7	9.7	240	880	2,337	23,760	701.1	10.8	0.318	105.5
Scraper- 657G Tractor	14.4	38.3	240	3,467	9,200	93,609	2,760.0	42.5	1.252	415.5
Motor Grader 120K	8.2	15.2	240	1,958	3,651	52,866	1,095.3	24.0	0.497	172.0
Water Truck	3.7	9.7	240	880	2,337	23,760	701.1	10.8	0.318	105.5
Hydraulic Excavator 349EL	11	29.2	240	2,641	7,010	71,307	2,103.0	32.3	0.954	316.6
ECM 590 Rock Drill	10.1	26.8	240	2,421	6,426	65,367	1,927.8	29.6	0.874	290.2
OFF-ROAD TOTALS	**94.5**	**244.1**		**22,669**	**58,620**	**612,063**	**17,586.0**	**277.6**	**7.977**	**2,654.7**
ON-ROAD TOTALS										**53.7**
TOTALS										**2,708.5**

Operational Vehicle GHG Levels

Vehicle Classification	Trip ADT	Annual VMT	Pounds per Year		GHG Emissions in tonnes		
			Direct CO_2	Calc N_2O	Direct CO_2	Calc N_2O	CO_2e
Light Duty Auto (LDA)	3,231	4,127,603	2,577,521	239.8	1,169.1	0.109	1,201.6
Light Duty Truck (LDT1)	909	1,161,248	838,624	117.2	380.4	0.053	396.2
Medium Duty Truck (LHD1)	300	383,250	381,571	99.6	173.1	0.045	186.5
Heavy Duty Truck Gasoline (MH GAS)	56	71,540	71,540	26.3	32.4	0.012	36.0
Heavy Duty Truck Diesel (MH DSL)	169	215,898	508,372	823.4	230.6	0.374	341.9
Motorcycle (MCY)	19	24,273	7,337	18.6	3.3	0.008	5.8
TOTALS	**4,683**	**5,983,810**	**4,384,964**	**1,325.00**	**1,989.0**	**0.601**	**2,168.1**

Note: N_2O is stoichiometrically determined by multiplying NO_X by 0.3

Natural Gas Combustion GHG Emissions

$GHG_{combustion}$ = ER * (NU * UR / 30) * $1x10^{-6}$

GHG =	GHG under examination in lbs/day
ER =	emission rate per $10^6 ft^3$ natural gas
NU =	number of units per metric per month
UR =	natgas usage rate per month

CO_2 ER =	116,765	$lbs/10^6 ft^3$
N_2O ER =	26.2	$lbs/10^6 ft^3$
Retail space UR =	2.9	ft^3/ft^2/month
Retail Space =	76,100	ft^2

Emissions Calcs

NU x UR =	*220,690*	
divide by 30	*7,356.3*	
times ER	*858,962,262*	*CO_2*
	192,736	*N_2O*
times 10^{-6}	*859.0*	*lbs/day*
(or / million)	*0.193*	
	with	
	365	*d/y*
	2,204.6	*lbs/MT*
	yields	
CO_2 =	142.21	MT/yr
N_2O =	0.0319	
	or	
CO_2e =	151.72	

Water & Wastewater GHG Emissions

Proposed Use	Size	Metric	Use Rate Factor (gal/metric)		Water use (gal/yr)			CO_2e (tonnes/yr)
			Indoor	Outdoor	Indoor	Outdoor	Total	
Bank w/ drive thru	4.5	10^3ft^2	39,622.92	24,285.01	178,303.1	109,282.5	287,586	1.09
Convenience market w/ pumps	3.0	10^3ft^2	74,072.52	45,399.29	222,217.6	136,197.9	358,415	1.36
Fast food rest w/ drive thru	3.5	10^3ft^2	303,533.71	19,374.49	1,062,368.0	67,810.7	1,130,179	4.28
Strip Mall	22.1	10^3ft^2	74,072.52	45,399.29	1,637,002.7	1,003,324.3	2,640,327	10.01
Supermarket	43.0	10^3ft^2	123,268.21	3,812.42	5,300,533.0	163,934.1	5,464,467	20.72
Drive thru car wash	102,200	gal/yr			102,200	0	102,200	0.39
				TOTALS	**8,502,624**	**1,480,549**	**9,983,174**	**37.8**

Electricity Intensity		
Supply water	9,727	$kWh/10^6$ gallons
Treat water	111	
Distribute water	1,272	
Wasterwater treatment	1,911	
TOTAL	13,021	

33% RPS Standard Reduction 12.5

Reduction from Pavley II + LCFS Strategy

Vehicle Classification	Standard Year 2020 Emission Rates (g/mi)	Pavley II + LCFS Year 2020 Emission Rates (g/mi)	Percentage Reduction (Standard vs. Pavley I + LCFS)	Annual VMT	CO_2e Reduction (t/y)
Light Duty Auto (LDA)	283.23	194.62	31.3%	4,127,603	376.1
Light Duty Truck (LDT)	327.75	237.41	27.6%	1,161,248	109.4
Medium Duty Trucks (MDT)	452.06	406.85	10.0%	383,250	18.7
Heavy Duty Trucks (HDT)	452.06	406.85	10.0%	71,540	3.6
Buses (UBUS)	1070.66	963.6	10.0%	215,898	34.2
Motorcycle (MCY)	138.86	124.97	10.0%	24,273	0.6
			Totals	**5,983,810**	**542.5**

Reductions from State Regulatory Measures

Sector	CO_2e Emissions (tonnes/yr)	Pavley II + LCFS	33% RPS	2013 CCR Title 24	Regulatory Adjustments	Total CO_2e
Amortized Construction	135.4				0.0	135.4
Motor Vehicles	2,168.1	542.5			542.5	1,625.6
Electricity	1,020.2		336.7	149.0	485.7	534.5
Natural Gas	151.7			25.5	25.5	126.2
Solid Waste	149.3				0.0	149.3
Water & Wastewater	37.9		12.5	8.3	20.8	17.1
Area Sources	42.8				0.0	42.8
TOTAL	**3,705**	**543**	**349**	**183**	**1,074**	**2,631.0**

Building Energy Use (BE-1)

Carbon Intensity for SDG&E *537.6 lbs CO_2 e/MWh* *2020 RPS intensity factor*

LJMP Component	Size (ft^2)	Title 24 %	CBECS Category
Market Building	43,000	26.0%	food sales
Financial Building	4,500	77.9%	service
Restaurant	3,500	32.9%	food service
Restaurant-Retail Building	9,600	65.9%	retail other than mall
Gas Station with conv store	3,000	26.0%	food sales
Restaurant-Retail Building	12,500	65.9%	retail other than mall
Total	***76,100***	***41.0%***	***< weighted average***

	3,504	MWh/yr	Estimated energy for building
	1,436	MWh/yr	Title 24 portion
	287	MWh/yr	20% of T-24 reduction
	154,368	lbs CO_2e/yr	
or	70.0	tCO_2e/yr	

Refrigeration Mitigation (BE-4)

Carbon Intensity for SDG&E	*537.6*	*lbs CO_2 e/MWh*	*2020 RPS intensity factor*
Grocery store	43,000	ft^2	
Climate zone	10		
Reduction for Energy Star Refirgerators	18%		*CAPCOA*
Enery intensity for refrigeration in food stores	22.42	$kWh/ft^2/yr$	*CEUS*
Energy usage for Project	964,060	kWh/yr	
Reduction for Energy Star	173,531	kWh/yr	
or	173.5	MWh/yr	
	93,290	lbs CO_2e/yr	
or	42.3	tCO_2e/yr	

Limit Outdoor Lighting Mitigation (LE-2)

	Carbon Intensity for SDG&E	
2020 RPS intensity factor	537.6	lbs CO_2e/MWh

Light Count	
9	80NB-180-T3
7	80NB-180-T4
12	Twin 80NB-180-T4
1	2 @ 90° 80NB-180-T4
29	***Total***

Source: Michael Duffy, Stuart Eng. Email. June 13, 2016.

	180	watts each	
	5,220	total watts	
From CAPCOA	4,280	hours of darkness in LA/yr	
	22.34	MW/yr	
	17,126	lumen of T4s	
	16,887	lumen of T3s	
	2,080	dimmable lumen level	
	88%	reduction in brightness	

Goal is after 11 pm all dimmed to 2,080 lumen

conservatively assumed	2,140	half the darkness hours	
	11.17	MW/y	energy used for "dimmable period"
	1.34	MW/y	energy use while dimmed
therefore	9.83	MW/y	reduced
	5,285	lbs CO^2e/yr	
or	2.4	tCO_2e/yr	

Solar Power Generation Mitigation (AE-2)

Building	Total Roof Area (SF)	Percent of usable Roof Space	Usable Roof Space (SF)	# of panels (3' x 5')
A	43,000	45%	19,350	1,290
B	4,500	5%	225	15
C	3,500	5%	175	11
D	9,600	5%	480	32
E	3,000	5%	150	10
F	12,500	5%	625	41
SUM	***76,100***		***21,005***	***1,399***

Source: Michael Duffy, Stuart Engineering Email. June 13, 2016.

0.19 kW per panel
265.81 kW total produced

2,000 kWh/kW-yr for San Diego area

531,620 kWh/year Max power rating
or 531.6 MWh/yr

78% expected % electricity captured based on inverter efficiency, panel performance, and losses from wiring

414.7 MWh/yr generated per year

3,504 MWh/yr Estimated project total

11.8% of electricity needs from solar

Carbon Intensity for SDG&E		
537.7	*lbs CO_2e/MWh*	*2020 RPS intensity factor*

222,965 lbs CO_2e/year
or 101.1 tCO_2e/year

Energy Intensity of Water Use Generation Mitigation (WSW-3)

CEC Water-Energy Proxies for Southern California

Sector	Indoor Use	Outdoor Use	Units
Water supply & conveyance	9,727	9,727	kWh/MG
Water Treatment	111	111	
Water Distribution	1,272	1,272	
Wastewater Treatment	1,911	0	
Regional Total	***13,022***	***11,111***	

Locally Sourced Supplies	Water supply & Conveyance (WSC)	
Sweetwater WD - groundwater	1,433	kWh/MG
Yuima WD - groundwater	2,029	
Local/intrabasin	120	
Ocean Desalination	13,800	
Brackish Water Desalination	3,230	

From CAPCOA Document

SDCWA Water Diversity

Source	Percent	WSC
Metro Water Dist	26%	9,727
Imperial Irrigation Dist	32%	2,029
All American & Coachella	14%	2,029
recycled water	7%	120
seawater desalination	8%	13,800
groundwater	5%	120
local surface water	8%	120
	Weighted Average	***4,590***

SDWCA Energy Intensity

Sector	Indoor Use	Outdoor Use	Units
Water supply & conveyance	4,590	4,590	kWh/MG
Water Treatment	111	111	
Water Distribution	1,272	1,272	
Wastewater Treatment	1,911	0	
Regional Total	***7,884***	***5,973***	
% Reduced	***39%***	***46%***	
	61%	*54%*	

	Indoor Use	Outdoor Use	Units
Project Totals Water Use	8.503	1.481	MG/yr
Energy Intensity	7,884	5,973	kWh
MW/yr	**67.04**	**8.84**	

75.88 total MW/yr

	Carbon Intensity for SDG&E	
2020 RPS intensity factor	537.6	lbs CO_2e/MWh

	40,794	lbs CO_2e/year
or	18.5	tCO_2e/year
for a reduction of	19.4	tCO_2e/year

Mitigation Reductions

Category	tCO_2e Emissions
Total Unmitigated Project	2,631.0
20% Beyond Title 24 (BE-1)	-70.0
Refrigeration (BE-4)	-42.3
Limit Outdoor Lighting (LE-2)	-2.4
Solar Power (AE-2)	-101.1
Locally Sourced Water (WSW-3)	-19.4
NET TOTAL	**2,396**