# GLOBAL CLIMATE CHANGE EVALUATION

**Shady Oak Residential Project**
**San Diego County Record ID: PDS2016-TM-5614; PDS2016-REZ-16-005; PDS2016-STP-16-019**

**Prepared For**

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**March 27, 2017**

# Global Climate Change Evaluation

**for the**

# Shady Oak Residential Project
# Valley Center, CA

*Submitted To:*

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**List of Acronyms**

| | |
|---|---|
| APCD | Air Pollution Control District |
| AB | Assembly Bill |
| AB 32 | Assembly Bill 32, Global Warming Solutions Act of 2006 |
| ARB | Air Resources Board |
| ASTM | American Society of Testing and Materials |
| CalEEMod | California Emissions Estimator Model |
| CAPCOA | California Air Pollution Control Officers Association |
| CAT | Climate Action Team |
| CCAP | Center for Clean Air Policy |
| CCAR | California Climate Action Registry |
| CEC | California Energy Commission |
| CEQA | California Environmental Quality Act |
| $CH_4$ | Methane |
| CO | Carbon Monoxide |
| $CO_2$ | Carbon Dioxide |
| $CO_2e$ | Carbon Dioxide Equivalent |
| DWR | Department of Water Resources |
| EIR | Environmental Impact Report |
| EPA | U.S. Environmental Protection Agency |
| EV | Electric Vehicles |
| GCC | Global Climate Change |
| GHG | Greenhouse Gas |
| GGEP | Greenhouse Gas Emissions Policy |
| GGRP | Greenhouse Gas Reduction Plan |
| GP | General Plan |
| GWP | Global Warming Potential |
| HFCs | Hydrofluorocarbons |
| IPCC | Intergovernmental Panel on Climate Change |
| LCFS | Low Carbon Fuel Standard |
| LEED | Leadership in Energy and Environmental Design |
| MMT | Million Metric Tons |
| MW | Megawatts |
| $N_2O$ | Nitrous Oxide |
| NOx | Oxides of Nitrogen |
| OPR | State Office of Planning and Research |
| PDFs | Project Design Features |
| PFCs | Perfluorocarbons |
| PM | Particulate Matter |
| ROG | Reactive Organic Gas |
| RPS | Renewable Portfolio Standards |
| S-3-05 | Executive Order S-3-05 |
| SB | Senate Bill |
| SDCGHGI | San Diego County Greenhouse Gas Inventory |
| SRI | Solar Reflective Index |

| | |
|---|---|
| THC | Total Hydrocarbon |
| UNFCCC | United Nations Framework Convention on Climate Change |
| USBGC | U.S. Green Building Council |
| VMT | Vehicle Miles Traveled |

**Executive Summary**

This report presents an assessment of potential global climate change impacts associated with the Shady Oak Residential Project. The evaluation addresses the potential for greenhouse gas (GHG) emissions during construction and after full buildout of the proposed Project.

The proposed project would construct 47 detached homes on a 5.2-acre site on Valley Center Road at Mirar de Valle Road. The project is consistent with the County's General Plan and with the SANDAG housing projections for the region. It is anticipated that the project would be built out by 2019.

A summary of the Project's GHG emissions is provided in Table ES-1. As shown in Table ES-1, the project's emissions are below the CAPCOA recommended screening threshold of 900 metric tons of CO2e.

**Table ES-1**
**SUMMARY OF PROPOSED PROJECT'S**
**ESTIMATED GREENHOUSE GAS EMISSIONS WITH GHG REDUCTION MEASURES**

| **Emission Source** | **Annual Emissions (Metric tons/year)** | | | |
|---|---|---|---|---|
| | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_2e$** |
| **Operational Emissions** | | | | |
| Area Sources | 14 | 0.0008 | 0.0003 | 14 |
| Electricity Use | 96 | 0.0038 | 0.0007 | 96 |
| Natural Gas Use | 54 | 0.0010 | 0.0010 | 54 |
| Water Consumption | 13 | 0.0803 | 0.0020 | 16 |
| Solid Waste Handling | 10 | 0.5627 | 0.0000 | 26 |
| Vehicles | 635 | 0.0340 | 0.0000 | 636 |
| Amortized Construction | 31 | 0.0000 | 0.0000 | 31 |
| Amortized Land Use Change | 1 | 0.0000 | 0.0000 | 1 |
| **Total** | **854** | **0.6826** | **0.004** | **874** |
| Global Warming Potential Factor | **1** | **28** | **265** | |
| $CO_2$ Equivalent Emissions | 854 | 19 | 1 | 874 |
| **TOTAL $CO_2$ Equivalent Emissions** | **874** | | | |

Table ES-2 provides a summary of the project design features that will be implemented by the Shady Oak Residential Project to reduce GHG emissions.

**Table ES-2**
**Proposed Project Design Features to Reduce GHG Emissions**

| Strategy to Reduce GHG Emissions | Description | Emission Reduction | Basis for Emission Reduction |
|---|---|---|---|
| **Transit Facilities and Alternative Transportation Modes** | | | |
| Public Transportation | Bus route 388 travels through Valley Center and provides transit service to the project site. | No reduction assumed. | CAPCOA White Paper, Appendix B |
| **Energy Efficiency** | | | |
| Energy Efficiency | Indoor residential appliances will carry the Environmental Protection Agency's (EPA) ENERGYSTAR® certification, as applicable and feasible. | Accounted for in CalEEMod Model. | CAPCOA White Paper, Appendix B |
| **Water Conservation** | | | |
| Low-Flow Fixtures | Indoor plumbing would include low-flow fixtures. | CalEEMod Reductions | CalEEMod Model |
| Outdoor water conservation | Outdoor irrigation will be water-efficient | 6.1% for outdoor uses | CalEEMod Model |
| **Building and Site Design** | | | |
| California 2013 Title 24 Building Energy Efficiency Standards | Residential buildings would be designed to meet the California 2013 Title 24 Building Energy Efficiency Standards. The GHG emission reduction benefits of this PDF have been quantitatively incorporated into the Project's GHG inventory by reducing CalEEMod electricity use by 36.4% and natural gas use by 6.5% | Title 24 as of 2013 | CEC 2013 |
| Solid Waste Diversion | The project would include solid waste diversion practices. | 20% reduction in solid waste generation from CalEEMod defaults | Boparai 2014 |

## 1.0 INTRODUCTION

This report presents an assessment of potential global climate change impacts associated with the proposed Shady Oak Residential Project. The evaluation addresses the potential for greenhouse gas impacts during construction and after full buildout of the proposed Project.

The proposed project would construct 47 detached single-family residential units on a 5.2-acre site on Valley Center Road at Mirar de Valle Road. The project is consistent with the County's General Plan and with the SANDAG housing projections for the region. It is anticipated that the project would be built out by 2019. Figure 1 shows the site location, and Figure 2 shows the site configuration.

### 1.1 Project Setting

The applicant proposes to develop the 5.2-acre site, which is currently vacant. The project is bounded by Valley Center Road to the north and Mirar del Valle to the west. The existing site is vegetated by non-native grassland.

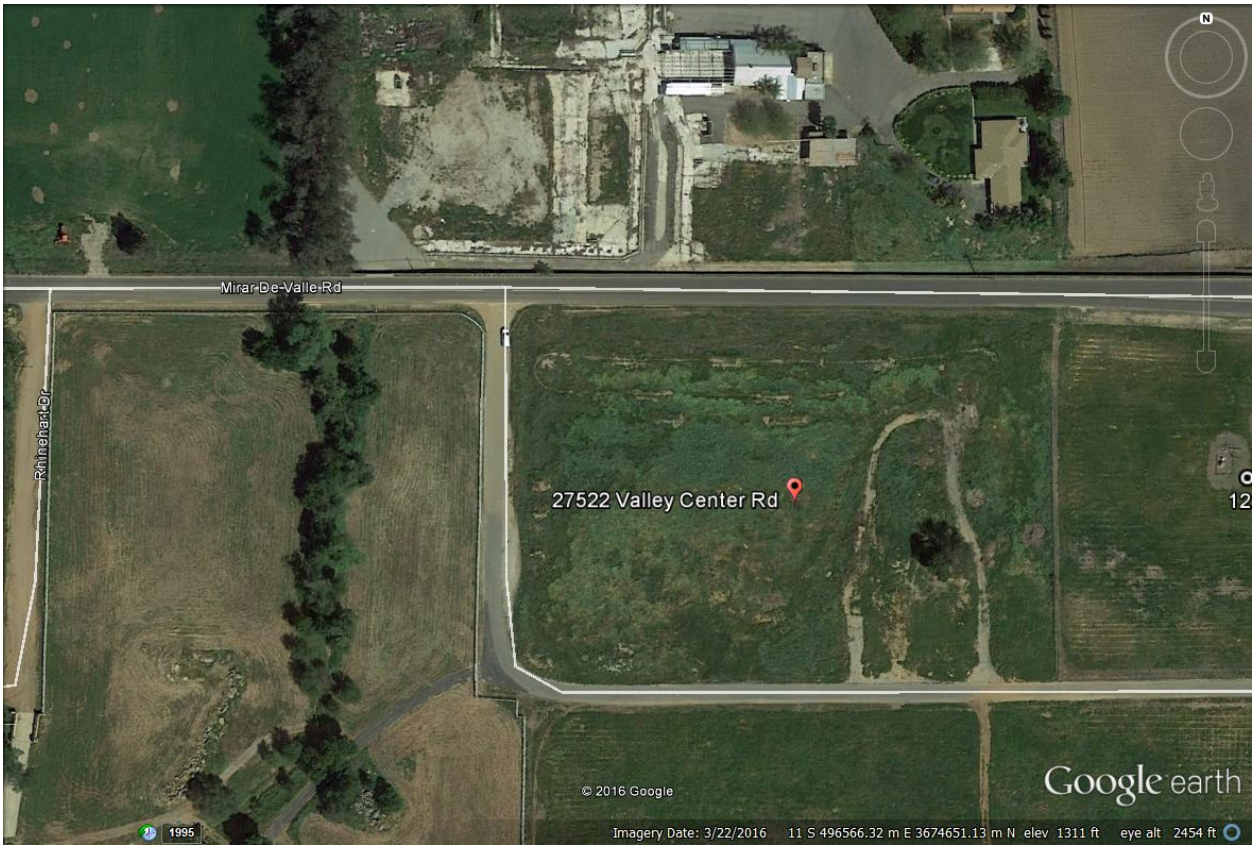


**Figure 1. Shady Oak Residential Project Location**

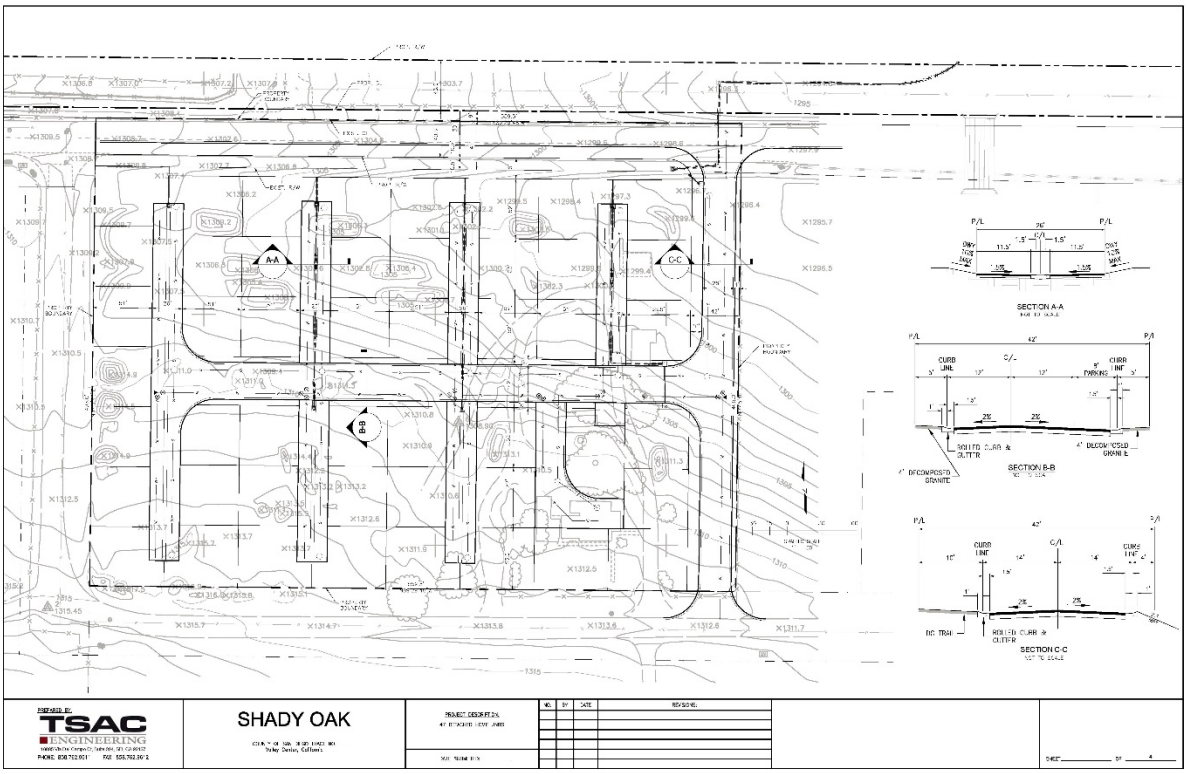


**Figure 2. Shady Oak Residential Project Plot Plan**

## 1.2 General Principles and Existing Conditions

Global climate change (GCC) refers to changes in average climatic conditions on Earth as a whole, including temperature, wind patterns, precipitation and storms. Global temperatures are moderated by naturally occurring atmospheric gases, including water vapor, carbon dioxide ($CO_2$), methane ($CH_4$) and nitrous oxide ($N_2O$), which are known as greenhouse gases (GHGs). These gases allow solar radiation (sunlight) into the Earth's atmosphere, but prevent radiative heat from escaping, thus warming the Earth's atmosphere. Gases that trap heat in the atmosphere are often called greenhouse gases, analogous to a greenhouse. The accumulation of GHGs in the atmosphere regulates the Earth's temperature. Without these natural GHGs, the Earth's temperature would be about 61º Fahrenheit cooler (California Environmental Protection Agency 2006). Emissions from human activities, such as electricity production and vehicle use, have elevated the concentration of these gases in the atmosphere.

GCC may result from natural factors, natural processes, and/or human activities that change the composition of the atmosphere and alter the surface and features of land. There is scientific consensus that global climate change is attributable to anthropogenic (human) emissions of GHGs (mainly $CO_2$, $CH_4$ and $N_2O$). Historical records indicate that global climate changes have occurred in the past due to natural phenomena (such as during previous ice ages). Some data indicate that the current global conditions differ from past climate changes in rate and magnitude. The State of California has been at the forefront of developing solutions to address potential anthropogenic impacts to GCC.

The United Nations Intergovernmental Panel on Climate Change (IPCC) constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. The IPCC concluded that a stabilization of GHGs at 400 to 450 ppm $CO_2$ equivalent concentration is required to keep global mean warming below 3.6º Fahrenheit (2º Celsius), which is assumed to be necessary to avoid dangerous climate change (Association of Environmental Professionals 2007).

State law defines greenhouse gases as any of the following compounds: carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride ($SF_6$) (California Health and Safety Code Section 38505(g). $CO_2$, followed by $CH_4$ and $N_2O$, are the most common GHGs that result from human activity.

## 1.3 Sources and Global Warming Potentials of GHG

As discussed further below, the sources of GHG emissions, GWP, and atmospheric lifetime of GHGs are all important variables to be considered in the process of calculating $CO_2e$ for discretionary land use projects that require a climate change analysis.

The State of California GHG Inventory performed by the California Air Resources Board (ARB), compiled statewide anthropogenic GHG emissions and sinks. It includes estimates for $CO_2$, $CH_4$, $N_2O$, $SF_6$, HFCs, and PFCs. The current inventory covers the years 1990 to 2013 (ARB 2015), and is summarized in Table 1. Data sources used to calculate this GHG inventory include state and federal agencies, international organizations, and industry associations. The calculation methodologies are consistent with guidance from the IPCC. The 1990 emissions level is the sum total of sources and sinks from all sectors and categories in the inventory. The inventory is divided into seven broad sectors and categories in the inventory. These sectors include: Agriculture; Commercial; Electricity Generation; Forestry; Industrial; Residential; and Transportation.

**Table 1**
**State of California GHG Emissions by Sector**

| Sector | Total 1990 Emissions ($MMTCO_2e$) | Percent of Total 1990 Emissions | Total 2013 Emissions ($MMTCO_2e$) | Percent of Total 2013 Emissions |
|---|---|---|---|---|
| Agriculture | 23.4 | 5% | 36.21 | 8% |
| Commercial | 14.4 | 3% | 15.43 | 3% |
| Electricity Generation | 110.6 | 26% | 90.45 | 20% |
| Forestry (excluding sinks) | 0.2 | <1% | Not reported | |
| Industrial | 103.0 | 24% | 92.68 | 20% |
| Residential | 29.7 | 7% | 28.11 | 6% |
| Transportation | 150.7 | 35% | 169.02 | 37% |
| Recycling and Waste | | | 8.87 | 2% |
| High GWP Gases | | | 18.50 | 4% |
| Forestry Sinks | (6.7) | | Not reported | |

When accounting for GHGs, all types of GHG emissions are expressed in terms of $CO_2$ equivalents ($CO_2e$) and are typically quantified in metric tons (MT) or millions of metric tons (MMT).

GHGs have varying global warming potential (GWP). The GWP is the potential of a gas or aerosol to trap heat in the atmosphere; it is the "cumulative radiative forcing effect of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas" (USEPA 2006). The reference gas for GWP is $CO_2$; therefore, $CO_2$ has a GWP of 1. The other main greenhouse gases that have been attributed to human activity include $CH_4$, which has a GWP of 28, and $N_2O$, which has a GWP of 265 (ARB 2014). Table 2 presents the GWP and atmospheric lifetimes of the GHGs that are regulated by the state of California.

**Table 2**
**Global Warming Potentials and Atmospheric Lifetimes of GHGs**

| GHG | Formula | 100-Year Global Warming Potential | Atmospheric Lifetime (Years) |
|---|---|---|---|
| Carbon Dioxide | $CO_2$ | 1 | Variable |
| Methane | $CH_4$ | 28 | 12 |
| Nitrous Oxide | $N_2O$ | 265 | 121 |
| Sulfur Hexafluoride | $SF_6$ | 23,500 | 3,200 |
| Hydrofluorocarbons | HFCs | 100 to 12,000 | 1 to 100 |
| Perfluorocarbons | PFCs | 7,000 to 11,000 | 3.000 to 50,000 |
| Nitrogen Trifluoride | $NF_3$ | 16,100 | 500 |

*Source*: First Update to the Climate Change Scoping Plan, ARB 2014

Human-caused sources of $CO_2$ include combustion of fossil fuels (coal, oil, natural gas, gasoline and wood). Data from ice cores indicate that $CO_2$ concentrations remained steady prior to the current period for approximately 10,000 years. Concentrations of $CO_2$ have increased in the atmosphere since the industrial revolution.

$CH_4$ is the main component of natural gas and also arises naturally from anaerobic decay of organic matter. Human-caused sources of natural gas include landfills, fermentation of manure and cattle farming. Human-caused sources of $N_2O$ include combustion of fossil fuels and industrial processes such as nylon production and production of nitric acid.

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

In addition to the State of California GHG Inventory, a more specific regional GHG inventory was prepared by the University of San Diego School of Law Energy Policy Initiative Center, a non-regulatory, academic and research center (University of San Diego 2008). This San Diego County Greenhouse Gas Inventory (SDCGHGI) is a detailed inventory that takes into account the unique characteristics of the region in calculating emissions. The SDCGHGI calculated GHG emissions for 1990, 2006, and projected 2020 emissions.

Areas where feasible reductions can occur and the strategies for achieving those reductions are outlined in the SDCGHGI. A summary of the various sectors that contribute GHG emissions in San Diego County for the year 2006 is provided in Table 3. Total GHGs in San Diego County are estimated at 34 $MMTCO_2e$.

**Table 3**
**San Diego County 2006 GHG Emissions by Category**

| Sector | Total Emissions ($MMTCO_2e$) | Percent of Total Emissions |
|---|---|---|
| On-Road Transportation | 16 | 46% |
| Electricity | 9 | 25% |
| Natural Gas Consumption | 3 | 9% |
| Civil Aviation | 1.7 | 5% |
| Industrial Processes & Products | 1.6 | 5% |
| Other Fuels/Other | 1.1 | 4% |
| Off-Road Equipment & Vehicles | 1.3 | 4% |
| Waste | 0.7 | 2% |
| Agriculture/Forestry/Land Use | 0.7 | 2% |
| Rail | 0.3 | 1% |
| Water-Born Navigation | 0.13 | 0.4% |

*Source*: EPIC's SDCGHGI, 2008.

According to the SDCGHGI, a majority of the region's emissions are attributable to on-road transportation, with the next largest source of GHG emissions attributable to electricity generation. Similarly, a majority of the emissions resulting from land development projects will be attributable to on-road transportation emissions. According to the SDCGHGI study, the emission reductions for on-road transportation will be achieved in a variety of ways, including through regulations aimed at increasing fuel efficiency standards and decreasing vehicle emissions. These regulations are outside the control of project applicants.

Similar to on-road emissions, the SDCGHGI indicated that the necessary emission reductions for electricity generation will be achieved in a variety of ways, including through implementation of the renewable portfolio standard (RPS), cleaner electricity purchases by San Diego Gas & Electric, replacement of the Boardman Contract (which allows the purchase of electricity from coal-fired power plants), and implementation of 400 MW of photovoltaics. These measures are also outside the control of project applicants. The SDCGHGI indicates that reduction in electricity consumption of 10 percent would contribute to the required reduction in GHG emissions required to reduce emissions to 1990 levels by 2020.

## 1.4 Regulatory Framework

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

### 1.4.1 National and International Efforts

GCC is being addressed at both the international and federal levels. In 1988, the United Nations and the World Meteorological Organization established the IPCC to assess the scientific, technical, and socioeconomic information relevant to understanding the scientific basis for human-induced climate change, its potential impacts, and options for adaptation and mitigation. The most recent reports of the IPCC have emphasized the scientific consensus that real and measurable changes to

the climate are occurring, that they are caused by human activity, and that significant adverse impacts on the environment, the economy, and human health and welfare are unavoidable.

On March 21, 1994, the United States joined a number of countries around the world in signing the United Nations Framework Convention on Climate Change (UNFCCC). Under the Convention, governments agreed to gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of GCC. Recently, the United States Supreme Court declared in the court case of Massachusetts et al. vs. the Environmental Protection Agency et al., 549 C.S. 497 (2007) that the EPA does have the ability to regulate GHG emissions. In addition to the national and international efforts described above, many local jurisdictions have adopted climate change policies and programs.

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

> **Endangerment Finding:** The Administrator finds that the current and projected concentrations of the six key well-mixed greenhouse gases--carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride ($SF_6$)--in the atmosphere threaten the public health and welfare of current and future generations.
>
> **Cause or Contribute Finding:** The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

The endangerment findings do not themselves impose any requirements on industry or other entities. However, this action is a prerequisite to finalizing the EPA's proposed greenhouse gas

emission standards for light-duty vehicles, which were jointly proposed by EPA and the Department of Transportation's National Highway Safety Administration on September 15, 2009.

**Mandatory GHG Reporting Rule.** On March 10, 2009, in response to the FY2008 Consolidated Appropriations Act (H.R. 2764; Public Law 110–161), EPA proposed a rule that requires mandatory reporting of greenhouse gas (GHG) emissions from large sources in the United States. On September 22, 2009, the Final Mandatory Reporting of Greenhouse Gases Rule was signed, and was published in the Federal Register on October 30, 2009. The rule became effective on December 29, 2009. The rule will collect accurate and comprehensive emissions data to inform future policy decisions.

EPA is requiring suppliers of fossil fuels or industrial greenhouse gases, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions to submit annual reports to EPA. The gases covered by the proposed rule are carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulfur hexafluoride ($SF_6$), and other fluorinated gases including nitrogen trifluoride ($NF_3$) and hydrofluorinated ethers (HFE).

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

President Obama directed the National Highway Traffic Safety Administration (NHTSA) and the EPA to develop and issue the next phase ("Phase 2") of medium- and heavy-duty vehicle fuel

efficiency and greenhouse gas (GHG) standards by March 2016. Under this timeline, the agencies are expected to issue a Notice of Proposed Rulemaking (NPRM) by March 2015. This second round of fuel efficiency standards will build on the first-ever standards for medium- and heavy-duty vehicles (model years 2014 through 2018).

As discussed above, the CAFÉ standards are standards that have been adopted by the U.S. Department of Transportation and the EPA. These standards are therefore federal standards and apply to vehicles throughout the United States. As discussed in Section 1.3.2 under State Standards, California implemented its own regulations to implement GHG standards for passenger vehicles. The ARB's Board originally approved regulations to reduce GHGs from passenger vehicles in September 2004, with the regulations to take effect in 2009. These regulations were authorized by the 2002 legislation Assembly Bill 1493 (Pavley).

The first California request to implement GHG standards for passenger vehicles, known as a waiver request, was made in December 2005 and was denied by the EPA in March 2008. That decision was based on a finding that California's request to reduce GHG emissions from passenger vehicles did not meet the Clean Air Act requirement of showing that the waiver was needed to meet "compelling and extraordinary conditions."

Subsequently, the EPA granted California the authority to implement GHG emission reduction standards for new passenger cars, pickup trucks and sport utility vehicles on June 30, 2009. With the granting of the waiver on June 30, 2009, it is expected that the Pavley regulations will reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016, all while improving fuel efficiency and reducing motorists' costs.

On September 15, 2009, EPA and NHTSA issued a joint proposal to establish new vehicle standards for fuel economy and GHG emissions for model years 2012 to 2016, which were finalized on April 1, 2010. The joint proposal reflected an agreement among EPA, NHTSA, and the state of California, along with most major automakers. California agreed to adopt the federal standards in lieu of its own separate standard. California has also adopted the most recent federal standards covering model years 2017 to 2025.

As discussed below in Section 1.3.2, State Regulations and Standards, ARB has adopted a second phase of the Pavley regulations, originally termed "Pavley II" but now called the Low Emission Vehicle III" (LEV III) Standards or Advanced Clean Cars (ACC) Program, that covers model years 2017 to 2025. CARB estimates that LEV III will reduce vehicle GHGs by an additional 4.0 MMTCO2E for an approximately 3 percent reduction over Pavley I. These reductions come from improved vehicle technologies such as smaller engines with superchargers, continuously variable transmissions, and hybrid electric drives. On August 7, 2012, the final regulation for the adoption of LEV III became effective.

### 1.4.2 State Regulations and Standards

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

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

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

emissions from any sources or categories of sources that ARB finds necessary to achieve the statewide GHG emissions limit.

- Monitor compliance with and enforce any emission reduction measure adopted pursuant to AB 32.

AB 32 required that by January 1, 2008, ARB determine what the statewide GHG emissions level was in 1990, and approve a statewide GHG emissions limit that is equivalent to that level, to be achieved by 2020. ARB adopted its Scoping Plan in December 2008, which provided estimates of the 1990 GHG emissions level and identified sectors for the reduction of GHG emissions. The ARB has recently published an update to the Scoping Plan (ARB 2014). The ARB has estimated that the 1990 GHG emissions level was 427 MMT net $CO_2e$ (ARB 2007b). The ARB estimated that a reduction of 169 MMT net $CO_2e$ emissions below business-as-usual would be required by 2020 to meet the 1990 levels (ARB 2008).This estimate was updated in the 2011 *Final Supplement to the AB 32 Scoping Plan Functional Equivalent Document* (ARB 2011a) based on new economic data and the incorporation of three regulatory standards (i.e., 2008 Title 24 standards; Pavley I standards; 20% Renewable Portfolio Standard). Based upon the update, the ARB determined in the 2011 Supplement that the State is projected to emit 507 MMT $CO_2e$ in 2020, and that a reduction of 80 MMT would be required by 2020 in order to return to the 1990 levels. The 80 MMT reduction correlates to a 16% reduction in GHG emissions.

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

The Governor's Office of Planning and Research (OPR) published a technical advisory on CEQA and Climate Change on June 19, 2008. The guidance did not include a suggested threshold. The OPR does recommend that CEQA analyses include the following components:

- Identify greenhouse gas emissions
- Determine Significance
- Mitigate Impacts

In April 2009, the OPR published its proposed revisions to CEQA to address GHG emissions. The amendments to CEQA indicate the following:

- Climate action plans and other greenhouse gas reduction plans can be used to determine whether a project has significant impacts, based upon its compliance with the plan.
- Local governments are encouraged to quantify the greenhouse gas emissions of proposed projects, noting that they have the freedom to select the models and methodologies that best meet their needs and circumstances. The section also recommends consideration of several qualitative factors that may be used in the determination of significance, such as the extent to which the given project complies with state, regional, or local GHG reduction plans and policies. OPR does not set or dictate specific thresholds of significance. Consistent with existing CEQA Guidelines, OPR encourages local governments to develop and publish their own thresholds of significance for GHG impacts assessment.
- When creating their own thresholds of significance, local governments may consider the thresholds of significance adopted or recommended by other public agencies, or recommended by experts.
- New amendments include guidelines for determining methods to mitigate the effects of greenhouse gas emissions in Appendix F of the CEQA Guidelines.
- OPR is clear to state that "to qualify as mitigation, specific measures from an existing plan must be identified and incorporated into the project; general compliance with a plan, by itself, is not mitigation."
- OPR's emphasizes the advantages of analyzing GHG impacts on an institutional, programmatic level. OPR therefore approves tiering of environmental analyses and highlights some benefits of such an approach.
- Environmental impact reports (EIRs) must specifically consider a project's energy use and energy efficiency potential.

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

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

**Executive Order S-21-09.** Executive Order S-21-09 was enacted by the Governor on September 15, 2009. Executive Order S-21-09 requires that the ARB, under its AB 32 authority, adopt a regulation by July 31, 2010 that sets a 33 percent renewable energy target as established in Executive Order S-14-08. Under Executive Order S-21-09, the ARB will work with the Public Utilities Commission and California Energy Commission to encourage the creation and use of renewable energy sources, and will regulate all California utilities. The ARB will also consult with the Independent System Operator and other load balancing authorities on the impacts on reliability, renewable integration requirements, and interactions with wholesale power markets in carrying out the provisions of the Executive Order. The order requires the ARB to establish highest priority for those resources that provide the greatest environmental benefits with the least environmental costs and impacts on public health.

**Executive Order B-30-15.** Executive Order B-30-15 was enacted by the Governor on April 29, 2015. Executive Order B-30-15 establishes an interim GHG emission reduction goal for the state

of California to reduce GHG emissions to 40 percent below 1990 levels by the year 2030. This Executive Order directs all state agencies with jurisdiction over GHG-emitting sources to implement measures designed to achieve the new interim 2030 goal, as well as the pre-existing, long-term 2050 goal identified in Executive Order S-3-05 to reduce GHG emissions to 80 percent below 1990 levels by the year 2050. The Executive Order directs ARB to update its Scoping Plan to address the 2030 goal. It is anticipated that ARB will develop statewide inventory projection data for 2030 and commence efforts to identify reduction strategies capable of securing emission reductions that allow for achievement of the new interim goal for 2030.

**California Code of Regulations Title 24.** Although not originally intended to reduce greenhouse gas emissions, California Code of Regulations Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The ARB's GHG emission inventory was based on Title 24 as of 2008. The 2013 standards require higher efficiency windows, insulation, lighting, ventilation systems and other features that further reduce energy consumption in homes and businesses. Additionally, the Standards will save 200 million gallons of water per year (equal to more than 6.5 million wash loads) and avoid 170,500 tons of greenhouse gas emissions per year. Energy efficient buildings require less electricity, natural gas, and other fuels. Electricity production from fossil fuels and on-site fuel combustion (typically for water heating) results in greenhouse gas emissions. Therefore, increased energy efficiency results in decreased greenhouse gas emissions.

**State Standards Addressing Vehicular Emissions.** California Assembly Bill 1493 (Pavley) enacted on July 22, 2002, required the ARB to develop and adopt regulations that reduce greenhouse gases emitted by passenger vehicles and light duty trucks. Regulations adopted by ARB would apply to 2009 and later model year vehicles. ARB estimated that the regulation would reduce climate change emissions from light duty passenger vehicle fleet by an estimated 18% in 2020 and by 27% in 2030 (AEP 2007). Once implemented, emissions from new light-duty vehicles are expected to be reduced in San Diego County by 21 percent by 2020. The ARB has adopted amendments to the "Pavley" regulations that reduce greenhouse gas (GHG) emissions in

new passenger vehicles from 2009 through 2016. The amendments, approved by the Board on September 24, 2009, are part of California's commitment toward a nation-wide program to reduce new passenger vehicle GHGs from 2012 through 2016. ARB's September 2009 amendments will cement California's enforcement of the Pavley rule starting in 2009 while providing vehicle manufacturers with new compliance flexibility. The amendments will also prepare California to harmonize its rules with the federal rules for passenger vehicles. It is expected that the Pavley regulations will reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016, all while improving fuel efficiency.

Implementation of the Pavley II standards will commence in 2017 and cover vehicles manufactured from 2017 through 2025. Based on information from the ARB (ARB 2011b), the Pavley II program (now referred to as the "Advanced Clean Cars" program) would reduce GHG emissions from the fleet by 3% by 2020, and by 12% by 2025, with continuing reductions in emissions of 27% by 2035 and 33% by 2050.

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

**Senate Bill 375.** Senate Bill 375 requires that regions within the state which have a metropolitan planning organization must adopt a sustainable communities strategy as part of their regional transportation plans. The strategy must be designed to achieve certain goals for the reduction of GHG emissions. The bill finds that GHG from autos and light trucks can be substantially reduced by new vehicle technology, but even so "it will be necessary to achieve significant additional greenhouse gas reductions from changed land use patterns and improved transportation. Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32." SB 375 provides that new CEQA provisions be enacted to "encourage developers to submit applications and local governments to make land use decisions that will help the state achieve its

goals under AB 32," and that "current planning models and analytical techniques used for making transportation infrastructure decisions and for air quality planning should be able to assess the effects of policy choices, such as residential development patterns, expanded transit service and accessibility, the walkability of communities, and the use of economic incentives and disincentives."

On June 30, 2010, CARB staff issued the *Draft Regional Greenhouse Gas Emission Reduction Targets For Automobiles And Light Trucks Pursuant To Senate Bill 375*. With respect to the SANDAG region, within which the project site is located, ARB staff proposed a draft reduction target of 5 to 10 percent for 2020, and a placeholder reduction target of 5 to 19 percent for 2035. The emissions reduction will be measured relative to 2005 levels and as a percent reduction in per capita emissions associated with passenger vehicles and light trucks. Of note, the proposed reduction targets explicitly exclude emission reductions expected from the AB 1493 and low carbon fuel standard regulations.

SB 375 (codified as the Sustainable Communities and Climate Protection Act of 2008) mandates that metropolitan planning organizations, such as the San Diego Association of Governments (SANDAG), prepare a Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) that integrates land use, housing, and transportation planning to create more sustainable, walkable, transit-oriented development. In compliance with AB 32 and SB 375, SANDAG prepared an RTP/SCS and also certified a programmatic EIR. In 2012, the Cleveland National Forest Foundation (CNFF) challenged the EIR.

On November 24, 2014, and after recirculation of the project's Draft EIR, Division One of the Fourth District Court of Appeal issued its decision in Cleveland National Forest Foundation v. SANDAG, Case No. D063288. In its decision, the Fourth District affirmed the trial court decision that SANDAG abused its discretion when it certified the EIR for the 2050 RTP/SCS because it did not adequately analyze and mitigate GHG emission levels after year 2020. The 2050 RTP/SCS EIR complied with CARB's AB 32-related GHG reduction target through 2020, but the EIR found that plan-related emissions would substantially increase after 2020 and through 2050. The majority of the Fourth District in the Cleveland National decision found SANDAG's EIR deficient

because, although the EIR used three significance thresholds authorized by CEQA Guidelines section 15064.4(b), it did not assess the 2050 RTP/SCS's consistency with the 2050 GHG emissions goal identified in EO S-03-05, which the majority construed as "state climate policy." The Fourth District did not require the set aside of SANDAG's 2050 RTP/SCS itself. In March 2015, the California Supreme Court granted SANDAG's petition for review of the Fourth District's decision (Case No. S223603), and the matter currently is pending before the state's highest court. Pursuant to Government Code Section 65080(b)(2)(K), a sustainable communities strategy does not: (i) regulate the use of land; (ii) supersede the land use authority of cities and counties; or (iii) require that a city's or county's land use policies and regulations, including those in a general plan, be consistent with it. Nonetheless, SB 375 makes regional and local planning agencies responsible for developing those strategies as part of the federally required metropolitan transportation planning process and the state-mandated housing element process.

Subsequent to the court decision, SANDAG has released an update to its Regional Plan (SANDAG 2015), along with a Draft EIR for the updated plan. The Draft EIR is currently in the public review process.

### 1.4.3 Local Regulations and Standards

The County has adopted its General Plan Update (County of San Diego 2011), which provides 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.

## 2.0 POTENTIAL CLIMATE CHANGE IMPACTS TO PROJECT SITE

### 2.1 Existing Conditions

The site is currently undeveloped and includes disturbed areas and native vegetation, consisting mainly of non-native grassland. Natural vegetation and soils temporarily store carbon as part of the terrestrial carbon cycle. Carbon is assimilated into plants and animals as they grow and then dispersed back into the environment when they die. There are two existing sources of carbon storage at the Project site: natural vegetation and soils. It is difficult to assess net changes in carbon storage associated with the proposed Project, but carbon sequestration rates for native vegetation in the Valley Center region are relatively low in comparison to heavily vegetated areas such as forests. For example, according to the U.S. EPA (http://www.epa.gov/sequestration/rates.html), riparian areas are estimated to sequester from 0.1 to 0.3 metric tons of $CO_2e$ per acre per year in comparison to forests, which are estimated to sequester 0.6 to 2.6 metric tons of $CO_2e$ per acre per year. Native vegetation in the Valley Center region, which consists mainly of scrub, would be expected to provide a low level of carbon sequestration. The key issue is the balance between the loss of natural vegetation and future carbon storage associated with landscaping. The situation is further complicated by changes in fire regime. Carbon in natural vegetation is likely to be released into the atmosphere through wildfire every 20 to 150 years. Carbon in landscaped areas will be protected from wildfire. The balance between these factors will influence the long-term carbon budget on the site.

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

Based on the site's current conditions and the absence of development, existing GHG emissions are negligible and assumed to be zero. The loss in carbon sequestration was calculated based on site vegetation studies, and included in the GHG analysis.

## 2.2 Typical Adverse Effects

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

According to the report, substantial temperature increases would result in a variety of impacts to the people, economy, and environment of California. These impacts would result from a projected increase in extreme conditions, with the severity of the impacts depending upon actual future emissions of GHGs and associated warming. These impacts are described below.

**Public Health.** Higher temperatures are expected to increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to $O_3$ formation are projected to increase by 25 to 35 percent under the lower warming range and 75 to 85 percent under the medium warming range. In addition, if global background $O_3$ levels increase as is predicted in some scenarios, it may become impossible to meet local air quality standards. An increase in wildfires could also occur, and the corresponding increase in the release of pollutants including $PM_{2.5}$ could further compromise air quality. The Climate Scenarios Report indicates that large wildfires could become up to 55 percent more frequent if GHG emissions are not significantly reduced.

Potential health effects from global climate change may arise from temperature increases, climate-sensitive diseases, extreme events, and air quality. There may be direct temperature effects through increases in average temperature leading to more extreme heat waves and less extreme cold spells.

Those living in warmer climates are likely to experience more stress and heat-related problems (e.g., heat rash and heat stroke). In addition, climate sensitive diseases (such as malaria, dengue fever, yellow fever, and encephalitis) may increase, such as those spread by mosquitoes and other disease-carrying insects.

Potential public health impacts from climate change would be global in nature rather than site-specific. That being said, because the project site is not located in an area that is subject to climate sensitive diseases (such as the tropics), it is unlikely that risks associated with these diseases would increase substantially. It is too speculative to estimate the potential frequency of heat waves at the project site that would be associated with global climate change.

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

Impacts to water resources could affect the project site through decreased availability of water in southern California overall. Decreased availability could lead to higher prices and water rationing. However, due to the scientific and factual uncertainties regarding the effects of climate change at a regional level, it is too speculative to quantify the effect of this impact.

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

This potential effect of climate change would not impact the proposed project because the project does not involve agricultural uses.

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

Due to the scientific and factual uncertainties regarding the effects of climate change at a regional and site-specific level, particularly as to sensitive biological resources, it is too speculative to assess the effect of this impact on the project site.

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

The project site generally has a low potential for fire risks due to the type of on-site native vegetation.

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

Because the site is not located in a coastal area, it is unlikely to be affected by rising sea levels.

## 2.3 California Climate Adaptation Strategy

As part of its climate change planning process, the California Natural Resources Agency prepared its California Climate Adaptation Strategy (CNRA 2009) to summarize the best known science on climate change impacts in California, with the goal of assessing vulnerability to climate change impacts. According to the ARB, some of the potential California-specific impacts of global warming may include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years. To protect the State's public health and safety, resources, and economy, the California Natural Resources Agency—in coordination with other state agencies—has updated the *2009 California Climate Adaptation Strategy* that is titled, *Safeguarding California: Reducing Climate Risk*. The final *Safeguarding California* plan is dated July 2014, and provides policy guidance for state decision makers relative to climate risks in nine sectors: agriculture; biodiversity and habitat; emergency management; energy; forestry; ocean and coastal ecosystems and resources; public health; transportation; and water. It also identifies policies for reducing GHG emissions and accelerating the transition to a clean-energy economy through reductions in emissions, readiness, and continued research.

The California Climate Adaptation Strategy takes into account the long-term, complex, and uncertain nature of climate change and establishes a proactive foundation for an ongoing adaptation process. The strategy made preliminary recommendations as a first step in addressing responses to impacts of global climate change within the state. Key recommendations include:

1. A Climate Adaptation Advisory Panel (CAAP) will be appointed to assess the greatest risks to California from climate change and recommend strategies to reduce those risks building on California's Climate Adaptation Strategy.
2. Identify necessary changes to California's water management and uses.

3. Consider project alternatives that avoid significant new development in areas that cannot be adequately protected (planning, permitting, development, and building) from flooding, wildfire and erosion due to climate change.
4. All state agencies responsible for the management and regulation of public health, infrastructure or habitat subject to significant climate change should prepare as appropriate agency-specific adaptation plans, guidance, or criteria by September 2010.
5. To the extent required by CEQA Guidelines Section 15126.2, all significant state projects, including infrastructure projects, must consider the potential impacts of locating such projects in areas susceptible to hazards resulting from climate change.
6. The California Emergency Management Agency (Cal EMA) will collaborate with the California Natural Resources Agency, the Climate Action Team, the Energy Commission, and the CAAP to assess California's vulnerability to climate change, identify impacts to state assets, and promote climate adaptation/mitigation awareness through the Hazard Mitigation Web Portal and My Hazards Website as well as other appropriate sites.
7. Using existing research the state should identify key California land and aquatic habitats that could change significantly during this century due to climate change. Based on this identification, the state should develop a plan for expanding existing protected areas or altering land and water management practices to minimize adverse effects from climate change induced phenomena.
8. The best long-term strategy to avoid increased health impacts associated with climate change is to ensure communities are healthy to build resilience to increased spread of disease and temperature increases.
9. Communities with General Plans and Local Coastal Plans should begin, when possible, to amend their plans to assess climate change impacts, identify areas most vulnerable to these impacts, and develop reasonable and rational risk reduction strategies using the CAS as guidance.
10. State fire fighting agencies should begin immediately to include climate change impact information into fire program planning to inform future planning efforts.
11. State agencies should meet projected population growth and increased energy demand with greater energy conservation and an increased use of renewable energy.

12. Existing and planned climate change research can and should be used for state planning and public outreach purposes; new climate change impact research should be broadened and funded.

## 3.0 CLIMATE CHANGE SIGNIFICANCE CRITERIA

According to Appendix G of the CEQA Guidelines, the following criteria are considered to establish a significance threshold for GCC impacts:

Would the project:

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

As described in Section 2.2, Executive Order B-30-15 established a statewide emissions reduction target of 40% below 1990 levels by 2030. This mid-term goal was identified to keep the State on a trajectory needed to meet the 2050 goal of reducing GHG emissions to 80% below 1990 levels by 2050 pursuant to Executive Order S-3-05. Because the 2030 and 2050 goals are currently an expression of executive policy (and not adopted legislative or regulatory action), there is an ongoing debate regarding their relevance to and force-and-effect under CEQA. Some environmental organizations and community groups contend that individual projects must achieve the reduction goals identified in the two Executive Orders. However, others note that the Executive Orders establish statewide reduction goals that cannot be achieved in a vacuum by cities and counties and individual projects within the jurisdiction of those agencies; rather, achievement of the reduction goals will depend on a coordinated effort amongst federal, state, regional and local agencies to secure emission reductions from existing and new emission sources.

The annual 900 metric ton carbon dioxide equivalent (MT CO2e) screening level referenced in the CAPCOA white paper is used as a conservative screening criterion for determining which projects require further analysis and identification of project design features or potential mitigation measures with regard to GHG emissions. The CAPCOA white paper reports that the 900 metric

ton screening level would capture more than 90 percent of development projects, allowing for mitigation towards achieving the State's GHG reduction goals.

For the purpose of this analysis, the project has been evaluated on the basis of the 900 MT $CO_2e$ screening level. It should be noted that the screening level assumes that the project does not involve unusually extensive construction activities and does not involve operational characteristics that would generate unusually high GHG emissions. Therefore, the following section presents an analysis of the project's GHG emissions to demonstrate that they would not exceed the screening level.

## 4.0 GREENHOUSE GAS INVENTORY

GHG emissions associated with the proposed Project were estimated separately for six categories of emissions: (1) construction; (2) area sources; (3) energy use, including electricity and natural gas usage; (4) water consumption; (5) solid waste handling; and (6) transportation. This inventory assumes that the proposed Project is constructed and operated consistent with the parameters of the ARB's 2011 Supplement.

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

### 4.1 Existing Greenhouse Gas Emissions

As discussed in Section 2.1, the site is currently undeveloped and existing site GHG emissions are negligible. Minor amounts of GHG emissions may be associated with intermittent on-site activities (e.g., vehicle use). However, this analysis assumes that the existing emission levels are zero.

### 4.2 Construction Greenhouse Gas Emissions

Construction GHG emissions include emissions from heavy construction equipment, truck traffic, and worker trips. Emissions were calculated using the CalEEMod Model Version 2016.3.1 (SCAQMD 2016), based on the anticipated construction schedule to full buildout. The total construction emissions were estimated to be 630 metric tons of $CO_2e$. The County Department of Planning and Development Service (PDS) follows recommendations by the SCAQMD for purposes of evaluating construction-related GHGs under CEQA (SCAQMD 2008). Specifically, the County PDS draft guidance recommends that the emissions be amortized over 20 years and added to operational emissions, as appropriate. Amortized over 20 years, construction would contribute 31 metric tons per year of $CO_2e$ emissions. These emissions were added to the operational GHG emissions to evaluate their significance.

## 4.3 Operational Greenhouse Gas Emissions

Operational GHG emissions were calculated using the CalEEMod Model, with adjustments to account for site-specific conditions.

**Area Source Emissions**. The CalEEMod Model calculates emissions associated with area sources, including landscaping equipment and hearth (fireplace) use. For this analysis, it was assumed that all residential units would be equipped with a natural gas fireplace. Fireplaces were modeled based on average use for 30 days per year. This assumption is similar to the default value for the SCAQMD within CalEEMod, which assumes that fireplaces would operate 25 days per year. This is an appropriate assumption for southern California.

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

The CalEEMod model includes energy intensity factors for utilities that are based on emission factors for electricity are based on Power Utility Protocol reports submitted to the California Climate Action Registry (CCAR) with the most recent years around 2006-2008 or from the Local Government Operations Protocol. Implementation of the RPS will affect indirect GHG emissions associated with electricity use for the proposed Project because electricity will be purchased from San Diego Gas and Electric. According to the SDCGHGI (USD 2008), implementation of the 20% RPS mandate by 2010, as established by Senate Bill 107, would reduce GHG emissions by 14% from 2006 levels; credit was taken for these GHG savings in this analysis. As of September 23, 2010, the ARB has adopted the regulation that implements the 33% renewable energy standard. Implementation of the 33% target by 2020 will reduce GHG emissions by an additional 13% per the SDCGHGI. Thus, implementation of Executive Order S-21-09 would serve to reduce GHG emissions by a total of 27% below 2006 levels. The emission factors for utility energy use have been adjusted to account for implementation of the 33% RPS.

At a minimum, buildings would meet the energy efficiency requirements of Title 24 as of 2013. For multi-family residential dwellings, implementation of Title 24 as of 2008 results in a decrease

of 23.3% in electricity use over Title 24 as of 2008, and a 3.8% decrease in natural gas use over Title 24 as of 2008. The buildings would be constructed post-2016 and would therefore be required to meet the requirements of Title 24 as of 2016; therefore, based on the California Energy Commissions' Adoption Hearing proceedings (CEC 2015), a 28% reduction in Title 24 energy use was included in the calculations.

It was also assumed that the residences would be equipped with EnergyStar appliances. The reductions for EnergyStar appliances was accounted for within the CalEEMod model under Energy Mitigation. The reductions for EnergyStar appliances was accounted for within the CalEEMod model under Energy Mitigation.

**Water.** Water use and energy use are often closely linked. The provision of potable water to commercial users consumes large amounts of energy associated with five stages: source and conveyance, treatment, distribution, end use, and wastewater treatment. GHG emissions from water use were calculated based on the CalEEMod model, assuming that low-flow fixtures would be used, and that water-efficient irrigation systems would be employed that would reduce outdoor water use by 6.1% (CalEEMod default mitigation measure).

**Solid Waste.** The disposal of solid waste produces GHG emissions from anaerobic decomposition in landfills, incineration, transportation of waste, and disposal. Solid waste generation rates were estimated from CalEEMod Model, and GHG emissions from solid waste management were estimated using the model, assuming landfilling of solid waste with flaring.

AB 341 sets forth a legislative declaration that it is the policy goal of the state that not less than 75% of solid waste generated be source reduced, recycled, or composted by the year 2020. For conservative purposes, it was assumed that the project would reduce its solid waste generation by 20%.

**Transportation.** Several regulatory initiatives have been passed to reduce emissions from on-road vehicles, as discussed in Section 1.3. The default emission factors within CalEEMod include

the EMFAC2014 emission factors, which account for the Pavley I standards and the Advanced Clean Cars program.

To calculate emissions associated with vehicle trips generated by the proposed Project, trip generation rates of 10 trips per unit for single-family residences were used. Trip lengths for the home to work trips were based on data from SANDAG (Darnell and Associates 2016), which estimates that for Valley Center, trip lengths would be 13.82 miles. The remaining trip lengths were based on rural trip lengths within the CalEEMod Model. These trip lengths are representative of the site's land uses and purpose, which is to provide local residences and services within the Valley Center community.

**Land Use Change.** The change in carbon sequestration due to loss of vegetation at the site was calculated using the CalEEMod Model. The analysis was based on information provided by the applicant, which provided the following breakdown of vegetation communities at the existing site:

- Non-native Grassland – 5.2 acres

The loss of sequestration calculated by the CalEEMod Model is 22 metric tons. Amortized over a 20-year period, the loss in sequestration is 1 metric tons of $CO_2$.

The project would include plantings of 200 new trees. The planting of new trees would increase carbon sequestration. While the additional tree plantings would sequester CO2e, this sequestration was not included in the GHG analysis.

## 5.0 SUMMARY OF PROJECT DESIGN FEATURES AND IMPACTS

### 5.1 Project Greenhouse Gas Emissions

The following is a summary of the specific project design features (PDFs) that would be implemented by the proposed Project, all of which are designed to reduce GHG emissions. Table 4 presents the project design features that reduce GHG emissions.

**Table 4**
**Proposed Project Design Features to Reduce GHG Emissions**

| Strategy to Reduce GHG Emissions | Description | Emission Reduction | Basis for Emission Reduction |
|---|---|---|---|
| **Transit Facilities and Alternative Transportation Modes** | | | |
| Public Transportation | Bus route 388 travels through Valley Center and provides transit service to the project site. | No reduction assumed. | CAPCOA White Paper, Appendix B |
| **Energy Efficiency** | | | |
| Energy Efficiency | Indoor residential appliances will carry the Environmental Protection Agency's (EPA) ENERGYSTAR® certification, as applicable and feasible. | Accounted for in CalEEMod Model. | CAPCOA White Paper, Appendix B |
| **Water Conservation** | | | |
| Low-Flow Fixtures | Indoor plumbing would include low-flow fixtures. | CalEEMod Reductions | CalEEMod Model |
| Outdoor water conservation | Outdoor irrigation will be water-efficient | 6.1% for outdoor uses | CalEEMod Model |
| **Building and Site Design** | | | |
| California 2013 Title 24 Building Energy Efficiency Standards | Residential buildings would be designed to meet the California 2013 Title 24 Building Energy Efficiency Standards. The GHG emission reduction benefits of this PDF have been quantitatively incorporated into the Project's GHG inventory by reducing Title 24 electricitry use by 23.3% and Title 24 natural gas use by 3.8%. | Reduction from Title 24 as of 2008 | CEC 2013 |
| Solid Waste Diversion | The project would include solid waste diversion practices. | 20% reduction in solid waste generation from CalEEMod defaults | Conservative assumption |

The results of the 2020 GHG inventory for emissions with implementation of GHG reduction measures are presented in Table 5. As shown in Table 5, in 2020, the Project would emit about 594 metric tonnes of $CO_2e$ considering GHG reductions and project design features.

**Table 5**
**SUMMARY OF PROPOSED PROJECT'S**
**ESTIMATED GREENHOUSE GAS EMISSIONS WITH GHG REDUCTION MEASURES**

| Emission Source | Annual Emissions (Metric tons/year) | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
| **Operational Emissions** | | | | |
| Area Sources | 14 | 0.0008 | 0.0003 | 14 |
| Electricity Use | 96 | 0.0038 | 0.0007 | 96 |
| Natural Gas Use | 54 | 0.0010 | 0.0010 | 54 |
| Water Consumption | 13 | 0.0803 | 0.0020 | 16 |
| Solid Waste Handling | 10 | 0.5627 | 0.0000 | 26 |
| Vehicles | 635 | 0.0340 | 0.0000 | 636 |
| Amortized Construction | 31 | 0.0000 | 0.0000 | 31 |
| Amortized Land Use Change | 1 | 0.0000 | 0.0000 | 1 |
| **Total** | **854** | **0.6826** | **0.004** | **874** |
| Global Warming Potential Factor | **1** | **28** | **265** | |
| $CO_2$ Equivalent Emissions | 854 | 19 | 1 | 874 |
| **TOTAL $CO_2$ Equivalent Emissions** | **874** | | | |

Based on the analysis, the project would not exceed the CAPCOA screening threshold of 900 metric tons. Therefore, the Project would not result in a significant impact due to greenhouse gas emissions.

## 5.2 Consistency with Applicable Plans

With respect to the second significance criterion, the proposed Project will be consistent with applicable plans, policies, and regulations discussed in Section 1.3, including:

- ARB Scoping Plan – to the extent required by law, the proposed Project will comply with all applicable regulations adopted by the ARB and other regulatory agencies to implement the Scoping Plan pursuant to AB 32.
- Executive Order S-3-05 – the proposed Project, through implementation of project design features and compliance with vehicle standards, will enable achievement of the statewide goal of reducing GHG emissions to 1990 levels by 2020.
- Executive Order S-21-09 – the proposed Project will purchase power from San Diego Gas and Electric, which is developing its renewable portfolio standard in accordance with state mandates.
- California Code of Regulations Title 24 – the proposed Project will comply with the then-applicable Title 24 standards, thereby demonstrating a commitment to the energy efficient design, construction and operation of residential and non-residential structures.
- State Vehicle Standards – vehicles operating within the proposed Project will meet Pavley and LCFS standards to the extent required by law.
- Senate Bill 375 – the proposed Project is part of a master-planned community that provides a mix of uses serving the community, consistent with the general objectives of SB 375.
- County General Plan Policies: Policy COS-14.1 (Land Use Development), Policy COS-14.2 (Villages and Rural Villages), Policy COS-14.3 (Sustainable Development), Policy COS-14.5 (Building Siting and Orientation in Subdivisions), Policy COS-14.6 (Solar Access for Infill Developments), Policy COS-15.1 (Design and Construction of New Buildings), COS-15.4 (Title 24 Energy Standards), and COS-19.1 (Sustainable Water Supply – Sustainable Development Practices).

The project will be consistent with the County's General Plan policies that are designed to reduce GHG emissions and the Climate Action Plan through implementation of the measures identified

above. The project would therefore not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

The proposed project would therefore be consistent with the goals of AB 32, and would not result in a significant impact on GCC.

## 6.0 CONCLUSIONS

Emissions of GHGs would result in a net increase in emissions from construction and operations. As discussed in Section 5.0, emissions would result in less than 900 metric tons of $CO_2e$. Accordingly, the project would not result in a significant impact from GHG emissions.

The proposed Project is consistent with the applicable plans, policies, and regulations adopted for regulation of GHG emissions. Therefore, the Project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

The proposed Project would therefore not result in any direct impacts to the global climate, and cumulative impacts would be less than significant.

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## 8.0 LIST OF PREPARERS, PERSONS AND ORGANIZATIONS CONTACTED

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# Appendix A

# Greenhouse Gas Emission Calculations

# Shady Oak Residential Project

**San Diego Air Basin, Annual**

## 1.0 Project Characteristics

### 1.1 Land Usage

| Land Uses | Size | Metric | Lot Acreage | Floor Surface Area | Population |
|---|---|---|---|---|---|
| Single Family Housing | 47.00 | Dwelling Unit | 5.00 | 84,600.00 | 143 |

### 1.2 Other Project Characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Urbanization** | Rural | **Wind Speed (m/s)** | 2.6 | **Precipitation Freq (Days)** | 40 |
| **Climate Zone** | 13 | | | **Operational Year** | 2020 |
| **Utility Company** | San Diego Gas & Electric | | | | |
| **CO2 Intensity (lb/MWhr)** | 525.96 | **CH4 Intensity (lb/MWhr)** | 0.021 | **N2O Intensity (lb/MWhr)** | 0.004 |

### 1.3 User Entered Comments & Non-Default Data

Architectural Coating - Rule 67.0.1 coatings

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

| Table Name | Column Name | Default Value | New Value |
|---|---|---|---|
| tblArchitecturalCoating | EF_Parking | 250.00 | 0.00 |
| tblArchitecturalCoating | EF_Residential_Exterior | 250.00 | 100.00 |
| tblArchitecturalCoating | EF_Residential_Interior | 250.00 | 50.00 |
| tblAreaCoating | Area_EF_Parking | 250 | 0 |
| tblAreaCoating | Area_EF_Residential_Exterior | 250 | 100 |

| | | | |
|---|---|---|---|
| tblAreaCoating | Area_EF_Residential_Interior | 250 | 50 |
| tblConstDustMitigation | WaterUnpavedRoadVehicleSpeed | 40 | 15 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 3.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 2.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 2.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 2.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 6.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstEquipMitigation | Tier | No Change | Tier 3 |
| tblConstructionPhase | NumDays | 18.00 | 65.00 |
| tblConstructionPhase | NumDays | 230.00 | 344.00 |
| tblConstructionPhase | NumDays | 8.00 | 43.00 |
| tblConstructionPhase | NumDays | 18.00 | 25.00 |

| | | | |
|---|---|---|---|
| tblEnergyUse | T24E | 374.93 | 269.95 |
| tblEnergyUse | T24NG | 24,312.55 | 17,505.04 |
| tblFireplaces | FireplaceDayYear | 82.00 | 30.00 |
| tblFireplaces | NumberGas | 25.85 | 47.00 |
| tblFireplaces | NumberNoFireplace | 4.70 | 0.00 |
| tblFireplaces | NumberWood | 16.45 | 0.00 |
| tblGrading | AcresOfGrading | 86.00 | 5.00 |
| tblLandUse | LotAcreage | 15.26 | 5.00 |
| tblLandUse | Population | 134.00 | 143.00 |
| tblOffRoadEquipment | HorsePower | 231.00 | 226.00 |
| tblOffRoadEquipment | HorsePower | 158.00 | 162.00 |
| tblOffRoadEquipment | HorsePower | 187.00 | 174.00 |
| tblOffRoadEquipment | HorsePower | 130.00 | 125.00 |
| tblOffRoadEquipment | HorsePower | 132.00 | 130.00 |
| tblOffRoadEquipment | HorsePower | 247.00 | 255.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 1.00 | 2.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 1.00 | 4.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 1.00 | 2.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 3.00 | 2.00 |
| tblProjectCharacteristics | CH4IntensityFactor | 0.029 | 0.021 |
| tblProjectCharacteristics | CO2IntensityFactor | 720.49 | 525.96 |
| tblProjectCharacteristics | N2OIntensityFactor | 0.006 | 0.004 |
| tblProjectCharacteristics | OperationalYear | 2018 | 2020 |
| tblProjectCharacteristics | UrbanizationLevel | Urban | Rural |
| tblTripsAndVMT | VendorTripLength | 6.60 | 7.30 |
| tblTripsAndVMT | VendorTripLength | 6.60 | 7.30 |
| tblTripsAndVMT | VendorTripLength | 6.60 | 7.30 |
| tblTripsAndVMT | VendorTripLength | 6.60 | 7.30 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 5.00 |
| tblTripsAndVMT | WorkerTripLength | 16.80 | 10.80 |

| | | | |
|---|---|---|---|
| tblTripsAndVMT | WorkerTripLength | 16.80 | 10.80 |
| tblTripsAndVMT | WorkerTripLength | 16.80 | 10.80 |
| tblTripsAndVMT | WorkerTripLength | 16.80 | 10.80 |
| tblVehicleTrips | HW_TL | 16.80 | 13.82 |
| tblVehicleTrips | ST_TR | 9.91 | 10.00 |
| tblVehicleTrips | SU_TR | 8.62 | 10.00 |
| tblVehicleTrips | WD_TR | 9.52 | 10.00 |
| tblWoodstoves | NumberCatalytic | 2.35 | 0.00 |
| tblWoodstoves | NumberNoncatalytic | 2.35 | 0.00 |

## 2.0 Emissions Summary

### 2.1 Overall Construction

**Unmitigated Construction**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | tons/yr | | | | | | | | | | MT/yr | | | | | |
| 2017 | 0.3249 | 3.1073 | 2.1031 | 2.8900e-003 | 0.2750 | 0.1808 | 0.4557 | 0.1462 | 0.1678 | 0.3140 | 0.0000 | 263.9658 | 263.9658 | 0.0701 | 0.0000 | 265.7191 |
| 2018 | 0.7008 | 3.1837 | 2.4383 | 3.9600e-003 | 0.0228 | 0.2000 | 0.2228 | 6.1600e-003 | 0.1883 | 0.1945 | 0.0000 | 351.3052 | 351.3052 | 0.0782 | 0.0000 | 353.2593 |
| **Maximum** | **0.7008** | **3.1837** | **2.4383** | **3.9600e-003** | **0.2750** | **0.2000** | **0.4557** | **0.1462** | **0.1883** | **0.3140** | **0.0000** | **351.3052** | **351.3052** | **0.0782** | **0.0000** | **353.2593** |

**Mitigated Construction**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | tons/yr | | | | | | | | | | MT/yr | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | 0.1449 | 2.0111 | 2.0093 | 2.8900e-003 | 0.1154 | 0.1091 | 0.2245 | 0.0592 | 0.1055 | 0.1647 | 0.0000 | 263.9655 | 263.9655 | 0.0701 | 0.0000 | 265.7188 |
| 2018 | 0.4203 | 1.9202 | 2.4747 | 3.9600e-003 | 0.0228 | 0.1167 | 0.1395 | 6.1600e-003 | 0.1177 | 0.1238 | 0.0000 | 351.3048 | 351.3048 | 0.0782 | 0.0000 | 353.2589 |
| **Maximum** | **0.4203** | **2.0111** | **2.4747** | **3.9600e-003** | **0.1154** | **0.1167** | **0.2245** | **0.0592** | **0.1177** | **0.1647** | **0.0000** | **351.3048** | **351.3048** | **0.0782** | **0.0000** | **353.2589** |

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio-CO2 | Total CO2 | CH4 | N20 | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Percent Reduction** | **44.89** | **37.51** | **1.26** | **0.00** | **53.59** | **40.69** | **46.35** | **57.10** | **37.33** | **43.25** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

| Quarter | Start Date | End Date | Maximum Unmitigated ROG + NOX (tons/quarter) | Maximum Mitigated ROG + NOX (tons/quarter) |
|---|---|---|---|---|
| | | **Highest** | | |

## 2.2 Overall Operational

### Unmitigated Operational

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Area | 0.3755 | 0.0157 | 0.3551 | 9.0000e-005 | | 2.8700e-003 | 2.8700e-003 | | 2.8700e-003 | 2.8700e-003 | 0.0000 | 14.1138 | 14.1138 | 8.2000e-004 | 2.5000e-004 | 14.2082 |
| Energy | 5.5000e-003 | 0.0470 | 0.0200 | 3.0000e-004 | | 3.8000e-003 | 3.8000e-003 | | 3.8000e-003 | 3.8000e-003 | 0.0000 | 150.3613 | 150.3613 | 4.8700e-003 | 1.7300e-003 | 150.9978 |
| Mobile | 0.1654 | 0.7634 | 2.0895 | 6.9700e-003 | 0.5846 | 6.9800e-003 | 0.5916 | 0.1566 | 6.5500e-003 | 0.1631 | 0.0000 | 641.8737 | 641.8737 | 0.0342 | 0.0000 | 642.7295 |
| Waste | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 11.9014 | 0.0000 | 11.9014 | 0.7034 | 0.0000 | 29.4851 |
| Water | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.9715 | 14.6296 | 15.6011 | 0.1004 | 2.4700e-003 | 18.8456 |
| **Total** | **0.5465** | **0.8261** | **2.4646** | **7.3600e-003** | **0.5846** | **0.0137** | **0.5982** | **0.1566** | **0.0132** | **0.1698** | **12.8729** | **820.9784** | **833.8512** | **0.8436** | **4.4500e-003** | **856.2662** |

### Mitigated Operational

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Area | 0.3755 | 0.0157 | 0.3551 | 9.0000e-005 | | 2.8700e-003 | 2.8700e-003 | | 2.8700e-003 | 2.8700e-003 | 0.0000 | 14.1138 | 14.1138 | 8.2000e-004 | 2.5000e-004 | 14.2082 |
| Energy | 5.5000e-003 | 0.0470 | 0.0200 | 3.0000e-004 | | 3.8000e-003 | 3.8000e-003 | | 3.8000e-003 | 3.8000e-003 | 0.0000 | 150.3613 | 150.3613 | 4.8700e-003 | 1.7300e-003 | 150.9978 |
| Mobile | 0.1647 | 0.7584 | 2.0729 | 6.9100e-003 | 0.5787 | 6.9200e-003 | 0.5857 | 0.1550 | 6.4900e-003 | 0.1615 | 0.0000 | 635.7671 | 635.7671 | 0.0340 | 0.0000 | 636.6159 |
| Waste | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 9.5211 | 0.0000 | 9.5211 | 0.5627 | 0.0000 | 23.5881 |
| Water | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.7772 | 12.4150 | 13.1922 | 0.0803 | 1.9800e-003 | 15.7900 |
| **Total** | **0.5457** | **0.8211** | **2.4480** | **7.3000e-003** | **0.5787** | **0.0136** | **0.5923** | **0.1550** | **0.0132** | **0.1682** | **10.2983** | **812.6571** | **822.9554** | **0.6826** | **3.9600e-003** | **841.2000** |

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio-CO2 | Total CO2 | CH4 | N20 | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Percent Reduction** | **0.14** | **0.61** | **0.67** | **0.82** | **1.00** | **0.44** | **0.99** | **1.00** | **0.45** | **0.95** | **20.00** | **1.01** | **1.31** | **19.08** | **11.01** | **1.76** |

## 2.3 Vegetation

### Vegetation

| | CO2e |
|---|---|
| Category | MT |
| Vegetation Land Change | -22.4120 |
| **Total** | **-22.4120** |

# 3.0 Construction Detail

### Construction Phase

| Phase Number | Phase Name | Phase Type | Start Date | End Date | Num Days Week | Num Days | Phase Description |
|---|---|---|---|---|---|---|---|
| 1 | Grading | Grading | 6/1/2017 | 7/31/2017 | 5 | 43 | |
| 2 | Paving | Paving | 8/1/2017 | 9/4/2017 | 5 | 25 | |
| 3 | Building Construction | Building Construction | 9/5/2017 | 12/30/2018 | 5 | 344 | |
| 4 | Architectural Coating | Architectural Coating | 10/1/2018 | 12/28/2018 | 5 | 65 | |

**Acres of Grading (Site Preparation Phase): 0**

**Acres of Grading (Grading Phase): 5**

**Acres of Paving: 0**

**Residential Indoor: 171,315; Residential Outdoor: 57,105; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area:**

## OffRoad Equipment

| Phase Name | Offroad Equipment Type | Amount | Usage Hours | Horse Power | Load Factor |
|---|---|---|---|---|---|
| Grading | Excavators | 2 | 8.00 | 162 | 0.38 |
| Grading | Graders | 4 | 8.00 | 174 | 0.41 |
| Grading | Rubber Tired Dozers | 2 | 8.00 | 255 | 0.40 |
| Grading | Tractors/Loaders/Backhoes | 2 | 8.00 | 97 | 0.37 |
| Paving | Pavers | 2 | 8.00 | 125 | 0.42 |
| Paving | Paving Equipment | 2 | 8.00 | 130 | 0.36 |
| Paving | Rollers | 2 | 8.00 | 80 | 0.38 |
| Building Construction | Cranes | 1 | 7.00 | 226 | 0.29 |
| Building Construction | Forklifts | 3 | 8.00 | 89 | 0.20 |
| Building Construction | Generator Sets | 1 | 8.00 | 84 | 0.74 |
| Building Construction | Tractors/Loaders/Backhoes | 3 | 7.00 | 97 | 0.37 |
| Building Construction | Welders | 1 | 8.00 | 46 | 0.45 |
| Architectural Coating | Air Compressors | 1 | 6.00 | 78 | 0.48 |

## Trips and VMT

| Phase Name | Offroad Equipment Count | Worker Trip Number | Vendor Trip Number | Hauling Trip Number | Worker Trip Length | Vendor Trip Length | Hauling Trip Length | Worker Vehicle Class | Vendor Vehicle Class | Hauling Vehicle Class |
|---|---|---|---|---|---|---|---|---|---|---|
| Grading | 10 | 25.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Paving | 6 | 15.00 | 5.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Building Construction | 9 | 17.00 | 5.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Architectural Coating | 1 | 3.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |

## 3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

## 3.2 Grading - 2017

**Unmitigated Construction On-Site**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Fugitive Dust | | | | | 0.2616 | 0.0000 | 0.2616 | 0.1426 | 0.0000 | 0.1426 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.1623 | 1.7001 | 1.0936 | 1.2800e-003 | | 0.0913 | 0.0913 | | 0.0840 | 0.0840 | 0.0000 | 118.7720 | 118.7720 | 0.0364 | 0.0000 | 119.6818 |
| **Total** | **0.1623** | **1.7001** | **1.0936** | **1.2800e-003** | **0.2616** | **0.0913** | **0.3529** | **0.1426** | **0.0840** | **0.2266** | **0.0000** | **118.7720** | **118.7720** | **0.0364** | **0.0000** | **119.6818** |

**Unmitigated Construction Off-Site**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 2.5400e-003 | 2.0600e-003 | 0.0198 | 5.0000e-005 | 4.3100e-003 | 3.0000e-005 | 4.3400e-003 | 1.1500e-003 | 3.0000e-005 | 1.1800e-003 | 0.0000 | 4.2683 | 4.2683 | 1.6000e-004 | 0.0000 | 4.2724 |
| **Total** | **2.5400e-003** | **2.0600e-003** | **0.0198** | **5.0000e-005** | **4.3100e-003** | **3.0000e-005** | **4.3400e-003** | **1.1500e-003** | **3.0000e-005** | **1.1800e-003** | **0.0000** | **4.2683** | **4.2683** | **1.6000e-004** | **0.0000** | **4.2724** |

## Mitigated Construction On-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Fugitive Dust | | | | | 0.1020 | 0.0000 | 0.1020 | 0.0556 | 0.0000 | 0.0556 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.1067 | 1.2618 | 0.9866 | 1.2800e-003 | | 0.0657 | 0.0657 | | 0.0617 | 0.0617 | 0.0000 | 118.7719 | 118.7719 | 0.0364 | 0.0000 | 119.6817 |
| **Total** | **0.1067** | **1.2618** | **0.9866** | **1.2800e-003** | **0.1020** | **0.0657** | **0.1677** | **0.0556** | **0.0617** | **0.1173** | **0.0000** | **118.7719** | **118.7719** | **0.0364** | **0.0000** | **119.6817** |

## Mitigated Construction Off-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 2.5400e-003 | 2.0600e-003 | 0.0198 | 5.0000e-005 | 4.3100e-003 | 3.0000e-005 | 4.3400e-003 | 1.1500e-003 | 3.0000e-005 | 1.1800e-003 | 0.0000 | 4.2683 | 4.2683 | 1.6000e-004 | 0.0000 | 4.2724 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **2.5400e-003** | **2.0600e-003** | **0.0198** | **5.0000e-005** | **4.3100e-003** | **3.0000e-005** | **4.3400e-003** | **1.1500e-003** | **3.0000e-005** | **1.1800e-003** | **0.0000** | **4.2683** | **4.2683** | **1.6000e-004** | **0.0000** | **4.2724** |

## 3.3 Paving - 2017

### Unmitigated Construction On-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Off-Road | 0.0238 | 0.2537 | 0.1841 | 2.8000e-004 | | 0.0142 | 0.0142 | | 0.0131 | 0.0131 | 0.0000 | 25.8668 | 25.8668 | 7.9300e-003 | 0.0000 | 26.0649 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **0.0238** | **0.2537** | **0.1841** | **2.8000e-004** | | **0.0142** | **0.0142** | | **0.0131** | **0.0131** | **0.0000** | **25.8668** | **25.8668** | **7.9300e-003** | **0.0000** | **26.0649** |

### Unmitigated Construction Off-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 3.8000e-004 | 8.9500e-003 | 2.5400e-003 | 2.0000e-005 | 4.1000e-004 | 8.0000e-005 | 5.0000e-004 | 1.2000e-004 | 8.0000e-005 | 2.0000e-004 | 0.0000 | 1.6786 | 1.6786 | 1.4000e-004 | 0.0000 | 1.6822 |
| Worker | 8.9000e-004 | 7.2000e-004 | 6.8900e-003 | 2.0000e-005 | 1.5000e-003 | 1.0000e-005 | 1.5100e-003 | 4.0000e-004 | 1.0000e-005 | 4.1000e-004 | 0.0000 | 1.4890 | 1.4890 | 6.0000e-005 | 0.0000 | 1.4904 |
| **Total** | **1.2700e-003** | **9.6700e-003** | **9.4300e-003** | **4.0000e-005** | **1.9100e-003** | **9.0000e-005** | **2.0100e-003** | **5.2000e-004** | **9.0000e-005** | **6.1000e-004** | **0.0000** | **3.1675** | **3.1675** | **2.0000e-004** | **0.0000** | **3.1725** |

### Mitigated Construction On-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Off-Road | 6.8600e-003 | 0.1383 | 0.2116 | 2.8000e-004 | | 7.4800e-003 | 7.4800e-003 | | 7.4800e-003 | 7.4800e-003 | 0.0000 | 25.8667 | 25.8667 | 7.9300e-003 | 0.0000 | 26.0649 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **6.8600e-003** | **0.1383** | **0.2116** | **2.8000e-004** | | **7.4800e-003** | **7.4800e-003** | | **7.4800e-003** | **7.4800e-003** | **0.0000** | **25.8667** | **25.8667** | **7.9300e-003** | **0.0000** | **26.0649** |

**Mitigated Construction Off-Site**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 3.8000e-004 | 8.9500e-003 | 2.5400e-003 | 2.0000e-005 | 4.1000e-004 | 8.0000e-005 | 5.0000e-004 | 1.2000e-004 | 8.0000e-005 | 2.0000e-004 | 0.0000 | 1.6786 | 1.6786 | 1.4000e-004 | 0.0000 | 1.6822 |
| Worker | 8.9000e-004 | 7.2000e-004 | 6.8900e-003 | 2.0000e-005 | 1.5000e-003 | 1.0000e-005 | 1.5100e-003 | 4.0000e-004 | 1.0000e-005 | 4.1000e-004 | 0.0000 | 1.4890 | 1.4890 | 6.0000e-005 | 0.0000 | 1.4904 |
| **Total** | **1.2700e-003** | **9.6700e-003** | **9.4300e-003** | **4.0000e-005** | **1.9100e-003** | **9.0000e-005** | **2.0100e-003** | **5.2000e-004** | **9.0000e-005** | **6.1000e-004** | **0.0000** | **3.1675** | **3.1675** | **2.0000e-004** | **0.0000** | **3.1725** |

## 3.4 Building Construction - 2017

**Unmitigated Construction On-Site**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Off-Road | 0.1303 | 1.1090 | 0.7614 | 1.1300e-003 | | 0.0748 | 0.0748 | | 0.0703 | 0.0703 | 0.0000 | 100.5812 | 100.5812 | 0.0248 | 0.0000 | 101.2001 |
| **Total** | **0.1303** | **1.1090** | **0.7614** | **1.1300e-003** | | **0.0748** | **0.0748** | | **0.0703** | **0.0703** | **0.0000** | **100.5812** | **100.5812** | **0.0248** | **0.0000** | **101.2001** |

## Unmitigated Construction Off-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 1.2700e-003 | 0.0301 | 8.5500e-003 | 6.0000e-005 | 1.3900e-003 | 2.8000e-004 | 1.6700e-003 | 4.0000e-004 | 2.7000e-004 | 6.7000e-004 | 0.0000 | 5.6400 | 5.6400 | 4.9000e-004 | 0.0000 | 5.6521 |
| Worker | 3.3700e-003 | 2.7300e-003 | 0.0262 | 6.0000e-005 | 5.7300e-003 | 4.0000e-005 | 5.7700e-003 | 1.5200e-003 | 4.0000e-005 | 1.5600e-003 | 0.0000 | 5.6700 | 5.6700 | 2.1000e-004 | 0.0000 | 5.6753 |
| **Total** | **4.6400e-003** | **0.0328** | **0.0348** | **1.2000e-004** | **7.1200e-003** | **3.2000e-004** | **7.4400e-003** | **1.9200e-003** | **3.1000e-004** | **2.2300e-003** | **0.0000** | **11.3099** | **11.3099** | **7.0000e-004** | **0.0000** | **11.3274** |

## Mitigated Construction On-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Off-Road | 0.0229 | 0.5664 | 0.7471 | 1.1300e-003 | | 0.0355 | 0.0355 | | 0.0359 | 0.0359 | 0.0000 | 100.5811 | 100.5811 | 0.0248 | 0.0000 | 101.2000 |
| **Total** | **0.0229** | **0.5664** | **0.7471** | **1.1300e-003** | | **0.0355** | **0.0355** | | **0.0359** | **0.0359** | **0.0000** | **100.5811** | **100.5811** | **0.0248** | **0.0000** | **101.2000** |

**Mitigated Construction Off-Site**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 1.2700e-003 | 0.0301 | 8.5500e-003 | 6.0000e-005 | 1.3900e-003 | 2.8000e-004 | 1.6700e-003 | 4.0000e-004 | 2.7000e-004 | 6.7000e-004 | 0.0000 | 5.6400 | 5.6400 | 4.9000e-004 | 0.0000 | 5.6521 |
| Worker | 3.3700e-003 | 2.7300e-003 | 0.0262 | 6.0000e-005 | 5.7300e-003 | 4.0000e-005 | 5.7700e-003 | 1.5200e-003 | 4.0000e-005 | 1.5600e-003 | 0.0000 | 5.6700 | 5.6700 | 2.1000e-004 | 0.0000 | 5.6753 |
| **Total** | **4.6400e-003** | **0.0328** | **0.0348** | **1.2000e-004** | **7.1200e-003** | **3.2000e-004** | **7.4400e-003** | **1.9200e-003** | **3.1000e-004** | **2.2300e-003** | **0.0000** | **11.3099** | **11.3099** | **7.0000e-004** | **0.0000** | **11.3274** |

## 3.4 Building Construction - 2018

**Unmitigated Construction On-Site**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Off-Road | 0.3469 | 3.0239 | 2.2793 | 3.4800e-003 | | 0.1943 | 0.1943 | | 0.1826 | 0.1826 | 0.0000 | 307.8006 | 307.8006 | 0.0753 | 0.0000 | 309.6837 |
| **Total** | **0.3469** | **3.0239** | **2.2793** | **3.4800e-003** | | **0.1943** | **0.1943** | | **0.1826** | **0.1826** | **0.0000** | **307.8006** | **307.8006** | **0.0753** | **0.0000** | **309.6837** |

**Unmitigated Construction Off-Site**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 3.4100e-003 | 0.0868 | 0.0239 | 1.8000e-004 | 4.3100e-003 | 6.7000e-004 | 4.9900e-003 | 1.2500e-003 | 6.5000e-004 | 1.8900e-003 | 0.0000 | 17.3978 | 17.3978 | 1.4300e-003 | 0.0000 | 17.4337 |
| Worker | 9.4500e-003 | 7.4800e-003 | 0.0717 | 1.9000e-004 | 0.0177 | 1.3000e-004 | 0.0179 | 4.7100e-003 | 1.2000e-004 | 4.8300e-003 | 0.0000 | 17.0562 | 17.0562 | 5.9000e-004 | 0.0000 | 17.0710 |
| **Total** | **0.0129** | **0.0943** | **0.0956** | **3.7000e-004** | **0.0220** | **8.0000e-004** | **0.0228** | **5.9600e-003** | **7.7000e-004** | **6.7200e-003** | **0.0000** | **34.4541** | **34.4541** | **2.0200e-003** | **0.0000** | **34.5046** |

## Mitigated Construction On-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Off-Road | 0.0743 | 1.7815 | 2.3164 | 3.4800e-003 | | 0.1128 | 0.1128 | | 0.1138 | 0.1138 | 0.0000 | 307.8002 | 307.8002 | 0.0753 | 0.0000 | 309.6833 |
| **Total** | **0.0743** | **1.7815** | **2.3164** | **3.4800e-003** | | **0.1128** | **0.1128** | | **0.1138** | **0.1138** | **0.0000** | **307.8002** | **307.8002** | **0.0753** | **0.0000** | **309.6833** |

## Mitigated Construction Off-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 3.4100e-003 | 0.0868 | 0.0239 | 1.8000e-004 | 4.3100e-003 | 6.7000e-004 | 4.9900e-003 | 1.2500e-003 | 6.5000e-004 | 1.8900e-003 | 0.0000 | 17.3978 | 17.3978 | 1.4300e-003 | 0.0000 | 17.4337 |
| Worker | 9.4500e-003 | 7.4800e-003 | 0.0717 | 1.9000e-004 | 0.0177 | 1.3000e-004 | 0.0179 | 4.7100e-003 | 1.2000e-004 | 4.8300e-003 | 0.0000 | 17.0562 | 17.0562 | 5.9000e-004 | 0.0000 | 17.0710 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **0.0129** | **0.0943** | **0.0956** | **3.7000e-004** | **0.0220** | **8.0000e-004** | **0.0228** | **5.9600e-003** | **7.7000e-004** | **6.7200e-003** | **0.0000** | **34.4541** | **34.4541** | **2.0200e-003** | **0.0000** | **34.5046** |

## 3.5 Architectural Coating - 2018

### Unmitigated Construction On-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Archit. Coating | 0.3309 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 9.7100e-003 | 0.0652 | 0.0603 | 1.0000e-004 | | 4.8900e-003 | 4.8900e-003 | | 4.8900e-003 | 4.8900e-003 | 0.0000 | 8.2981 | 8.2981 | 7.9000e-004 | 0.0000 | 8.3178 |
| **Total** | **0.3406** | **0.0652** | **0.0603** | **1.0000e-004** | | **4.8900e-003** | **4.8900e-003** | | **4.8900e-003** | **4.8900e-003** | **0.0000** | **8.2981** | **8.2981** | **7.9000e-004** | **0.0000** | **8.3178** |

### Unmitigated Construction Off-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 4.2000e-004 | 3.3000e-004 | 3.1600e-003 | 1.0000e-005 | 7.8000e-004 | 1.0000e-005 | 7.9000e-004 | 2.1000e-004 | 1.0000e-005 | 2.1000e-004 | 0.0000 | 0.7525 | 0.7525 | 3.0000e-005 | 0.0000 | 0.7531 |
| **Total** | **4.2000e-004** | **3.3000e-004** | **3.1600e-003** | **1.0000e-005** | **7.8000e-004** | **1.0000e-005** | **7.9000e-004** | **2.1000e-004** | **1.0000e-005** | **2.1000e-004** | **0.0000** | **0.7525** | **0.7525** | **3.0000e-005** | **0.0000** | **0.7531** |

### Mitigated Construction On-Site

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Archit. Coating | 0.3309 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 1.9300e-003 | 0.0441 | 0.0596 | 1.0000e-004 | | 3.0900e-003 | 3.0900e-003 | | 3.0900e-003 | 3.0900e-003 | 0.0000 | 8.2981 | 8.2981 | 7.9000e-004 | 0.0000 | 8.3178 |
| **Total** | **0.3328** | **0.0441** | **0.0596** | **1.0000e-004** | | **3.0900e-003** | **3.0900e-003** | | **3.0900e-003** | **3.0900e-003** | **0.0000** | **8.2981** | **8.2981** | **7.9000e-004** | **0.0000** | **8.3178** |

**Mitigated Construction Off-Site**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 4.2000e-004 | 3.3000e-004 | 3.1600e-003 | 1.0000e-005 | 7.8000e-004 | 1.0000e-005 | 7.9000e-004 | 2.1000e-004 | 1.0000e-005 | 2.1000e-004 | 0.0000 | 0.7525 | 0.7525 | 3.0000e-005 | 0.0000 | 0.7531 |
| **Total** | **4.2000e-004** | **3.3000e-004** | **3.1600e-003** | **1.0000e-005** | **7.8000e-004** | **1.0000e-005** | **7.9000e-004** | **2.1000e-004** | **1.0000e-005** | **2.1000e-004** | **0.0000** | **0.7525** | **0.7525** | **3.0000e-005** | **0.0000** | **0.7531** |

# 4.0 Operational Detail - Mobile

## 4.1 Mitigation Measures Mobile

Improve Pedestrian Network

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Mitigated | 0.1647 | 0.7584 | 2.0729 | 6.9100e-003 | 0.5787 | 6.9200e-003 | 0.5857 | 0.1550 | 6.4900e-003 | 0.1615 | 0.0000 | 635.7671 | 635.7671 | 0.0340 | 0.0000 | 636.6159 |
| Unmitigated | 0.1654 | 0.7634 | 2.0895 | 6.9700e-003 | 0.5846 | 6.9800e-003 | 0.5916 | 0.1566 | 6.5500e-003 | 0.1631 | 0.0000 | 641.8737 | 641.8737 | 0.0342 | 0.0000 | 642.7295 |

### 4.2 Trip Summary Information

| | Average Daily Trip Rate | | | Unmitigated | Mitigated |
|---|---|---|---|---|---|
| Land Use | Weekday | Saturday | Sunday | Annual VMT | Annual VMT |
| Single Family Housing | 470.00 | 470.00 | 470.00 | 1,551,086 | 1,535,575 |
| Total | 470.00 | 470.00 | 470.00 | 1,551,086 | 1,535,575 |

### 4.3 Trip Type Information

| | Miles | | | Trip % | | | Trip Purpose % | | |
|---|---|---|---|---|---|---|---|---|---|
| Land Use | H-W or C-W | H-S or C-C | H-O or C-NW | H-W or C-W | H-S or C-C | H-O or C-NW | Primary | Diverted | Pass-by |
| Single Family Housing | 13.82 | 7.10 | 7.90 | 41.60 | 18.80 | 39.60 | 86 | 11 | 3 |

### 4.4 Fleet Mix

| Land Use | LDA | LDT1 | LDT2 | MDV | LHD1 | LHD2 | MHD | HHD | OBUS | UBUS | MCY | SBUS | MH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single Family Housing | 0.588316 | 0.042913 | 0.184449 | 0.110793 | 0.017294 | 0.005558 | 0.015534 | 0.023021 | 0.001902 | 0.002024 | 0.006181 | 0.000745 | 0.001271 |

## 5.0 Energy Detail

Historical Energy Use: N

### 5.1 Mitigation Measures Energy

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Electricity Mitigated | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 95.9731 | 95.9731 | 3.8300e-003 | 7.3000e-004 | 96.2864 |
| Electricity Unmitigated | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 95.9731 | 95.9731 | 3.8300e-003 | 7.3000e-004 | 96.2864 |
| NaturalGas Mitigated | 5.5000e-003 | 0.0470 | 0.0200 | 3.0000e-004 | | 3.8000e-003 | 3.8000e-003 | | 3.8000e-003 | 3.8000e-003 | 0.0000 | 54.3882 | 54.3882 | 1.0400e-003 | 1.0000e-003 | 54.7114 |
| NaturalGas Unmitigated | 5.5000e-003 | 0.0470 | 0.0200 | 3.0000e-004 | | 3.8000e-003 | 3.8000e-003 | | 3.8000e-003 | 3.8000e-003 | 0.0000 | 54.3882 | 54.3882 | 1.0400e-003 | 1.0000e-003 | 54.7114 |

## 5.2 Energy by Land Use - NaturalGas

### Unmitigated

| | NaturalGas Use | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Land Use | kBTU/yr | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Single Family Housing | 1.0192e+006 | 5.5000e-003 | 0.0470 | 0.0200 | 3.0000e-004 | | 3.8000e-003 | 3.8000e-003 | | 3.8000e-003 | 3.8000e-003 | 0.0000 | 54.3882 | 54.3882 | 1.0400e-003 | 1.0000e-003 | 54.7114 |
| **Total** | | **5.5000e-003** | **0.0470** | **0.0200** | **3.0000e-004** | | **3.8000e-003** | **3.8000e-003** | | **3.8000e-003** | **3.8000e-003** | **0.0000** | **54.3882** | **54.3882** | **1.0400e-003** | **1.0000e-003** | **54.7114** |

### Mitigated

| | NaturalGas Use | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Land Use | kBTU/yr | tons/yr | | | | | | | | | | MT/yr | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single Family Housing | 1.0192e+006 | 5.5000e-003 | 0.0470 | 0.0200 | 3.0000e-004 | | 3.8000e-003 | 3.8000e-003 | | 3.8000e-003 | 3.8000e-003 | 0.0000 | 54.3882 | 54.3882 | 1.0400e-003 | 1.0000e-003 | 54.7114 |
| **Total** | | **5.5000e-003** | **0.0470** | **0.0200** | **3.0000e-004** | | **3.8000e-003** | **3.8000e-003** | | **3.8000e-003** | **3.8000e-003** | **0.0000** | **54.3882** | **54.3882** | **1.0400e-003** | **1.0000e-003** | **54.7114** |

## 5.3 Energy by Land Use - Electricity

### Unmitigated

| | Electricity Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | kWh/yr | MT/yr | | | |
| Single Family Housing | 402282 | 95.9731 | 3.8300e-003 | 7.3000e-004 | 96.2864 |
| **Total** | | **95.9731** | **3.8300e-003** | **7.3000e-004** | **96.2864** |

### Mitigated

| | Electricity Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | kWh/yr | MT/yr | | | |
| Single Family Housing | 402282 | 95.9731 | 3.8300e-003 | 7.3000e-004 | 96.2864 |
| **Total** | | **95.9731** | **3.8300e-003** | **7.3000e-004** | **96.2864** |

## 6.0 Area Detail

### 6.1 Mitigation Measures Area

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Mitigated | 0.3755 | 0.0157 | 0.3551 | 9.0000e-005 | | 2.8700e-003 | 2.8700e-003 | | 2.8700e-003 | 2.8700e-003 | 0.0000 | 14.1138 | 14.1138 | 8.2000e-004 | 2.5000e-004 | 14.2082 |
| Unmitigated | 0.3755 | 0.0157 | 0.3551 | 9.0000e-005 | | 2.8700e-003 | 2.8700e-003 | | 2.8700e-003 | 2.8700e-003 | 0.0000 | 14.1138 | 14.1138 | 8.2000e-004 | 2.5000e-004 | 14.2082 |

### 6.2 Area by SubCategory

**Unmitigated**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SubCategory | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Architectural Coating | 0.0331 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Consumer Products | 0.3304 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Hearth | 1.3700e-003 | 0.0117 | 4.9800e-003 | 7.0000e-005 | | 9.5000e-004 | 9.5000e-004 | | 9.5000e-004 | 9.5000e-004 | 0.0000 | 13.5437 | 13.5437 | 2.6000e-004 | 2.5000e-004 | 13.6242 |
| Landscaping | 0.0107 | 4.0500e-003 | 0.3501 | 2.0000e-005 | | 1.9300e-003 | 1.9300e-003 | | 1.9300e-003 | 1.9300e-003 | 0.0000 | 0.5701 | 0.5701 | 5.6000e-004 | 0.0000 | 0.5840 |
| **Total** | **0.3755** | **0.0157** | **0.3551** | **9.0000e-005** | | **2.8800e-003** | **2.8800e-003** | | **2.8800e-003** | **2.8800e-003** | **0.0000** | **14.1138** | **14.1138** | **8.2000e-004** | **2.5000e-004** | **14.2082** |

**Mitigated**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SubCategory | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Architectural Coating | 0.0331 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Consumer Products | 0.3304 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Hearth | 1.3700e-003 | 0.0117 | 4.9800e-003 | 7.0000e-005 | | 9.5000e-004 | 9.5000e-004 | | 9.5000e-004 | 9.5000e-004 | 0.0000 | 13.5437 | 13.5437 | 2.6000e-004 | 2.5000e-004 | 13.6242 |
| Landscaping | 0.0107 | 4.0500e-003 | 0.3501 | 2.0000e-005 | | 1.9300e-003 | 1.9300e-003 | | 1.9300e-003 | 1.9300e-003 | 0.0000 | 0.5701 | 0.5701 | 5.6000e-004 | 0.0000 | 0.5840 |
| **Total** | **0.3755** | **0.0157** | **0.3551** | **9.0000e-005** | | **2.8800e-003** | **2.8800e-003** | | **2.8800e-003** | **2.8800e-003** | **0.0000** | **14.1138** | **14.1138** | **8.2000e-004** | **2.5000e-004** | **14.2082** |

## 7.0 Water Detail

### 7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

| | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|
| Category | MT/yr | | | |
| Mitigated | 13.1922 | 0.0803 | 1.9800e-003 | 15.7900 |

| | | | | |
|---|---|---|---|---|
| Unmitigated | 15.6011 | 0.1004 | 2.4700e-003 | 18.8456 |

## 7.2 Water by Land Use

**Unmitigated**

| | Indoor/Outdoor Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | Mgal | MT/yr | | | |
| Single Family Housing | 3.06224 / 1.93054 | 15.6011 | 0.1004 | 2.4700e-003 | 18.8456 |
| **Total** | | **15.6011** | **0.1004** | **2.4700e-003** | **18.8456** |

**Mitigated**

| | Indoor/Outdoor Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | Mgal | MT/yr | | | |
| Single Family Housing | 2.44979 / 1.81278 | 13.1922 | 0.0803 | 1.9800e-003 | 15.7900 |
| **Total** | | **13.1922** | **0.0803** | **1.9800e-003** | **15.7900** |

# 8.0 Waste Detail

## 8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

**Category/Year**

| | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|
| | MT/yr | | | |
| Mitigated | 9.5211 | 0.5627 | 0.0000 | 23.5881 |
| Unmitigated | 11.9014 | 0.7034 | 0.0000 | 29.4851 |

## 8.2 Waste by Land Use

**Unmitigated**

| | Waste Disposed | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | tons | MT/yr | | | |
| Single Family Housing | 58.63 | 11.9014 | 0.7034 | 0.0000 | 29.4851 |
| **Total** | | **11.9014** | **0.7034** | **0.0000** | **29.4851** |

**Mitigated**

| | Waste Disposed | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|

| Land Use | tons | MT/yr | | | |
|---|---|---|---|---|---|
| Single Family Housing | 46.904 | 9.5211 | 0.5627 | 0.0000 | 23.5881 |
| **Total** | | **9.5211** | **0.5627** | **0.0000** | **23.5881** |

## 9.0 Operational Offroad

| Equipment Type | Number | Hours/Day | Days/Year | Horse Power | Load Factor | Fuel Type |
|---|---|---|---|---|---|---|

## 10.0 Stationary Equipment

### Fire Pumps and Emergency Generators

| Equipment Type | Number | Hours/Day | Hours/Year | Horse Power | Load Factor | Fuel Type |
|---|---|---|---|---|---|---|

### Boilers

| Equipment Type | Number | Heat Input/Day | Heat Input/Year | Boiler Rating | Fuel Type |
|---|---|---|---|---|---|

### User Defined Equipment

| Equipment Type | Number |
|---|---|

## 11.0 Vegetation

| | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|
| Category | MT | | | |
| Unmitigated | -22.4120 | 0.0000 | 0.0000 | -22.4120 |

## 11.1 Vegetation Land Change

### Vegetation Type

| | Initial/Final | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| | Acres | MT | | | |
| Grassland | 5.2 / 0 | -22.4120 | 0.0000 | 0.0000 | -22.4120 |
| **Total** | | **-22.4120** | **0.0000** | **0.0000** | **-22.4120** |