# Global Climate Change Evaluation

**for the**

# College Avenue Apartments Project

*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 |
| CalEEMod | California Emissions Estimator Model |
| CAPCOA | California Air Pollution Control Officers Association |
| CCAP | Center for Clean Air Policy |
| CCAR | California Climate Action Registry |
| CEC | California Energy Commission |
| CEQA | California Environmental Quality Act |
| $CH_4$ | Methane |
| $CO_2$ | Carbon Dioxide |
| $CO_2e$ | Carbon Dioxide Equivalent |
| DWR | Department of Water Resources |
| EPA | U.S. Environmental Protection Agency |
| GCC | Global Climate Change |
| GHG | Greenhouse Gas |
| 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 |
| OPR | State Office of Planning and Research |
| PFCs | Perfluorocarbons |
| RPS | Renewable Portfolio Standards |
| SB | Senate Bill |
| SDCGHGI | San Diego County Greenhouse Gas Inventory |
| UNFCCC | United Nations Framework Convention on Climate Change |
| USBGC | U.S. Green Building Council |
| VMT | Vehicle Miles Traveled |

## 1.0 INTRODUCTION

This report presents an assessment of potential greenhouse gas impacts associated with the College Avenue Apartments Project located at 5030 College Avenue in the City of San Diego. The project site is located in the College area near San Diego State University. The project site is currently undeveloped.

The proposed project would consist of two, five-story buildings, with two levels of underground parking. The proposed project would consist of two, five-story buildings, with two levels of underground parking. A total of 95 residential apartments would be provided as one-, two-, three-, and four-bedroom suites for student housing. The project would provide one one-bedroom suite with one bed, five two-bedroom suites (two beds per suite), 39 three-bedroom suites (four beds per suite), and 50 four-bedroom suites (four beds per suite), for a total capacity of 367 beds. Construction of the project will take approximately 14 months. A total of 238 parking spaces would be provided. Construction will take place as a single phase and is estimated to begin May 2015.

This greenhouse gas (GHG) analysis includes an evaluation of existing conditions in the project vicinity, an assessment of potential greenhouse gas emissions associated with project construction and operations, and project design features and other regulatory actions that will reduce greenhouse gas emissions.

### 1.1 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. 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. 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.

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, much like a greenhouse. GHGs are emitted by both natural processes and human activities. 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. For example, data from ice cores indicate that $CO_2$ concentrations remained steady prior to the current period for approximately 10,000 years; however, concentrations of $CO_2$ have increased in the atmosphere since the industrial revolution.

GCC and GHGs have been at the center of a widely contested political, economic, and scientific debate. Although the conceptual existence of GCC is generally accepted, the extent to which GHGs generally and anthropogenic-induced GHGs (mainly $CO_2$, $CH_4$ and $N_2O$) contribute to it remains a source of debate. The State of California has been at the forefront of developing solutions to address 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), sulfur hexafluoride ($SF_6$), and nitrogen trifluoride ($NF_3$) (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.

## 1.2 Sources and Global Warming Potentials of GHG

Anthropogenic sources of $CO_2$ include combustion of fossil fuels (coal, oil, natural gas, gasoline and wood). $CH_4$ is the main component of natural gas and also arises naturally from anaerobic decay of organic matter. Accordingly, anthropogenic sources of $CH_4$ include landfills, fermentation of manure and cattle farming. Anthropogenic 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.

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. Table 1 presents the GWP and atmospheric lifetimes of common GHGs. In order to account for each GHG's respective GWP, 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).

**Table 1**
**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

The California Air Resources Board (ARB) compiled a statewide inventory of anthropogenic GHG emissions and sinks that includes estimates for $CO_2$, $CH_4$, $N_2O$, $SF_6$, HFCs, and PFCs. The current inventory covers the years 1990 to 2012, and is summarized in Table 2. Data sources used to calculate this GHG inventory include California and federal agencies, international organizations, and industry associations. The calculation methodologies are consistent with guidance from the 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 2**
**State of California GHG Emissions by Sector**

| Sector | Total 1990 Emissions ($MMTCO_2e$) | Percent of Total 1990 Emissions | Total 2012 Emissions ($MMTCO_2e$) | Percent of Total 2012 Emissions |
|---|---|---|---|---|
| Agriculture | 23.4 | 5% | 37.86 | 8% |
| Commercial | 14.4 | 3% | 14.20 | 3% |
| Electricity Generation | 110.6 | 26% | 95.09 | 21% |
| Forestry (excluding sinks) | 0.2 | <1% | | |
| Industrial | 103.0 | 24% | 89.16 | 19% |
| Residential | 29.7 | 7% | 28.09 | 6% |
| Transportation | 150.7 | 35% | 167.38 | 36% |
| Recycling and Waste | | | 8.49 | 2% |
| High GWP Gases | | | 18.41 | 4% |
| Forestry Sinks | (6.7) | | | |

In addition to the statewide GHG inventory prepared by the ARB, a GHG inventory was prepared by the University of San Diego School of Law Energy Policy Initiative Center (EPIC) for the San Diego region (University of San Diego 2008). The San Diego County Greenhouse Gas Inventory (SDCGHGI) takes into account the unique characteristics of the region when estimating emissions, and estimated emissions for years 1990, 2006, and 2020. Based on this inventory and the emission projections for the region, EPIC found that GHG emissions must be reduced by 33 percent below business as usual conditions for year 2020 in order for San Diego

County to return to 1990 emission levels. "Business as usual" is defined as the emissions that would occur without any greenhouse gas reduction measures[1]. For example, construction of buildings using 2005 Title 24 building standards, and not subsequently enacted more rigorous standards, would create "business as usual" emissions.

Areas where feasible reductions could 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 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. The SDCGHGI states that emission reductions from 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 for land use development. The SDCGHGI also indicates that emission reductions

[1] As defined in the California Air Resources Board's *Climate Change Proposed Scoping Plan*, October 2008, page 11.

from electricity generation will be achieved in a variety of ways, including through a 10 percent reduction in electricity consumption, 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. Many of these measures are also outside the control of project applicants.

In its Draft Climate Action Plan (City of San Diego 2014), the City identified the 2010 baseline for GHG emissions of 12,851,000 MT CO2e. Based on the community-wide emissions inventory, 55% of the baseline emissions are attributable to transportation, 23% are attributable to electricity use, 17% are attributable to natural gas use, and 5% are attributable to solid waste and wastewater handling and treatment.

## 1.3 Regulatory Framework

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

### 1.3.1 National and International Efforts

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. 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 global climate change. The U.S. Supreme Court rules in *Massachusetts v. Environmental Protection Agency*, 549 U.S. 497 (2007), that USEPA has 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.

On December 7, 2009, the USEPA Administrator signed two distinct findings regarding GHGs under section 202(a) of the federal CAA:

> **Endangerment Finding:** USEPA found that the current and projected concentrations of the six key well-mixed GHGs ($CO_2$, $CH_4$, $N_2O$, HFCs, PFCs, and $SF_6$) in the atmosphere threaten the public health and welfare of current and future generations.
>
> **Cause or Contribute Finding:** USEPA found that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution which threatens public health and welfare.

These findings do not themselves impose any requirements on industry or other entities. However, this action was 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 and adopted on April 1, 2010. As finalized in April 2010, the emissions standards rule for vehicles will improve average fuel economy standards to 35.5 miles per gallon by 2016. In addition, the rule will require model year 2016 vehicles to meet an estimated combined average emission level of 250 grams of carbon dioxide per mile.

**Mandatory GHG Reporting Rule.** On March 10, 2009, in response to the FY2008 Consolidated Appropriations Act (H.R. 2764; Public Law 110–161), the 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.

The 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).

### 1.3.2 State Regulations and Standards

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

**Assembly Bill 32, the California Global Warming Solutions Act of 2006.** In September 2006, Governor Schwarzenegger signed AB 32 into law. AB 32 directed 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, the 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. The ARB adopted its Scoping Plan in December 2008 (ARB 2008a), which provided estimates of the 1990 GHG emissions level and identified sectors for the reduction of GHG emissions. The ARB estimated that the 1990 GHG emissions level was 427 MMT net $CO_2e$ (ARB 2007). The ARB estimates that a reduction of 173 MMT net $CO_2e$ emissions below business-as-usual would be required by 2020 to meet the 1990 levels. This amounts to roughly a 28.35 percent reduction from projected business-as-usual levels in 2020. In 2011, the ARB developed a supplement to the AB 32 Scoping Plan (ARB 2011). The Supplement updated the emissions inventory based on current projections for "business as usual" emissions to 506.8 metric tons of $CO_2e$. The updated projection included adopted measures (Pavley 1 fuel efficiency standards, 20% Renewable Portfolio Standard requirement), and estimated that an additional 16 percent reduction below the estimated "business as usual" levels would be necessary to return to 1990 levels by 2020.

In 2014, the ARB published its First Update to the Climate Change Scoping Plan (ARB 2014). The Update indicates that the State is on target to meet the goal of reducing GHG emissions to 1990 level by 2020. The First Update tracks progress in achieving the goals of AB 32, and lays out a new set of actions that will move the State further along the path to achieving the 2050 goal of reducing emissions to 80% below 1990 levels. While the Update discusses setting a mid-term target, the plan does not yet set a quantifiable target toward meeting the 2050 goal.

**Senate Bill 97.** Senate Bill (SB) 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. SB 97 directed the Governor's Office of Planning and Research (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 directed the California Natural Resources Agency (CNRA) to certify and adopt the CEQA guidelines by January 1, 2010.

OPR published a technical advisory on CEQA and climate change on June 19, 2008. The guidance did not include a suggested threshold, but stated that the OPR had asked the ARB to "recommend a method for setting thresholds which will encourage consistency and uniformity in the CEQA analysis of greenhouse gas emissions throughout the state." The OPR technical advisory does recommend that CEQA analyses include the following components:

- Identification of greenhouse gas emissions;
- Determination of significance; and
- Mitigation of impacts, as needed and as feasible.

On December 31, 2009, the CNRA adopted the proposed amendments to the State CEQA Guidelines. These amendments became effective 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 below 1990 levels 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. 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.

**California Code of Regulations Title 24.** Although not originally intended to reduce greenhouse gas emissions, Title 24 of the California Code of Regulations, 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 for the consideration and possible incorporation of new energy efficiency technologies and methods. 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.

The GHG emission inventory was based on Title 24 standards as of October 2005; however, Title 24 has been updated as of 2008 and 2013. The 2013 standards require buildings to be 15% more energy-efficient than 2008 standards.

**Senate Bill 1078, Senate Bill 107, and Executive Order S-14-08.** SB 1078 initially set a target of 20% of energy to be sold from renewable sources by the year 2017. The schedule for implementation of the RPS was accelerated in 2006 with the Governor's signing of SB 107, which accelerated the 20% RPS goal from 2017 to 2010. On November 17, 2008, the Governor signed Executive Order S-14-08, which requires all retail sellers of electricity to serve 33 percent

of their load with renewable energy by 2020. The Governor signed Executive Order S-21-09 on September 15, 2009, which directed ARB to implement a regulation consistent with the 2020 33% renewable energy target by July 31, 2010. The 33% RPS was adopted in 2010.

**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 up to 21 percent by 2020[2].

The ARB has adopted amendments to the Pavley regulations that reduce GHG emissions in new passenger vehicles from 2009 through 2016. The amendments, approved by the ARB 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, and prepare California to harmonize its rules with the federal rules for passenger vehicles.

**Executive Order S-01-07.** Executive Order S-01-07 was enacted by the Governor on January 18, 2007, and mandates that: 1) a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020; and 2) a Low Carbon Fuel Standard ("LCFS") for transportation fuels be established for California. According to the SDCGHGI, the effects of the LCFS would be a 10% reduction in GHG emissions from fuel use by 2020[3]. On April 23, 2009, the ARB adopted regulations to implement the LCFS.

**Senate Bill 375.** SB 375 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

[2] SDCGHGI, An Analysis of Regional Emissions and Strategies to Achieve AB 32 Targets, On-Road Transportation Report. Sean Tanaka, Tanaka Research and Consulting, September 2008, Page 7.
[3] SDCGHGI, An Analysis of Regional Emissions and Strategies to Achieve AB 32 Targets, On-Road Transportation Report. Sean Tanaka, Tanaka Research and Consulting, September 2008, Page 7.

transportation. Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32." Therefore, SB 375 requires that regions with metropolitan planning organizations adopt sustainable communities strategies, as part of their regional transportation plans, which are designed to achieve certain goals for the reduction of GHG emissions from mobile sources.

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

### 1.3.3 Local Regulations and Standards

The City of San Diego adopted a Climate Protection Action Plan (City of San Diego 2005) that identified early goals for the reduction of GHG emissions for City facilities. The plan did not address City development, but rather focused on how the City itself could reduce emissions through implementing policies such as recycling, energy efficiency and alternative energy programs, and transportation programs.

In February 2014 the City of San Diego released its Draft Climate Action Plan (CAP) to the public for review and comment. The CAP established a baseline for 2010, sets goals for GHG reductions for the milestone years 2020 and 2035, and details the implementation actions and phasing for achieving the goals. To implement the state's goals of reducing emissions to 15% below 2010 levels by 2020, and 49% below 2010 levels by 2035, the City would be required to implement strategies that would reduce emissions to approximately 10.6 MMT CO2e by 2020 and to 6.4 MMT CO2e by 2035. The CAP determined that, with implementation of the measures identified therein, the City would exceed the state's targets for 2020 and 2035.

The City of San Diego has adopted policies in their Conservation Element (City of San Diego 2008) that address state and federal efforts to reduce GHG emissions. The policies that are applicable to the project include the following:

Policy CE-A.5 Employ sustainable or "green" building techniques for the construction and operation of buildings.

(a) Develop and implement sustainable building standards for new and significant remodels of residential and commercial buildings to maximize energy efficiency, and to achieve overall net zero energy consumption by 2020 for new residential buildings and2030 for new commercial buildings. This can be accomplished through factors including, but not limited to:

- Designing mechanical and electrical systems that achieve greater energy efficiency with currently available technology;
- Minimizing energy use through innovative site design and building orientation that addresses factors such as sun-shade patterns, prevailing winds, landscape, and sun-screens;
- Employing self generation of energy using renewable technologies;
- Combining energy efficient measures that have longer payback periods with measures that have shorter payback periods;
- Reducing levels of non-essential lighting, heating and cooling; and
- Using energy efficient appliances and lighting.

(b) Provide technical services for "green" buildings in partnership with other agencies and organizations.

Policy CE-A-7 Construct and operate buildings using materials, methods, and mechanical and electrical systems that ensure a healthful indoor air quality. Avoid contamination by carcinogens, volatile organic compounds, fungi, molds, bacteria, and other known toxins.

(a) Eliminate the use of chlorofluorocarbon-based refrigerants in newly constructed facilities and major building renovations and retrofits for all heating, ventilation, air conditioning, and refrigerant-based building systems.

(b) Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to protect installers and occupants' health and comfort. Where feasible, select low-emitting adhesives, paints, coatings, carpet systems, composite wood, agri-fiber products, and others.

Policy CE-A.8 Reduce construction and demolition waste in accordance with Public Facilities Element, Policy PF-I.2, or be renovating or adding on to existing buildings, rather than constructing new buildings.

Policy CE-A.9 Reuse building materials, use materials that have recycled content, or use materials that are derived from sustainable or rapidly renewable sources to the extent possible, through factors including:

- Scheduling time for deconstruction and recycling activities to take place during project demolition and construction phases;
- Using life cycle costing in decision making for materials and construction techniques. Life cycle costing analyzes the costs and benefits over the life of a particular product, technology, or system;
- Removing code obstacles to using recycled materials and for construction; and
- Implementing effective economic incentives to recycle construction and demolition debris.

Policy CE-A.10 Include features in buildings to facilitate recycling of waste generated by building occupants and associated refuse storage areas.

- Provide permanent, adequate, and convenient space for individual building occupants to collect refuse and recyclable material.
- Provide a recyclables collection area that serves the entire building or project. The space should allow for the separation, collection and storage of paper, glass, plastic, metals, yard waste, and other materials as needed.

Policy CE-A.11 Implement sustainable landscape design and maintenance.

(a) Use integrated pest management techniques, where feasible, to delay, reduce, or eliminate dependence on the use of pesticides, herbicides, and synthetic fertilizers.

(b) Encourage composting efforts through education, incentives, and other activities.

(c) Decrease the amount of impervious surfaces in developments, especially where public places, plazas and amenities are proposed to serve as recreation opportunities.

(d) Strategically plant deciduous shade trees, evergreen trees, and drought tolerant native vegetation, as appropriate, to contribute to sustainable development goals.

(e) Reduce use of lawn types that require high levels of irrigation.

(f) Strive to incorporate existing mature trees and native vegetation into site designs.

(g) Minimize the use of landscape equipment powered by fossil fuels.

(h) Implement water conservation measures in site/building design and landscaping.

(i) Encourage the use of high efficiency irrigation technology, and recycled site water to reduce the use of potable water for irrigation. Use recycled water to meet the needs of development projects to the maximum extent feasible.

## 2.0 POTENTIAL CLIMATE CHANGE IMPACTS TO PROJECT SITE

### 2.1 Existing Conditions

The site is currently vacant and undeveloped. As it exists, the site is not a source of GHG emissions.

### 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 10.5 ºF). 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 of GHG emissions are not significantly reduced.

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

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

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

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

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

**Rising Sea Levels.** Rising sea levels, more intense coastal storms, and warmer water temperatures will 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.

Sea levels rose approximately 7 inches during the last century (IPCC 2007) and the State of California predicts an additional rise of 10 to 17 inches by 2050 and a rise of 31–69 inches by 2100, depending on the future levels of GHG emissions (State of California 2010). If this occurs, resultant effects could include increased coastal flooding. Sea level rise adaptation strategies include strategies that involve construction of hard structures as barriers, such as seawalls and levees; soft structure strategies such as wetland enhancement, detention basins, and other natural strategies; accommodation strategies that include grade elevations, elevated structures, and other building design options; and withdrawal strategies that limit development to areas unaffected by sea level rise.

Compliance with IBMC Section 15.50.160, Flood Hazard Reduction Standards, would require development within coastal high hazard areas to be elevated above the base flood level and be adequately anchored to resist flotation, collapse, and lateral movement as detailed in the regulatory setting section. The Project is not within the coastal high hazard area, and is therefore not subject to the standards. It is not anticipated that the levels of sea level rise predicted for the area would affect the project.

## 3.0 CLIMATE CHANGE SIGNIFICANCE CRITERIA

According to the California Natural Resources Agency[4], "due to the global nature of GHG emissions and their potential effects, GHG emissions will typically be addressed in a cumulative impacts analysis." According to Appendix G of the CEQA Guidelines, the following criteria may be considered to establish the significance of GCC emissions:

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 discussed in Section 15064.4 of the CEQA Guidelines, the determination of the significance of greenhouse gas emissions calls for a careful judgment by the lead agency, consistent with the provisions in Section 15064. Section 15064.4 further provides that a lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of GHG emissions resulting from a project. A lead agency shall have discretion to determine, in the context of a particular project, whether to:

(1) Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use. The lead agency has discretion to select the model or methodology it considers most appropriate provided it supports its decision with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use; and/or

(2) Rely on a qualitative analysis or performance based standards.

Section 15064.4 also advises a lead agency to consider the following factors, among others, when assessing the significance of impacts from greenhouse gas emissions on the environment:

[4] California Natural Resources Agency, Initial Statement of Reasons for Regulatory Action, Proposed Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gases Pursuant to SB 97. July 2009.

(1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;

(2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; and

(3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions.

The California Air Pollution Control Officers Association proposed a screening threshold of 900 metric tons of $CO_2e$ to evaluate whether a project requires further analysis. Projects with emissions above the 900 metric ton threshold are required to evaluate whether emissions can be reduced below "business as usual" levels. As an interim screening threshold, the 900 metric ton level has been used in this analysis.

Based on the ARB's analysis that statewide 2020 business as usual GHG emissions would be 596 $MMTCO_2e$ and that 1990 emissions were 427 $MMTCO_2e$, local lead agencies have estimated that a reduction of 28.3% below business as usual is required to achieve the AB 32 reduction mandate (ARB 2010). According to the ARB (ARB 2010), "ARB staff estimated 2020 business-as-usual GHG emissions, which represent the emissions that would be expected to occur in the absence of any GHG reductions actions. ARB staff estimates the statewide 2020 business-as-usual greenhouse gas emissions will be 596 $MMTCO_2E$. Emission reductions from the recommended measures in the Scoping Plan total 169 $MMTCO_2E$, allowing California to attain the 2020 emissions limit of 427 $MMTCO_2E$.

The 2020 BAU emissions estimate was derived by projecting emissions from a past baseline year using growth factors specific to each of the different economic sectors. For the purposes of the Scoping Plan, ARB used three-year average emissions, by sector, for 2002-2004 to forecast emissions to 2020. At the time the Scoping Plan process was initiated, 2004 was the most recent year for which actual data were available."

According to the ARB (ARB 2010), "Growth factors are sector-specific and are derived from several sources, including the energy demand models generated by California Energy Commission (CEC) for their 2007 Integrated Energy Policy Report (IEPR), business economic growth data developed for ARB's criteria pollutant forecast system (CEFS), population growth data from the California Department of Finance, and projections of vehicle miles traveled from ARB's on-road mobile source emissions model, EMFAC2007. For the electricity and other energy sectors, ARB consulted with CEC to select the most appropriate growth factor."

The project has been analyzed based on a reduction from business as usual of 28.3% to evaluate significance of global climate change impacts. The City is in the process of reviewing their GHG significance thresholds, but to date, no new standards have been proposed.

## 4.0 GREENHOUSE GAS INVENTORY

GHG emissions associated with the College Avenue Apartments Project were estimated separately for five categories of emissions: (1) construction; (2) energy use, including electricity and natural gas usage; (3) water consumption; (4) solid waste handling; and (5) transportation. The analysis includes a baseline estimate assuming Title 24-compliant buildings, which is considered business as usual for the Project. Emissions were estimated based on emission factors from the California Climate Action Registry General Reporting Protocol (CCAR 2009). This inventory presents emissions based on "business as usual" assumptions.

### 4.1 Existing Conditions

As discussed in Section 2.0, the project site is currently undeveloped and is not a source of GHG emissions.

### 4.2 Project Emissions

#### 4.2.1 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, which is the newest land use emissions model developed by ENVIRON and the SCAQMD (ENVIRON 2013), for completed and proposed construction. CalEEMod contains emission factors from the OFFROAD model for heavy construction equipment, and from the EMFAC2011 model for on-road vehicles. Table 5 presents the construction-related emissions associated with construction of the project.

The City of San Diego recommends that construction emissions be amortized over a 30-year period to account for the contribution of construction emissions over the lifetime of the project. These emissions are added to operational emissions to account for the contribution of construction to GHG emissions for the lifetime of the project.

| Table 4<br>Construction GHG Emissions<br>Metric tons/year | | |
|---|---|---|
| **Scenario** | **$CO_2e$ Emissions, metric tons** | **Amortized $CO_2e$ Emissions, metric tons/year** |
| Construction Emissions | 1,105 | 37 |

4.2.2 Operational Greenhouse Gas Emissions

GHG emissions for the project were estimated for five categories of emissions: (1) construction; (2) energy use, including electricity and natural gas usage; (3) water consumption; (4) solid waste management, and (5) transportation. Emissions were estimated for each of the development scenarios using the methodologies described below.

4.2.2.1 Energy Use

Electricity usage rates for the residential units was calculated as a function of kWh per square foot based on average performance for southern California residences, according to the *California Statewide Residential Appliance Saturation Survey* (CEC 2010). The energy use figures in these reports represent current state-wide average uses for all land uses, including those that are compliant with 2005 Title 24 standards. The baseline energy use provides a conservative estimate of current energy requirements relative to future energy requirements.

The *California Statewide Residential Appliance Saturation Survey* provided estimated energy use for apartments is 3,709 annually. Natural gas usage rates were estimated as 150 therms per year per unit. Emissions were calculated based on emission factors in the California Climate Action Registry General Reporting Protocol, Version 3.1 (CCAR 2009), which assumes that for California, energy use (electricity) would have emissions of 724.12 lbs/MWh of $CO_2$, 0.0302 lbs/MWh of $CH_4$, and 0.0081 lbs/MWh of $N_2O$.

#### 4.2.2.2 Water Usage

GHG emissions were calculated on the basis of the embodied energy of water, assuming that in southern California, water has an embodied energy of 13,022 kWh/million gallons for indoor uses and 11,111 kWh/million gallons for outdoor uses (Navigant 2006). Water usage was estimated based on the water use calculated by the CalEEMod Model (ENVIRON 2013) for indoor and outdoor water use based on the development scenarios. Total annual water use for the project uses was estimated at 6,189,630 gallons for indoor uses and 3,902,160 gallons for outdoor uses for a total of 10,091,790 gallons.

#### 4.2.2.3 Vehicle Emissions

Mobile source greenhouse gas emissions were estimated based on the projected ADTs from the Traffic Impact Analysis (Fehr & Peers 2014). Based on the analysis, the trip generation rate would be 570 average daily trips (ADT). Emissions from vehicles were estimated using the ARB's emission factors without considering the effects of state and federal measures to reduce GHG emissions from EMFAC2011 (ARB 2011), using the vehicle miles traveled (VMT) calculated by the CalEEMod Model. Emission factors from the EMFAC2011 model were used with the San Joaquin Valley Air Pollution Control District's vehicle mix[5] for residential developments. This vehicle mix was considered the best representation of the vehicle mix that would travel to the residential development. Residential developments do not generate substantial heavy-duty truck trips, and the default vehicle mix within the EMFAC2011 model represents both light- and heavy-duty vehicles traveling throughout the County. The vehicle mix does include some trips for medium- and heavy-duty trucks.

[5] SJVAPCD. 2009. Accepted URBEMIS Default Values.

#### 4.2.2.4 Solid Waste

Solid waste generation rates were estimated based on the CalEEMod Model. The CalEEMod Model calculated a solid waste generation rate of 44 tons per year for the project. Solid waste GHG emissions were calculated based on the CalEEMod Model.

#### 4.2.2.5 Operational Emissions Summary

The results of the inventory for operational emissions for business as usual are presented in Table 6. These include GHG emissions associated with buildings (natural gas, purchased electricity), water consumption (energy embodied in potable water), solid waste management (including transport and landfill gas generation), and vehicles. Table 6 summarizes projected emissions using the methodologies noted above.

**Table 6**
**SUMMARY OF ESTIMATED OPERATIONAL GREENHOUSE GAS EMISSIONS**
**BUSINESS AS USUAL SCENARIO**

| **Emission Source** | **Annual Emissions (Metric tons/year)** | | | |
|---|---|---|---|---|
| | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_2e$** |
| **Operational Emissions** | | | | |
| Electricity Use | 116 | 0.0048 | 0.0013 | 116 |
| Natural Gas Use | 76 | 0.0084 | 0.0001 | 76 |
| Water Use | 41 | 0.0017 | 0.0005 | 41 |
| Solid Waste Management | 9 | 0.5242 | - | 24 |
| Vehicle Emissions | 509 | 0.0037 | 0.0214 | 515 |
| Amortized Construction Emissions | 37 | - | - | 37 |
| **Total** | **788** | **0.5428** | **0.0233** | **809** |
| Global Warming Potential Factor | **1** | **28** | **265** | |
| $CO_2$ Equivalent Emissions | **788** | **15** | **6** | **809** |
| **TOTAL $CO_2$ Equivalent Emissions** | **809** | | | |

As shown in Table 6, the net emissions associated with the College Avenue Apartments Project are below the 900 metric ton screening threshold under business as usual conditions. The project would therefore not result in a significant impact due to GHG emissions.

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

As concluded in Section 4.0, the net emissions associated with the proposed project are below the 900 metric ton screening threshold under business as usual conditions. Therefore, the project would not result in a significant impact associated with GHG emissions. The project is designed to incorporate energy saving measures to further reduce GHG emissions. The following GHG reduction measures will be incorporated into the project design:

Site:

- On site stormwater management via vegetated stormwater planters
- Permeable paving (grasscrete at secondary fire lane access)
- Drought tolerant native plantings
- Drip irrigation or other high efficiency irrigation system
- Access to mass transit
- EV charging station

Building Envelope:

- Continuous exterior insulation – as part of stucco system
- High performance vinyl windows – U-value 0.30 or lower
- "Cool" TPO membrane roofing

MEP:

- Energy efficient/energy star lighting throughout (meet title 24 w/controls and use 60% energy star fixtures)
- Energy star appliances
- Low flow plumbing fixtures
    - low flow toilets (1.10 gal/flush or less)
    - low flow kitchen sinks w/aerators (1.5 gpm)
    - low flow vanities (1.5 gpm)
    - low flow showers (1.75 gpm)
- Solar water preheat

Materials:

- Low VOC paints and sealants
- Use of engineered wood products
- Construction Waste Management Plan

Air Quality:

- No smoking building
- Walk-off mats at all building entries

In addition to these project design features, state and federal programs designed to reduce GHGs from vehicles, utility-generated electricity, and buildings would further reduce GHG emissions from the project.

Based on the SDCGHGI, the percent reductions in GHG emissions anticipated through implementation of the Federal CAFE standards, LCFS, and Pavley fuel efficiency standard (analogous to the Federal CAFE standard), as well as the effect of light/heavy vehicle efficiency/hybridization programs can be estimated. Emissions were calculated based on the reductions in the SDCGHGI. It should be noted that these reductions are consistent with the EMFAC2011 emission factor reductions, which calculate that for the fleet of light-duty vehicles within the state of California, the Pavley and LCFS programs will reduce GHG emissions by 20% and 10% for a total of 30% (ARB 2011). The EMFAC2011 emission factors are provided as an attachment to this report. It should be noted that the reductions associated with the Pavley standards are applicable to light-duty autos and trucks, and do not apply to heavy-duty vehicles.

In addition to the Pavley and LCFS standards to reduce GHG emissions, reductions in VMT predicted by the CalEEMod Model were taken into account. The project would include more dense development and would be located in an area with a mix of uses. The CalEEmod Model estimated a reduction in VMT of 5% for these measures.

In addition to the energy efficiency and mobile source emissions reductions discussed above, reductions attributable to California's RPS (SB 1078; 2002) were included in the emission calculations for electricity use. SB 1078 initially set a target of 20% of energy to be sold from renewable sources by the year 2017. The schedule for implementation of the RPS was accelerated in 2006 with the Governor's signing of SB 107, which accelerated the 20% RPS goal from 2017 to 2010. On November 17, 2008, the Governor signed Executive Order S-14-08,

which requires all retail sellers of electricity to serve 33 percent of their load with renewable energy by 2020. The Governor signed Executive Order S-21-09 on September 15, 2009, which directs ARB to implement a regulation consistent with the 2020 33% renewable energy target by July 31, 2010. As of September 23, 2010, the ARB has adopted the regulation that implements the 33% renewable energy standard.

The renewable energy standard would replace existing conventional power generation (i.e., from combustion sources) with renewable energy (i.e., with non-combustion source that would not generate GHG emissions). At the time of the adoption of the Scoping Plan, according to the SDCGHGI, SDG&E was providing 6% of its electricity from renewable sources. As of 2012, SDG&E provided 20.31% of its electricity from renewable sources[6].

Implementation of the 33% RPS would replace an additional 27% of electricity from GHG emitting sources (i.e., combustion of fossil fuels) with non-GHG emitting sources (i.e., renewable energy sources). To account for the reduction in emissions attributable to the RPS, non-GHG emitting sources would replace GHG emitting sources. Accordingly, the GHG intensity of electricity, on a lbs/MWh basis, would be reduced by 27%. This translates to a reduction of 27% in the GHG emission factors used to calculate GHG emissions from electricity use for both direct electricity use, and the electricity used to transport water (which relies on electricity for pumping, transport, and treatment). Accordingly, the electricity use emission factors in the California Climate Action Registry General Reporting Protocol, Version 3.1 (CCAR 2009) of 724.12 lbs/MWh of $CO_2$, 0.0302 lbs/MWh of $CH_4$, and 0.0081 lbs/MWh of $N_2O$ would be reduced to 528.61 lbs/MWh of $CO_2$, 0.0220 lbs/MWh of $CH_4$, and 0.0059 lbs/MWh of $N_2O$.

According to Energy Code Works, Inc., for non-residential buildings, the 2013 Title 24 standards would reduce energy requirements by 15% to 20%[7] over the 2008 Title 24 standards.

[6] http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm

[7] http://www.slideshare.net/ccsemedia/updating-the-2013-title-24-building-efficiency-codes

By implementation of these measures, and due to the fact that the project's emissions are below the City's screening threshold of 900 metric tons of CO2e, the College Avenue Apartments Project will not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

The project will meet the goals of the City's Conservation Element, and will therefore be consistent with the City's GHG reduction plans and policies. The following policies will be adopted for the project:

Policy CE-A.5 Employ sustainable or "green" building techniques for the construction and operation of buildings.

(a) Develop and implement sustainable building standards for new and significant remodels of residential and commercial buildings to maximize energy efficiency, and to achieve overall net zero energy consumption by 2020 for new residential buildings and 2030 for new commercial buildings. This can be accomplished through factors including, but not limited to:

- Designing mechanical and electrical systems that achieve greater energy efficiency with currently available technology;
- Minimizing energy use through innovative site design and building orientation that addresses factors such as sun-shade patterns, prevailing winds, landscape, and sun-screens;
- Employing self generation of energy using renewable technologies;
- Combining energy efficient measures that have longer payback periods with measures that have shorter payback periods;
- Reducing levels of non-essential lighting, heating and cooling; and
- Using energy efficient appliances and lighting.

The Project will meet the most recent 2013 Title 24 energy efficiency standards, which are estimated to exceed Title 24 standards as of 2008 by 15%. The project is therefore employing sustainable building development practices to maximize energy efficiency.

Policy CE-A-7 Construct and operate buildings using materials, methods, and mechanical and electrical systems that ensure a healthful indoor air quality. Avoid contamination by carcinogens, volatile organic compounds, fungi, molds, bacteria, and other known toxins.

(a) Eliminate the use of chlorofluorocarbon-based refrigerants in newly constructed facilities and major building renovations and retrofits for all heating, ventilation, air conditioning, and refrigerant-based building systems.

(b) Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to protect installers and occupants' health and comfort. Where feasible, select low-emitting adhesives, paints, coatings, carpet systems, composite wood, agri-fiber products, and others.

The Project will be constructed in a manner that will ensure healthful indoor air quality.

Policy CE-A.8 Reduce construction and demolition waste in accordance with Public Facilities Element, Policy PF-I.2, or by renovating or adding on to existing buildings, rather than constructing new buildings.

The Project will reduce construction and demolition waste to the extent feasible.

Policy CE-A.9 Reuse building materials, use materials that have recycled content, or use materials that are derived from sustainable or rapidly renewable sources to the extent possible, through factors including:

- Scheduling time for deconstruction and recycling activities to take place during project demolition and construction phases;
- Using life cycle costing in decision making for materials and construction techniques. Life cycle costing analyzes the costs and benefits over the life of a particular product, technology, or system;
- Removing code obstacles to using recycled materials and for construction; and
- Implementing effective economic incentives to recycle construction and demolition debris.

The Project will use recycled/sustainable materials for construction and during operation to the extent feasible. The project will recycle construction and demolition debris as appropriate.

Policy CE-A.10 Include features in buildings to facilitate recycling of waste generated by building occupants and associated refuse storage areas.

- Provide permanent, adequate, and convenient space for individual building occupants to collect refuse and recyclable material.
- Provide a recyclables collection area that serves the entire building or project. The space should allow for the separation, collection and storage of paper, glass, plastic, metals, yard waste, and other materials as needed.

The Project will provide space for individual building occupants to implement recycling practices within their buildings.

Policy CE-A.11 Implement sustainable landscape design and maintenance.

(a) Use integrated pest management techniques, where feasible, to delay, reduce, or eliminate dependence on the use of pesticides, herbicides, and synthetic fertilizers.

(b) Encourage composting efforts through education, incentives, and other activities.

(c) Decrease the amount of impervious surfaces in developments, especially where public places, plazas and amenities are proposed to serve as recreation opportunities.

(d) Strategically plant deciduous shade trees, evergreen trees, and drought tolerant native vegetation, as appropriate, to contribute to sustainable development goals.

(e) Reduce use of lawn types that require high levels of irrigation.

(f) Strive to incorporate existing mature trees and native vegetation into site designs.

(g) Minimize the use of landscape equipment powered by fossil fuels.

(h) Implement water conservation measures in site/building design and landscaping.

(i) Encourage the use of high efficiency irrigation technology, and recycled site water to reduce the use of potable water for irrigation. Use recycled water to meet the needs of development projects to the maximum extent feasible.

The Project will use landscaping that minimizes water use, utilizes efficient irrigation practices, and reduces the use of pesticides.

Through implementation of these practices, the College Avenue Apartments Project will not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

## 6.0 CONCLUSIONS

Emissions of GHGs were quantified for both construction and operation of the College Avenue Apartments Project. Operational emissions were calculated assuming a "business as usual" operational scenario. Based on the analysis, the project's emissions would be below the City of San Diego's screening threshold of 900 metric tons of CO2e. Furthermore, the Project would implement GHG reduction measures described in Section 5.0 that would further reduce emissions. The project would be consistent with the City's goals to reduce GHGs. The project would therefore not:

- 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.

The Project will be consistent with the goals of AB 32, and would not result in a significant global climate change impact.

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# Appendix A

# Greenhouse Gas Emission Calculations

Table A-1
Electricity Greenhouse Gas Emissions - Business As Usual
College Avenue Apartments

## Electricity

| Land Use | 1,000 Sqft or units | Usage Rate [a] (kWh\sq.ft\yr) | (KWh\year) | MWh\year |
|---|---|---|---|---|
| **Project** | | | 0 | 0.00 |
| Residential | 95.0 | 3709.00 | 352,355 | 352.36 |
| **Total Project** | | | **352,355** | **352.36** |

| GHG | lbs/MWh[b] | lbs | metric tons | $CO_2E$ |
|---|---|---|---|---|
| **Project** | | | | |
| **$CO_2$** | 724.12 | 255147.3026 | 115.7327753 | 115.7327753 |
| **$CH_4$** | 0.0302 | 10.641121 | 0.004826727 | 0.135148366 |
| **$N_2O$** | 0.0081 | 2.8540755 | 0.001294586 | 0.343065241 |
| | | | | **116.21** |

[b] Emission factors for $CO_2$, $CH_4$, and $N_2O$ were derived from the California Climate Action Registry General Reporting Protocol; Version 3.1, January 2009

Table A-2
Natural Gas Greenhouse Gas Emissions - Business As Usual
College Avenue Apartments

## Natural Gas

| Land Use | 1,000 Sqft | Usage Rate per SF or unit Therms/Year | Total Natural Gas Usage Therms/Year | Total Natural Gas Usage (MMBTU\year) |
|---|---|---|---|---|
| **Project** | | | | |
| Residential | 95.0 | 150.00 | 14,250 | 1,425 |
| **Total Project** | | | 14,250 | **1,425** |

| GHG | Kg/MMBtu[b] | Kg | metric tons | $CO_2E$ (Metric Tons) |
|---|---|---|---|---|
| **Project** | | | | |
| **$CO_2$** | 53.06 | 75,610.50 | 75.61 | 75.6105 |
| **$CH_4$** | 0.0059 | 8.41 | 0.0084 | 0.23541 |
| **$N_2O$** | 0.0001 | 0.14 | 0.0001 | 0.0377625 |
| | | | | **75.88** |

[b] Emission factors for $CO_2$, $CH_4$, and $N_2O$ were derived from the California Climate Action Registry General Reporting Protocol; Version 3.1, January 2009

Table A-3
Water Use Greenhouse Gas Emissions - Business As Usual
College Avenue Apartments

## Water Usage

| Land Use | GPY | Usage Rate (kWh\MMgal) | (KWh\year) | MWh\year |
|---|---|---|---|---|
| **Indoor Water Use** | 6189630 | 13022 | 80,601 | 80.60 |
| **Outdoor Water Use** | 3902160 | 11111 | 43,357 | 43.36 |
| **Total Project** | 10091790.0 | | **123,958** | **123.96** |

| GHG | lbs/MWh[b] | lbs | metric tons | $CO_2E$ |
|---|---|---|---|---|
| **Project** | | | | |
| **$CO_2$** | 724.12 | 89760.6564 | 40.71471566 | 40.71471566 |
| **$CH_4$** | 0.0302 | 3.743539501 | 0.00169804 | 0.047545108 |
| **$N_2O$** | 0.0081 | 1.004061919 | 0.000455434 | 0.12069013 |
| | | | | **40.88** |

[b] Emission factors for $CO_2$, $CH_4$, and $N_2O$ were derived from the California Climate Action Registry General Reporting Protocol; Version 3.1, January 2009

Table A-4
Solid Waste Management -Business As Usual
College Avenue Apartments

## Solid Waste Management

| Land Use | Solid Waste Tons/year |
|---|---|
| **Project** | |
| Residential | 43.70 |
| **Total Project** | |

| GHG | CO2 | CH4 | $CO_2E$ |
|---|---|---|---|
| **Project** | | | |
| **$CO_2e$** | 8.87 | 0.5242 | 23.5476 |
| | | | **23.55** |

Table A-5
On-Road Mobile Source Greenhouse Gas Emissions - Business As Usual
College Avenue Apartments

## On Road Mobile Source

| Land Use | Daily VMT | Annual VMT[a] |
|---|---|---|
| **Total Project** | **3,306** | **1,206,690.00** |

[a] Multiplied Daily VMT by 365 to get Annual VMT

| | |
|---|---|
| **San Diego County $CO_2$ 2020 AVG Gram/Mile[a]** | **422.1852** |
| **San Diego County $CH_4$ 2020 AVG Gram/Mile[a]** | **0.003065304** |
| **$N_2O$ Gram/Mile[b]** | **0.0177** |

| GHG | Gram/Mile | Gram | metric tons | $CO_2E$ (Metric Tons) |
|---|---|---|---|---|
| **Project** | | | | |
| **$CO_2$** | 422.1852 | 509,446,658.99 | 509.45 | 509.446659 |
| **$CH_4$** | 0.0030653 | 3,698.87 | 0.0037 | 0.103568407 |
| **$N_2O$** | 0.0177 | 21,358.41 | 0.0214 | 5.659979445 |
| | | | | **515.21** |

# College Avenue Apartments

**San Diego Air Basin, Annual**

## 1.0 Project Characteristics

### 1.1 Land Usage

| Land Uses | Size | Metric | Lot Acreage | Floor Surface Area | Population |
|---|---|---|---|---|---|
| Enclosed Parking Structure | 238.00 | Space | 1.51 | 95,200.00 | 0 |
| Apartments Mid Rise | 95.00 | Dwelling Unit | 1.51 | 95,000.00 | 272 |

### 1.2 Other Project Characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Urbanization** | Urban | **Wind Speed (m/s)** | 2.6 | **Precipitation Freq (Days)** | 40 |
| **Climate Zone** | 13 | | | **Operational Year** | 2016 |
| **Utility Company** | | | | | |
| **CO2 Intensity (lb/MWhr)** | 0 | **CH4 Intensity (lb/MWhr)** | 0 | **N2O Intensity (lb/MWhr)** | 0 |

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

Project Characteristics -

Land Use - Based on project description

Construction Phase - Based on 14-month construction schedule

Woodstoves - No fireplaces

| Table Name | Column Name | Default Value | New Value |
|---|---|---|---|
| tblAreaMitigation | UseLowVOCPaintNonresidentialExteriorValue | 250 | 0 |
| tblAreaMitigation | UseLowVOCPaintNonresidentialInteriorValue | 250 | 0 |
| tblAreaMitigation | UseLowVOCPaintResidentialExteriorValue | 250 | 0 |
| tblAreaMitigation | UseLowVOCPaintResidentialInteriorValue | 250 | 0 |
| tblConstructionPhase | NumDays | 18.00 | 391.00 |
| tblConstructionPhase | NumDays | 230.00 | 262.00 |
| tblConstructionPhase | NumDays | 8.00 | 43.00 |
| tblConstructionPhase | NumDays | 18.00 | 262.00 |
| tblConstructionPhase | PhaseEndDate | 8/30/2016 | 6/30/2015 |
| tblConstructionPhase | PhaseEndDate | 7/3/2017 | 6/30/2016 |
| tblConstructionPhase | PhaseStartDate | 7/1/2016 | 5/1/2015 |
| tblConstructionPhase | PhaseStartDate | 7/1/2016 | 7/1/2015 |
| tblFireplaces | NumberGas | 52.25 | 0.00 |
| tblFireplaces | NumberNoFireplace | 9.50 | 95.00 |
| tblFireplaces | NumberWood | 33.25 | 0.00 |
| tblGrading | AcresOfGrading | 21.50 | 1.51 |
| tblGrading | MaterialExported | 0.00 | 48,000.00 |
| tblLandUse | LotAcreage | 2.14 | 1.51 |
| tblLandUse | LotAcreage | 2.50 | 1.51 |
| tblProjectCharacteristics | OperationalYear | 2014 | 2016 |
| tblVehicleTrips | ST_TR | 7.16 | 6.00 |
| tblVehicleTrips | SU_TR | 6.07 | 6.00 |
| tblVehicleTrips | WD_TR | 6.59 | 6.00 |
| tblWoodstoves | NumberCatalytic | 4.75 | 0.00 |
| tblWoodstoves | NumberNoncatalytic | 4.75 | 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 | | | | | |
| 2015 | 2.3727 | 5.7931 | 4.4844 | 7.8300e-003 | 0.2894 | 0.3185 | 0.6078 | 0.1138 | 0.2982 | 0.4121 | 0.0000 | 705.4211 | 705.4211 | 0.1034 | 0.0000 | 707.5930 |
| 2016 | 1.2756 | 3.4086 | 2.7944 | 4.5100e-003 | 0.0892 | 0.2156 | 0.3048 | 0.0239 | 0.2020 | 0.2259 | 0.0000 | 395.4883 | 395.4883 | 0.0781 | 0.0000 | 397.1279 |
| **Total** | **3.6484** | **9.2017** | **7.2788** | **0.0123** | **0.3785** | **0.5341** | **0.9126** | **0.1377** | **0.5002** | **0.6380** | **0.0000** | **1,100.9094** | **1,100.9094** | **0.1815** | **0.0000** | **1,104.7209** |

### 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 | | | | | |
| 2015 | 2.3727 | 5.7931 | 4.4844 | 7.8300e-003 | 0.2078 | 0.3185 | 0.5263 | 0.0700 | 0.2982 | 0.3683 | 0.0000 | 705.4207 | 705.4207 | 0.1034 | 0.0000 | 707.5926 |
| 2016 | 1.2756 | 3.4086 | 2.7944 | 4.5100e-003 | 0.0892 | 0.2156 | 0.3048 | 0.0239 | 0.2020 | 0.2259 | 0.0000 | 395.4879 | 395.4879 | 0.0781 | 0.0000 | 397.1276 |
| **Total** | **3.6484** | **9.2017** | **7.2788** | **0.0123** | **0.2970** | **0.5341** | **0.8311** | **0.0940** | **0.5002** | **0.5942** | **0.0000** | **1,100.9086** | **1,100.9086** | **0.1815** | **0.0000** | **1,104.7201** |

| | 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** | **0.00** | **0.00** | **0.00** | **0.00** | **21.54** | **0.00** | **8.93** | **31.78** | **0.00** | **6.86** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

## 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 | 1.0245 | 8.3900e-003 | 0.7175 | 4.0000e-005 | | 3.8700e-003 | 3.8700e-003 | | 3.8700e-003 | 3.8700e-003 | 0.0000 | 1.1565 | 1.1565 | 1.1900e-003 | 0.0000 | 1.1814 |
| Energy | 2.8100e-003 | 0.0240 | 0.0102 | 1.5000e-004 | | 1.9400e-003 | 1.9400e-003 | | 1.9400e-003 | 1.9400e-003 | 0.0000 | 27.7937 | 27.7937 | 5.3000e-004 | 5.1000e-004 | 27.9629 |
| Mobile | 0.3976 | 0.9612 | 4.2700 | 8.8900e-003 | 0.6120 | 0.0121 | 0.6241 | 0.1637 | 0.0111 | 0.1748 | 0.0000 | 703.5845 | 703.5845 | 0.0306 | 0.0000 | 704.2261 |
| Waste | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 8.8707 | 0.0000 | 8.8707 | 0.5242 | 0.0000 | 19.8798 |
| Water | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 1.9637 | 0.0000 | 1.9637 | 0.2017 | 4.7600e-003 | 7.6755 |
| **Total** | **1.4249** | **0.9936** | **4.9976** | **9.0800e-003** | **0.6120** | **0.0179** | **0.6299** | **0.1637** | **0.0169** | **0.1806** | **10.8344** | **732.5347** | **743.3691** | **0.7582** | **5.2700e-003** | **760.9257** |

## 2.2 Overall Operational

**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 | 1.0245 | 8.3900e-003 | 0.7175 | 4.0000e-005 | | 3.8700e-003 | 3.8700e-003 | | 3.8700e-003 | 3.8700e-003 | 0.0000 | 1.1565 | 1.1565 | 1.1900e-003 | 0.0000 | 1.1814 |
| Energy | 2.5100e-003 | 0.0215 | 9.1400e-003 | 1.4000e-004 | | 1.7400e-003 | 1.7400e-003 | | 1.7400e-003 | 1.7400e-003 | 0.0000 | 24.8885 | 24.8885 | 4.8000e-004 | 4.6000e-004 | 25.0400 |
| Mobile | 0.3976 | 0.9612 | 4.2700 | 8.8900e-003 | 0.6120 | 0.0121 | 0.6241 | 0.1637 | 0.0111 | 0.1748 | 0.0000 | 703.5845 | 703.5845 | 0.0306 | 0.0000 | 704.2261 |
| Waste | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 4.4354 | 0.0000 | 4.4354 | 0.2621 | 0.0000 | 9.9399 |
| Water | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 1.5710 | 0.0000 | 1.5710 | 0.1614 | 3.8100e-003 | 6.1404 |
| **Total** | **1.4246** | **0.9911** | **4.9966** | **9.0700e-003** | **0.6120** | **0.0177** | **0.6297** | **0.1637** | **0.0167** | **0.1804** | **6.0063** | **729.6295** | **735.6358** | **0.4557** | **4.2700e-003** | **746.5278** |

| | 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** | **0.02** | **0.25** | **0.02** | **0.11** | **0.00** | **1.12** | **0.03** | **0.00** | **1.18** | **0.11** | **44.56** | **0.40** | **1.04** | **39.90** | **18.98** | **1.89** |

## 3.0 Construction Detail

**Construction Phase**

| Phase Number | Phase Name | Phase Type | Start Date | End Date | Num Days Week | Num Days | Phase Description |
|---|---|---|---|---|---|---|---|
| 1 | Architectural Coating | Architectural Coating | 1/1/2015 | 6/30/2016 | 5 | 391 | |
| 2 | Grading | Grading | 5/1/2015 | 6/30/2015 | 5 | 43 | |
| 3 | Building Construction | Building Construction | 7/1/2015 | 6/30/2016 | 5 | 262 | |
| 4 | Paving | Paving | 7/1/2015 | 6/30/2016 | 5 | 262 | |

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

**Acres of Grading (Grading Phase): 1.51**

**Acres of Paving: 0**

**Residential Indoor: 192,375; Residential Outdoor: 64,125; Non-Residential Indoor: 142,800; Non-Residential Outdoor: 47,600 (Architectural Coating – sqft)**

**OffRoad Equipment**

| Phase Name | Offroad Equipment Type | Amount | Usage Hours | Horse Power | Load Factor |
|---|---|---|---|---|---|
| Grading | Excavators | 1 | 8.00 | 162 | 0.38 |
| Grading | Graders | 1 | 8.00 | 174 | 0.41 |
| Grading | Rubber Tired Dozers | 1 | 8.00 | 255 | 0.40 |
| Grading | Tractors/Loaders/Backhoes | 3 | 8.00 | 97 | 0.37 |
| 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 |
| Paving | Cement and Mortar Mixers | 2 | 6.00 | 9 | 0.56 |
| Paving | Pavers | 1 | 8.00 | 125 | 0.42 |
| Paving | Paving Equipment | 2 | 6.00 | 130 | 0.36 |
| Paving | Rollers | 2 | 6.00 | 80 | 0.38 |
| Paving | Tractors/Loaders/Backhoes | 1 | 8.00 | 97 | 0.37 |
| 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 | 6 | 15.00 | 0.00 | 6,000.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Building Construction | 9 | 108.00 | 26.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Paving | 8 | 20.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Architectural Coating | 1 | 22.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |

## 3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

## 3.2 Architectural Coating - 2015

### 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 | 1.7284 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0531 | 0.3354 | 0.2482 | 3.9000e-004 | | 0.0288 | 0.0288 | | 0.0288 | 0.0288 | 0.0000 | 33.3200 | 33.3200 | 4.3400e-003 | 0.0000 | 33.4111 |
| **Total** | **1.7814** | **0.3354** | **0.2482** | **3.9000e-004** | | **0.0288** | **0.0288** | | **0.0288** | **0.0288** | **0.0000** | **33.3200** | **33.3200** | **4.3400e-003** | **0.0000** | **33.4111** |

### 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 | 0.0108 | 0.0143 | 0.1374 | 2.8000e-004 | 0.0230 | 1.9000e-004 | 0.0232 | 6.1200e-003 | 1.7000e-004 | 6.2900e-003 | 0.0000 | 22.2337 | 22.2337 | 1.2300e-003 | 0.0000 | 22.2595 |
| **Total** | **0.0108** | **0.0143** | **0.1374** | **2.8000e-004** | **0.0230** | **1.9000e-004** | **0.0232** | **6.1200e-003** | **1.7000e-004** | **6.2900e-003** | **0.0000** | **22.2337** | **22.2337** | **1.2300e-003** | **0.0000** | **22.2595** |

## 3.2 Architectural Coating - 2015

### 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 | 1.7284 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0531 | 0.3354 | 0.2482 | 3.9000e-004 | | 0.0288 | 0.0288 | | 0.0288 | 0.0288 | 0.0000 | 33.3199 | 33.3199 | 4.3400e-003 | 0.0000 | 33.4110 |
| **Total** | **1.7814** | **0.3354** | **0.2482** | **3.9000e-004** | | **0.0288** | **0.0288** | | **0.0288** | **0.0288** | **0.0000** | **33.3199** | **33.3199** | **4.3400e-003** | **0.0000** | **33.4110** |

### 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 | 0.0108 | 0.0143 | 0.1374 | 2.8000e-004 | 0.0230 | 1.9000e-004 | 0.0232 | 6.1200e-003 | 1.7000e-004 | 6.2900e-003 | 0.0000 | 22.2337 | 22.2337 | 1.2300e-003 | 0.0000 | 22.2595 |
| **Total** | **0.0108** | **0.0143** | **0.1374** | **2.8000e-004** | **0.0230** | **1.9000e-004** | **0.0232** | **6.1200e-003** | **1.7000e-004** | **6.2900e-003** | **0.0000** | **22.2337** | **22.2337** | **1.2300e-003** | **0.0000** | **22.2595** |

## 3.2 Architectural Coating - 2016

### 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 | 0.8609 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0240 | 0.1542 | 0.1225 | 1.9000e-004 | | 0.0128 | 0.0128 | | 0.0128 | 0.0128 | 0.0000 | 16.5962 | 16.5962 | 1.9600e-003 | 0.0000 | 16.6372 |
| **Total** | **0.8848** | **0.1542** | **0.1225** | **1.9000e-004** | | **0.0128** | **0.0128** | | **0.0128** | **0.0128** | **0.0000** | **16.5962** | **16.5962** | **1.9600e-003** | **0.0000** | **16.6372** |

### 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 | 4.9000e-003 | 6.4800e-003 | 0.0618 | 1.4000e-004 | 0.0115 | 9.0000e-005 | 0.0116 | 3.0500e-003 | 8.0000e-005 | 3.1300e-003 | 0.0000 | 10.6865 | 10.6865 | 5.6000e-004 | 0.0000 | 10.6984 |
| **Total** | **4.9000e-003** | **6.4800e-003** | **0.0618** | **1.4000e-004** | **0.0115** | **9.0000e-005** | **0.0116** | **3.0500e-003** | **8.0000e-005** | **3.1300e-003** | **0.0000** | **10.6865** | **10.6865** | **5.6000e-004** | **0.0000** | **10.6984** |

## 3.2 Architectural Coating - 2016

### 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 | 0.8609 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0240 | 0.1542 | 0.1225 | 1.9000e-004 | | 0.0128 | 0.0128 | | 0.0128 | 0.0128 | 0.0000 | 16.5961 | 16.5961 | 1.9600e-003 | 0.0000 | 16.6372 |
| **Total** | **0.8848** | **0.1542** | **0.1225** | **1.9000e-004** | | **0.0128** | **0.0128** | | **0.0128** | **0.0128** | **0.0000** | **16.5961** | **16.5961** | **1.9600e-003** | **0.0000** | **16.6372** |

### 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 | 4.9000e-003 | 6.4800e-003 | 0.0618 | 1.4000e-004 | 0.0115 | 9.0000e-005 | 0.0116 | 3.0500e-003 | 8.0000e-005 | 3.1300e-003 | 0.0000 | 10.6865 | 10.6865 | 5.6000e-004 | 0.0000 | 10.6984 |
| **Total** | **4.9000e-003** | **6.4800e-003** | **0.0618** | **1.4000e-004** | **0.0115** | **9.0000e-005** | **0.0116** | **3.0500e-003** | **8.0000e-005** | **3.1300e-003** | **0.0000** | **10.6865** | **10.6865** | **5.6000e-004** | **0.0000** | **10.6984** |

## 3.3 Grading - 2015

### 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 | | | | | 0.1337 | 0.0000 | 0.1337 | 0.0718 | 0.0000 | 0.0718 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0824 | 0.8690 | 0.5735 | 6.4000e-004 | | 0.0501 | 0.0501 | | 0.0461 | 0.0461 | 0.0000 | 61.0298 | 61.0298 | 0.0182 | 0.0000 | 61.4124 |
| **Total** | **0.0824** | **0.8690** | **0.5735** | **6.4000e-004** | **0.1337** | **0.0501** | **0.1837** | **0.0718** | **0.0461** | **0.1178** | **0.0000** | **61.0298** | **61.0298** | **0.0182** | **0.0000** | **61.4124** |

### 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 | 0.0720 | 1.0153 | 0.7777 | 2.2500e-003 | 0.0512 | 0.0152 | 0.0664 | 0.0141 | 0.0140 | 0.0281 | 0.0000 | 207.3801 | 207.3801 | 1.6900e-003 | 0.0000 | 207.4156 |
| 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 | 1.2200e-003 | 1.6100e-003 | 0.0154 | 3.0000e-005 | 2.5900e-003 | 2.0000e-005 | 2.6100e-003 | 6.9000e-004 | 2.0000e-005 | 7.1000e-004 | 0.0000 | 2.4975 | 2.4975 | 1.4000e-004 | 0.0000 | 2.5004 |
| **Total** | **0.0733** | **1.0170** | **0.7932** | **2.2800e-003** | **0.0538** | **0.0153** | **0.0690** | **0.0147** | **0.0140** | **0.0288** | **0.0000** | **209.8777** | **209.8777** | **1.8300e-003** | **0.0000** | **209.9160** |

## 3.3 Grading - 2015

### 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 | | | | | 0.0521 | 0.0000 | 0.0521 | 0.0280 | 0.0000 | 0.0280 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0824 | 0.8689 | 0.5735 | 6.4000e-004 | | 0.0501 | 0.0501 | | 0.0461 | 0.0461 | 0.0000 | 61.0297 | 61.0297 | 0.0182 | 0.0000 | 61.4124 |
| **Total** | **0.0824** | **0.8689** | **0.5735** | **6.4000e-004** | **0.0521** | **0.0501** | **0.1022** | **0.0280** | **0.0461** | **0.0740** | **0.0000** | **61.0297** | **61.0297** | **0.0182** | **0.0000** | **61.4124** |

### 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 | 0.0720 | 1.0153 | 0.7777 | 2.2500e-003 | 0.0512 | 0.0152 | 0.0664 | 0.0141 | 0.0140 | 0.0281 | 0.0000 | 207.3801 | 207.3801 | 1.6900e-003 | 0.0000 | 207.4156 |
| 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 | 1.2200e-003 | 1.6100e-003 | 0.0154 | 3.0000e-005 | 2.5900e-003 | 2.0000e-005 | 2.6100e-003 | 6.9000e-004 | 2.0000e-005 | 7.1000e-004 | 0.0000 | 2.4975 | 2.4975 | 1.4000e-004 | 0.0000 | 2.5004 |
| **Total** | **0.0733** | **1.0170** | **0.7932** | **2.2800e-003** | **0.0538** | **0.0153** | **0.0690** | **0.0147** | **0.0140** | **0.0288** | **0.0000** | **209.8777** | **209.8777** | **1.8300e-003** | **0.0000** | **209.9160** |

## 3.4 Building Construction - 2015

### 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 | 0.2415 | 1.9820 | 1.2371 | 1.7700e-003 | | 0.1397 | 0.1397 | | 0.1314 | 0.1314 | 0.0000 | 161.0363 | 161.0363 | 0.0404 | 0.0000 | 161.8848 |
| **Total** | **0.2415** | **1.9820** | **1.2371** | **1.7700e-003** | | **0.1397** | **0.1397** | | **0.1314** | **0.1314** | **0.0000** | **161.0363** | **161.0363** | **0.0404** | **0.0000** | **161.8848** |

### 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 | 0.0221 | 0.1930 | 0.2538 | 4.1000e-004 | 0.0112 | 3.0800e-003 | 0.0142 | 3.1900e-003 | 2.8300e-003 | 6.0300e-003 | 0.0000 | 37.4637 | 37.4637 | 3.3000e-004 | 0.0000 | 37.4706 |
| Worker | 0.0269 | 0.0356 | 0.3412 | 7.0000e-004 | 0.0572 | 4.6000e-004 | 0.0576 | 0.0152 | 4.2000e-004 | 0.0156 | 0.0000 | 55.2009 | 55.2009 | 3.0500e-003 | 0.0000 | 55.2649 |
| **Total** | **0.0490** | **0.2286** | **0.5950** | **1.1100e-003** | **0.0683** | **3.5400e-003** | **0.0719** | **0.0184** | **3.2500e-003** | **0.0216** | **0.0000** | **92.6645** | **92.6645** | **3.3800e-003** | **0.0000** | **92.7355** |

## 3.4 Building Construction - 2015

### 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 | 0.2415 | 1.9820 | 1.2371 | 1.7700e-003 | | 0.1397 | 0.1397 | | 0.1314 | 0.1314 | 0.0000 | 161.0361 | 161.0361 | 0.0404 | 0.0000 | 161.8846 |
| **Total** | **0.2415** | **1.9820** | **1.2371** | **1.7700e-003** | | **0.1397** | **0.1397** | | **0.1314** | **0.1314** | **0.0000** | **161.0361** | **161.0361** | **0.0404** | **0.0000** | **161.8846** |

### 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 | 0.0221 | 0.1930 | 0.2538 | 4.1000e-004 | 0.0112 | 3.0800e-003 | 0.0142 | 3.1900e-003 | 2.8300e-003 | 6.0300e-003 | 0.0000 | 37.4637 | 37.4637 | 3.3000e-004 | 0.0000 | 37.4706 |
| Worker | 0.0269 | 0.0356 | 0.3412 | 7.0000e-004 | 0.0572 | 4.6000e-004 | 0.0576 | 0.0152 | 4.2000e-004 | 0.0156 | 0.0000 | 55.2009 | 55.2009 | 3.0500e-003 | 0.0000 | 55.2649 |
| **Total** | **0.0490** | **0.2286** | **0.5950** | **1.1100e-003** | **0.0683** | **3.5400e-003** | **0.0719** | **0.0184** | **3.2500e-003** | **0.0216** | **0.0000** | **92.6645** | **92.6645** | **3.3800e-003** | **0.0000** | **92.7355** |

## 3.4 Building Construction - 2016

### 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 | 0.2214 | 1.8529 | 1.2029 | 1.7400e-003 | | 0.1279 | 0.1279 | | 0.1202 | 0.1202 | 0.0000 | 157.3998 | 157.3998 | 0.0390 | 0.0000 | 158.2196 |
| **Total** | **0.2214** | **1.8529** | **1.2029** | **1.7400e-003** | | **0.1279** | **0.1279** | | **0.1202** | **0.1202** | **0.0000** | **157.3998** | **157.3998** | **0.0390** | **0.0000** | **158.2196** |

### 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 | 0.0192 | 0.1651 | 0.2313 | 4.0000e-004 | 0.0110 | 2.4300e-003 | 0.0134 | 3.1500e-003 | 2.2400e-003 | 5.3800e-003 | 0.0000 | 36.4612 | 36.4612 | 2.9000e-004 | 0.0000 | 36.4672 |
| Worker | 0.0241 | 0.0318 | 0.3032 | 6.9000e-004 | 0.0563 | 4.3000e-004 | 0.0567 | 0.0150 | 4.0000e-004 | 0.0154 | 0.0000 | 52.4612 | 52.4612 | 2.7700e-003 | 0.0000 | 52.5194 |
| **Total** | **0.0433** | **0.1969** | **0.5345** | **1.0900e-003** | **0.0673** | **2.8600e-003** | **0.0702** | **0.0181** | **2.6400e-003** | **0.0207** | **0.0000** | **88.9224** | **88.9224** | **3.0600e-003** | **0.0000** | **88.9866** |

## 3.4 Building Construction - 2016

### 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 | 0.2214 | 1.8529 | 1.2029 | 1.7400e-003 | | 0.1279 | 0.1279 | | 0.1202 | 0.1202 | 0.0000 | 157.3997 | 157.3997 | 0.0390 | 0.0000 | 158.2194 |
| **Total** | **0.2214** | **1.8529** | **1.2029** | **1.7400e-003** | | **0.1279** | **0.1279** | | **0.1202** | **0.1202** | **0.0000** | **157.3997** | **157.3997** | **0.0390** | **0.0000** | **158.2194** |

### 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 | 0.0192 | 0.1651 | 0.2313 | 4.0000e-004 | 0.0110 | 2.4300e-003 | 0.0134 | 3.1500e-003 | 2.2400e-003 | 5.3800e-003 | 0.0000 | 36.4612 | 36.4612 | 2.9000e-004 | 0.0000 | 36.4672 |
| Worker | 0.0241 | 0.0318 | 0.3032 | 6.9000e-004 | 0.0563 | 4.3000e-004 | 0.0567 | 0.0150 | 4.0000e-004 | 0.0154 | 0.0000 | 52.4612 | 52.4612 | 2.7700e-003 | 0.0000 | 52.5194 |
| **Total** | **0.0433** | **0.1969** | **0.5345** | **1.0900e-003** | **0.0673** | **2.8600e-003** | **0.0702** | **0.0181** | **2.6400e-003** | **0.0207** | **0.0000** | **88.9224** | **88.9224** | **3.0600e-003** | **0.0000** | **88.9866** |

## 3.5 Paving - 2015

### 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 | 0.1294 | 1.3402 | 0.8368 | 1.2300e-003 | | 0.0808 | 0.0808 | | 0.0745 | 0.0745 | 0.0000 | 115.0368 | 115.0368 | 0.0335 | 0.0000 | 115.7395 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **0.1294** | **1.3402** | **0.8368** | **1.2300e-003** | | **0.0808** | **0.0808** | | **0.0745** | **0.0745** | **0.0000** | **115.0368** | **115.0368** | **0.0335** | **0.0000** | **115.7395** |

### 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 | 4.9800e-003 | 6.5900e-003 | 0.0632 | 1.3000e-004 | 0.0106 | 9.0000e-005 | 0.0107 | 2.8100e-003 | 8.0000e-005 | 2.8900e-003 | 0.0000 | 10.2224 | 10.2224 | 5.6000e-004 | 0.0000 | 10.2343 |
| **Total** | **4.9800e-003** | **6.5900e-003** | **0.0632** | **1.3000e-004** | **0.0106** | **9.0000e-005** | **0.0107** | **2.8100e-003** | **8.0000e-005** | **2.8900e-003** | **0.0000** | **10.2224** | **10.2224** | **5.6000e-004** | **0.0000** | **10.2343** |

## 3.5 Paving - 2015

### 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 | 0.1294 | 1.3402 | 0.8368 | 1.2300e-003 | | 0.0808 | 0.0808 | | 0.0745 | 0.0745 | 0.0000 | 115.0367 | 115.0367 | 0.0335 | 0.0000 | 115.7394 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **0.1294** | **1.3402** | **0.8368** | **1.2300e-003** | | **0.0808** | **0.0808** | | **0.0745** | **0.0745** | **0.0000** | **115.0367** | **115.0367** | **0.0335** | **0.0000** | **115.7394** |

### 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 | 4.9800e-003 | 6.5900e-003 | 0.0632 | 1.3000e-004 | 0.0106 | 9.0000e-005 | 0.0107 | 2.8100e-003 | 8.0000e-005 | 2.8900e-003 | 0.0000 | 10.2224 | 10.2224 | 5.6000e-004 | 0.0000 | 10.2343 |
| **Total** | **4.9800e-003** | **6.5900e-003** | **0.0632** | **1.3000e-004** | **0.0106** | **9.0000e-005** | **0.0107** | **2.8100e-003** | **8.0000e-005** | **2.8900e-003** | **0.0000** | **10.2224** | **10.2224** | **5.6000e-004** | **0.0000** | **10.2343** |

## 3.5 Paving - 2016

### 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 | 0.1167 | 1.1922 | 0.8166 | 1.2100e-003 | | 0.0719 | 0.0719 | | 0.0663 | 0.0663 | 0.0000 | 112.1683 | 112.1683 | 0.0330 | 0.0000 | 112.8602 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **0.1167** | **1.1922** | **0.8166** | **1.2100e-003** | | **0.0719** | **0.0719** | | **0.0663** | **0.0663** | **0.0000** | **112.1683** | **112.1683** | **0.0330** | **0.0000** | **112.8602** |

### 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 | 4.4600e-003 | 5.8900e-003 | 0.0562 | 1.3000e-004 | 0.0104 | 8.0000e-005 | 0.0105 | 2.7700e-003 | 7.0000e-005 | 2.8400e-003 | 0.0000 | 9.7150 | 9.7150 | 5.1000e-004 | 0.0000 | 9.7258 |
| **Total** | **4.4600e-003** | **5.8900e-003** | **0.0562** | **1.3000e-004** | **0.0104** | **8.0000e-005** | **0.0105** | **2.7700e-003** | **7.0000e-005** | **2.8400e-003** | **0.0000** | **9.7150** | **9.7150** | **5.1000e-004** | **0.0000** | **9.7258** |

### 3.5 Paving - 2016

**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 | 0.1167 | 1.1922 | 0.8166 | 1.2100e-003 | | 0.0719 | 0.0719 | | 0.0663 | 0.0663 | 0.0000 | 112.1682 | 112.1682 | 0.0330 | 0.0000 | 112.8601 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **0.1167** | **1.1922** | **0.8166** | **1.2100e-003** | | **0.0719** | **0.0719** | | **0.0663** | **0.0663** | **0.0000** | **112.1682** | **112.1682** | **0.0330** | **0.0000** | **112.8601** |

**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 | 4.4600e-003 | 5.8900e-003 | 0.0562 | 1.3000e-004 | 0.0104 | 8.0000e-005 | 0.0105 | 2.7700e-003 | 7.0000e-005 | 2.8400e-003 | 0.0000 | 9.7150 | 9.7150 | 5.1000e-004 | 0.0000 | 9.7258 |
| **Total** | **4.4600e-003** | **5.8900e-003** | **0.0562** | **1.3000e-004** | **0.0104** | **8.0000e-005** | **0.0105** | **2.7700e-003** | **7.0000e-005** | **2.8400e-003** | **0.0000** | **9.7150** | **9.7150** | **5.1000e-004** | **0.0000** | **9.7258** |

## 4.0 Operational Detail - Mobile

## 4.1 Mitigation Measures Mobile

| | 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 | 0.3976 | 0.9612 | 4.2700 | 8.8900e-003 | 0.6120 | 0.0121 | 0.6241 | 0.1637 | 0.0111 | 0.1748 | 0.0000 | 703.5845 | 703.5845 | 0.0306 | 0.0000 | 704.2261 |
| Unmitigated | 0.3976 | 0.9612 | 4.2700 | 8.8900e-003 | 0.6120 | 0.0121 | 0.6241 | 0.1637 | 0.0111 | 0.1748 | 0.0000 | 703.5845 | 703.5845 | 0.0306 | 0.0000 | 704.2261 |

## 4.2 Trip Summary Information

| | Average Daily Trip Rate | | | Unmitigated | Mitigated |
|---|---|---|---|---|---|
| Land Use | Weekday | Saturday | Sunday | Annual VMT | Annual VMT |
| Apartments Mid Rise | 570.00 | 570.00 | 570.00 | 1,627,523 | 1,627,523 |
| Enclosed Parking Structure | 0.00 | 0.00 | 0.00 | | |
| Total | 570.00 | 570.00 | 570.00 | 1,627,523 | 1,627,523 |

## 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 |
| Apartments Mid Rise | 10.80 | 7.30 | 7.50 | 41.60 | 18.80 | 39.60 | 86 | 11 | 3 |
| Enclosed Parking Structure | 9.50 | 7.30 | 7.30 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 |

| LDA | LDT1 | LDT2 | MDV | LHD1 | LHD2 | MHD | HHD | OBUS | UBUS | MCY | SBUS | MH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.510118 | 0.073510 | 0.192396 | 0.133166 | 0.036737 | 0.005265 | 0.012605 | 0.021642 | 0.001847 | 0.002083 | 0.006548 | 0.000610 | 0.003471 |

## 5.0 Energy Detail

Historical Energy Use: N

### 5.1 Mitigation Measures Energy

Exceed Title 24

Install Energy Efficient Appliances

| | 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Electricity Unmitigated | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| NaturalGas Mitigated | 2.5100e-003 | 0.0215 | 9.1400e-003 | 1.4000e-004 | | 1.7400e-003 | 1.7400e-003 | | 1.7400e-003 | 1.7400e-003 | 0.0000 | 24.8885 | 24.8885 | 4.8000e-004 | 4.6000e-004 | 25.0400 |
| NaturalGas Unmitigated | 2.8100e-003 | 0.0240 | 0.0102 | 1.5000e-004 | | 1.9400e-003 | 1.9400e-003 | | 1.9400e-003 | 1.9400e-003 | 0.0000 | 27.7937 | 27.7937 | 5.3000e-004 | 5.1000e-004 | 27.9629 |

## 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 | | | | | |
| Enclosed Parking Structure | 0 | 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 |
| Apartments Mid Rise | 520835 | 2.8100e-003 | 0.0240 | 0.0102 | 1.5000e-004 | | 1.9400e-003 | 1.9400e-003 | | 1.9400e-003 | 1.9400e-003 | 0.0000 | 27.7937 | 27.7937 | 5.3000e-004 | 5.1000e-004 | 27.9629 |
| **Total** | | **2.8100e-003** | **0.0240** | **0.0102** | **1.5000e-004** | | **1.9400e-003** | **1.9400e-003** | | **1.9400e-003** | **1.9400e-003** | **0.0000** | **27.7937** | **27.7937** | **5.3000e-004** | **5.1000e-004** | **27.9629** |

### 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 | | | | | |
| Apartments Mid Rise | 466393 | 2.5100e-003 | 0.0215 | 9.1400e-003 | 1.4000e-004 | | 1.7400e-003 | 1.7400e-003 | | 1.7400e-003 | 1.7400e-003 | 0.0000 | 24.8885 | 24.8885 | 4.8000e-004 | 4.6000e-004 | 25.0400 |
| Enclosed Parking Structure | 0 | 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 |
| **Total** | | **2.5100e-003** | **0.0215** | **9.1400e-003** | **1.4000e-004** | | **1.7400e-003** | **1.7400e-003** | | **1.7400e-003** | **1.7400e-003** | **0.0000** | **24.8885** | **24.8885** | **4.8000e-004** | **4.6000e-004** | **25.0400** |

## 5.3 Energy by Land Use - Electricity

**Unmitigated**

| | Electricity Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | kWh/yr | MT/yr | | | |
| Apartments Mid Rise | 328327 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Enclosed Parking Structure | 623560 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | | **0.0000** | **0.0000** | **0.0000** | **0.0000** |

**Mitigated**

| | Electricity Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | kWh/yr | MT/yr | | | |
| Apartments Mid Rise | 315498 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Enclosed Parking Structure | 567582 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | | **0.0000** | **0.0000** | **0.0000** | **0.0000** |

# 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 | 1.0245 | 8.3900e-003 | 0.7175 | 4.0000e-005 | | 3.8700e-003 | 3.8700e-003 | | 3.8700e-003 | 3.8700e-003 | 0.0000 | 1.1565 | 1.1565 | 1.1900e-003 | 0.0000 | 1.1814 |
| Unmitigated | 1.0245 | 8.3900e-003 | 0.7175 | 4.0000e-005 | | 3.8700e-003 | 3.8700e-003 | | 3.8700e-003 | 3.8700e-003 | 0.0000 | 1.1565 | 1.1565 | 1.1900e-003 | 0.0000 | 1.1814 |

## 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 | 0.2589 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Consumer Products | 0.7428 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Hearth | 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 |
| Landscaping | 0.0227 | 8.3900e-003 | 0.7175 | 4.0000e-005 | | 3.8700e-003 | 3.8700e-003 | | 3.8700e-003 | 3.8700e-003 | 0.0000 | 1.1565 | 1.1565 | 1.1900e-003 | 0.0000 | 1.1814 |
| **Total** | **1.0245** | **8.3900e-003** | **0.7175** | **4.0000e-005** | | **3.8700e-003** | **3.8700e-003** | | **3.8700e-003** | **3.8700e-003** | **0.0000** | **1.1565** | **1.1565** | **1.1900e-003** | **0.0000** | **1.1814** |

### 6.2 Area by SubCategory

**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 | 0.2589 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Consumer Products | 0.7428 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Hearth | 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 |
| Landscaping | 0.0227 | 8.3900e-003 | 0.7175 | 4.0000e-005 | | 3.8700e-003 | 3.8700e-003 | | 3.8700e-003 | 3.8700e-003 | 0.0000 | 1.1565 | 1.1565 | 1.1900e-003 | 0.0000 | 1.1814 |
| **Total** | **1.0245** | **8.3900e-003** | **0.7175** | **4.0000e-005** | | **3.8700e-003** | **3.8700e-003** | | **3.8700e-003** | **3.8700e-003** | **0.0000** | **1.1565** | **1.1565** | **1.1900e-003** | **0.0000** | **1.1814** |

## 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 | 1.5710 | 0.1614 | 3.8100e-003 | 6.1404 |
| Unmitigated | 1.9637 | 0.2017 | 4.7600e-003 | 7.6755 |

## 7.2 Water by Land Use

**Unmitigated**

| | Indoor/Outdoor Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | Mgal | MT/yr | | | |
| Apartments Mid Rise | 6.18963 / 3.90216 | 1.9637 | 0.2017 | 4.7600e-003 | 7.6755 |
| Enclosed Parking Structure | 0 / 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | | **1.9637** | **0.2017** | **4.7600e-003** | **7.6755** |

### 7.2 Water by Land Use

**Mitigated**

| | Indoor/Outdoor Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | Mgal | MT/yr | | | |
| Apartments Mid Rise | 4.95171 / 3.66413 | 1.5710 | 0.1614 | 3.8100e-003 | 6.1404 |
| Enclosed Parking Structure | 0 / 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | | **1.5710** | **0.1614** | **3.8100e-003** | **6.1404** |

## 8.0 Waste Detail

### 8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

**Category/Year**

| | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|
| | MT/yr | | | |
| Mitigated | 4.4354 | 0.2621 | 0.0000 | 9.9399 |
| Unmitigated | 8.8707 | 0.5242 | 0.0000 | 19.8798 |

## 8.2 Waste by Land Use

**Unmitigated**

| | Waste Disposed | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | tons | MT/yr | | | |
| Apartments Mid Rise | 43.7 | 8.8707 | 0.5242 | 0.0000 | 19.8798 |
| Enclosed Parking Structure | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | | **8.8707** | **0.5242** | **0.0000** | **19.8798** |

**Mitigated**

| | Waste Disposed | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | tons | MT/yr | | | |
| Apartments Mid Rise | 21.85 | 4.4354 | 0.2621 | 0.0000 | 9.9399 |
| Enclosed Parking Structure | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | | **4.4354** | **0.2621** | **0.0000** | **9.9399** |

## 9.0 Operational Offroad

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

## 10.0 Vegetation