3.3 GREENHOUSE GAS EMISSIONS

This chapter describes the proposed project's potential impact related to construction and operational greenhouse gas (GHG) emissions, as well as the proposed project's consistency with applicable GHG emissions and climate change legislation.

3.3.1 ENVIRONMENTAL SETTING

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. A portion of the solar radiation that enters the earth's atmosphere is absorbed by the earth's surface, and a smaller portion of this radiation is reflected back towards space. This infrared radiation (i.e., thermal heat) is absorbed by GHGs within the earth's atmosphere. As a result, infrared radiation released from the earth that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the "greenhouse effect," is responsible for maintaining a habitable climate on the earth.

GHGs are present in the atmosphere naturally, are released by natural and anthropogenic sources, and are formed from secondary reactions taking place in the atmosphere. Natural sources of GHGs include the respiration of humans, animals and plants, decomposition of organic matter and evaporation from the oceans. Anthropogenic sources include the combustion of fossil fuels, waste treatment, and agricultural processes. The following are GHGs that are widely accepted as the principal contributors to human-induced global climate change:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Sulfur Hexafluoride (SF_6)

Global warming potential (GWP) is a concept developed to compare the ability of each GHG to trap heat in the atmosphere relative to CO_2. The GWP of a GHG is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and length of time (i.e., lifetime) that the gas remains in the atmosphere ("atmospheric lifetime"). The reference gas for GWP is CO_2; therefore, CO_2 has a GWP of 1. The other main GHGs that have been attributed to human activity include CH_4, which has a GWP of 21, and N_2O, which has a GWP of 310.[1] For example, 1 ton of CH_4 has the same contribution to the greenhouse effect as approximately 21 tons of CO_2. GHGs with lower emissions rates than CO_2 may still contribute to climate change, because they are more effective at absorbing outgoing infrared radiation than CO_2 (i.e., high GWP). The concept of CO_2-equivalents (CO_2e) is used to account for the different GWP potentials of GHGs to absorb infrared radiation.

[1] United Nations Framework Convention on Climate Change. 2012.

GHG emissions related to human activities have been determined to be highly likely responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's atmosphere and oceans, with corresponding effects on global circulation patterns and climate.[2] Similarly, impacts of GHGs are borne globally, as opposed to the more localized air quality effects of criteria air pollutants and toxic air contaminants (TACs). The quantity of GHGs that it takes to ultimately result in climate change is not precisely known; however, no single project alone is expected to measurably contribute to a noticeable incremental change in the global average temperature, or to a global, local, or micro climate. From the standpoint of the CEQA, GHG impacts to global climate change are inherently cumulative.

GREENHOUSE GAS EMISSION SOURCES

GHG emissions contributing to global climate change are attributable in large part to human activities associated with the transportation, industrial/manufacturing, electric utility, residential, commercial, and agricultural sectors. Emissions of CO_2 are byproducts of fossil fuel combustion, and CH_4, a highly potent GHG, is the primary component in natural gas and is associated with agricultural practices and landfills. N_2O is also largely attributable to agricultural practices and soil management.

For purposes of accounting for and regulating GHG emissions, sources of GHG emissions are grouped into emissions sectors. CARB identifies the following main GHG emissions sectors that account for most anthropogenic GHG emissions generated within California:

- *Transportation:* On-road motor vehicles, recreational vehicles, aviation, ships, and rail
- *Electricity:* Use and production of electrical energy
- *Industry:* Mainly stationary sources (e.g., boilers and engines) associated with process emissions
- *Commercial and Residential:* Area sources, such as landscape maintenance equipment, fireplaces, and consumption of natural gas for space and water heating
- *Agriculture:* Agricultural sources that include off-road farm equipment; irrigation pumps; crop residue burning (CO_2); and emissions from flooded soils, livestock waste, crop residue decomposition, and fertilizer volatilization (CH_4 and N_2O)
- *High GWP Gases:* Refrigerants for stationary and mobile source air conditioning and refrigeration, electrical insulation (e.g., SF_6), and various consumer products that use pressurized containers.
- *Recycling and Waste:* Waste management facilities and landfills; primary emissions are CO_2 from combustion and CH_4 from landfills and wastewater treatment

[2] Intergovernmental Panel on Climate Change. 2007.

STATE GREENHOUSE GAS EMISSIONS INVENTORY

CARB performs an annual GHG inventory for emissions and sinks of the six major GHGs. As shown in Figure 3.3-1, California produced 451.6 million metric tons (MMT) of CO_2e in 2010.[3] Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions in 2010, accounting for 38 percent of total GHG emissions in the state. The transportation sector was followed by the electric power sector, which accounts for 23 percent of total GHG emissions in the state (including in- and out-of-state sources), and the industrial sector, which accounts for 21 percent of total GHG emissions in the state.[4]

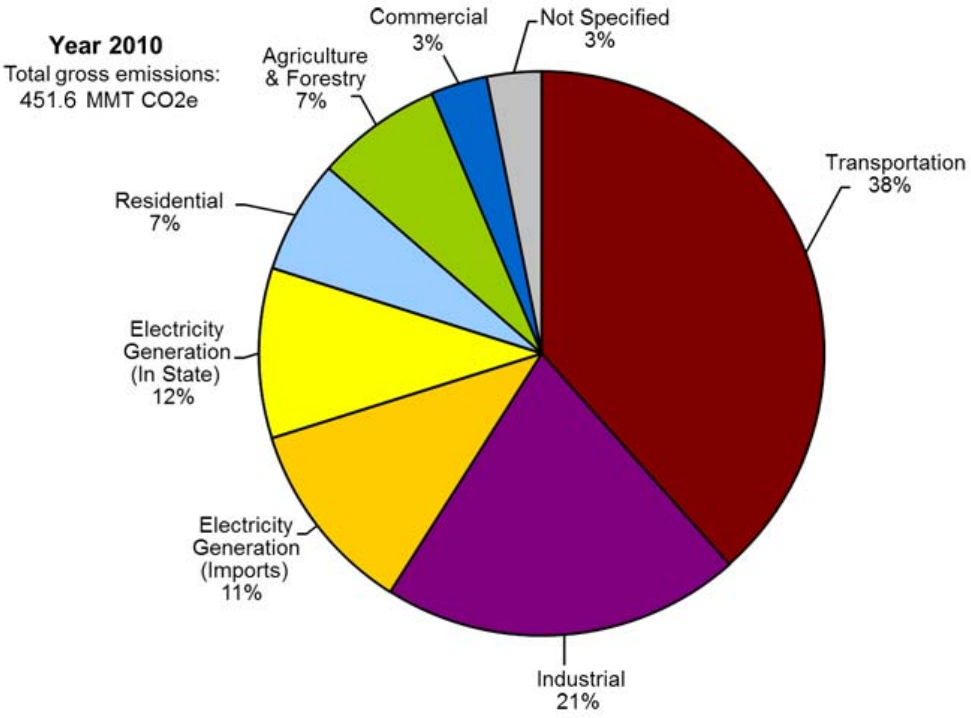

FIGURE 3.3-1
2010 CALIFORNIA GHG EMISSIONS BY SECTOR

[3] Air Resources Board. 2013.

[4] California Air Resources Board. 2013.

3.3.2 REGULATORY SETTING

FEDERAL

Executive Order S-3-05

The goal of this Executive Order, signed on June 1, 2005, by Governor Arnold Schwarzenegger, is to reduce California's GHG emissions to (1) 2000 levels by 2010, (2) 1990 levels by 2020 and (3) 80 percent below the 1990 levels by the year 2050. In 2006, this goal was further reinforced with the passage of Assembly Bill (AB) 32.

STATE

AB 32 - Global Warming Solutions Act of 2006

AB 32, the California Global Warming Solutions Act of 2006, was signed in September 2006. AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and gives conditions to ensure that businesses and consumers are not unfairly affected by the reductions. Executive Order S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the State's Climate Action Team.

Senate Bill 97 (Chapter 185, 2007)

Senate Bill (SB) 97, signed August 2007, acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. SB 97 required the Governor's Office of Planning and Research to develop recommended amendments to the CEQA Guidelines for addressing GHG emissions. The Amendments became effective on March 18, 2010.

Climate Change Scoping Plan

In December 2008, CARB adopted its *Climate Change Scoping Plan* (Scoping Plan), which contains the main strategies California will implement to achieve the required GHG reductions required by AB 32. The Scoping Plan states that local governments are "essential partners" in the effort to reduce GHG emissions.[5] CARB also acknowledges that local governments have broad influence and, in some cases, exclusive jurisdiction over activities that contribute to significant direct and indirect GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and

[5] Ibid.

municipal operations. Many of the proposed measures to reduce GHG emissions rely on local government actions.

SCAQMD Regulation XXVII

In December 2008, the SCAQMD adopted Regulation XXVII, which includes Rules 2701 and 2702. These rules offer definitions and a table for conversion to CO_2e, and set up the procedures to generate GHG emissions reductions that follow pre-approved protocols. In February 2009, the SCAQMD adopted Rule 2702 as part of the regulation, and included mechanisms to recognize and quantify voluntary reductions. The SCAQMD amended the regulation in June 2010 to (1) change Rule 2702 so protocols can be added without CARB approval; (2) update the forest, urban forest projects, and manure management protocols to the latest versions; (3) limit forestry projects to include only reforestation and forestry maintenance projects without harvesting; and (4) add a boiler and process heater efficiency protocol to the approved protocol list.

LOCAL

Long Beach Unified School District

In 2008, LBUSD approved the Facility Master Plan (FMP) that emerged includes principles and provides guidance on how LBUSD schools can be renovated and replaced over the next 20 years. The FMP includes recommendations from the Community Advisory Committee, including a recommendation that ~~that~~ sustainable design practices be followed for renovations and new construction. The Community Advisory Committee recommended that LBUSD adopt the Collaborative High Performance Schools (CHPS) and/or LEED. In coordination with the FMP, LBUSD enacted Resolution No. 012208-B to address sustainability guidelines associated with the CHPS program. Resolution No. 012208-B ensures that "every new school, new building, modernization project, and relocatable classroom…meet or exceed minimum eligibility under CHPS criteria and incorporate to the extent feasible CHPS best practices."

City of Long Beach General Plan

The City's General Plan does not include any policies that directly address GHG emissions. However, the Air Quality Element of the General Plan contains goals, policies, and actions that relate to the reduction of GHG emissions associated with the proposed project:

- *Goal 7.0*. Reduced emissions through reduced energy consumption.
- *Policy 7.1*. Reduce energy consumption through conservation improvements and requirements.
- *Action 7.1.4*. Encourage the incorporation of energy conservation features in the design of all new construction.

3.3.3 ENVIRONMENTAL IMPACTS

THRESHOLDS OF SIGNIFICANCE

Pursuant to the CEQA Guidelines, the proposed project would have a significant effect on GHG emissions and its incremental contribution to global climate change if it would:

- Generate GHG emissions, either directly or indirectly, that may have a significant effect on the environment; and/or

- Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of GHGs.

At the time of this analysis, the SCAQMD has only adopted a significance threshold of 10,000 metric tons of CO_2 per year for industrial projects. The SCAQMD has not adopted GHG thresholds of significance for residential, commercial, or mixed use projects. In 2009, the GHG CEQA Significance Threshold Stakeholder Working Group recommended options for evaluating non-industrial projects including thresholds for residential, commercial, and mixed use projects. The draft thresholds released by the SCAQMD include possible thresholds of 3,000 MT CO_2e per year for all non-industrial projects and use an efficiency metric of 4.8 MT CO_2e per "service population" per year. Service population is defined as the sum of the residential population and employees for a project. The total estimated GHG emissions are divided by the service population to estimate the GHG efficiency metric. These thresholds were never adopted, but are considered applicable for the proposed project for the purpose of this analysis.

The SCAQMD recommends that construction emissions associated with a project be amortized over the life of the project (typically 30 years) and added to the operational emissions. Therefore, this analysis includes a quantification of total modeled construction-related GHG emissions. Those emissions are then amortized and evaluated as a component of the proposed project's operational emissions over the 30-year life of the project.

METHODOLOGY

Construction-related emissions associated with construction activities were modeled using the California Emissions Estimator Model (CalEEMod), Version 2013.2. Construction-generated GHG emissions were modeled based on general land use information and construction period information provided in Chapter 2.0, Project Description of this EIR. CalEEMod allows the user to enter project-specific construction information, such as types, number and horsepower of construction equipment, and number and length of off-site motor vehicle trips. The construction period for the proposed project was input into CalEEMod to estimate total construction-related emissions. Construction-related exhaust emissions for the proposed project were estimated for construction worker commutes, haul trucks, and the use of off-road equipment. The CalEEMod input data, included in this EIR as Appendix B, lists the assumed equipment to be used for project construction, the duration of each phase, and changes to default settings that were made for project-specific conditions.

After construction, day-to-day activities associated with operation of the project would generate emissions from a variety of sources. Operational GHG emissions were also estimated using CalEEMod. CalEEMod estimates operational GHG emissions associated with development of a project, including transportation, electricity, natural gas, solid waste, water and wastewater, and area source (e.g., landscaping) emissions. Since the project site is currently operating as a high school, the estimated emissions are based on the impacts of the proposed project's net increase in emissions compared to existing conditions. The proposed project would include an additional approximately 90,000 square feet of academic buildings compared to existing conditions. Therefore, this analysis evaluates the net change in operational emissions associated with the additional approximately 90,000 square feet of academic buildings. Vehicle fleet characteristics, energy consumption, waste generation, and water use and wastewater generation data specific to Los Angeles County, or project-specific data, were used in place of CalEEMod defaults, where available.

IMPACT ANALYSIS

GHG-1 *The proposed project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. This impact would be less than significant.*

Construction of the proposed project would generate GHG emissions. Heavy-duty off-road equipment, material transport, and worker commutes during construction of the proposed project would result in exhaust-related GHG emissions. GHG emissions generated by construction activities would be primarily in the form of CO_2. Although emissions of other GHGs, such as CH_4 and N_2O, are important with respect to global climate change, the emission levels of these other GHGs from on- and off-road vehicles used during construction are relatively small compared with CO_2 emissions, even when factoring in the relatively larger global warming potential of CH_4 and N_2O. However, if appropriate emission factors were available, emissions of CH_4 and N_2O were included in the analysis of the proposed project. As shown in Table 3.3-1, total project construction emissions would be approximately 4,993MT CO_2e.

TABLE 3.3-1
ESTIMATED CONSTRUCTION-RELATED GHG EMISSIONS

Phase	CO_2e (Metric Tons per Year)
Phase 1A	288
Phase 1B	915
Phase 1C	1,035
Phase 2A	101
Phase 2B	685
Phase 3	387
Phase 4	355
Phase 5	492
Phase 6	735
Total	4,993

Source: Estimated by AECOM in 2013.

Table 3.3-2 summarizes the annual existing and proposed operational emissions and amortized construction GHG emissions and compares the net increase in emissions to the proposed SCAQMD threshold of 3,000 MT CO_2e per year.

TABLE 3.3-2
ESTIMATED OPERATIONAL GHG EMISSIONS

	CO_2e (Metric Tons per Year)
Existing Operational Emissions	8,594
Proposed Project Operational Emissions	9,165
Net Change	571
Amortized Construction Emissions	166
Total GHG Emissions	737
SCAMQD Proposed Threshold	3,000
Exceed Significance Threshold?	NO

Source: Estimated by AECOM in 2013.

As shown in Table 3.3-2, the project-related amortized construction and annual operational GHG emissions are below the proposed SCAQMD threshold. Therefore, the impact would be less than significant.

GHG-2 *The proposed project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases. The impact would be less than significant.*

The California Global Warming Solutions Act establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and establishes a cap on statewide GHG emissions. CARB's Scoping Plan includes measures to achieve the GHG reductions in California required by the California Global Warming Solutions Act. Measures included in the Scoping Plan would indirectly address GHG emissions levels associated with construction activities, including the phasing-in of cleaner technology for diesel engine fleets (including construction equipment) and the development of a low-carbon fuel standard. Policies formulated under the mandate of the California Global Warming Solutions Act that are applicable to construction-related activity, either directly or indirectly, are assumed to be implemented statewide and would affect the proposed project if those policies are implemented before construction begins. The proposed project's construction emissions would comply with any mandate or standards set forth by the Scoping Plan. Therefore, it is assumed that project construction would not conflict with the Scoping Plan.

Consistent with sustainability goals of the Scoping Plan, the LBUSD has enacted Resolution No. 012208-B to address sustainability guidelines associated with the CHPS. The mission of the CHPS is to facilitate the design, construction and operation of high performance schools that include energy and resource-efficient environments, as well as amenities for a quality education. The goals of CHPS are to: increase student performance with better-designed and healthier facilities; raise awareness of the impact and advantages of high performance schools; provide professionals with better tools to facilitate effective

design, construction and maintenance of high performance schools; increase school energy and resource efficiency; and reduce peak electric loads. Therefore, the CHPS criteria include several requirements that would be consistent with the goals of the Scoping Plan to reduce GHG emissions and increase energy and resource efficiency.

As discussed earlier, the proposed project would not generate a level of GHG emissions that would have a significant impact on the environment and would not be expected to conflict with existing California and local GHG reduction plans adopted to reduce statewide GHG emissions. Therefore, proposed project would not conflict with any applicable plan, policy, or regulation for the purpose of reducing GHG emissions. The impact would be less than significant.

3.3.4 Mitigation Measures

Impacts to GHG emissions would be less than significant. Therefore, no mitigation measures are required.

3.3.5 Level of Significance After Mitigation

Not applicable.

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