3.3 Greenhouse Gas Emissions

3.3.1 Overview

This section describes the existing air quality conditions and applicable laws and regulations associated with air quality, as well as an analysis of the potential effects resulting from implementation of the proposed project. Information contained in this section is summarized from the *Air Quality and Greenhouse Gas Technical Memorandum* (Appendix B).

3.3.2 Environmental Setting

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system. An ever-increasing body of scientific research attributes these climatological changes to GHG emissions, particularly those generated from the production and use of fossil fuels.

While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change by the United Nations and World Meteorological Organization in 1988 has led to increased efforts devoted to GHG emissions reduction and climate change research and policy. These efforts are primarily concerned with the emissions of GHGs generated by human activity, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride (SF_6), HFC-23 (fluoroform), HFC-134a (1,1,1,2-tetrafluoroethane), and HFC-152a (difluoroethane).

In the U.S., the main source of GHG emissions is electricity generation, followed by transportation. In California, transportation sources (including passenger cars, light-duty trucks, other trucks, buses, and motorcycles) make up the largest source of GHG-emitting sources. The dominant GHG emitted is CO_2, mostly from fossil fuel combustion.

There are typically two terms used when discussing the impacts of climate change: “Greenhouse Gas Mitigation” and “Adaptation.” "Greenhouse Gas Mitigation" is a term for reducing GHG emissions to reduce or "mitigate" the impacts of climate change. “Adaptation" refers to the effort of planning for, and adapting to, impacts resulting from climate change, such as adjusting transportation design standards to withstand more intense storms and higher sea levels.

There are four primary strategies for reducing GHG emissions from transportation sources: 1) improving the transportation system and operational efficiencies; 2) reducing travel activity; 3) transitioning to lower GHG-emitting fuels; and 4) improving vehicle technologies/efficiency. To be most effective, all four strategies should be pursued cooperatively.

GHGs vary considerably in terms of global warming potential (GWP), which is a concept developed to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. The GWP is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and length of time that the gas remains in the atmosphere (“atmospheric lifetime”). The GWP of each gas is measured relative to CO_2, the most abundant GHG. The definition of GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to the ratio of heat trapped by one unit mass of CO_2 over a specified time period. GHG emissions are typically measured in terms of pounds or tons of CO_2 equivalents (CO_2e). Table 3.3-1 shows the GWPs for each type of GHG. For example, SF_6 is 23,900 times more potent at contributing to global warming than CO_2.

Table 3.3-1. Global Warming Potential of Greenhouse Gases

Gas	Atmospheric Lifetime (Years)	GWP (100-year Time Horizon)
CO_2	50–200	1
CH_4	12	21
N_2O	114	310
HFC-23	270	11,700
HFC-134a	14	1,300
HFC-152a	1.4	140
PFC: CF_4	50,000	6,500
PFC: C_2F_6	10,000	9,200
SF_6	3,200	23,900

Source: Intergovernmental Panel on Climate Change 2007

Notes:
C_2F_6=hexafluoromethane; CF_4=tetrafluoromethane; CH_4=methane; CO_2=Carbon Dioxide; HFC-23=fluoroform; HFC-134a=1,1,1,2-tetrafluoroethane; HFC-152a=difluoroethane; GWP=global warming potential; N_2O=nitrous oxide; PFC=perfluorocarbons ; SF_6=sulfur hexafluoride

3.3.3 Regulatory Framework

Table 3.3-2 identifies and summarizes laws, regulations, and plans relative to GHG emissions.

Table 3.3-2. Applicable Laws, Regulations, and Plans for Greenhouse Gas Emissions

Laws, Regulation, or Plan	Description
State	
EO S-3-05 – Statewide GHG Emissions Target	EO S-3-05 was issued to reduce California's GHG emissions to: (1) 2000 levels by 2010; (2) 1990 levels by the 2020; and (3) 80 percent below the 1990 levels by 2050. EOs are binding only on state agencies. Accordingly, EO S-03-05 will guide state agencies' efforts to control and regulate GHG emissions but will have no direct binding effect on local government or private actions.
EO B-55-18	EO S-3-05 was expanded upon by EO B-55-18, which was issued by the Governor in 2018. EO B-55-18 creates a goal of statewide carbon neutrality by 2045 and to achieve and maintain net negative emissions thereafter. Future scoping plans would be required to identify measures to achieve the carbon neutrality goal.
AB 32 – California Global Warming Solutions Act	In 2006, AB 32, the Global Warming Solutions Act of 2006, was adopted and set the 2020 GHG emissions reduction goal into law. CARB is tasked with the responsibility of monitoring and reducing GHG emissions pursuant to the guidelines of AB 32.

Table 3.3-2. Applicable Laws, Regulations, and Plans for Greenhouse Gas Emissions

Laws, Regulation, or Plan	Description
EO B-30-15	On April 20, 2015, Governor Edmund G. Brown Jr. signed EO B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. The Governor's EO aligns California's GHG reduction targets with those of leading international governments, such as the 28-nation European Union, which adopted the same target in October 2014. California is on track to meet or exceed its legislated target of reducing GHG emissions to 1990 levels by 2020, as established in the California Global Warming Solutions Act of 2006 (AB 32). California's new emission reduction target of 40 percent below 1990 levels by 2030 would make it possible to reach the ultimate goal of reducing emissions 80 percent below 1990 levels by 2050. This is in line with the scientifically established levels needed in the U.S. to limit global warming below 2°C, the warming threshold at which there would likely be major climate disruptions, such as super droughts and rising sea levels.
SB 32	SB 32 was signed into law on September 8, 2016, and expands upon AB 32 to reduce GHG emissions. SB 32 sets into law the mandated GHG emissions target of 40 percent below 1990 levels by 2030 written into EO B-30-15.
AB 1493 – Light-duty Vehicle GHG Emissions Standards	AB 1493 (Pavley) requires CARB to develop and adopt regulations that achieve "the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty truck and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the State." On September 24, 2009, CARB adopted amendments to the Pavley regulations that intend to reduce GHG emissions in new passenger vehicles from 2009 through 2016. The amendments bind California's enforcement of AB 1493 (starting in 2009), while providing vehicle manufacturers with new compliance flexibility. The amendments also prepare California to merge its rules with the federal corporate average fuel economy rules for passenger vehicles. In January 2012, CARB approved a new emissions-control program for model years 2017 through 2025. The program combines the control of smog, soot, and global warming gases and requirements for greater numbers of zero-emission vehicles into a single packet of standards called Advanced Clean Cars.
EO S-01-07	This EO, signed by Governor Schwarzenegger on January 18, 2007, directs that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by the year 2020. It orders that a low carbon fuel standard for transportation fuels be established for California and directs the CARB to determine whether a low carbon fuel standard can be adopted as a discrete early action measure pursuant to AB 32. The CARB approved the low carbon fuel standard as a discrete early action item with a regulation adopted and implemented in April 2010.
SB 97 – CEQA GHG Amendments	SB 97 acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. The California Natural Resources Agency adopted amendments to the CEQA Guidelines to address GHG emissions, consistent with the Legislature's directive in PRC Section 21083.05.
SB 743	SB 743, adopted by the California Natural Resources Agency in December 2018, changes the way that transportation impacts are analyzed under CEQA. With the amended CEQA Guidelines Section 15064.4, transportation impacts may be evaluated using VMT, VMT per capita, automobile trip generation rates, or automobile trips generated, as LOS and auto delay are no longer considered a significant impact under CEQA. Compliance with SB 743 is not mandatory until July 2020.

Table 3.3-2. Applicable Laws, Regulations, and Plans for Greenhouse Gas Emissions

Laws, Regulation, or Plan	Description
SB 375 – Sustainable Communities Act	SB 375, the Sustainable Communities Act, was passed by the State Assembly in August 2008 and signed by the Governor in September 2008. SB 375 is intended to encourage reductions in transportation-related emissions from cars and light trucks. Under SB 375, Metropolitan Planning Organizations are required to prepare and adopt a sustainable community strategy to reach emission reduction targets by linking housing needs and transportation planning with GHG reduction targets.
State of California Building Energy Efficiency Standards (Title 24, Part 6)	The California Energy Commission adopted new 2013 Building Energy Efficiency Standards effective July 1, 2014. The 2013 standards improve upon the 2008 standards for new construction of, and additions and alterations to, residential and nonresidential buildings. The 2008 standards were updated for a number of reasons, including: • To respond to AB 32, the Global Warming Solutions Act of 2006 • To pursue California energy policy that would establish energy efficiency as the resource of first choice for meeting California's energy needs • To act on the findings of California's Integrated Energy Policy Report that indicates standards in general (as opposed to incentives or other mechanisms) are the most cost- effective means to achieve energy efficiency • To meet California's commitment to include aggressive energy efficiency measures in updates of state building codes To meet California's commitment to improve the energy efficiency of nonresidential buildings through aggressive standards
SB 350	SB 350 was signed into law in September 2015. SB 350 establishes tiered increases to the renewable portfolio standard of 40 percent by 2024, 45 percent by 2027, and 50 percent by 2030. SB 350 also set a new goal to double the energy efficiency savings in electricity and natural gas through energy efficiency and conservation measures.
SB 100	SB 100, adopted in September 2018, requires the state's retail electricity to achieve a 60-percent renewable energy portfolio by 2030 (an increase from 50 percent set forth by SB 350), and 100-percent carbon-free by 2045
SLCP Reduction Strategy	This final proposed SLCP reduction strategy (SLCP Strategy) was developed pursuant to SB 605 and SB 1383 and lays out a range of options to accelerate SLCP emission reductions in California, including regulations, incentives, and other market-supporting activities. The SLCP Strategy will inform and be integrated into the upcoming 2017 Climate Change Scoping Plan update, which will incorporate input from a wide range of stakeholders to develop a comprehensive plan for achieving the SB 32 statewide 2030 GHG limit of 40 percent below 1990 levels. The process for updating the scoping plan began in fall 2015 and is scheduled for completion in 2017.
California Green Building Code	The California Green Building Standards Code (2016), referred to as CalGreen, took effect on January 1, 2017, and instituted mandatory minimum environmental performance standards for all ground-up new construction of commercial and low-rise residential buildings, state-owned buildings, schools, and hospitals.

Table 3.3-2. Applicable Laws, Regulations, and Plans for Greenhouse Gas Emissions

Laws, Regulation, or Plan	Description
Local	
City of Long Beach Climate Action and Adaptation Plan	Pursuant to California SB 379, all California cities and counties are required to include climate adaptation and resiliency strategies in their general plans to ensure safety and protection of their community in the future. Currently, the City of Long Beach is in a multi-year effort to develop a Climate Change Action and Adaptation Plan that will provide a framework for creating or updating policies, programs, practices, and incentives for Long Beach residents and businesses to reduce the city's GHG footprint, and ensure the community and physical assets are better protected from the impacts of climate change. The climate action/mitigation element of the Climate Change Action and Adaptation Plan will include the following steps: • A GHG inventory of emissions from various sectors in the Long Beach community, such as building energy, transportation, solid waste, and wastewater. • A forecast of projected emissions based on anticipated city growth. • Development of GHG reduction targets based on the latest climate science, and local, regional, State, and federal context and requirements. • Analysis of existing sustainability and climate mitigation efforts. • Development of additional GHG mitigation strategies to reduce future emissions from key sectors. • Development of a framework for implementing mitigation strategies. • A plan to monitor the performance of the mitigation strategies using performance metrics to track GHG reduction targets.
LBMC	Section 21.45.400 of the LBMC further regulates public and private development to include various standards that promote green buildings. A green building, also known as a sustainable building, is a structure that is designed, built, renovated, operated, or reused in an ecological and resource-efficient manner. Green buildings are designed to meet certain objectives such as protecting occupant health; improving employee productivity; using energy, water and other resources more efficiently; and reducing the overall impact on the environment. The City of Long Beach recognizes the benefit of green buildings and establishes a green building program.
City of Long Beach General Plan	The City of Long Beach's General Plan Mobility Element includes strategies to reduce single-occupancy vehicle trips and reduce VMT and associated GHG emissions. Policies in the General Plan Mobility Element include reducing VMT and vehicle trips through alternative modes of transportation and Transportation Demand Management; encouraging use of low- or no-emissions vehicles to reduce pollution; and supporting the development of a network of alternative fuel vehicle charging/fueling stations citywide.

Note: °C=degrees Celsius; AB=assembly bill; CARB=California Air Resources Board; CEQA=California Environmental Quality Act; EO=executive order; GHG=greenhouse gas; LBMC=Long Beach Municipal Code; LOS=level of service; PRC=Public Resources Code; SB=Senate Bill; SLCP=short-lived climate pollutant; VMT=vehicle miles traveled

3.3.4 Analysis of Impacts

Methodology

For the purposes of determining whether or not GHG emissions from affected projects are adverse, SCAQMD specifies that project emissions must include direct, indirect, and, to the extent information is available, life cycle emissions during construction and operation. Based on this direction, construction emissions were amortized over the life of the project (defined as 30 years), added to the operational emissions, and compared with the applicable GHG significance thresholds.

Thresholds of Significance

Based on CEQA Guidelines Appendix G, project impacts related to GHG emissions are considered significant if any of the following occur:

a) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment

b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs

As discussed in the IS (Appendix A), criterion (b) would result in a less than significant impact, and therefore, is not included in the analysis below.

South Coast Air Quality Management District's Greenhouse Gas Emission Threshold

The SCAQMD's interim thresholds for commercial, residential, mixed use, and industrial development projects are as follows:

- Industrial projects – 10,000 metric tons (MT) of CO_2e per year
- Residential, commercial, and mixed use projects (including parks, warehouses, etc.) – 3,000 MT CO_2e per year

The proposed business park/warehouse complex includes the construction of three industrial/manufacturing buildings with accessory office uses. As discussed in Section 3.5, Transportation, the methodology for the transportation study analyzed the trip generation under land use code manufacturing. Thus, for purposes of this analysis, both direct and indirect GHG emissions from the proposed project are discussed in the context of the 10,000 MT threshold levels.

Impact Analysis

Threshold (a) Generate greenhouse gas emissions, either directly or indirectly, that may have an adverse effect on the environment.

Construction Emissions

Construction of the project would result in temporary emissions associated with diesel engine combustion from mass grading, and site preparation construction equipment would be assumed to occur for engines running at the correct fuel-to-air ratios (the ratio whereby complete combustion of the diesel fuel occurs). Construction-related GHG emissions include site preparation, excavation, and associated construction of the proposed business park/warehouse complex.

The most recent version of the CalEEMod model (Version 2016.3.2) was used to calculate the construction emissions. Table 3.3-3 quantifies the expected GHG emissions from construction activities. As shown, construction of the proposed project would generate 745 MT of CO_2e. Amortized over a 30-year period, the approximate life of the project, the yearly contribution to GHG from the construction of the build alternatives with an at-grade concourse would be 24.9 MT of CO_2e per year.

Table 3.3-3. Construction Greenhouse Gas Emissions

Year	Pollutant Emissions (MT/year)			
	CO_2	CH_4	N_2O	CO_2e
2019	334.1	0.06	0.0	335.6
2020	410.5	0.06	0.0	412.1
Total	**744.6**	**0.12**	**0.0**	**747.7**

Notes:
CH_4=methane; CO_2=carbon dioxide; CO_2e=carbon dioxide equivalent; N_2O=nitrous oxide; MT=metric tons

Operational Emissions

The operational GHG emission estimates were also calculated using CalEEMod. The following activities associated with the project could directly or indirectly contribute to the generation of GHG emissions:

- **Gas, Electricity, and Water Use** – Natural gas use results in the emissions of two GHGs: CH_4 (the major component of natural gas) and CO_2 from the combustion of natural gas. Electricity use can result in GHG production if the electricity is generated by combusting fossil fuel. Annual electricity emissions were estimated using the reported GHG emissions per kilowatt-hour for Southern California Edison; the supplier would provide electricity for the project.
- **Solid Waste Disposal** – Solid waste generated by the project could contribute to GHG emissions in a variety of ways. Landfilling and other methods of disposal use energy for transporting and managing the waste, and they produce additional GHGs to varying degrees. Landfilling, the most common waste management practice, results in the release of CH_4 from the anaerobic decomposition of organic materials. CH_4 is 21 times more potent a GHG than CO_2. However, landfill CH_4 can also be a source of energy. In addition, many materials in landfills do not decompose fully, and the carbon that remains is sequestered in the landfill and not released into the atmosphere.
- **Motor Vehicle Use** – Transportation associated with the project would result in GHG emissions from the combustion of fossil fuels in vehicle trips. The project would result in GHG emissions through the vehicular traffic generated.
- **Combined Emissions** – The GHG emission estimates presented in Table 3.3-4 show the emissions associated with the level of development at build-out. Appendix B, *Air Quality and Greenhouse Gas Technical Memorandum,* includes the annual CalEEMod calculations for GHG emissions. Table 3.3-4 shows that project operations would result in average annual emissions of 2,290 MTs of CO_2e per year.

The total annual GHG emissions of 2,290 MT of CO_2e is less than SCAQMD's screening threshold of 10,000 MT of CO_2e per year and also less than SCAQMD's screening threshold for mixed-use projects of 3,000 MT of CO2e per year.

Table 3.3-4. Annual Greenhouse Gas Emissions

Source	Pollutant Emissions (MT/year)					
	Bio-CO_2	NBio-CO_2	CO_2	CH_4	N_2O	CO_2e
Construction Emissions Amortized over 30 Years	0.0	24.8	24.8	0.004	0.0	24.9
Operational Emissions						
Area Sources	0.0	0.0	0.0	0.0	0.0	0.0
Energy Sources	0.0	743.4	743.4	0.03	0.0	746.4
Mobile Sources	0.0	1,212.4	1,212.4	0.05	0.0	1,213.5
Waste Sources	40.4	0.0	40.4	2.4	0.0	100.2
Water Usage	11.8	154.1	165.9	1.2	0.03	205.3
Total Operational Emissions	**52.2**	**2,109.9**	**2,162.2**	**3.7**	**0.04**	**2,265.4**
Total Project Emissions	**52.2**	**2,134.7**	**2,187.0**	**3.7**	**0.04**	**2,290.3**

Notes:
Columns may not add up due to rounding.
Bio-CO_2=biogenic carbon dioxide; CH_4=methane; CO_2=carbon dioxide; CO_2e=carbon dioxide equivalent; MT=metric tons; NBio-CO_2=non-biogenic carbon dioxide; N_2O=nitrous oxide

Conclusion

Construction activities would generate GHG emissions from equipment use and transportation of workers travelling to and from the project site. The amount of GHG emissions that would be generated is not anticipated to be substantial due to the temporary nature of construction. Operation of the project would result in annual emissions of 2,265.4 MT of CO2e per year. Combined, construction and operational emissions would result in 2,290 MT of CO_2e per year, which is below SCAQMD's screening threshold of 10,000 MT of CO_2e per year for industrial projects and SCAQMD's threshold of 3,000 MT CO2e per year for commercial and mixed-use projects. Therefore, the proposed project would have a less than significant individual impact for GHG emissions.

Cumulative Impacts

As shown in Table 3.3-4, the proposed project's GHG emissions would be less than the SCAQMD's interim threshold. Therefore, the project would not contribute to a long-term cumulative GHG emission impact.

Mitigation Measures

No mitigation is required.

Level of Significance after Mitigation

Impacts would be less than significant.

This page is intentionally blank.