4.3 GLOBAL CLIMATE CHANGE

4.3.1 Introduction

This section provides a discussion of global climate change (GCC), existing regulations pertaining to GCC, and an analysis of greenhouse gas (GHG) emissions impacts associated with the construction and operation of potential development that would be allowed under the proposed City of Long Beach (City) General Plan Land Use Element and Urban Design Elements Project (proposed project). This analysis examines the short-term construction and long-term operational impacts within the planning area and evaluates the effectiveness of measures incorporated as part of the design of the proposed project. This section is based on information provided in the Air Quality Impact Analysis (LSA 2019) (Appendix B).

4.3.2 CEQA Baseline

Although the Notice of Preparation (NOP) was published in May 2015, the baseline for GCC is considered to be 2018 when the analysis for the Recirculated Draft Environmental Impact Report (EIR) was initiated. This provides an updated baseline that reflects current conditions related to GCC at the time the Recirculated Draft EIR was prepared.

4.3.3 Methodology

Climate change is a global issue and is described in the context of the cumulative environment because individual projects are unlikely to measurably affect GCC. Therefore, the project is considered in the context of multiple sectors and the combined efforts of many industries, including development.

Greenhouse gas emissions associated with implementation of the proposed project would occur over the short term from construction activities, consisting primarily of emissions from equipment exhaust. There would also be long-term GHG emissions associated with project-related vehicular trips. Recognizing that the field of GCC analysis is rapidly evolving, the most recently advocated approaches indicate that lead agencies should calculate, or estimate, emissions from vehicular traffic, energy consumption, water conveyance and treatment, waste generation, construction activities, and any other significant source of emissions within the planning area. GHG emissions expected to be released from sources within the City primarily consist of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) and are described in greater detail below. In order to develop 2018 GHG emission levels, the sectors in which GHG emissions would be emitted have been characterized below to establish the basis upon which the analysis builds on to determine the levels of carbon dioxide, methane, and nitrous oxide emissions. The GHG emission calculations prepared for purposes of this EIR include the following sectors:

- **Transportation:** On-road mobile sources, including citywide vehicle trips to and from land use development projects, and pass through traffic on freeways and arterials will result primarily in emissions of CO_2, with minor emissions of CH_4 and N_2O. Citywide, vehicle miles traveled (VMT) per capita is anticipated to decline in the future as a result of previous planning efforts and is anticipated to decline further due to the elements of the 2016 Southern California Association of Governments (SCAG) Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS).

The traffic analysis prepared for the project indicates VMT in Long Beach would be reduced from 9,482,252 VMT per day in the existing condition to 9,028,327 VMT with the proposed Land Use Element (LUE)/Urban Design Element (UDE) (a 9 percent decrease). However, VMT during off-peak times would increase slightly with the LUE as compared to the existing LUE for the horizon year. These off-peak VMT are generated by discretionary trips, which the traffic model calculates based on the number of households. In other words, the model assumes that people living in overcrowded housing conditions generate fewer trips to the grocery store than the same number of people living in less-crowded, separate housing. Because the LUE reduces overcrowding compared to the previous land use distribution, the number of discretionary trips would increase thereby increasing the off-peak VMT, and subsequently, the total VMT for the horizon year compared to the no project 2040 scenario. The existing VMT per household is 56.9 per day, which is anticipated to decline in the future to 49.9 VMT per day under the no project scenario. The efficiency of the distribution of land uses in the LUE would reduce this further to 46.1 VMT per day per household (a 19 percent decrease from existing conditions).

- **Energy:** The most significant GHG emission from natural gas usage will be CH_4. Electricity usage by future land use developments will result primarily in emissions of CO_2.

- **Waste:** Disposal of solid waste will result in emissions of CH_4 from the decomposition of waste at landfills coupled with CO_2 emission from the handling and transport of solid waste.

- **Water/Wastewater:** Indirect usage of electricity for water and wastewater conveyance will result primarily in emissions of CO_2.

- **Area Sources:** The future use of hearths, consumer products, area architectural coatings, landscaping equipment and light commercial equipment will result primarily in emissions of CO_2, with minor emissions of CH_4 and N_2O.

- **Industrial sources of emissions that require a permit from the South Coast Air Quality Management District (SCAQMD) are not included in the City's emissions inventory:** Life-cycle emissions are also not included in this analysis because not enough information is available for the proposed project and, therefore, they would be too speculative.

For purposes of this analysis, as the horizon year for the proposed project is 2040, the per service population emissions rate is evaluated to a year 2040 efficiency target. As part of the City's CAAP, although not yet adopted, a GHG Emission Reduction Target Options Memo was prepared in August 2018 and was updated in May 2019 based on more recent data and direction from the Long Beach Mayor and City Council (see Appendix B to the Air Quality Impact Analysis, which itself is included as Appendix B to this Recirculated Draft EIR). The GHG Emissions Reduction Target Options Memo provides the supporting documentation needed as substantial evidence to support the use of the identified targets for significance analysis of a GHG threshold. The Memo identifies three target options that could be used for the CAAP. Although another target option may be formally adopted, target Option D "Local Emissions Source-Based Intensity Targets", has been identified by the City and its CAAP Scientific Working Group as the preferable target because it represents per capita and per

service population[1] emissions efficiency targets for Long Beach based on the sub-set of statewide emissions sectors that are included in City's CAAP GHG emissions inventory. This target aligns with the most current guidance from the California Air Resources Board (CARB) and the Governor's Office of Planning and Research (OPR) in how it is tailored to match the emissions sectors included locally in the City's inventory. Target Option D consists of a 2040 per capita efficiency target of 2.79 metric tons (MT) of carbon dioxide equivalent (CO_2e) per year per capita (or MT CO_2e/yr/capita); or expressed another way, 1.92 MT of CO_2e per year per service population (or MT CO_2e/yr/SP). Consistent with the draft CAAP, this efficiency target will be used for purposes of determining project significance. This metric is appropriate in that it would achieve per capita emissions that align with the State's reduction goals, and would be consistent with the requirements of the Global Covenant of Mayors.

The total GHG emissions associated with the 2040 With Project Scenario is divided by the total service population associated with the anticipated General Plan build out to determine whether the proposed project would result in a significant GHG impact.

4.3.3.1 Consistency with the Statewide GHG Reduction Targets

The per service population efficiency targets are based on the 2040 reduction targets established for the CAAP and are consistent with the State's target reductions of 40 percent below 1990 levels by 2030 and the State's 2050 GHG target.[2] The following threshold is the applicable GHG threshold for the proposed project: 2040 GHG efficiency target of 1.92 MT CO_2e/yr/SP if the community GHG emissions exceed this per service population efficiency target, GHG emissions would be considered potentially significant in the absence of mitigation measures.

4.3.4 Existing Environmental Setting

4.3.4.1 Existing Project Site

The planning area is currently developed and consists of a mix of residential, commercial, medical, institutional, industrial, and open space and recreation uses. These uses currently generate criteria air pollutants from natural gas use for energy, heating and cooking, vehicle trips associated with each land use, and area sources such as landscaping equipment and consumer cleaning products.

4.3.4.2 Sensitive Uses in the Project Vicinity

Sensitive receptors in the City include residences, retirement facilities, hospitals, schools, recreational land uses, and similar uses that are sensitive to air pollutants. Construction and operation of development allowed under the LUE could adversely affect nearby sensitive land uses.

4.3.4.3 Global Climate Change

Global climate change is the observed increase in the average temperature of the Earth's atmosphere and oceans in recent decades. The Earth's average near-surface atmospheric temperature rose 0.6 ±

[1] "Per capita" refers to total citywide emissions divided by the total number of residents in the City. "Per service population" refers to total citywide emissions divided by the number of employees and the number of residents in the planning area.

[2] AECOM. 2019. *City of Long Beach Climate Action Adaptation Plan GHG Emissions Reduction Target Options Memorandum #2 – 2045 Carbon Neutrality*. May.

0.2° Celsius (°C) or 1.1 ± 0.4° Fahrenheit (°F) in the 20th century. The prevailing scientific opinion on climate change is that most of the warming observed over the last 50 years is attributable to human activities. The increased amounts of carbon dioxide (CO_2) and other GHGs are the primary causes of the human-induced component of warming. GHGs are released by the burning of fossil fuels, land clearing, agriculture, and other activities, and lead to an increase in the greenhouse effect.[3]

GHGs are present in the atmosphere naturally, are released by natural sources, or are formed from secondary reactions taking place in the atmosphere. The gases that are widely seen as the principal contributors to human-induced global climate change are:

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

Over the last 200 years, humans have caused substantial quantities of GHGs to be released into the atmosphere. These extra emissions are increasing GHG concentrations in the atmosphere, and enhancing the natural greenhouse effect, which is believed to be causing global warming. While manmade GHGs include naturally-occurring GHGs such as CO_2, methane, and N_2O, some gases, like HFCs, PFCs, and SF_6 are completely new to the atmosphere.

Certain gases, such as water vapor, are short-lived in the atmosphere. Others remain in the atmosphere for significant periods of time, contributing to climate change in the long term. Water vapor is excluded from the list of GHGs above because it is short-lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes, such as oceanic evaporation. For the purposes of this air quality analysis, the term "GHGs" will refer collectively to only the six gases listed above.

These gases vary considerably in terms of Global Warming Potential (GWP), which is a concept developed to compare the ability of each greenhouse gas to trap heat in the atmosphere relative to another gas. The global warming potential 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 carbon dioxide, 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] The temperature on Earth is regulated by a system commonly known as the "greenhouse effect." Just as the glass in a greenhouse lets heat from sunlight in and reduces the heat escaping, greenhouse gases like carbon dioxide, methane, and nitrous oxide in the atmosphere keep the Earth at a relatively even temperature. Without the greenhouse effect, the Earth would be a frozen globe; thus, although an excess of greenhouse gas results in global warming, the *naturally occurring* greenhouse effect is necessary to keep our planet at a comfortable temperature.

4.3.A shows the GWP for each type of GHG. For example, sulfur hexafluoride is 22,800 times more potent at contributing to global warming than carbon dioxide.

Table 4.3.A: Global Warming Potential of Greenhouse Gases

Gas	Atmospheric Lifetime (Years)	Global Warming Potential (100-Year Time Horizon)
Carbon Dioxide	50-200	1
Methane	12	25
Nitrous Oxide	114	298
HFC-23	270	14,800
HFC-134a	14	1,430
HFC-152a	1.4	124
PFC: Tetrafluoromethane (CF_4)	50,000	7,390
PFC: Hexafluoromethane (C_2F_6)	10,000	12,200
Sulfur Hexafluoride (SF_6)	3,200	22,800

Source: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC* (Intergovernmental Panel on Climate Change, 2007).

The following discussion summarizes the characteristics of the six GHGs and black carbon.

Carbon Dioxide. In the atmosphere, carbon generally exists in its oxidized form, as CO_2. Natural sources of CO_2 include the respiration (breathing) of humans, animals and plants, volcanic out gassing, decomposition of organic matter and evaporation from the oceans. Human caused sources of CO_2 include the combustion of fossil fuels and wood, waste incineration, mineral production, and deforestation. Natural sources release approximately 150 billion tons of CO_2 each year, far outweighing the 7 billion tons of manmade emissions of CO_2 each year. Nevertheless, natural removal processes, such as photosynthesis by land- and ocean-dwelling plant species, cannot keep pace with this extra input of manmade CO_2, and consequently, the gas is building up in the atmosphere.

In 2016, CO_2 emissions accounted for approximately 83 percent of California's overall GHG emissions.[4] The transportation sector accounted for California's largest portion of CO_2 emissions, approximately 39 percent, with gasoline consumption making up the greatest portion of these emissions. Industrial sources were California's second largest category of GHG emissions.

Methane. Methane is produced when organic matter decomposes in environments lacking sufficient oxygen. Natural sources include wetlands, termites, and oceans. Decomposition occurring in landfills accounts for the majority of human-generated CH_4 emissions in California and in the United States as a whole. Agricultural processes such as intestinal fermentation, manure management, and rice cultivation are also significant sources of CH_4 in California. Methane accounted for approximately 9.0 percent of GHG emissions in California in 2016.[5]

Total annual emissions of methane in California are approximately 38.9 million tons, with manmade emissions accounting for the majority. As with CO_2, the major removal process of atmospheric

[4] California Air Resources Board (CARB). 2018. *California Greenhouse Gas Emission Inventory – 2018 Edition*. July 11. Website: www.arb.ca.gov/cc/inventory/data/data.htm (accessed March 2019).

[5] CARB. 2018. *California Greenhouse Gas Emission Inventory – 2018 Edition*. July 11. Website: www.arb.ca.gov/cc/inventory/data/data.htm (accessed March 2019).

methane—a chemical breakdown in the atmosphere—cannot keep pace with source emissions, and methane concentrations in the atmosphere are increasing.

Nitrous Oxide. Nitrous oxide is produced naturally by a wide variety of biological sources, particularly microbial action in soils and water. Tropical soils and oceans account for the majority of natural source emissions. Nitrous oxide is a product of the reaction that occurs between nitrogen and oxygen during fuel combustion. Both mobile and stationary combustion emit N_2O, and the quantity emitted varies according to the type of fuel, technology, and pollution control device used, as well as maintenance and operating practices. Agricultural soil management and fossil fuel combustion are the primary sources of human-generated N_2O emissions in California. Nitrous oxide emissions accounted for approximately 3 percent of GHG emissions in California in 2016.[6]

Hydrofluorocarbons, Perfluorocarbons, and Sulfur Hexafluoride. HFCs are primarily used as substitutes for ozone-depleting substances regulated under the Montreal Protocol.[7] PFCs and SF_6 are emitted from various industrial processes, including aluminum smelting, semiconductor manufacturing, electric power transmission and distribution, and magnesium casting. There is no aluminum or magnesium production in California; however, the rapid growth in the semiconductor industry leads to greater use of PFCs. HFCs, PFCs, and SF_6 accounted for about 6 percent of manmade GHG emissions (CO_2e) in California in 2016.[8]

Black Carbon. Black carbon is the most strongly light-absorbing component of PM formed by burning fossil fuels such as coal, diesel, and biomass. Black carbon is emitted directly into the atmosphere in the form of and is the most effective form of PM, by mass, at absorbing solar energy. Per unit of mass in the atmosphere, black carbon can absorb a million times more energy than CO_2.[9] Black carbon contributes to climate change both directly, such as absorbing sunlight, and indirectly, such as affecting cloud formation. However, because black carbon is short-lived in the atmosphere, it can be difficult to quantify its effect on global-warming.

Most U.S. emissions of black carbon come from mobile sources (52 percent), particularly from diesel fueled vehicles. The other major source of black carbon is open biomass burning, including wildfires, although residential heating and industry also contribute. CARB estimates that the annual black carbon emissions in California have decreased approximately 70 percent between 1990 and 2010 and are expected to continue to decline significantly due to controls on mobile diesel emissions.

4.3.4.4 Effects of Global Climate Change

Effects from GCC may arise from temperature increases, climate-sensitive diseases, extreme weather 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. Heat-related problems

6 Ibid.

7 The Montreal Protocol is an international treaty that was approved on January 1, 1989, and was designated to protect the ozone layer by phasing out the production of several groups of halogenated hydrocarbons believed to be responsible for ozone depletion.

8 Ibid.

9 United States Environmental Protection Agency (USEPA). 2015. *Black Carbon*. Website: www3.epa.gov/blackcarbon/basic.html (accessed March 2019). September.

include heat rash and heat stroke. In addition, climate-sensitive diseases may increase, such as those spread by mosquitoes and other disease-carrying insects. Such diseases include malaria, dengue fever, yellow fever, and encephalitis. Extreme events such as flooding and hurricanes can displace people and agriculture. GCC may also contribute to air quality problems from increased frequency of smog and particulate air pollution.[10]

Additionally, according to the 2006 California Climate Action Team (CAT) Report,[11] the following climate change effects, which are based on trends established by the United Nations Intergovernmental Panel on Climate Change (IPCC), can be expected in California over the course of the next century:

- The loss of sea ice and mountain snow pack, resulting in higher sea levels and higher sea surface evaporation rates with a corresponding increase in tropospheric water vapor due to the atmosphere's ability to hold more water vapor at higher temperatures.[12]

- Rise in global average sea level, primarily due to thermal expansion and melting of glaciers and ice caps in the Greenland and Antarctic ice sheets.[13]

- Changes in weather that include widespread changes in precipitation, ocean salinity, wind patterns, and more energetic aspects of extreme weather, including droughts, heavy precipitation, heat waves, extreme cold, and the intensity of tropical cyclones.[14]

- Decline of the Sierra snowpack, which accounts for approximately one-half of the surface water storage in California by 70 percent to as much as 90 percent over the next 100 years.[15]

- Increase in the number of days conducive to O_3 formation by 25–85 percent (depending on the future temperature scenario) in high O_3 areas of Los Angeles and the San Joaquin Valley by the end of the 21st century.[16]

- High potential for erosion of California's coastlines and seawater intrusion into the Delta and levee systems due to the rise in sea level.[17]

A summary of these potential effects are identified in Table 4.3.B.

10 USEPA. 2016. *Climate Impacts on Human Health*. April. Website: https://www3.epa.gov/climatechange/impacts/health.html (accessed March 2019).
11 California Environmental Protection Agency (Cal/EPA). 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March.
12 Ibid.
13 Ibid.
14 IPCC. 2007. *Climate Change 2007: The Physical Science Basis, Summary for Policymakers*. February.
15 Cal/EPA. 2006. op. cit.
16 Cal/EPA. 2006. op. cit.
17 Ibid.

Table 4.3.B: Potential Impacts of Global Warming and Expected Consequences for California

Potential Water Resource Impacts	Anticipated Consequences Statewide
Reduction of the State's average annual snowpack	● Specifically, the decline of the Sierra snowpack, would lead to a loss in half of the surface water storage in California by 70% to 90% over the next 100 years ● Potential loss of 5 million acre-feet or more of average annual water storage in the State's snowpack ● Increased challenges for reservoir management and balancing the competing concerns of flood protection and water supply ● Higher surface evaporation rates with a corresponding increase in tropospheric water vapor
Rise in average sea level	● Potential economic impacts related to coastal tourism, commercial fisheries, coastal agriculture, and ports ● Increased risk of flooding, coastal erosion along the State's coastline, seawater intrusion into the Delta and levee systems
Changes in weather	● Changes in precipitation, ocean salinity, and wind patterns ● Increased likelihood for extreme weather events, including droughts, heavy precipitation, heat waves, extreme cold, and the intensity of tropical cyclones
Changes in the timing, intensity, location, amount, and variability of precipitation	● Potential increased storm intensity and increased potential for flooding ● Possible increased potential for droughts ● Long-term changes in vegetation and increased incidence of wildfires ● Changes in the intensity and timing of runoff ● Possible increased incidence of flooding and increased sedimentation ● Sea level rise and inundation of coastal marshes and estuaries ● Increased salinity intrusion into the Sacramento-San Joaquin River Delta (Delta) ● Increased potential for Delta levee failure ● Increased potential for salinity intrusion into coastal aquifers (groundwater) ● Increased potential for flooding near the mouths of rivers due to backwater effects
Increased water temperatures	● Increased environmental water demand for temperature control ● Possible increased problems with foreign invasive species in aquatic ecosystems ● Potential adverse changes in water quality, including the reduction of dissolved oxygen levels ● Possible critical effects on listed and endangered aquatic species
Changes in urban and agricultural water demand	● Changes in demand patterns and evapotranspiration
Increase in the number of days conducive to O_3 formation	● Increased temperatures ● Potential health effects, including adverse impacts to respiratory systems

Source: U.S. Department of the Interior, Environmental Water Account Draft Supplemental EIS/EIR to the Environmental Water Account Final EIS/EIR, Bureau of Reclamation Mid-Pacific Region, Sacramento, California (October 2007).
EIR = Environmental Impact Report
EIS = Environmental Impact Statement
O_3 = ozone

4.3.4.5 Effects of Rising Ocean Levels in California

Rising ocean levels, more intense coastal storms, and warmer water temperatures may increasingly threaten the Long Beach coastal region. As previously described, global surface temperatures have

increased by 1.5 degrees Fahrenheit (°F) during the period from 1880 to 2012, with temperatures anticipated to rise in California by 3 to 10.5°F by the end of the century.

Rising sea levels may affect the natural environment in the coming decades by eroding beaches, converting wetlands to open water, exacerbating coastal flooding, and increasing the salinity of estuaries and freshwater aquifers. Coastal headlands and beaches are expected to erode at a faster pace in response to future sea level rise. The California Coastal Commission estimates that 450,000 acres of wetlands exist along the California coast,[18] but additional work is needed to evaluate the extent to which these wetlands would be degraded over time, or to what extent new wetland habitat would be created if those lands are protected from further development. Cumulatively, the effects of sea level rise may be combined with other potential long-term factors such as changes in sediment input and nutrient runoff. The cumulative impacts of physical and biological change due to sea level rise on the quality and quantity of coastal habitats are not well understood.[19]

Sea level along the west coast of the United States is affected by a number of factors, including climate patterns such as El Niño, effects from the melting of modern and ancient ice sheets, and geologic processes such as plate tectonics. Regional projections for California, Oregon, and Washington show a sharp distinction at Cape Mendocino in northern California. South of that point, sea-level rise is expected to be very close to global projections. Projections are lower north of Cape Mendocino because the land is being pushed upward as the ocean plate moves under the continental plate along the Cascadia Subduction Zone.

The *Final Climate Change Vulnerability Assessment Results*[20] (2018) for the Long Beach CAAP identifies the California Ocean Protection Council's (OPC) guidance on sea level rise in its *State of California Sea-Level Rise Guidance 2018 Update* (OPC, March 2018), which relied on previous findings from its *Rising Seas in California, an Update on Sea-Level Rise Science* [April 2017]). The OPC developed future sea level rise projections at each tide station along the California coast. The OPC guidance incorporated a range of global emissions scenarios ranging from aggressive emissions reductions to no emissions reductions through the end of the century. Sea level rise will cause many harmful economic, ecological, physical, and social impacts but incorporating sea level rise impacts into agency decisions can help mitigate some of these potential impacts. The updated State of California's Sea-Level Guidance Document recommends the ranges of sea level rise presented in the March 2018 OPC guidance report as a starting place for analysis of potential impacts related to sea level rise. Table 4.3.C presents sea level rise projections for Los Angeles based on the OPC guidance.

18 California Coastal Commission (CCC). *Procedural Guidance for the Review of Wetland Projects in California's Coastal Zone*. Website: http://www.coastal.ca.gov/wetrev/wetch4.html (accessed March 2019).

19 Climate Change Science Program (CCSP) 4.1. January 15, 2009, 1 of 784 Final Report, United States CCSP, Synthesis and Assessment Product 4.1. *Coastal Sensitivity to Sea-Level Rise: A Focus on the Mid-Atlantic Region.* Lead Agency: U.S. Environmental Protection Agency, Other Key Participating Agencies: U.S. Geological Survey, National Oceanic and Atmospheric Administration. Contributing Agencies: Department of Transportation.

20 AECOM. 2018. *Final Climate Change Vulnerability Assessment Results.*

Table 4.3.C: Sea Level Rise Projections for Los Angeles, California

Year (Emissions Scenario)	Inches about 1991–2009 Mean Sea Level (in)			
	Median (50% probability of exceedance)	Likely Range (67% likely range)	1-in-20 Chance (5% probability of exceedance)	1-in-200 Chance (0.5% probability of exceedance)
2030	4	2 to 6	7	8
2050	8	6 to 12	14	22
2100 (low emissions)	16	8 to 25	36	65
2100 (very high emissions)	26	16 to 38	49	80

Source: *State of California Sea-Level Rise Guidance 2018 Update* (OPC, March 2018).
in = inches

Rising sea levels may also affect the built environment, including coastal development such as buildings, roads, and infrastructure. Coastal areas within the City are relatively flat, low-lying, and developed and may be directly affected by the change in sea level resulting from GCC.

Areas that are essentially at sea level are potentially exposed to the rising of the ocean levels and could result in on-site flood conditions. A recent wave uprush study completed for a project along the coast in Long Beach indicated that sea levels along the Long Beach Coast could be expected to rise 0.5 to 2.6 feet (ft) by 2060 and 1.4 to 5.5 ft by 2100.[21] This is consistent with the sea level rise projections included in Table 4.3.C above. In addition, the *Final Climate Change Vulnerability Assessment Results*[22] report identifies the sea level rise vulnerability for geographical areas, buildings and facilities, parks and open space, transportation assets, energy assets, stormwater assets, wastewater assets, and potable water assets based on 11, 24, 36, and 66 inches of sea level rise.

4.3.4.6 Existing Greenhouse Gas Emissions

An emissions inventory that identifies and quantifies the primary human-generated sources and sinks (an artificial reservoir of emissions) of GHGs is a well-recognized and useful tool for addressing climate change. This section summarizes the latest information on global, national, California, and local GHG emission inventories. However, because GHGs persist for a long time in the atmosphere, accumulate over time, and are generally well-mixed, their impact on the atmosphere and climate cannot be tied to a specific point of emission.

Global Emissions. Worldwide emissions of GHGs in 2016 totaled approximately 26 billion metric tons of CO_2e.[23] Global estimates are based on country inventories developed as part of the programs of the United Nations Framework Convention on Climate Change (UNFCCC).

21 Ibid.

22 AECOM. 2018. *Final Climate Change Vulnerability Assessment Results.*

23 United Nations Framework Convention on Climate Change (UNFCCC). 2016. GHG data from UNFCCC. Website: https://unfccc.int/process/transparency-and-reporting/greenhouse-gas-data/ghg-data-unfccc (accessed February 2019).

United States Emissions. In 2015, the United States emitted about 6.6 billion metric tons of CO_2e or about 21 metric tons per year per person. The total 2015 CO_2e emissions represent a 3.5 percent increase since 1990 but a 10 percent decrease since 2005. Of the six major sectors nationwide – residential, commercial, agricultural, industry, transportation, and electricity generation – electricity generation accounts for the highest amount of GHG emissions (approximately 29 percent), with transportation second at 27 percent; these emissions are generated entirely from direct fossil fuel combustion[24]

State of California Emissions. According to CARB emission inventory estimates, the State emitted approximately 429.4 million metric tons (MMT) of CO_2e emissions in 2016. This is a decrease of 12 MMT CO_2e since 2015.[25]

CARB estimates that transportation was the source of approximately 39 percent of the State's GHG emissions in 2016, followed by industrial sources at 21 percent and electricity generation at 16 percent. The remaining sources of GHG emissions were residential and commercial activities at 9 percent, agriculture at 8 percent, high-GWP gases at 5 percent, and recycling and waste at 2 percent.[26]

City of Long Beach Emissions. As part of preparing the City's CAAP, the City developed a baseline GHG emissions inventory for the year 2015. As shown in Table 4.3.D below, the City's 2015 total emissions were 3.1 MMT of CO_2e with the majority coming from transportation (50 percent) and building energy use (44 percent). The remaining 6 percent comes from solid waste and wastewater.

[24] USEPA. 2017. Inventory of U.S. Greenhouse Gas Emissions and Sinks. 1990-2015. Website: www.epa.gov/sites/production/files/2017-02/documents/2017_complete_report.pdf (accessed February 2019).

[25] CARB. 2018. op. cit.

[26] Ibid.

Table 4.3.D: City of Long Beach 2015 Greenhouse Gas Inventory

Sector	MT CO_2e/yr	Percent of Total
Energy	**1,377,291**	**44**
Residential	428,245	14
Commercial	300,818	10
Manufacturing/Construction	399,089	13
Energy Industries	219,899	7
Fugitive Emissions (oil/natural gas)	29,240	1
Transportation	**1,546,326**	**50**
On-road transportation	1,213,601	39
Railways	11,883	<1
Waterborne Navigation	301,345	10
Aviation	4,550	<1
Off-road Transportation	14,947	<1
Waste	**176,851**	**6**
Solid Waste	173,259	6
Wastewater	3,592	<1
TOTAL	**3,100,468**	**100**

Source: City of Long Beach (May 2019).
CO_2e = carbon dioxide equivalent
MT CO_2e/yr = metric tons of carbon dioxide equivalent per year

In addition, to provide a 2018 baseline for the purposes of this plan level analysis, an emissions inventory of the City of Long Beach was conducted based on the existing land uses and is shown in Table 4.3.E, which identifies existing land uses as residential, commercial, office, and industrial emissions. The GHG emissions inventory includes the following sectors:

- **Transportation:** On-road mobile sources, including citywide vehicle trips to and from land use development projects, and pass-through traffic on freeways and arterials will result primarily in emissions of CO_2, with minor emissions of CH_4 and N_2O.
- **Energy:** The most significant GHG emission from natural gas usage will be CH_4. Electricity usage by future land use developments will result primarily in emissions of CO_2.
- **Waste:** Disposal of solid waste will result in emissions of CH_4 from the decomposition of waste at landfills coupled with CO_2 emissions from the handling and transport of solid waste.
- **Water/Wastewater:** Indirect usage of electricity for water and wastewater conveyance will result primarily in emissions of CO_2.
- **Area Sources:** The future use of hearths, consumer products, area architectural coatings, landscaping equipment, and light commercial equipment will result primarily in emissions of CO_2, with minor emissions of CH_4 and N_2O.

Table 4.3.E: Existing City of Long Beach LUE Major Areas of Change Greenhouse Gas Emissions Inventory

Sector	Existing (CEQA Baseline) 2018 GHG Emissions	
	MT CO_2e/yr	Percent of Total
Transportation (2018 emission factors)[1]	1,394,808	58.9
Area Source - Residential: Landscaping/ Consumer Products[2]	40,484	1.7
Area Source - Commercial + Industrial: Landscaping/Consumer Products[2]	1	0.0
Area Source - Public Facilities/Institutional: Landscaping/Consumer Products[2]	0	0.0
Energy: Residential [2]	438,967	18.5
Energy: Commercial + Industrial [2]	209,635	8.9
Energy: Public Facilities/Institutional [2]	49,276	2.1
Waste: Residential[2]	58,191	2.5
Waste: Commercial + Industrial[2]	52,512	2.2
Waste: Public Facilities/Institutional[2]	6,060	0.3
Water: Residential[2]	60,441	2.6
Water: Commercial + Industrial[2]	51,291	2.2
Water: Public Facilities/Institutional[2]	5,823	0.3
Existing Year 2018 Emissions Total	**2,367,487**	**-**
Service Population[3]	619,409	-
MT CO_2e/yr/SP	3.8	-

Source: Compiled by LSA (2019).
Note: Emissions may not total 100 percent due to rounding.
[1] Transportation on-road mobile source data was calculated using EMFAC2017. Model runs were based on citywide VMT data provided by LSA. VMT per year based on a conversion of VMT × 347 days per year to account for less travel on weekend, consistent with CARB statewide GHG emissions inventory methodology.
[2] Area Source, Energy use, Waste, and Water data were calculated using CalEEMod version 2016.3.2.
[3] Service Population is the sum of the residential population and workplace employees within the City.
CalEEMod = California Emission Estimator Model
CEQA = California Environmental Quality Act
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
LUE = Land Use Element
MT CO_2e/yr/SP = metric tons of carbon dioxide equivalent per year per service population
VMT = vehicle miles traveled

The results of this inventory vary from the analysis conducted for the CAAP as the industrial sources of emissions that require a permit from the SCAQMD are not included in the City's emissions inventory per guidance for CAAP inventories. Additionally, aviation and watercraft emissions are not included (though a subset of these emissions are included in the CAAP inventory such as fuel use from ground service equipment at the airport and harbor craft and hoteling ocean-going vessels within the City boundaries). Life-cycle emissions are also not included in this analysis because not enough information is available for the proposed project and therefore they would be too speculative.

Emissions for the City:[27]

- **Transportation:** Emissions from vehicle trips beginning and ending in the City and from external/ internal vehicle trips (i.e., trips that either begin or end in the City).
- **Area Sources:** Emissions generated from lawn and garden, commercial, and construction equipment use in the City.
- **Energy:** Emissions generated from purchased electricity and natural gas consumption used for cooking and heating in the City.
- **Solid Waste Disposal:** Indirect emissions from waste generated in the City.
- **Water/Wastewater:** Emissions from electricity used to supply, treat, and distribute water based on the overall water demand and wastewater generation in the City.

4.3.5 Regulatory Setting

This section describes regulations related to Global Climate Change at the federal, State, and local level.

4.3.5.1 Federal Regulations

The United States has historically had a voluntary approach to reducing greenhouse gas emissions. However, on April 2, 2007, the United States Supreme Court ruled that the United States Environmental Protection Agency (USEPA) has the authority to regulate CO_2 emissions under the federal Clean Air Act. While there currently are no adopted federal regulations for the control or reduction of greenhouse gas emissions, the USEPA commenced several actions in 2009 to implement a regulatory approach to global climate change.

This includes the 2009 USEPA final rule for mandatory reporting of greenhouse gases from large greenhouse gas emission sources in the United States. Additionally, the USEPA Administrator signed an endangerment finding action in 2009 under the Clean Air Act, finding that six greenhouse gases (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6) constitute a threat to public health and welfare, and that the combined emissions from motor vehicles cause and contribute to global climate change, leading to national greenhouse gas emission standards.

[27] Life-cycle emissions include indirect emissions associated with materials manufacture. However, these indirect emissions involve numerous parties, each of which is responsible for GHG emissions of their particular activity. The California Resources Agency, in adopting the CEQA Guidelines Amendments on GHG emissions, found that life-cycle analysis was not warranted for project-specific CEQA analysis in most situations, for a variety of reasons, including lack of control over some sources and the possibility of double-counting emissions (see Final Statement of Reasons for Regulatory Action, December 2009). Because the amount of materials consumed during the operation or construction of the proposed project is not known, the origin of the raw materials purchased is not known, and manufacturing information for those raw materials are also not known, calculation of life-cycle emissions would be speculative. A life-cycle analysis is not warranted (Governor's Office of Planning and Research 2008).

4.3.5.2 State Regulations

CARB is the lead agency for implementing climate change regulations in the State. Since its formation, CARB has worked with the public, the business sector, and local governments to find solutions to California's air pollution problems. Key efforts by the State are described below.

Assembly Bill 1493 (2002). In a response to the transportation sector's significant contribution to California's CO_2 emissions, Assembly Bill (AB) 1493 was enacted on July 22, 2002. AB 1493 requires CARB to set greenhouse gas emission standards for passenger vehicles and light duty trucks (and other vehicles whose primary use is noncommercial personal transportation in the State) manufactured in 2009 and all subsequent model years. These standards (starting in model years 2009 to 2016) were approved by CARB in 2004, but the needed waiver of CAA Preemption was not granted by the USEPA until June 30, 2009. CARB responded by amending its original regulation, now referred to as Low Emission Vehicle III, to take effect for model years starting in 2017 to 2025.

Executive Order S-3-05 (2005). Governor Arnold Schwarzenegger signed Executive Order (EO) S-3-05 on June 1, 2005, which proclaimed that California is vulnerable to the impacts of climate change. To combat those concerns, the executive order established California's greenhouse gas emissions reduction targets, which established the following goals:

- Greenhouse gas emissions should be reduced to 2000 levels by 2010;
- Greenhouse gas emissions should be reduced to 1990 levels by 2020; and
- Greenhouse gas emissions should be reduced to 80 percent below 1990 levels by 2050.

The Secretary of the California Environmental Protection Agency (CalEPA) is required to coordinate efforts of various State agencies in order to collectively and efficiently reduce greenhouse gases. A biannual progress report must be submitted to the Governor and State Legislature disclosing the progress made toward greenhouse emission reduction targets. In addition, another biannual report must be submitted illustrating the impacts of global warming on California's water supply, public health, agriculture, the coastline, and forestry, and report possible mitigation and adaptation plans to address these impacts.

The Secretary of CalEPA leads this Climate Action Team (CAT) made up of representatives from State agencies as well as numerous other boards and departments. The CAT members work to coordinate Statewide efforts to implement global warming emission reduction programs and the State's Climate Adaptation Strategy. The CAT is also responsible for reporting on the progress made toward meeting the statewide greenhouse gas targets that were established in the executive order and further defined under AB 32, the "Global Warming Solutions Act of 2006." The first CAT Report to the Governor and the Legislature was released in March 2006, which it laid out 46 specific emission reduction strategies for reducing greenhouse gas emissions and reaching the targets established in the Executive Order. The CAT Report to the Governor and Legislature; the most recent was released in December 2010.

Assembly Bill 32 (2006), California Global Warming Solutions Act. California's major initiative for reducing greenhouse gas emissions is AB 32, passed by the State legislature on August 31, 2006. This effort aims at reducing greenhouse gas emissions to 1990 levels by 2020. CARB has established the level of greenhouse gas emissions in 1990 at 427 MMT of CO_2e. The emissions target of 427 MMT

requires the reduction of 169 MMT from the State has projected business-as-usual 2020 emissions of 596 MMT. AB 32 requires CARB to prepare a Scoping Plan that outlines the main State strategies for meeting the 2020 deadline and to reduce greenhouse gases that contribute to global climate change. The Scoping Plan was approved by CARB on December 11, 2008, and contains the main strategies California will implement to achieve the reduction of approximately 169 MMT of CO_2e, or approximately 30 percent, from the State's projected 2020 emission level of 596 MMT of CO_2e under a business-as-usual scenario (this is a reduction of 42 MMT CO_2e, or almost 10 percent from 2002–2004 average emissions). The Scoping Plan also includes CARB-recommended greenhouse gas reductions for each emissions sector of the State's greenhouse gas inventory. The Scoping Plan calls for the largest reductions in greenhouse gas emissions to be achieved by implementing the following measures and standards:

- Improved emissions standards for light-duty vehicles (estimated reductions of 31.7 MMT CO_2e);
- The Low-Carbon Fuel Standard (15.0 MMT CO_2e);
- Energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (26.3 MMT CO_2e); and
- A renewable portfolio standard for electricity production (21.3 MMT CO_2e).

The Scoping Plan identifies 18 emission reduction measures that address cap-and-trade programs, vehicle gas standards, energy efficiency, low carbon fuel standards, renewable energy, regional transportation-related greenhouse gas targets, vehicle efficiency measures, goods movement, solar roof programs, industrial emissions, high-speed rail, green building strategies, recycling, sustainable forests, water, and air. The measures would result in a total reduction of 174 MMT CO_2e by 2020.

On August 24, 2011, CARB unanimously approved both the new supplemental assessment and reapproved its Scoping Plan, which provides the overall roadmap and rule measures to carry out AB 32. CARB also approved a more robust CEQA equivalent document supporting the supplemental analysis of the cap-and-trade program. The cap-and-trade took effect on January 1, 2012, with an enforceable compliance obligation that began January 1, 2013.

CARB has not yet determined what amount of greenhouse gas reductions it recommends from local government operations and local land use decisions; however, the Scoping Plan states that land use planning and urban growth decisions will play an important role in the State's greenhouse gas reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions (meanwhile, CARB is also developing an additional protocol for community emissions). CARB further acknowledges that decisions on how land is used will have large impacts on the greenhouse gas emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The Scoping Plan states that the ultimate greenhouse gas reduction assignment to local government operations is to be determined. With regard to land use planning, the Scoping Plan expects an approximately 5.0 MMT CO_2e reduction due to implementation of Senate Bill (SB) 375.

In addition to reducing greenhouse gas emissions to 1990 levels by 2020, AB 32 directed CARB and the CAT to identify a list of "discrete early action greenhouse gas reduction measures" that could be adopted and made enforceable by January 1, 2010. On January 18, 2007, Governor Schwarzenegger signed EO S-1-07, further solidifying California's dedication to reducing greenhouse gases by setting a new Low Carbon Fuel Standard. The Executive Order sets a target to reduce the carbon intensity of California transportation fuels by at least 10 percent by 2020 and directs CARB to consider the Low Carbon Fuel Standard as a discrete early action measure. In 2011, U.S. District Court Judge Lawrence O'Neil issued an injunction preventing implementation of the Low Carbon Fuel Standard, ruling that it is unconstitutional. In 2012, the Ninth Circuit Court of Appeal stayed the District Court's injunction, allowing implementation of the Low Carbon Fuel Standard. The Ninth Circuit decided to uphold the Low Carbon Fuel Standard.

In June 2007, CARB approved a list of 37 early action measures, including three discrete early action measures (Low Carbon Fuel Standard, Restrictions on GWP Refrigerants, and Landfill CH_4 Capture).[28] Discrete early action measures are measures that were required to be adopted as regulations and made effective no later than January 1, 2010, the date established by Health and Safety Code Section 38560.5. CARB adopted additional early action measures in October 2007 that tripled the number of discrete early action measures. These measures relate to truck efficiency, port electrification, reduction of PFCs from the semiconductor industry, reduction of propellants in consumer products, proper tire inflation, and SF_6 reductions from the non-electricity sector. The combination of early action measures is estimated to reduce statewide greenhouse gas emissions by nearly 16 MMT.[29]

CARB approved the First Update to the Climate Change Scoping Plan on May 22, 2014. The First Update identifies opportunities to leverage existing and new funds to further drive greenhouse gas emission reductions through strategic planning and targeted low carbon investments. The First Update defines CARB climate change priorities until 2020, and also sets the groundwork to reach long-term goals set forth in EOs S-3-05 and B-16-2012. The Update highlights California's progress toward meeting the "near-term" 2020 greenhouse gas emission reduction goals as defined in the initial Scoping Plan. It also evaluates how to align the State's "longer-term" greenhouse gas reduction strategies with other State policy priorities for water, waste, natural resources, clean energy, transportation, and land use. CARB released a second update to the Scoping Plan, the 2017 Scoping Plan,[30] to reflect the 2030 target set by EO B-30-15 and codified by SB 32.

Senate Bill 97 (2007). SB 97, signed by the Governor in August 2007 (Chapter 185, Statutes of 2007; Public Resources Code, Sections 21083.05 and 21097), acknowledges climate change is a prominent environmental issue that requires analysis under CEQA. This bill directed the OPR to prepare, develop, and transmit to the California Resources Agency guidelines for mitigating greenhouse gas emissions or the effects of greenhouse gas emissions, as required by CEQA.

28 CARB. 2007. *Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration*. October.

29 CARB. 2007. "ARB approves tripling of early action measures required under AB 32" News Release 07-46. October 25.

30 CARB. 2017. *California's 2017 Climate Change Scoping Plan*. November.

The California Natural Resources Agency adopted the amendments to the *State CEQA Guidelines* in November 2018, which went into effect in December 2018. The amendments do not identify a threshold of significance for greenhouse gas emissions, nor do they prescribe assessment methodologies or specific mitigation measures. The amendments encourage lead agencies to consider many factors in performing a CEQA analysis, but preserve the discretion granted by CEQA to lead agencies in making their own determinations based on substantial evidence. The amendments also encourage public agencies to make use of programmatic mitigation plans and programs when they perform individual project analyses.

Senate Bill 375 (2008). SB 375, the Sustainable Communities and Climate Protection Act, which establishes mechanisms for the development of regional targets for reducing passenger vehicle GHG emissions, was adopted by the State on September 30, 2008. On September 23, 2010, the ARB adopted the vehicular GHG emissions reduction targets that had been developed in consultation with the Metropolitan Planning Organization (MPOs); the targets require a 6 to 15 percent reduction by 2020 and between 13 to 19 percent reduction by 2035 for each MPO. SB 375 recognizes the importance of achieving significant GHG reductions by working with cities and counties to change land use patterns and improve transportation alternatives. Through the SB 375 process, MPOs such as SCAG will work with local jurisdictions in the development of Sustainable Communities Strategies designed to integrate development patterns and the transportation network in a way that reduces GHG emissions while meeting housing needs and other regional planning objectives. Pursuant to SB 375, the SCAG reduction targets for per capita vehicular emissions are 8 percent by 2020 and 13 percent by 2035 as shown in Table 4.3.F.

Table 4.3.F: Senate Bill 375 Regional Greenhouse Gas Emissions Reduction Targets

Metropolitan Planning Organization	By 2020 (%)	By 2035 (%)
San Francisco Bay Area	10	19
San Diego	15	19
Sacramento	7	19
Central Valley/San Joaquin	6–13	13–16
Los Angeles/Southern California	8	19

Source: California Air Resources Board (2018).

Executive Order B-30-15 (2015). Governor Jerry Brown signed EO B-30-15 on April 29, 2015, which added the immediate target of the following:

- Greenhouse gas emissions should be reduced to 40 percent below 1990 levels by 2030.

All State agencies with jurisdiction over sources of greenhouse gas emissions were directed to implement measures to achieve reductions of greenhouse gas emissions to meet the 2030 and 2050 targets. CARB was directed to update the AB 32 Scoping Plan to reflect the 2030 target, and therefore, is moving forward with the update process. The mid-term target is critical to help frame the suite of

policy measures, regulations, planning efforts, and investments in clean technologies and infrastructure needed to continue reducing emissions.

Senate Bill 350 (2015) Clean Energy and Pollution Reduction Act. SB 350 signed by Governor Jerry Brown on October 7, 2015, updates and enhances AB 32 by introducing the following set of objectives in clean energy, clean air, and pollution reduction for 2030:

- Raise California's renewable portfolio standard from 33 percent to 50 percent; and
- Increasing energy efficiency in buildings by 50 percent by the year 2030.

The 50 percent renewable energy standard will be implemented by the California Public Utilities Commission for the private utilities and by the California Energy Commission for municipal utilities. Each utility must submit a procurement plan showing it will purchase clean energy to displace other non-renewable resources. The 50 percent increase in energy efficiency in buildings must be achieved through the use of existing energy efficiency retrofit funding and regulatory tools already available to state energy agencies under existing law. The addition made by this legislation requires state energy agencies to plan for, and implement those programs in a manner that achieves the energy efficiency target.

Senate Bill 32, California Global Warming Solutions Act of 2016, and Assembly Bill 197. In summer 2016 the Legislature passed, and the Governor signed, SB 32, and Assembly Bill (AB) 197. SB 32 affirms the importance of addressing climate change by codifying into statute the greenhouse gas emissions reductions target of at least 40 percent below 1990 levels by 2030 contained in Governor Brown's April 2015 EO B-30-15. SB 32 builds on AB 32 and keeps us on the path toward achieving the State's 2050 objective of reducing emissions to 80 percent below 1990 levels, consistent with an IPCC analysis of the emissions trajectory that would stabilize atmospheric greenhouse gas concentrations at 450 parts per million CO_2e and reduce the likelihood of catastrophic impacts from climate change.

The companion bill to SB 32, AB 197, provides additional direction to CARB related to the adoption of strategies to reduce greenhouse gas emissions. Additional direction in AB 197 meant to provide easier public access to air emissions data that are collected by CARB was posted in December 2016.

Senate Bill 100. On September 10, 2018, Governor Brown signed SB 100, which raises California's RPS requirements to 60 percent by 2030, with interim targets, and 100 percent by 2045. The bill also establishes a state policy that eligible renewable energy resources and zero-carbon resources supply 100 percent of all retail sales of electricity to California end-use customers and 100 percent of electricity procured to serve all state agencies by December 31, 2045. Under the bill, the state cannot increase carbon emissions elsewhere in the western grid or allow resource shuffling to achieve the 100 percent carbon-free electricity target.

Executive Order B-55-18. EO B-55-18, signed September 10, 2018, sets a goal "to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter." EO B-55-18 directs CARB to work with relevant state agencies to ensure future Scoping Plans identify and recommend measures to achieve the carbon neutrality goal. The goal of carbon neutrality by 2045 is in addition to other statewide goals, meaning not only should emissions be reduced to 80 percent below 1990 levels by 2050, but that, by no later than 2045, the remaining

emissions be offset by equivalent net removals of CO_2e from the atmosphere, including through sequestration in forests, soils, and other natural landscapes.

Title 24, Building Standards Code and CALGreen Code. In November 2008, the California Building Standards Commission established the California Green Building Standards (CALGreen) Code, which sets performance standards for residential and nonresidential development to reduce environmental impacts and encourage sustainable construction practices. The CALGreen Code addresses energy efficiency, water conservation, material conservation, planning and design, and overall environmental quality. The CALGreen Code was most recently updated in 2016 to include new mandatory measures for residential as well as nonresidential uses; the new measures took effect on January 1, 2017.

Cap and Trade. The development of a cap-and-trade program was included as a key reduction measure of the CARB AB 32 Climate Change Scoping Plan. The cap-and-trade program will help put California on the path to meet its goal of reducing GHG emissions to 1990 levels by 2020 and ultimately achieving an 80 percent reduction from 1990 levels by 2050. The cap-and-trade emissions trading program developed by CARB took effect on January 1, 2012, with enforceable compliance obligations beginning January 1, 2013. The cap-and-trade program aims to regulate GHG emissions from the largest producers in the State by setting a statewide firm limit, or cap, on allowable annual GHG emissions. The cap was set in 2013 at approximately 2 percent below the emissions forecast for 2020. In 2014, the cap declined approximately 2 percent. Beginning in 2015 and continuing through 2020, the cap has been declining approximately 3 percent annually. CARB administered the first auction on November 14, 2012, with many of the qualified bidders representing corporations or organizations that produce large amounts of GHG emissions, including energy companies, agriculture and food industries, steel mills, cement companies, and universities. On January 1, 2015, compliance obligation began for distributors of transportation fuels, natural gas, and other fuels. California is working closely with British Columbia, Ontario, Quebec, and Manitoba through the Western Climate Initiative to develop harmonized cap-and-trade programs that will deliver cost-effective emission reductions. Two lawsuits have been filed against cap-and-trade, but the cap-and-trade program will be implemented as is until further notice.[31]

4.3.5.3 Local and Regional Policies and Regulations

Southern California Association of Governments. SCAG's 2016 RTP/SCS is a regional growth-management strategy that targets per capita GHG reduction from passenger vehicles and light-duty trucks in the southern California region. The 2016 RTP/SCS incorporates local land-use projections and circulation networks in city and county general plans. The projected regional development pattern, including locations of land uses and residential densities included in local general plans, when integrated with the proposed regional transportation network identified in the 2016 RTP/SCS, would reduce per capita vehicular travel-related GHG emissions and achieve the GHG reduction per capita targets for the SCAG region of 8 percent per capita from 2005 GHG emission levels by 2020 and 19 percent per capita from 2005 GHG emission levels by 2035.

[31] CARB. 2014. Cap and Trade Program. Website: http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm (accessed March 2019).

City of Long Beach *Sustainable City Action Plan*. The City of Long Beach's *Sustainable City Action Plan* (SCAP) was adopted in February 2010.[32] The SCAP is intended to guide operational, policy, and financial decisions to create a more sustainable Long Beach. The SCAP includes initiatives, goals, and actions that will move Long Beach toward becoming a sustainable city. These goals and actions included in the SCAP relate to the following:

- Buildings & Neighborhoods
- Energy
- Green Economy & Lifestyle
- Transportation
- Urban Nature
- Waste Reduction
- Water

City of Long Beach Climate Action and Adaptation Plan. In 2017, the City of Long Beach began development of a CAAP. The CAAP aims to reduce communitywide GHG emissions, and help the city adapt to future climate change impacts. As part of the CAAP, the City conducted a communitywide GHG inventory to identify its baseline emissions footprint, and is developing business-as-usual forecasts of emissions based on anticipated growth in population, employment, housing, and other factors in the community. In the next stages of the project, the City will establish GHG reduction targets and define local actions to achieve those targets.

The CAAP 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 policies, programs, practices, and incentives included in the CAAP will relate to the following:

- Public Health
- Water Supply
- Housing & Neighborhoods
- Coastal Resources
- Parks and Open Space
- Transportation
- Energy
- Wastewater/Stormwater

4.3.6 Thresholds of Significance

The following thresholds of significance criteria are based on Appendix G of the *State CEQA Guidelines* Based on these thresholds, implementation of the proposed project would have a significant adverse impact related to global climate change if it would:

Threshold 4.3.1: Generate greenhouse gas emissions, either directly or indirectly, that may have a significance impact on the environment; or

Threshold 4.3.2: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

[32] City of Long Beach. 2010. *Sustainable City Action Plan*. February.

4.3.7 Compliance Measures and Project Design Features

No Compliance Measures or Project Design Features (PDFs) have been identified with respect to GCC and GHG emissions; however, the update to the LUE includes several policies to support sustainable urban development patterns as identified below.

4.3.7.1 Proposed Land Use Element Strategies and Policies

The following proposed Goals, Strategies, and Policies are applicable to the analysis of GHG and GCC and would replace existing goals, strategies, and policies outlined in the City's existing LUE and SRE following project approval:

Land Use Element.

Strategy No. 1: Support sustainable urban development patterns.

- **LU Policy 1-1:** Promote sustainable development patterns and development intensities that use land efficiently and accommodate and encourage walking.
- **LU Policy 1-2:** Support high-density residential, mixed-use, and transit-oriented development within the Downtown, along transit corridors, near transit stations and at neighborhood hubs.
- **LU Policy 1-3:** Require sustainable design strategies to be integrated into public and private development projects.
- **LU Policy 1-4:** Require electric vehicle charging stations to be installed in new commercial, industrial, institutional, and multiple-family residential development projects. Require that all parking for single-unit and two-unit residential development projects be capable of supporting future electric vehicle supply equipment.
- **LU Policy 1-5:** Encourage resources and processes that support sustainable development for adaptive reuse projects, as well as appropriate infill projects.
- **LU Policy 1-6:** Require that new building construction incorporate solar panels, vegetated surface, high albedo surface, and/or similar roof structures to reduce net energy usage and reduce the heat island effect.
- **LU Policy 1-7:** Encourage neighborhood-serving retail, employment, and entertainment destinations in new mixed-use projects to create local, walkable daily trip destinations.
- **LU Policy 1-8:** Include and recognize the contribution of natural lands in the City's carbon inventory and climate actions. Require scientific analysis of carbon sequestration losses or gains with all land conversion proposals that impact or convert natural lands and wetlands.

Strategy No. 2: Promote efficient management of energy resources to reduce greenhouse gas emissions and the impacts of climate change by employing a full range of feasible means to meet climate goals.

- **LU Policy 2-1:** Promote the establishment of local green energy generation projects along with the infrastructure to support such projects.

- **LU Policy 2-2:** Ensure that long-range planning processes consider impacts of sea level rise and propose mitigation measures.

Strategy No. 4: Attract and invest in green and innovative industries to expand creative employment opportunities.

- **LU Policy 4-1:** Provide a Land Use Plan that allows a place for green energy development and green businesses.

- **LU Policy 4-2:** Promote the transition of some heavy industrial and manufacturing sites to creative green and sustainable industries.

Strategy No. 20: Preserve, restore, and protect water bodies, natural areas, and wildlife habitats.

- **LU Policy 20-8:** Manage and restore land to increase carbon storage and minimize greenhouse gas emissions in a sustainable manner by increasing the City's carbon sinks over time.

- **LU-M-3:** Consider including development incentives in the Zoning Regulations that allow greater development flexibility if projects include affordable housing; creative open space; cultural amenities; historic preservation or green building elements beyond those required; renewable energy components; and transit, pedestrian and bicycle amenities.

- **LU-M-8:** Require that all new City building projects and major renovations achieve at least LEED silver certification.

- **LU-M-9:** Require that all new City leases and tenant improvements follow LEED standards. Require energy efficiency standards to be part of all City lease/rental agreements.

- **LU-M-10:** Continue to utilize solar power within public buildings and on public sites, and continue to study means by which solar power can be incorporated into all aspects of municipal services.

- **LU M-11:** Continue to implement the Sustainability Action Plan. Introduce new goals and action measures that promote sustainability, including items related to land use and mobility planning, increasing walking and biking, increasing energy efficiency, reducing greenhouse gases and promoting renewable energy.

- **LU-M-12:** Create innovative renewable energy partnerships and demonstration projects.

- **LU-M-59:** Attract renewable energy and green technology manufacturing companies to establish a presence/office in Long Beach. Facilitate the creation of jobs in the renewable/clean energy sector.

- **LU-M-62:** Continue to implement the Green Recognition Program, which is designed to encourage Long Beach business owners who have implemented sustainable practices to share their success stories and receive recognition for going green.

- **LU-M-63:** Partner with Pacific Gateway Workforce Investment Network's Green Job Corps, California State University at Long Beach, Long Beach City College and other educational organizations, agencies and non-profit organizations to coordinate the creation of a training academy and programs for green jobs.

- **LU-M-64:** Work with Southern California Edison and other utility companies to provide rebates and savings programs for businesses using green technologies or emphasizing green industries.

- **LU-M-65:** Repurpose business development grants and loans for green business development in Long Beach. Encourage technology and manufacturing companies to take advantage of Long Beach green business development opportunities.

- **LU-M-66:** Implement a City green business program that incorporates goals and strategies for waste reduction, energy efficiency, water conservation, green purchasing, and similar strategies.

- **LU-M-67:** Encourage the formation of a local environmental business network to share information and promote green business strategies and best practices.

- **LU-M-68:** Develop a "shop green" program to increase consumer awareness about local green businesses and products so that consumers can easily make green purchasing choices.

- **LU-M-69:** Conduct green business workshops designed to help local businesses go green and showcase local green vendors and products.

- **LU-M-70:** Explore funding opportunities to provide incentives for businesses to make environmental improvements.

- **LU-M-71:** Explore the feasibility of establishing a City Hall liaison to help business owners navigate environmental requirements.

- **LU-M-72:** Explore the feasibility of establishing "Green Zones," a Clean Up Green Up program, or similar, to allow businesses with harsh emissions to "Clean Up" by providing resources and programs through the City and partner agencies. Green Zones are defined as a community-led strategy to transform areas in Long Beach that are overburdened by pollution and inequity into healthy, thriving neighborhoods. Green Zones in Long Beach will reflect the needs, priorities, and issues identified by residents who know their community best. Green Zones will focus on the low-income communities and people of color in West, Central and North Long Beach—who are most impacted by the local pollution—while these equity measures will benefit the entire City.

- **LU-M-73:** Continue to update the City's greenhouse gas (GHG) emissions inventory with the California Climate Action Registry, which will enable the City to better meet future environmental regulations and secure future grant funding for sustainability programs.

- **LU-M-74:** Through the Port of Long Beach, provide Greenhouse Gas Emissions Reduction Grant Program and similar programs aimed at implementing strategies to reduce the impacts of greenhouse gases.
- **LU-M-75:** Continue to implement the 2010 Clean Air Action Plan Update aimed at reducing air pollution emissions from port-related cargo movement.
- **LU-M-76:** Continue to consult with the Port of Los Angeles to reduce emissions from port operations.
- **LU-M-77:** Continue to support/coordinate programs and organizations aimed at improving energy efficiency and reducing greenhouse gas emissions.
- **LU-M-78:** Implement the Technology Advancement Program to identify, evaluate, and demonstrate new and emerging emissions reduction technologies/strategies that could be utilized in future updates to the Clean Air Action Plan.
- **LU-M-79:** Consult with utility companies in promoting and developing renewable energy and emerging greenhouse gas reduction technologies. Identify potential sites within the Regional-Serving Facilities PlaceType to locate such facilities.
- **Eastside Land Use Strategy 10:** Finish the City's urban forestry inventories then develop and implement tree planting, maintenance and greening plans which are coordinated with citywide air quality improvement, greenhouse gas reduction, and local water-saving landscape plans and programs.

4.3.8 Project Impacts

Threshold 4.3.1: Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Significant and Unavoidable Impact.

Implementation of the proposed project would contribute to global climate change through direct and indirect emissions of GHG from land uses within the City of Long Beach. The change in GHG emissions is based on the difference between existing land uses and those associated with the proposed implementation of the project. Table 4.3.G compares the community-wide GHG emissions inventory for the City of Long Beach under existing conditions, the anticipated General Plan build out scenario (year 2040), and year 2040 no project scenario (assuming existing General Plan conditions). Inventories for both 2040 scenarios (project and no project) include reductions from federal and State measures identified in CARB's Scoping Plan, including the Pavley fuel efficiency standards, Low Carbon Fuel Standard (LCFS) for fuel use (transportation and off-road), and a reduction in carbon intensity from electricity use.

Table 4.3.G: Anticipated General Plan Build Out 2040 GHG Emissions Inventory

Sectors	Existing 2018 GHG Emissions (MT CO_2e/yr)	Anticipated General Plan 2040 Build Out (MT CO_2e/yr)	2040 No Project (MT CO_2e/yr)	Percent of Total Proposed Project
Transportation (2040 emission factors)[1]	1,394,808	890,829	878,821	53.3
Area: Residential[2]	40,484	37,345	34,324	2.2
Area: Commercial + Industrial[2]	1	1	1	0.0
Area: Public Facilities/Institutional[2]	0	1	1	0.0
Energy: Residential[2]	438,967	336,360	315,904	20.1
Energy: Commercial + Industrial[2]	209,635	150,273	150,273	9.0
Energy: Public Facilities/Institutional[2]	49,276	32,366	32,366	1.9
Waste: Residential[2]	58,191	64,066	60,926	3.8
Waste: Commercial + Industrial[2]	52,512	65,529	65,529	3.9
Waste: Public Facilities/Institutional[2]	6,060	6,297	6,297	0.4
Water: Residential	60,441	41,257	38,363	2.5
Water: Commercial + Industrial[2]	51,291	42,764	42,764	2.6
Water: Public Facilities/Institutional[2]	5,823	3,330	3,330	0.2
Emissions Total	**2,367,487**	**1,670,419**	**1,628,900**	N/A
Service Population[3]	619,409	666,150	666,150	N/A
Emissions per Service Population	3.8	2.5	2.4	N/A
Plan-Level Efficiency Threshold	1.92	1.92	1.92	N/A

Source: Compiled by LSA (2019).
Note: Emissions may not total 100 percent due to rounding.
[1] Transportation on-road mobile source data was calculated using EMFAC2017. Model runs were based on citywide VMT data. VMT per year based on a conversion of VMT × 347 days per year to account for less travel on weekend, consistent with CARB statewide GHG emissions inventory methodology.
[2] Area Source, energy use, waste, and water data were calculated using CalEEMod version 2016.3.2. Area Sources include landscaping equipment and consumer product use.
[3] Service Population is the sum of the residential population and workplace employees within the City.
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
LUE = Land Use Element
MT CO_2e/yr = metric tons of carbon dioxide equivalent per year
N/A = Not Applicable
UDE = Urban Design Element

As shown in Table 4.3.G, GHG emissions associated with the anticipated General Plan build out scenario would exceed the efficiency threshold of 1.92 MT CO_2e/yr/SP in the City in horizon year 2040.

As noted above, citywide VMT per capita is anticipated to decline in the future as a result of previous planning efforts and is anticipated to decline further due to the elements of the 2016 SCAG RTP/SCS. Although the traffic analysis indicates VMT in Long Beach will be reduced 9 percent from the existing conditions with the proposed project, VMT during off-peak times increases slightly with the LUE as compared to the existing LUE. These off-peak VMT are generated by discretionary trips, which the traffic model calculates based on the number of households. In other words, the model assumes that people living in overcrowded housing conditions generate fewer trips to the grocery store than the same number of people living in less-crowded, separate housing. Because the LUE reduces overcrowding compared to the previous land use distribution, the number of discretionary trips increases as does the off-peak VMT, and subsequently, the total VMT, compared to the no project scenario. The existing VMT per household is 56.9 per day, which is anticipated to decline in the future to 49.9 per day without the Land Use Element. The efficiency of the distribution of land uses in the

Land Use Element would reduce this further to 46.1 VMT per day per household (a 19-percent decrease from existing conditions).

The State of California has concurrent goals of reducing VMT and increasing housing supply to improve affordability and reduce overcrowding. The proposed project would increase the number of housing units to reduce overcrowding in Long Beach. The efficiency of the location of land uses in the LUE (i.e., infill development policies and sites) results in a 19 percent decrease in VMT per household compared to existing conditions. Other measures of VMT, including per capita and absolute terms, decline as well, compared to existing conditions. With the proposed project, VMT per capita in Long Beach remains lower than the region as a whole and lower than in Los Angeles County. The City believes that the proposed General Plan strikes the appropriate balance between the State's concurrent goals of reducing VMT and increasing housing supply.

On a service population basis, the anticipated General Plan build out scenario (year 2040) would reduce the GHG emissions from 2,367,487 MT CO_2e/yr/SP under existing conditions down to 1,670,419 MT CO_2e/yr/SP under the anticipated General Plan build out scenario. Implementation of the proposed project would result in lower GHG emissions within the City in the future year when compared to existing conditions due to the way in which the model calculates non-peak trips for overcrowded households; however, as described above, the proposed project would result in higher VMT rates when compared to the 2040 no project scenario (existing General Plan in the future year). Although the GHG emissions per service population would be lower under future year conditions, the emission rate of 2.5 MT CO_2e/yr/SP would exceed the 1.92 MT CO_2e/yr/SP criterion established by the City for purposes of this environmental evaluation.

Implementation of the proposed LUE policies would help further reduce GHG emissions. Many of these policies promote an increase in concepts and designs that would increase walking, bicycling, and use of public transit that would contribute to reduced VMT. In addition, infill development near public transit would help create sustainable development patterns. As listed in Section 4.3.7.1 above, the LUE includes the following strategies and policies that would result in further reductions in GHG emissions: Strategy No. 2, LU Policies 2-1 and 2-2; Strategy No. 4, LU Policies 4-1 and 4-2; Strategy No. 20, LU Policies 2-1 and 20-8, LU-M-3, LU-M-8 through 12, LU-M-59, LU-M-62 through 79; and Eastside Land Use Strategy 10.

Implementation of these land use strategies would reduce emissions to the extent feasible. In addition, Mitigation Measure (MM) GHG-1 would require the City to adopt a GHG Reduction Plan or Climate Action and Adaption Plan to ensure that the City meets short- and long-term GHG reduction goals established by the State. While this mitigation measure would serve to reduce GHG emissions associated with build out of the project, additional State-sponsored reduction programs may be required in order to meet the service population threshold set by the CAAP. Because the performance of GHG reduction measures in the CAAP and compliance with future targets cannot be assured at this time, and in an abundance of caution, GHG emission impacts would remain significant and unavoidable even with implementation of MM GHG-1.

Threshold 4.3.2: Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less than Significant with Mitigation Incorporated.

The following discusses the consistency of the proposed project to the State's GHG reduction goals, the CARB Scoping Plan, and SCAG's 2016 RTP/SCS in addition to the City's *Sustainable City Action Plan.*

Consistency with the Long-Term Goal of AB 32 and SB 32:

The AB 32 Scoping Plan has a range of GHG reduction actions, which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB 32 implementation fee to fund the program.

In addition, SB 32 affirms the importance of addressing climate change by codifying into statute the GHG emissions reductions target of at least 40 percent below 1990 levels by 2030 contained in EO B-30-15. SB 32 builds on AB 32 and keeps us on the path toward achieving the State's 2050 objective of reducing emissions to 80 percent below 1990 levels, consistent with an IPCC analysis of the global emissions trajectory that would stabilize atmospheric GHG concentrations at 450 parts per million CO_2e and reduce the likelihood of catastrophic impacts from climate change.

The companion bill to SB 32, AB 197, provides additional direction to CARB in the following areas related to the adoption of strategies to reduce GHG emissions. Additional direction in AB 197, intended to provide easier public access to air emissions data that are collected by CARB, was posted in December 2016. The measures applicable to the proposed project include energy efficiency measures, water conservation and efficiency measures, and transportation and motor vehicle measures.

As shown in Table 4.3.G, the community-wide GHG emissions for the anticipated General Plan build out scenario (year 2040) would exceed the City's efficiency target of 1.92 MT CO_2e/yr/SP. The CAAP targets and the service population threshold would measure progress in meeting the AB 32 and SB 32 reduction targets.

The proposed project includes various policies as listed above that would contribute to reduced GHG emissions. While these policies would contribute to reduced GHG emissions, the City would require assistance from additional federal and State programs and regulations to achieve the long-term GHG emissions goal. Therefore, GHG impacts within the City of Long Beach from the overall growth under the proposed project would need to develop a GHG reduction plan as recommended under *State CEQA Guidelines* Section 15183.5 in order to achieve the long-term GHG reductions goals under AB 32 and SB 32 so that the proposed project would not cumulatively contribute to the long-term GHG emissions in the State. As previously noted, the City is in the process of preparing the CAAP, which will identify the GHG reduction measures needed to achieve the targets. In order to achieve compliance with State GHG reduction targets, the CAAP has been identified as a mitigation measure (MM GHG-1) to reduce GHG impacts associated with growth anticipated under the proposed project.

CARB Scoping Plan: In accordance with AB 32, CARB developed the Scoping Plan to outline the State's strategy to achieve 1990-level emissions by year 2020. Since adoption of the 2008 and 2017 Scoping Plans, State agencies have adopted programs identified in the Scoping Plan, and the legislature has passed additional legislation to achieve the GHG reduction targets. Statewide strategies to reduce GHG emissions include the LCFS and changes in the corporate average fuel economy standards (e.g., Pavley I and 2017–2025 Corporate Average Fuel Economy [CAFE] standards). These statewide measures are applicable uniformly throughout the State, and all future developments under the proposed project would be in compliance.

Table 4.3.H provides a summary of the statewide strategies and the associated GHG emissions reductions when integrated into the proposed project. In addition to these statewide strategies, the LUE/UDE policies outlined above would also contribute to reducing GHG emissions. Therefore, the proposed project would be consistent with the Scoping Plan, and impacts are considered less than significant.

SCAG's 2016 Regional Transportation Plan/Sustainable Communities Strategies: SCAG's 2016 RTP/SCS is a regional growth-management strategy that targets per capita GHG reduction from passenger vehicles and light-duty trucks in the Southern California region. The 2016 RTP/SCS incorporates local land-use projections and circulation networks in city and county general plans. The projected regional development pattern, including locations of land uses and residential densities included in local general plans, when integrated with the proposed regional transportation network identified in the 2016 RTP/SCS, would reduce per capita vehicular travel-related GHG emissions and achieve the GHG reduction per capita targets for the SCAG region of 8 percent per capita from 2005 GHG emission levels by 2020 and 19 percent per capita from 2005 GHG emission levels by 2035. The strategies, programs, and projects outlined in the 2016 RTP/SCS are projected to result in GHG emissions reductions in the SCAG region that meet or exceed these targets. The proposed project and its policies would be consistent with the applicable RTP/SCS goals. Implementation of the LUE/UDE policies would create higher density mixed-use communities. In addition, the proposed project includes various policies that would call for creation of more mixed-use and walkable communities; therefore, the proposed project would contribute to reduced VMT per capita and reduced overall GHG emissions from passenger vehicles. Therefore, the proposed project is consistent with SCAG's 2016 RTP/SCS.

City of Long Beach *Sustainable City Action Plan:* The *Sustainable City Action Plan* is a City-adopted plan to guide the City in becoming more sustainable. The plan identifies a wide range of goals and implementation actions to conserve energy and water, reduce solid waste, address global warming, tailor urban design, protect natural habitats, improve transportation options, and reduce risks to human health. Specific goals related to GHG include increasing the use of renewable energy in Long Beach and reducing the City's overall electric load by 10 percent. Other goals include reducing single-occupancy vehicle trips by 10 percent and advancing higher density mixed-use neighborhoods that are bike and pedestrian friendly. The proposed project includes various policies that are and would be consistent with these goals and initiatives of the Sustainable City Action Plan. Impacts are, therefore, considered less than significant.

Table 4.3.H: Statewide GHG Emissions Reduction Strategies

Policy/Action	Policy/Implementation Action Description
Circulation/Land Use	
Pavley I	A clean-car standard that reduces GHG emissions from new passenger vehicles (light- to medium-duty) from 2009 through 2016 and is anticipated to reduce GHG emissions from new passenger vehicles by 30 percent in 2016. California implements the Pavley I standards through a waiver granted to California by the U.S. Environmental Protection Agency.
Advanced Clean Car (Pavley II)	A multifaceted approach focused on controlling smog and soot and reducing GHG emissions from passenger vehicles for model years 2015–2025. It is designed to extend beyond Pavley I (i.e., 2016). The program is anticipated to reduce GHG emissions by 12 percent in year 2025.
Low Carbon Fuel Standard (LCFS)	Requires a reduction of 2.5 percent in the carbon intensity of California's transportation fuels by 2015 and of at least 10 percent by 2020. Applies to refiners, blenders, producers, and importers of transportation fuels and uses market-based mechanisms to allow providers to use the most economically feasible methods to reduce emissions during the fuel cycle.
Energy Efficiency and Use	
Title 24 Energy Standards	Energy conservation standards for new residential and nonresidential buildings were adopted by the California Energy Resources Conservation and Development Commission in June 1977 and are updated triennially to allow for consideration and possible incorporation of new energy-efficiency technologies and methods. Buildings that are constructed in accordance with the current 2016 Building and Energy Efficiency Standards are 46 percent more energy efficient than the 2008 standards as a result of better windows, insulation, lighting, ventilation systems, and other features that reduce energy consumption in homes and businesses.
Title 24 CALGreen	Adopted in 2008 as part of the California Green Building Standards Code. Established planning and design standards for sustainable site development, energy efficiency, water conservation, material conservation, and internal air contaminants.
60 percent RPS	Senate Bill 100 was signed in September 2018 and raises California's RPS requirements to 60 percent by 2030, with interim targets, and 100 percent by 2045. Renewable sources of electricity include wind, small hydropower, solar, geothermal, biomass, and biogas. The increase in renewable electricity production will decrease indirect GHG emissions from development projects, because electricity production from renewable sources is generally considered carbon neutral.
Title 20	The 2016 Appliance Efficiency Regulations were adopted by the California Energy Commission and approved by the California Office of Administrative Law in 2016. The regulations include standards for both federally and non-federally regulated appliances.

Source: Compiled by LSA (2019).
CALGreen = California Green Building Standards
GHG = greenhouse gas
RPS = Renewable Portfolio Standard

Existing Regulations and Compliance Measures: The following list includes State and local regulations and conditions.

- **State**
  - **Executive Order S-3-05 and Executive Order B-30-15:** Greenhouse Gas Emission Reduction Targets
  - **AB 32:** California Global Warming Solutions Act
  - **SB 375:** Sustainable Communities Strategies
  - **AB 1493:** Pavley Fuel Efficiency Standards

- **Title 20 California Code of Regulations:** Appliance Energy Efficiency Standards
- **Title 17 California Code of Regulations:** Low Carbon Fuel Standard
- **AB 1881:** California Water Conservation in Landscaping Act of 2006
- **SB 1368:** Statewide Retail Provider Emissions Performance Standards
- **SB 350:** Renewable Portfolio Standards
- **Title 24, Part 6, California Code of Regulations:** Building and Energy Efficiency Standards
- **Title 24, Part 11, California Code of Regulations:** Green Building Standards Code

- **Local**
  - **Green Building Ordinance:** City of Long Beach Municipal Code Title 18, Chapter 18.47, Sections 18.47.010 to 18.47.080.

4.3.9 Mitigation Measures

The following mitigation measure would reduce GHG emissions associated with the proposed project.

MM GHG-1 The City of Long Beach (City) shall develop and adopt a greenhouse gas (GHG) Reduction Plan or Climate Action and Adaptation Plan (CAAP) to ensure that the City continues on a trajectory that aligns with the short-term, interim, and long-term State GHG reduction goals. Within approximately 36 months of adoption of the proposed General Plan Land Use Element (LUE)/Urban Design Element (UDE) project, the City of Long Beach shall prepare and present a CAAP to the City Council for adoption. The CAAP shall identify strategies to be implemented to reduce GHG emissions associated with the City. In addition, the City shall monitor GHG emissions by updating its community-wide GHG emissions inventory every 5 years upon adoption of the initial CAAP, which will include details on how the reduction programs will be implemented and will designate responsible parties to monitor progress and ensure implementation of the reductions within the CAAP. A monitoring and reporting program shall be included to ensure the CAAP achieves the reduction targets.

4.3.10 Cumulative Impacts

As defined in Section 15130 of the *State CEQA Guidelines,* cumulative impacts are the incremental effects of an individual project when viewed in connection with the effects of past, current, and probable future projects within the cumulative impact area for GCC. However, unlike the cumulative analysis for many topics that address the combined impacts of a proposed project in addition to related projects in a project study area, GCC is affected by a larger range of development activity. Climate change is a global issue and is already addressed as a cumulative impact because individual projects are unlikely to measurably affect GCC. Although the State requires Metropolitan Planning Organizations and other planning agencies to consider how regionwide planning decisions can impact GCC, there is currently no established non-speculative methodology for assessing the cumulative impact of proposed independent private party development projects.

Although the proposed project is expected to emit GHGs, the emission of GHGs by any single project into the atmosphere is not itself necessarily an adverse environmental effect. Rather, it is the increased accumulation of GHGs from more than one project and many sources in the atmosphere that may result in GCC. The resultant consequences of that climate change, including sea level rise, could cause adverse environmental effects. A project's GHG emissions typically would be very small in comparison to State or global GHG emissions and, consequently, they would, in isolation, have no significant direct impact on climate change. Due to the complex physical, chemical, and atmospheric mechanisms involved in GCC, it is speculative to identify the specific impact, if any, to GCC from one project's incremental increase in global GHG emissions. As such, a project's GHG emissions and the resulting significance of potential impacts are more properly assessed on a cumulative basis. Thus, the analysis conducted above is essentially already a cumulative analysis because it takes into consideration Statewide GHG reduction targets and demonstrates that the proposed project would be consistent with those targets.

The State has mandated a goal of reducing statewide emissions to 1990 levels by 2020 and to 80 percent below 1990 levels by 2050, even though Statewide population and commerce are predicted to continue to expand. In order to achieve these goals, CARB is in the process of establishing and implementing regulations to reduce statewide GHG emissions. However, there are currently no applicable significance thresholds, specific reduction targets, and/or approved policy or guidance to assist in determining significance at the cumulative level. Additionally, there is currently no generally accepted methodology to determine whether GHG emissions associated with a specific project represent new emissions or existing, displaced emissions.

As previously stated, the proposed project would result in a GHG emission profile that is lower than existing GHG emissions within the City. Additionally, since climate change is a global issue, it is unlikely that the proposed project would generate enough GHG emissions to influence GCC on its own. Because the proposed project's impacts alone would not cause or significantly contribute to GCC, project-related CO_2e emissions and their contribution to GCC impacts in the State of California would not make a significant contribution to cumulatively considerable GHG emission impacts. Therefore, the proposed project would not result in a significant long-term cumulative impact on GCC (including sea level rise).

As shown previously in Table 4.3.C, projected sea level rise for Los Angeles, California is anticipated to have a median increase of 8 inches, with a likely increase of 6 to 12 inches by 2050. Rising sea levels may affect the built environment, including coastal development such as buildings, roads, and infrastructure. However, future discretionary projects facilitated under the proposed project would be planned in consideration of the conditions at the time they are proposed and would be evaluated for their potential to be affected by the change in sea level resulting from GCC during environmental review. Sea level rise is a slow gradual condition and future projects would be implemented over the proposed project's planning horizon year 2040 and would undergo environmental review, as necessary. Due to the programmatic nature of the project, the uncertainty in the timing regarding when sea level rise could affect coastal areas within the City limits, and because the future discretionary development proposals within the City would be subject to environmental review under CEQA and would be required to analyze potential sea level rise impacts and include mitigation as appropriate, cumulative sea-level rise impacts would be less than significant.

4.3.11 Level of Significance after Mitigation

GHG emissions associated with the anticipated General Plan build out scenario would exceed the efficiency threshold of 1.92 MT CO_2e/yr/SP in the City at the horizon year of 2040. While Mitigation Measure MM GHG-1 would serve to reduce GHG emissions associated with build out of the project, GHG emission impacts would remain significant and unavoidable because compliance with future efficiency targets cannot be assured.

MM GHG-1 would require the City to adopt and implement a CAAP. Implementation of the CAAP that meets the reduction targets of AB 32 and SB 32 would bring the City into compliance with Statewide GHG emission reduction goals. Therefore, MM GHG-1 would reduce impacts related to consistency with plans, policies, and regulations to a less than significant level.

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