SECTION 4.6

CLIMATE CHANGE AND GREENHOUSE GASES

4.6 CLIMATE CHANGE AND GREENHOUSE GASES

This section provides an analysis of potential climate change and greenhouse gases (GHG) impacts resulting from construction and operation of the proposed Project. Information in this section is derived from California Air Resources Board (CARB), California Public Utility Commission (CPUC), and California Energy Commission (CEC) sources, as well information provided in the "Air Quality & Greenhouse Gas Impact Analysis for Trinity Cultivation and Manufacturing Facility, City of Calexico, CA" (AMBIENT 2018).

A brief introduction to greenhouse gases and climate change is provided to lay the foundation for understanding the discussion and analysis that follows.

GREENHOUSE GASES

To fully understand global climate change, it is important to recognize the naturally occurring "greenhouse effect" and to define the GHGs that contribute to this phenomenon. Various gases in the earth's atmosphere, classified as atmospheric GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space and a portion of the radiation is absorbed by the earth's surface. The earth emits this radiation back toward space, but the properties of the radiation change from high-frequency solar radiation to lower-frequency infrared radiation. GHGs, which are transparent to solar radiation, are effective in absorbing infrared radiation. As a result, this radiation that otherwise would have escaped back into space is now retained, resulting in a warming of the atmosphere. This phenomenon is known as the greenhouse effect. Among the prominent GHGs contributing to the greenhouse effect are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Primary GHGs attributed to global climate change, are discussed, as follows:

Carbon Dioxide

Carbon dioxide (CO_2) is a colorless, odorless gas. CO_2 is emitted in a number of ways, both naturally and through human activities. The largest source of CO_2 emissions globally is the combustion of fossil fuels such as coal, oil, and gas in power plants, automobiles, industrial facilities, and other sources. A number of specialized industrial production processes and product uses such as mineral production, metal production, and the use of petroleum-based products can also lead to CO_2 emissions. The atmospheric lifetime of CO_2 is variable because it is so readily exchanged in the atmosphere (EPA 2018a).

Methane

Methane (CH_4) is a colorless, odorless gas that is not flammable under most circumstances. CH_4 is the major component of natural gas, about 87 percent by volume. It is also formed and released to the atmosphere by biological processes occurring in anaerobic environments. Methane is emitted from a variety of both human-related and natural sources. Human-related sources include fossil fuel production, animal husbandry (enteric fermentation in livestock and manure management), rice cultivation, biomass burning, and waste management. These activities release significant quantities of methane to the atmosphere.

Natural sources of methane include wetlands, gas hydrates, permafrost, termites, oceans, freshwater bodies, non-wetland soils, and other sources such as wildfires. Methane's atmospheric lifetime is about 12 years (U.S. EPA 2018a).

Nitrous Oxide

Nitrous oxide (N_2O) is a clear, colorless gas with a slightly sweet odor. N_2O is produced by both natural and human-related sources. Primary human-related sources of N_2O are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuels, adipic acid production, and nitric acid production. N_2O is also produced naturally from a wide variety of biological

sources in soil and water, particularly microbial action in wet tropical forests. The atmospheric lifetime of N_2O is approximately 114 years (U.S. EPA 2018a).

Hydrofluorocarbons

Hydrofluorocarbons (HFCs) are man-made chemicals, many of which have been developed as alternatives to ozone-depleting substances for industrial, commercial, and consumer products. The only significant emissions of HFCs before 1990 were of the chemical HFC-23, which is generated as a byproduct of the production of HCFC-22 (or Freon 22, used in air conditioning applications). The atmospheric lifetime for HFCs varies from just over a year for HFC-152a to 270 years for HFC-23. Most of the commercially used HFCs have atmospheric lifetimes of less than 15 years (e.g., HFC-134a, which is used in automobile air conditioning and refrigeration, has an atmospheric life of 14 years) (U.S. EPA 2018a).

Perfluorocarbons

Perfluorocarbons (PFCs) are colorless, highly dense, chemically inert, and nontoxic. There are seven PFC gases: perfluoromethane (CF_4), perfluoroethane (C_2F_6), perfluoropropane (C_3F_8), perfluorobutane (C_4F_{10}), perfluorocyclobutane (C_4F_8), perfluoropentane (C_5F_{12}), and perfluorohexane (C_6Fl_4). Natural geological emissions have been responsible for the PFCs that have accumulated in the atmosphere in the past; however, the largest current source is aluminum production, which releases CF_4 and C_2F_6 as byproducts. The estimated atmospheric lifetimes for PFCs range from 2,600 to 50,000 years (U.S. EPA 2018a).

Nitrogen Trifluoride

Nitrogen trifluoride (NF_3) is an inorganic, colorless, odorless, toxic, nonflammable gas used as an etchant in microelectronics. Nitrogen trifluoride is predominantly employed in the cleaning of the plasma-enhanced chemical vapor deposition chambers in the production of liquid crystal displays and silicon-based thin film solar cells. It has a global warming potential of 17,200 carbon dioxide equivalents (CO_2e). While NF_3 may have a lower global warming potential than other chemical etchants, it is still a potent GHG. In 2009, NF_3 was listed by California as a high global warming potential GHG to be listed and regulated under Assembly Bill (AB) 32 (Section 38505 Health and Safety Code).

Sulfur Hexafluoride

Sulfur hexafluoride (SF_6) is an inorganic compound that is colorless, odorless, nontoxic, and generally nonflammable. SF_6 is primarily used as an electrical insulator in high voltage equipment. The electric power industry uses roughly 80 percent of all SF_6 produced worldwide. Leaks of SF_6 occur from aging equipment and during equipment maintenance and servicing. SF_6 has an atmospheric life of 3,200 years (U.S. EPA 2018a).

Black Carbon

Black carbon is the most strongly light-absorbing component of particulate matter (PM) emitted from burning fuels such as coal, diesel, and biomass. Black carbon contributes to climate change both directly by absorbing sunlight and indirectly by depositing on snow and by interacting with clouds and affecting cloud formation. Black carbon is considered a short-lived species, which can vary spatially and, consequently, it is very difficult to quantify associated global-warming potentials. The main sources of black carbon in California are wildfires, off-road vehicles (locomotives, marine vessels, tractors, excavators, dozers, etc.), on-road vehicles (cars, trucks, and buses), fireplaces, agricultural waste burning, and prescribed burning (planned burns of forest or wildlands). California has been an international leader in reducing emissions of black carbon, with close to 95 percent control expected by 2020 due to existing programs that target reducing PM from diesel engines and burning activities (CARB 2017).

Each GHG differs in its ability to absorb heat in the atmosphere based on the lifetime, or persistence, of the gas molecule in the atmosphere. Often, estimates of GHG emissions are presented in carbon dioxide

equivalents (CO_2e), which weight each gas by its global warming potential (GWP). Expressing GHG emissions in carbon dioxide equivalents takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted. **Table 4.6-1** provides a summary of the GWP for GHG emissions of typical concern with regard to community development projects, based on a 100-year time horizon. As indicated, Methane traps over 25 times more heat per molecule than CO_2, and N_2O absorbs roughly 298 times more heat per molecule than CO_2. Additional GHG with high GWP include Nitrogen trifluoride, Sulfur hexafluoride, Perfluorocarbons, and black carbon.

TABLE 4.6-1
GLOBAL WARMING POTENTIAL FOR GREENHOUSE GASES

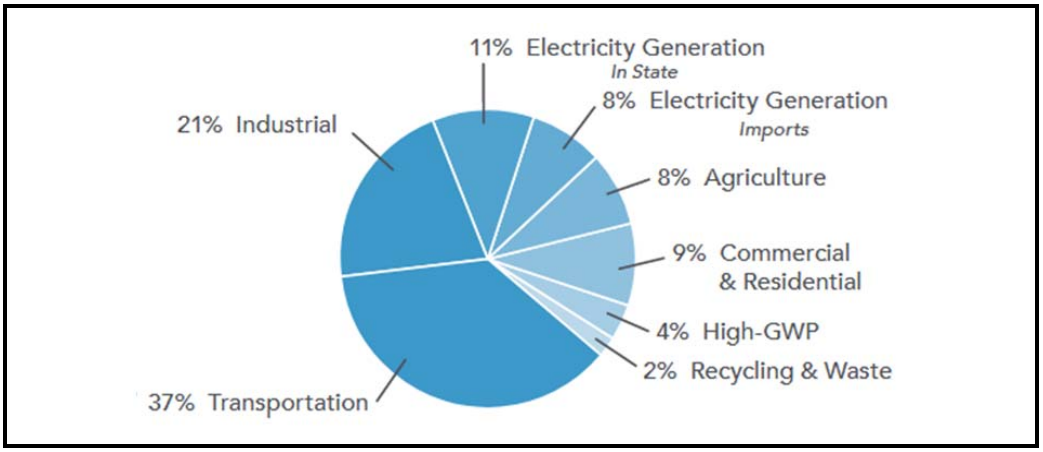
Greenhouse Gas	Global Warming Potential (100-year)*
Carbon Dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous Dioxide (N_2O)	298

Source: IPCC 2007.
**Based on IPCC GWP values for 100-year time horizon.*

SOURCES OF GHG EMISSIONS

On a global scale, GHG emissions are predominantly associated with activities related to energy production; changes in land use, such as deforestation and land clearing; industrial sources; agricultural activities; transportation; waste and wastewater generation; and commercial and residential land uses. World-wide, energy production including the burning of coal, natural gas, and oil for electricity and heat is the largest single source of global GHG emissions (U.S. EPA 2008, 2018).

In 2015, GHG emissions within California totaled 440.4 million metric tons (MMT) of CO_2e. **Figure 4.6-1** summarizes GHG emissions, by sector. Within California, the transportation sector is the largest contributor, accounting for approximately 37 percent of the total state-wide GHG emissions. Emissions associated with industrial uses are the second largest contributor, totaling roughly 21 percent. Electricity generation totaled roughly 19 percent (CARB 2017).



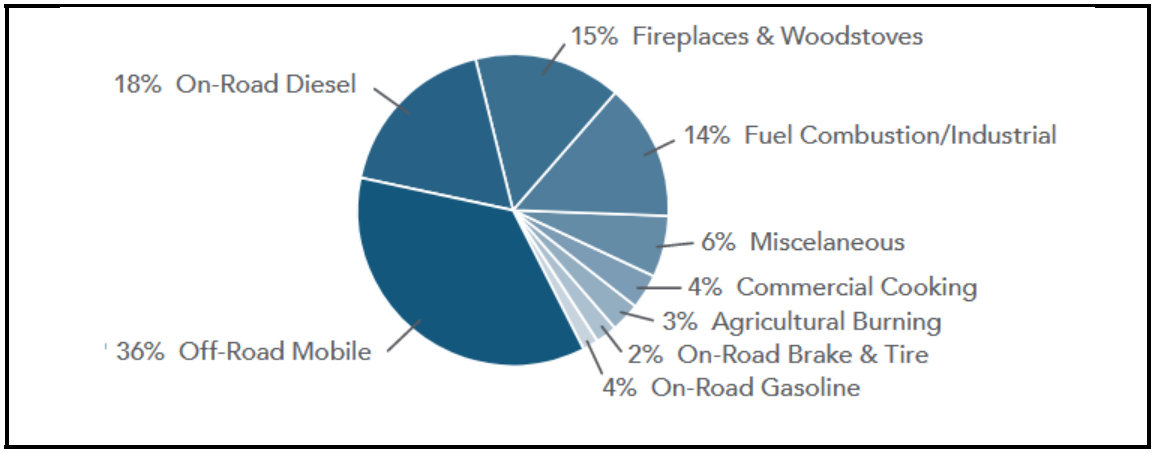
Source: CARB 2017.

FIGURE 4.6-1
CALIFORNIA GHG EMISSIONS INVENTORY BY SCOPING PLAN SECTOR

Short-Lived Climate Pollutants

Short-lived climate pollutants (SLCPs), such as black carbon, fluorinated gases, and methane, also have a dramatic effect on climate change. Though short lived, these pollutants create a warming influence on the climate that is many times more potent than that of carbon dioxide.

As part of the ARB's efforts to address SLCPs, the ARB has developed a statewide emission inventory for black carbon. The black carbon inventory will help support implementation of the SLCP Strategy but is not part of the State's GHG Inventory that tracks progress towards the State's climate targets. **Figure 4.6-2** depicts the most recent inventory for year 2013 conditions. As depicted, off-road mobile sources account for a majority of black carbon emissions totaling roughly 36 percent of the inventory. Other major anthropogenic sources of black carbon include on-road transportation, residential wood burning, fuel combustion, and industrial processes (CARB 2017).



Source: CARB 2017.

FIGURE 4.6-2
CALIFORNIA BLACK CARBON EMISSIONS INVENTORY (YEAR 2013)

EFFECTS OF GLOBAL CLIMATE CHANGE

There are uncertainties as to exactly what the climate changes will be in various local areas of the earth. There are also uncertainties associated with the magnitude and timing of other consequences of a warmer planet: sea level rise, spread of certain diseases out of their usual geographic range, the effect on agricultural production, water supply, sustainability of ecosystems, increased strength and frequency of storms, extreme heat events, increased air pollution episodes, and the consequence of these effects on the economy.

Within California, climate changes would likely alter the ecological characteristics of many ecosystems throughout the state. Such alterations would likely include increases in surface temperatures and changes in the form, timing, and intensity of precipitation. For instance, historical records are depicting an increasing trend toward earlier snowmelt in the Sierra Nevada. This snow pack is a principal supply of water for the state, providing roughly 50 percent of state's annual runoff. If this trend continues, some areas of the state may experience an increased danger of floods during the winter months and possible exhaustion of the snowpack during spring and summer months. An earlier snowmelt would also impact the State's energy resources. Currently, approximately 20 percent of California's electricity comes from hydropower. An early exhaustion of the Sierra snowpack may force electricity producers to switch to more costly or non-renewable forms of electricity generation during spring and summer months. A changing

climate may also impact agricultural crop yields, coastal structures, and biodiversity. As a result, resultant changes in climate will likely have detrimental effects on some of California's largest industries, including agriculture, wine, tourism, skiing, recreational and commercial fishing, and forestry.

4.6.1 REGULATORY FRAMEWORK

A. FEDERAL

Executive Order 13514

Executive Order 13514 is focused on reducing GHGs internally in federal agency missions, programs and operations, but also direct federal agencies to participate in the Interagency Climate Change Adaptation Task Force, which is engaged in developing a national strategy for adaptation to climate change.

On April 2, 2007, in Massachusetts v. U.S. EPA, 549 U.S. 497 (2007), the Supreme Court found that GHGs are air pollutants covered by the Clean Air Act and that the U.S. EPA has the authority to regulate GHG. The Court held that the U.S. EPA Administrator must determine whether or not emissions of GHGs from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision.

On December 7, 2009, the U.S. EPA Administrator signed two distinct findings regarding GHGs under section 202(a) of the Clean Air Act:

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

Although these findings did not themselves impose any requirements on industry or other entities, this action was a prerequisite to finalizing the U.S. EPA's Proposed Greenhouse Gas Emission Standards for Light-Duty Vehicles, which was published on September 15, 2009. On May 7, 2010 the final Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards was published in the Federal Register.

U.S. EPA and the National Highway Traffic Safety Administration (NHTSA) are taking coordinated steps to enable the production of a new generation of clean vehicles with reduced GHG emissions and improved fuel efficiency from on-road vehicles and engines. These next steps include developing the first-ever GHG regulations for heavy-duty engines and vehicles, as well as additional light-duty vehicle GHG regulations. These steps were outlined by President Obama in a Presidential Memorandum on May 21, 2010.

The final combined U.S. EPA and NHTSA standards that make up the first phase of this national program apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The standards require these vehicles to meet an estimated combined average emissions level of 250 grams of CO_2 per mile, (the equivalent to 35.5 miles per gallon if the automobile industry were to meet this CO_2 level solely through fuel economy improvements). Together, these standards will cut GHG emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016). On August 28, 2012, U.S. EPA and NHTSA issued their joint rule to extend this national program of coordinated GHG and fuel economy standards to model years 2017 through 2025 passenger vehicles.

B. STATE

Assembly Bill 1493

AB 1493 (Pavley) of 2002 (Health and Safety Code Sections 42823 and 43018.5) requires the ARB to develop and adopt the nation's first GHG emission standards for automobiles. These standards are also known as Pavley I. The California Legislature declared in AB 1493 that global warming is a matter of increasing concern for public health and the environment. It cites several risks that California faces from climate change, including a reduction in the state's water supply, an increase in air pollution caused by higher temperatures, harm to agriculture, an increase in wildfires, damage to the coastline, and economic losses caused by higher food, water, energy, and insurance prices. The bill also states that technological solutions to reduce GHG emissions would stimulate California's economy and provide jobs. In 2004, the State of California submitted a request for a waiver from federal clean air regulations, as the State is authorized to do under the Clean Air Act, to allow the State to require reduced tailpipe emissions of CO_2. In late 2007, the U.S. EPA denied California's waiver request and declined to promulgate adequate federal regulations limiting GHG emissions. In early 2008, the State brought suit against the U.S. EPA related to this denial.

In January 2009, President Obama instructed the U.S. EPA to reconsider the Bush Administration's denial of California's and 13 other states' requests to implement global warming pollution standards for cars and trucks. In June 2009, the U.S. EPA granted California's waiver request, enabling the State to enforce its GHG emissions standards for new motor vehicles beginning with the current model year.

Also in 2009, President Obama announced a national policy aimed at both increasing fuel economy and reducing GHG pollution for all new cars and trucks sold in the US. The new standards would cover model years 2012 to 2016 and would raise passenger vehicle fuel economy to a fleet average of 35.5 miles per gallon by 2016. When the national program takes effect, California has committed to allowing automakers who show compliance with the national program to also be deemed in compliance with state requirements. California is committed to further strengthening these standards beginning in 2017 to obtain a 45 percent GHG reduction from the 2020 model year vehicles.

Executive Order No. S-3-05

Executive Order S-3-05 (State of California) proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the Executive Order established total GHG emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, to the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

The Executive Order directed the secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce GHG emissions to the target levels. The secretary will also submit biannual reports to the governor and state legislature describing (1) progress made toward reaching the emission targets, (2) impacts of global warming on California's resources, and (3) mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the secretary of CalEPA created a Climate Action Team made up of members from various state agencies and commissions. The Climate Action Team released its first report in March 2006 and continues to release periodic reports on progress. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as state incentive and regulatory programs.

Assembly Bill 32 - California Global Warming Solutions Act of 2006

AB 32 (Health and Safety Code Sections 38500, 38501, 28510, 38530, 38550, 38560, 38561–38565, 38570, 38571, 38574, 38580, 38590, 38592–38599) requires that statewide GHG emissions be reduced to 1990

levels by the year 2020. The gases that are regulated by AB 32 include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride. The reduction to 1990 levels will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs ARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles.

AB 32 requires that ARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap, institute a schedule to meet the emissions cap, and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions (CARB 2018c).

Climate Change Scoping Plan

In October 2008, ARB published its *Climate Change Proposed Scoping Plan*, which is the State's plan to achieve GHG reductions in California required by AB 32. This initial Scoping Plan contained the main strategies to be implemented in order to achieve the target emission levels identified in AB 32. The Scoping Plan included ARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. The largest proposed GHG reduction recommendations were associated with improving emissions standards for light-duty vehicles, implementation of the Low Carbon Fuel Standard program, energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems, and a renewable portfolio standard for electricity production.

The Scoping Plan states that land use planning and urban growth decisions will play important roles in the state's GHG 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. ARB further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emissions sectors. With regard to land use planning, the Scoping Plan expects approximately 5.0 $MMTCO_2e$ will be achieved in association with implementation of Senate Bill 375, which is discussed further below.

The initial Scoping Plan was first approved by ARB on December 11, 2008 and is updated every five years. The first update of the Scoping Plan was approved by the ARB on May 22, 2014, which looked past 2020 to set mid-term goals (2030-2035) on the road to reaching the 2050 goals., The most recent update released by ARB is the *2017 Climate Change Scoping Plan*, which was released In November 2017. The *2017 Climate Change Scoping Plan* incorporates strategies for achieving the 2030 GHG-reduction target established in SB 32 and EO B-30-15.

Senate Bill 1078 and Governor's Order S-14-08 (California Renewables Portfolio Standards)

Senate Bill 1078 (Public Utilities Code Sections 387, 390.1, 399.25 and Article 16) addresses electricity supply and required that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide a minimum 20 percent of their supply from renewable sources by 2017. This Senate Bill will affect statewide GHG emissions associated with electricity generation. In 2008, Governor Schwarzenegger signed Executive Order S-14-08, which set the Renewables Portfolio Standard target to 33 percent by 2020. It directed state government agencies and retail sellers of electricity to take all appropriate actions to implement this target. Executive Order S-14-08 was later superseded by Executive Order S-21-09 on September 15, 2009. Executive Order S-21-09 directed the ARB to adopt regulations requiring 33 percent of electricity sold in the State come from renewable energy by 2020. This Executive

Order was superseded by statute SB X1-2 in 2011, which obligates all California electricity providers, including investor-owned utilities and publicly owned utilities, to obtain at least 33 percent of their energy from renewable electrical generation facilities by 2020.

ARB is required by current law, AB 32 of 2006, to regulate sources of GHGs to meet a state goal of reducing GHG emissions to 1990 levels by 2020 and an 80 percent reduction of 1990 levels by 2050. The CEC and CPUC serve in advisory roles to help ARB develop the regulations to administer the 33 percent by 2020 requirement. ARB is also authorized to increase the target and accelerate and expand the time frame.

Mandatory Reporting of GHG Emissions

Reporting of GHGs by major sources is required by the California Global Warming Solutions Act (AB 32, 2006). Revisions to the existing ARB mandatory GHG reporting regulation were considered at the board hearing on December 16, 2010. The revised regulation was approved by the California Office of Administrative Law and became effective on January 1, 2012. The revised regulation affects industrial facilities, suppliers of transportation fuels, natural gas, natural gas liquids, liquefied petroleum gas, and carbon dioxide, operators of petroleum and natural gas systems, and electricity retail providers and marketers.

Cap-and-Trade Regulation

The cap-and-trade regulation is a key element in California's climate plan. It sets a statewide limit on sources responsible for 85 percent of California's greenhouse gas emissions and establishes a price signal needed to drive long-term investment in cleaner fuels and more efficient use of energy. The cap-and-trade rules came into effect on January 1, 2013 and apply to large electric power plants and large industrial plants. In 2015, the rules extended to fuel distributors (including distributors of heating and transportation fuels.

Under the cap-and-trade regulation, companies must hold enough emission allowances to cover their emissions and are free to buy and sell allowances on the open market. California held its first auction of GHG allowances on November 14, 2012. California's GHG cap-and-trade system is projected to reduce GHG emissions to 1990 levels by the year 2020 and would achieve an approximate 80 percent reduction from 1990 levels by 2050. The proposed Project may be required to purchase emissions allowances to off-set emissions associated with operation.

Senate Bill 32

SB 32 was signed by Governor Brown on September 8, 2016. SB 32 effectively extends California's GHG emission-reduction goals from year 2020 to year 2030. This new emission-reduction target of 40 percent below 1990 levels by 2030 is intended to promote further GHG-reductions in support of the State's ultimate goal of reducing GHG emissions by 80 percent below 1990 levels by 2050. SB 32 also directs the ARB to update the Climate Change Scoping Plan to address this interim 2030 emission-reduction target.

Senate Bill 375

SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS) that will address land use allocation in that MPOs regional transportation plan. ARB, in consultation with MPOs, establishes regional reduction targets for GHGs emitted by passenger cars and light trucks for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, funding for transportation projects may be withheld.

California Renewables Portfolio Standards (Senate Bill 1078, Governor's Order S-14-08, and SB 350)

Senate Bill 1078 (Public Utilities Code Sections 387, 390.1, 399.25 and Article 16) addresses electricity supply and requires that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide a minimum 20 percent of their supply from renewable sources by 2017. This Senate Bill will affect statewide GHG emissions associated with electricity generation. In 2008, Governor Schwarzenegger signed Executive Order S-14-08, which set the Renewables Portfolio Standard target to 33 percent by 2020. It directed state government agencies and retail sellers of electricity to take all appropriate actions to implement this target. Executive Order S-14-08 was later superseded by Executive Order S-21-09 on September 15, 2009. Executive Order S-21-09 directed the ARB to adopt regulations requiring 33 percent of electricity sold in the State come from renewable energy by 2020. This Executive Order was superseded by statute SB X1-2 in 2011, which obligates all California electricity providers, including investor-owned utilities and publicly owned utilities, to obtain at least 33 percent of their energy from renewable electrical generation facilities by 2020.

SB 350 (Chapter 547, Statues of 2015) further increased the Renewables Portfolio Standard to 50 percent by 2030. The legislation also included interim targets of 40 percent by 2024 and 45 percent by 2027. SB 350 was signed into law on October 7, 2015.

California Building Code

The California Building Code (CBC) contains standards that regulate the method of use, properties, performance, or types of materials used in the construction, alteration, improvement, repair, or rehabilitation of a building or other improvement to real property. The CBC is adopted every three years by the Building Standards Commission (BSC). In the interim, the BSC also adopts annual updates to make necessary mid-term corrections. The CBC standards apply statewide; however, a local jurisdiction may amend a CBC standard if it makes a finding that the amendment is reasonably necessary due to local climatic, geological, or topographical conditions.

Green Building Standards

In essence, green buildings standards are indistinguishable from any other building standards. Both are contained in the CBC and regulate the construction of new buildings and improvements. The only practical distinction between the two is that whereas the focus of traditional building standards has been protecting public health and safety, the focus of green building standards is to improve environmental performance.

AB 32, which mandates the reduction in GHG emissions in California to 1990 levels by 2020, increased the urgency around the adoption of green building standards. In its scoping plan for the implementation of AB 32, ARB identified energy use as the second largest contributor to California's GHG emissions, constituting roughly 25 percent of all such emissions. In recommending a green building strategy as one element of the scoping plan, ARB estimated that green building standards would reduce GHG emissions by approximately 26 million metric tons of CO_2e ($MMTCO_2e$) by 2020. The green buildings standards were most recently updated in 2016.

Senate Bill 97

Senate Bill 97 (SB 97) was enacted in 2007. SB 97 required OPR to develop, and the Natural Resources Agency to adopt, amendments to the CEQA Guidelines addressing the analysis and mitigation of GHG emissions. Those CEQA Guidelines amendments clarified several points, including the following:

- Lead agencies must analyze the GHG emissions of proposed projects and must reach a conclusion regarding the significance of those emissions.
- When a project's GHG emissions may be significant, lead agencies must consider a range of potential mitigation measures to reduce those emissions.
- Lead agencies must analyze potentially significant impacts associated with placing projects in hazardous locations, including locations potentially affected by climate change.
- Lead agencies may significantly streamline the analysis of GHGs on a project level by using a programmatic GHG emissions reduction plan meeting certain criteria.
- CEQA mandates analysis of a proposed project's potential energy use (including transportation-related energy), sources of energy supply, and ways to reduce energy demand, including through the use of efficient transportation alternatives.

As part of the administrative rulemaking process, the California Natural Resources Agency developed a Final Statement of Reasons explaining the legal and factual bases, intent, and purpose of the CEQA Guidelines amendments. The amendments to the CEQA Guidelines implementing SB 97 became effective on March 18, 2010.

Short-Lived Climate Pollutant Reduction Strategy

In March 2017, the ARB adopted the *Short-Lived Climate Pollutant Reduction Strategy* (*SLCP Strategy*) establishing a path to decrease GHG emissions and displace fossil-based natural gas use. Strategies include avoiding landfill methane emissions by reducing the disposal of organics through edible food recovery, composting, in-vessel digestion, and other processes; and recovering methane from wastewater treatment facilities, and manure methane at dairies, and using the methane as a renewable source of natural gas to fuel vehicles or generate electricity. The *SLCP Strategy* also identifies steps to reduce natural gas leaks from oil and gas wells, pipelines, valves, and pumps to improve safety, avoid energy losses, and reduce methane emissions associated with natural gas use. Lastly, the *SLCP Strategy* also identifies measures that can reduce hydrofluorocarbon (HFC) emissions at national and international levels, in addition to State-level action that includes an incentive program to encourage the use of low-Global Warming Potential (GWP) refrigerants, and limitations on the use of high-GWP refrigerants in new refrigeration and air-conditioning equipment (CARB 2017).

C. LOCAL

Imperial County Air Pollution Control District (ICAPCD)

The CARB's Scoping Plan states that local governments are "essential partners" in the effort to reduce GHG emissions (CARB 2008). The Scoping Plan also acknowledges that local governments have broad influence and, in some cases, exclusive jurisdiction over activities that contribute to significant direct and indirect GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations. Many of the proposed measures to reduce GHG emissions rely on local government actions. Imperial County has not established formal quantitative or qualitative thresholds through a public rulemaking process, but CEQA permits the lead agency to establish a project-specific threshold of significance if backed by substantial evidence, until a formal threshold is approved.

ICAPCD Rule 903

ICAPCD Rule 903 applies to any stationary source that would have the potential to emit air contaminants equal to or in excess of the threshold for a major source of regulated air pollutants. In 2011, ICAPCD amended Rule 903 to add GHGs to the list of regulated pollutants. As part of the revised rule, stationary sources that do not exceed the de minimis emissions level of 20,000 tons CO_2e per year in a 12-

month period would not need to meet recordkeeping and reporting requirements. The ICAPCD has no regulations or additional guidelines relative to GHG emissions for residential, commercial, or industrial projects.

City of Calexico General Plan

The Calexico General Plan has been prepared to fulfill the requirement of California law that each city adopt a comprehensive General Plan to guide physical development of the incorporated area and land outside of the municipal boundaries. Calexico's current General Plan dated February 2007 was adopted by the City on May 1, 2007. The General Plan does not contain any goals, objectives or policies that directly address greenhouse gases and climate change. Therefore, a General Plan consistency analysis is not possible as it relates to greenhouse gases.

4.6.2 ENVIRONMENTAL SETTING

A. GLOBAL CLIMATE CHANGE

The earth's climate has been warming for the past century. The warming trend is believed to be related to the release of certain gases into the atmosphere. GHGs absorb infrared energy that would otherwise escape from the earth. As the infrared energy is absorbed, the air surrounding the earth is heated. An overall warming trend has been recorded since the late 19th century with the 10 warmest years of the last century all occurring within the last 15 years. The decade of the 1990s was the warmest in human history. GHGs have risen 34 percent since 1990 (NOAA 2014). The increase in the atmospheric abundance of GHGs has been attributed to human activities.

Climate Change in California

The "California Greenhouse Gas Inventory for 2000 – 2014 by Category as Defined in the 2008 Scoping Plan" was updated by CARB on March 30, 2016. **Table 4.6-2** provides a summary of the Inventory by sector for years 2000, 2005, 2010, 2011, 2012, 2013 and 2014. The Inventory is divided into nine broad sectors of economic activity: agriculture, commercial, electricity generation, forestry, high global warming potential (GWP) emitters, industrial, recycling and waste, residential, and transportation. Emissions are quantified in $MMTCO_2E$. The inventory indicates that California's gross emissions of GHG decreased by approximately 5.7 percent from 465.91 $MMTCO_2e$ in 2000 to 441.54 $MMTCO_2e$ in 2014, with a maximum 489.2 $MMTCO_2e$ in 2004 (2004 not shown in Table 4.6-2). During the same period, California's population grew by nine percent from 33.99 million to 38.68 million people (U.S. Census Bureau n.d.). As a result, California's per capita GHG emissions decreased from 2000 through 2014 from 13.74 to 11.41 tons of CO_2e per person. Emissions from all sectors remained relatively flat with minor increases or decreases from 2010 to 2014 (CARB 2016b).

Comparatively, total U.S. GHG emissions as of 2014, the latest information available, were 6870.5 million metric tons of carbon dioxide equivalents ($MMTCO_2e$) (EPA 2016). Total U.S. GHG emissions increased by 6.9 percent from 1990 to 2014, and emissions decreased from 2013 to 2014 by 1.0 percent (70.5 $MMTCO_2e$).

According to the "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2014) (EPA 2016), the largest portion of GHG emissions in 2014 (30 percent) was attributed to electricity generation. This was followed by transportation activities, in aggregate (26 percent) and emissions from industry (21 percent). In contrast, GHG emissions from industry have generally declined over the past decade. The long-term decline in these emissions is attributed to structural changes in the U.S. economy (i.e., shifts from a manufacturing-based to a service-based economy), fuel switching, and efficiency improvements.

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TABLE 4.6-2
CALIFORNIA GHG EMISSIONS BY SECTOR IN 2005, 2010, 2011, 2013, AND 2014
(BY CATEGORY AS DEFINED IN THE 2008 SCOPING PLAN)

Sector	2000 Emissions in $MMTCO_2E$ (% total)[1]	2005 Emissions in $MMTCO_2E$ (% total)[1]	2010 Emissions in $MMTCO_2E$ (% total)[1]	2011 Emissions in $MMTCO_2E$ (% total)[1]	2012 Emissions in $MMTCO_2E$ (% total)[1]	2013 Emissions in $MMTCO_2E$ (% total)[1]	2014 Emissions in $MMTCO_2E$ (% total)[1]
Agriculture	31.80 (7%)	34.45 (7%)	34.92 (8%)	35.85 (8%)	36.78 (8%)	35.36 (8%)	36.11 (8%)
Commercial Fuel Usel[2]	11.47 (2%)	12.55 (3%)	13.58 (3%)	13.71 (3%)	13.27 (3%)	13.15 (3%)	12.62 (3%)
Commercial Cogeneration Heat Output	1.09 (0%)	0.40 (0%)	0.92 (0%)	0.78 (0%)	0.76 (0%)	0.71 (0%)	0.58 (0%)
Residential Fuel Use[2]	29.38 (6%)	27.98 (6%)	29.19 (7%)	29.64 (7%)	27.34 (6%)	28.14 (6%)	23.73 (5%)
Other Commercial & Residential	1.24 (0%)	1.31 (0%)	1.36 (0%)	1.37 (0%)	1.39 (0%)	1.40 (0%)	1.41 (0%)
Electric Power	104.84 (23%)	107.85 (22%)	90.34 (20%)	88.06 (20%)	95.09 (22%)	89.65 (20%)	88.24 (20%)
High GWP[3]	5.33 (1%)	7.70 (2%)	12.39 (3%)	13.65 (3%)	14.89 (3%)	16.05 (4%)	17.15 (4%)
Industrial	96.99 (21%)	95.41	90.99 (20%)	90.49 (20%)	90.63 (20%)	93.10 (21%)	93.32 (21%)
Recycling & Waste	7.46 (2%)	7.94 (2%)	8.58 (2%)	8.69 (2%)	8.72 (2%)	8.76 (2%)	8.85 (2%)
Transportation	176.31 (38%)	184.21 (38%)	162.78 (37%)	159.47 (36%)	159.47 (36%)	157.99 (36%)	159.53 (36%)
Total	**465.91**	**479.81**	**445.05**	**441.71**	**448.33**	**444.31**	**441.54**

Source: [1]CARB 2016c.

The remaining 22 percent of U.S. GHG emissions were contributed by the residential, agriculture, and commercial sectors, plus emissions from U.S. Territories. The residential sector accounted for 6 percent of GHG emissions, largely carbon dioxide (CO2) emissions from fossil fuel combustion. Agriculture activities accounted for approximately 9 percent of U.S. emissions. Unlike other economic sectors which generate CO2 from fossil fuel combustion, agricultural sector emissions are dominated by nitrous oxide (N2O) emissions from agricultural soil management and methane (CH4) emissions from enteric fermentation. The commercial sector accounted for roughly 7 percent of emissions, while U.S. Territories accounted for less than 1 percent. Carbon dioxide was also emitted and sequestered (in the form of C) by various activities including forest management practices, tree planting in urban areas, the management of agricultural soils, and landfilling of yard trimmings (EPA 2016, p. 2-22). A summary and overview of the impacts of GCC on various sectors of California's economy and natural resources, based on the CAT's white paper "Scenarios of Climate Change in California: An Overview" (CCCC 2006) is provided below.

Public Health

Higher temperatures are expected to increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to ozone formation are projected to increase from 25 percent to 35 percent under the lower warming range; under the medium warming range, ozone formation is expected to increase from 75 percent to 85 percent. In addition, if global background ozone levels increase as predicted in some scenarios, it may become impossible to meet local air quality standards. Air quality could be further compromised by increases in wildfires which emit fine particulate matter that can travel long distances depending on wind conditions. Large wildfires could become up to 55 percent more frequent if GHG emissions are not significantly reduced (CCCC 2006).

In addition, under the higher warming scenario, there could be up to 100 more days per year with temperatures above 90°F in Los Angeles and 95°F in Sacramento by 2100. This is a large increase over historical patterns and approximately twice the increase projected if temperatures remain within or below the lower warming range. Rising temperatures will increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

Water Resources

A vast network of man-made reservoirs and aqueducts capture and transport water throughout the state from northern California and the Colorado River. The current distribution system relies on Sierra Nevada snow pack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snow pack, increasing the risk of summer water shortages (CCCC 2006).

The state's water supplies are also at risk from rising sea levels. An influx of saltwater would degrade California's estuaries, wetlands, and groundwater aquifers. Saltwater intrusion caused by rising sea levels is a major threat to the quality and reliability of water within the southern edge of the Sacramento/San Joaquin River Delta, a major state fresh water supply. Global warming is also projected to seriously affect agricultural areas, with California farmers projected to lose as much as 25 percent of the water supply needed; decrease the potential for hydropower production within the State (although the effects on hydropower are uncertain); and seriously harm winter tourism. Under the lower warming range, the snow dependent winter recreational season at lower elevations could be reduced by as much as one month. If temperatures reach the higher warming range and precipitation declines, there might be many years with insufficient snow for skiing and snowboarding and other snow dependent recreational activities (CCCC 2006). If GHG emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snow pack by as much as 70 percent to 90 percent.

Under the lower warming scenario, snow pack losses are expected to be only half as large as those expected if temperatures were to rise to the higher warming range. How much snow pack will be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snow pack would pose challenges to water managers, hamper hydropower generation, and nearly eliminate all skiing and other snow-related recreational activities (CCCC 2006).

Agriculture

Increased GHG emissions are expected to cause widespread changes to the agriculture industry reducing the quantity and quality of agricultural products statewide. Although higher carbon dioxide levels can stimulate plant production and increase plant water-use efficiency, California's farmers will face greater water demand for crops and a less reliable water supply as temperatures rise (CCCC 2006).

Plant growth tends to be slow at low temperatures, increasing with rising temperatures up to a threshold. However, faster growth can result in less-than optimal development for many crops, so rising temperatures are likely to worsen the quantity and quality of yield for a number of California's agricultural products. Products likely to be most affected include wine grapes, fruits and nuts, and milk (CCCC 2006).

Crop growth and development will be affected, as will the intensity and frequency of pest and disease outbreaks. Rising temperatures will likely aggravate ozone pollution, which makes plants more susceptible to disease and pests and interferes with plant growth (CCCC 2006).

In addition, continued global warming will likely shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion is expected in many species while range contractions are less likely in rapidly evolving species with significant populations already established. Should range contractions occur, it is likely that new or different weed species will fill the emerging gaps. Continued global warming is also likely to alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates (CCCC 2006).

Energy Resources

California produces almost 70 percent of its electricity consumption from power plants located within the State and imports the remaining 30 percent. Energy production effects the GHG intensity of electricity generation (i.e., the quantity of CO_2e emitted per MWh produced). The GHG intensity of California electricity peaked in 2001, a year marked by drought and electricity market manipulation (CARB 2013). Overall, GHG emissions from electricity have been on the decline since 2005. The lowest level of emissions was reached in 2011 followed by a slight increase in 2012 before continuing the downward trend (**Table 4.6-2**) (CARB 2016b).

CARB's GHG emission inventory divides the electric power sector into two broad categories: 1) emissions from in-state power generation; and, 2) emissions from imported electricity. Emissions from the electric power sector comprised 20% of 2014 statewide GHG emissions. GHG emissions from this sector declined by 1.6% in 2014 compared to 2013. The overall decrease in this sector is driven by the RPS which requires that a greater share of California's power come from renewable sources. The GHG intensity of imported electricity has been declining steadily over time, while the GHG intensity of in-state electricity has been relatively constant (CARB 2016c).

The Imperial Irrigation District (IID) is the electric utility provider to Imperial County. IID uses a comprehensive energy strategy that relies on expansion of customer energy efficiency and demand-side management programs to meet its customers' future power needs in ways that are consistent with the California's Energy Action Plan. The strategy also includes securing additional renewable power resources before seeking to meet customer energy needs through efficient traditional generation sources.

An analysis of Energy Consumption associated with the proposed Project is included in Chapter 7.0, Other CEQA Required Considerations, of this EIR.

B. PROJECT PARCELS

The 8.44-acre Project includes an existing structure at 2421 Enterprise Boulevard (Phase 1) and four vacant parcels, the latter to be developed with three cannabis cultivation and manufacturing facilities (Phase 2). A 10,000 square foot (sq. ft.) parcel is to be created for a transportation and distribution facility. The new parcel would be carved out of the existing parcel on which 2421 Enterprise Boulevard is located. The Project includes a total of 353,480 sq. ft. Construction of the Project is expected to take approximately 30 months to complete.

Buildings A, B, C and D are expected to require approximately 3 mega-watts (MWs) of electricity per day depending on the amount of production. The proposed Transportation and Distribution Facility electrical consumption is expected to use 200 to 240 volts of electricity. An existing transmission line currently extends to 2421 Enterprise Boulevard.

At buildout, the entire Trinity Cannabis Cultivation and Manufacturing Facility would require over 12-MWs of electricity including electrical supply to the Transportation Office.

In aggregate, the four cultivation facilities anticipate using 5,610 gross gallons of water per day (GPD) accessed from two tanks per facility capable of storing a total of 10,000 gallons of fresh water. However, approximately 70% of the water would be captured and recycled resulting in net use of approximately 1,071 GPD, strictly for cultivation purposes. Of the 5,610 gross GPD used for cultivation approximately 1,326 GPD will be used strictly for employee purposes (e.g., sinks) resulting in an equivalent amount of wastewater. The proposed Transportation Office is estimated to use approximately 30 to 45 gallons of water per day. At full buildout, the Project would use approximately 5,655 gross gallons of water per day (5,610 gallons + 45 gallons). The City of Calexico will provide water to serve the Project.

4.6.3 IMPACTS AND MITIGATION MEASURES

A. SIGNIFICANCE THRESHOLD CRITERIA

With the passage of AB 32 and SB 97, CEQA documents are now required to contain an analysis of GHG emissions. According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would:

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

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

Neither the City of Calexico nor the ICAPCD have adopted GHG reduction programs, plans, or regulations for the reduction of GHGs. However, various other entities have identified recommended GHG-significance thresholds, as discussed below.

State of California

By enacting SB 97, California's lawmakers expressly recognized the need to analyze GHG emissions as a part of the CEQA process. SB 97 required OPR to develop, and the Natural Resources Agency to adopt, amendments to the CEQA Guidelines addressing the analysis and mitigation of GHG emissions. The amendments to the CEQA Guidelines implementing SB 97 became effective on March 18, 2010. These amendments, however, do not establish a threshold of significance for the assessment of GHG impacts. However, lead agencies are granted discretion to establish significance thresholds for their respective

jurisdictions, including looking to thresholds developed by other public agencies, or suggested by other experts (i.e., California Air Pollution Control Officers Association [CAPCOA], South Coast Air Quality Management District [SCAQMD]), so long as any threshold chosen is supported by substantial evidence. The California Natural Resources Agency has also clarified that the amendments recognized the cumulative effects of GHG emissions as they relate to climate change and that GHG impacts should be analyzed in the context of CEQA's requirements for the assessment of cumulative impacts.

California Air Pollution Control Officers Association (CAPCOA)

In its January 2008 "CEQA and Climate Change" white paper, CAPCOA identified a number of potential approaches for determining the significance of GHG emissions in CEQA documents. In its white paper, CAPCOA suggests making significance determinations "on a case-by-case basis in the context of the project at the time it comes forward" when no significance thresholds have been formally adopted by a lead agency. The CAPCOA white paper suggested a bright-line threshold of 900 $MTCO_2e$/year. As proposed, projects generating emissions exceeding this threshold would be considered to have a potentially significant impact. This threshold reflects the amount of emissions that ninety percent of development projects surveyed in four cities within California would generate, which included the cities of Los Angeles, Pleasanton, Dublin, and Livermore.

Stationary Source GHG Thresholds

The ICAPCD has not adopted a GHG significance threshold for stationary sources. However, other air districts in California have adopted significance thresholds that apply to permitted stationary sources. In December 2008, SCAQMD Governing Board adopted an interim GHG significance threshold of 10,000 $MTCO_2e$ for stationary source/industrial projects where the SCAQMD is the lead agency. This threshold was adopted based upon an October 2008 staff report, which concluded that the 10,000 $MTCO_2e$/yr threshold was consistent with achieving an emission capture rate of 90 percent for new or modified stationary sources. Other entities have also adopted a stationary source threshold of 10,000 $MTCO_2e$/yr, including the County of San Diego, Bay Area Air Quality Management District (BAAQMD), Sacramento Metropolitan Air Quality Management District (SMAQMD), and the San Luis Obispo County Air Pollution Control District (SLOAPCD).

B. SIGNIFICANCE THRESHOLDS

As noted above, the City of Calexico and the ICAPCD have not formally adopted quantitative significance thresholds for determination of whether or not a project would have a significant impact on the environment or conflict with an applicable GHG-reduction plan, policy, or regulation. For purposes of this analysis, project-generated emissions were evaluated based on CAPCOA's recommended GHG threshold of 900 $MTCO_2e$/year, as reflected in CAPCOA's *CEQA and Climate Change* white paper. With regard to stationary sources, ICAPCD's Rule 903 identifies a *de minimis* level of 20,000 MTCO2e. Stationary sources emitting GHGs above this *de minimis* level are required to meet recordkeeping and reporting requirements. This *de minimis* level, however, is not a CEQA threshold of significance. Stationary source emissions were, therefore, evaluated separately in comparison to a threshold of 10,000 $MTCO_2e$/year, based on the thresholds adopted by various other entities (e.g., SCAQMD, BAAQMD, SLOAPCD, SMAQMD, San Diego County).

C. METHODOLOGY

Construction emissions of GHGs were calculated using the CalEEMod, version 2016.3.2 computer program. Modeling was conducted for the proposed Project based on construction schedules provided by the Project applicant. Other construction modeling assumptions, including off-road equipment usage, mobile-source emission factors, and usage rates, were based on default parameters contained in the

model for Imperial County. In accordance with common practice for the evaluation of construction-generated GHGs, construction-generated GHG emissions were amortized over an assumed 30-year project life and included as part of the operational emissions inventory. Emissions modeling assumptions and output files are provided in Appendix A of the Air Quality & Greenhouse Gas Impact Analysis included as **Appendix B** of this EIR.

Emissions modeling assumptions and output files are provided in Appendix A of the Air Quality & Greenhouse Gas Impact Analysis included in **Appendix B** of this EIR.

Long-term operational emissions of GHGs were also calculated using the CalEEMod, version 2016.3.2, computer program. Modeling was conducted based on the estimated building square footage to be constructed and vehicle trip-generation rates identified in the traffic analysis prepared for this Project. Electricity usage rates were provided by the project engineer taking into account cultivation and non-cultivation usage. The quantification of project-generated GHG emissions takes into account compliance with current building standards, such as the use of low-flow water fixtures and energy-efficient lighting.

D. PROJECT/CUMULATIVE IMPACTS AND MITIGATION MEASURES

Generation of GHG Emissions/Conflict with Applicable Plan, Policy or Regulation Reducing GHGs

Impact 4.6.1 Implementation of the proposed Project would produce both short-term construction and long-term operational GHGs**.** Operational GHG emissions would exceed the threshold of 900 $MTCO_2e$/year. Generation of GHGs in excess of the threshold could conflict with GHG-reduction planning efforts. This is considered a **potentially significant impact.**

Short-Term Construction Emissions

Table 4.6-3 summarizes estimated construction-generated emissions. As indicated, construction of the proposed project would generate maximum annual emissions of approximately 172.9 metric tons of carbon dioxide equivalent ($MTCO_2e$) per year associated with the construction of Buildings B and C. In total, project construction would generate approximately 368.7 $MTCO_2e$. There are no GHG significance threshold for short-term construction-generated emissions.

TABLE 4.6-3
SHORT-TERM CONSTRUCTION GHG EMISSIONS

Project Phase	Emissions (MT CO_2e)[2] per year
Building A	69.3
Buildings B & C	172.9
Building D	126.5
Total at Project Buildout:	368.7
Amortized[2]:	12.3

Source: AMBIENT 2018.

[1] Emissions were quantified using CalEEMod, version 2016.3.2. Refer to Appendix A *of the Air Quality & Greenhouse Gas Impact Analysis included in* ***Appendix B*** *of this EIR* or modeling results and assumptions. Totals may not sum due to rounding.

[2] Amortized emissions were quantified based on an approximate 30-year project life.

Based on commonly applied methodologies recommended by other entities, such as the SCAQMD, construction-generated emissions were amortized over a recommended project life of 30 years. These amortized emissions were then included in the analysis of long-term operational emissions for comparison to the GHG threshold. As noted in **Table 4.6-4**, when amortized over an assumed 30-year project life, amortized annual construction emissions would be 12 $MTCO_2e$. There are no GHG significance

threshold for short-term construction-generated emissions. Based on commonly applied methodologies recommended by other entities, such as the SCAQMD, construction-generated emissions were amortized over a recommended project life of 30 years. These amortized emissions were then included in the analysis of long-term operational emissions for comparison to the GHG threshold. As noted in **Table 4.6-4**, when amortized over an assumed 30-year project life, annual construction emissions would be 12 MTCO2*e.*

Long-term Operational Emissions

Long-term operation of the proposed Project would result in emissions predominantly associated with energy use and, to a lesser extent, vehicle trips, water use, and solid waste generation. **Table 4.6-4** summarizes estimated operational emissions.

TABLE 4.6-4
LONG-TERM OPERATIONAL GHG EMISSIONS

Source	Annual Emissions (MT CO_2e)[1, 2]
Stationary Sources (Emergency Generators)	70
Significance Threshold	10,000
Exceeds Threshold/Significant Impact?	No
Energy Usage (Natural Gas & Electricity)	28,162
Motor Vehicles	506
Waste Generation	40
Water Usage	49
Total at Project Buildout:	28,757
Amortized Construction Emissions[3]:	12
Total with Amortized Construction Emissions:	28,769
Significance Threshold:	900
Exceeds Threshold/Significant Impact?:	Yes

Source: AMBIENT 2018.

[1] Emissions were quantified using CalEEMod, version 2016.3.2. Totals may not sum due to rounding. Assumes compliance with current building standards and regulatory requirements for energy and water conservation.

[2] Construction-generated emissions were amortized assuming a 30-year project life.

[3] There are no GHG significance threshold for short-term construction-generated emissions. Based on commonly applied methodologies recommended by other entities, such as the SCAQMD, construction-generated emissions were amortized over a recommended project life of 30 years. These amortized emissions were then included in the analysis of long-term operational emissions for comparison to the GHG threshold. Construction-generated GHGs are summarized in Table 4.6-3.

Onsite stationary sources would include the installation of four diesel-fueled emergency generators. Assuming compliance with current permitting limitations for the generators of 100 hours/year for routine maintenance and testing purposes, annual GHG emissions associated with operation of the emergency generators would total approximately 70 $MTCO_2e$/year. Operational GHG emissions associated with the emergency generators would not exceed the significance threshold of 10,000 $MTCO_2e$/year. Long-term operational GHG emissions associated with on-site stationary sources (i.e. generators) would be considered to have a **less-than-significant impact**.

As indicated in **Table 4.6-4**, annual operational GHG emissions generated by the proposed Project would total approximately 28,769 $MTCO_2e$/year. As indicated, a majority of the emissions generated (roughly 99.7%) would be attributable to energy usage. GHG emissions from mobile sources constitute a majority of the remaining operational GHG emissions. Operational GHG emissions associated with non-stationary sources (excluding the generators) would exceed the threshold of 900 $MTCO_2e$/year and would be

considered to have a potentially significant impact on the environment, which could conflict with GHG-reduction planning efforts.

Mitigation Measures

Implement mitigation measure MM 4.2.1a j thru n and MM 4.2.1b.

MM 4.6.1a Incorporate water-reducing features into building and landscape design exceeding current building standards. Such measures shall include, at a minimum, the following:

- Installation of xeriscape landscaping.
- Installation of automated water-efficient irrigation systems and building fixtures.

Timing/Implementation: As a condition of approval/Project Contractor and Applicant.

Enforcement/Monitoring: City of Calexico Development Services Department/City of Calexico Code Enforcement.

MM 4.6.1b Incorporate energy-reducing features into building and site design exceeding current building standards. Such measures shall include, at a minimum, the use of high-efficiency HVAC & dehumidification systems.

Timing/Implementation: As a condition of approval/Project Contractor and Applicant.

Enforcement/Monitoring: City of Calexico Development Services Department.

MM 4.6.1c Incorporate energy-reducing practices to minimize peak energy loads. Such measures may include the staggering of grow room schedules over a 24-hour period so the minimum number of rooms run concurrently. Similarly, other energy-intensive processes such as extraction, cleaning or electric heating should be staggered and scheduled carefully with lighting cycles to minimize peak power demands. Scheduling overlapping or high-energy demand activities during the nighttime when outdoor air temperatures are lower can reduce the cooling load during peak energy demand time.

Timing/Implementation: As a condition of approval/Applicant(s).

Enforcement/Monitoring: City of Calexico Development Services Department.

MM 4.6.1d Incorporate the use of alternative/renewable energy sources (e.g., solar photovoltaic, wind-power systems) to the maximum extent achievable through site and building design.

Timing/Implementation: As a condition of approval/Applicant(s).

Enforcement/Monitoring: City of Calexico Development Services Department.

MM 4.6.1e Light colored "cool" roofs and cool pavements shall be included in building and site designs to the extent practical.

Timing/Implementation: As a condition of approval/Applicant(s).

Enforcement/Monitoring: City of Calexico Development Services Department.

MM 4.6.1f To the extent practical, on-site plant waste shall be diverted for composting or recycling. Recycling of other materials (e.g., paper, plastic, glass, etc.) shall comply with current regulatory requirements.

Timing/Implementation: During operation/Applicant(s).
Enforcement/Monitoring: City of Calexico Development Services Department.

Significance after Mitigation

Mitigation measure MM 4.2.1a items j – n (from Section 4.2 Air Quality) would require actions that would minimize diesel-exhaust emissions from off-road equipment thereby reducing short-lived GHG emissions of black carbon. With implementation of mitigation measure MM 4.6.1a thru MM 4.6.1f and MM 4.2.1b, GHG emissions associated with Project operations would be significantly reduced. GHG reductions would be achieved through the implementation of measures to reduce energy use, such as the installation of energy-efficient lighting and alternative/renewable energy sources (e.g., solar photovoltaic (PV) and wind-power systems.) With installation of energy-efficient lighting, annual operational GHG emissions associated with electricity use would be reduced to approximately 26,269 $MTCO_2e$. The amount of energy demand provided by onsite renewable energy sources, such solar PV systems, would vary depending largely on building and site design constraints. Based on preliminary information provided by the project applicant, it is estimated that on-site solar PV systems could reduce on-site electricity demand by roughly 16 percent. Based on this estimate, operational GHG emissions associated with electricity use could be further reduced to approximately 22,066 $MTCO_2e$ with installation of solar PV systems. With the inclusion of GHG emissions associated with natural gas use, combined energy-related GHG emissions with mitigation would total 22,084 $MTCO_2e$/year. Measures would also be implemented to reduce waste generation, as well as, water, and motor vehicle use. Implementation of these additional measures would reduce operational GHG emissions by roughly 20 $MTCO_2e$/year, or more. In total, implementation of the proposed mitigation measures would reduce operational emissions by roughly 6,098 $MTCO_2e$/year, or more. With the inclusion of amortized construction emissions, mitigated operational emissions would total approximately 22,671 $MTCO_2e$/year. Mitigated operational emissions, particularly emissions associated with energy use, would continue to exceed the GHG significance threshold of 900 $MTCO_2e$/year. As a result, even with available mitigation measures, increases in project-related GHG emissions could have a significant impact on the environment, which could conflict with GHG-reduction planning efforts. This impact is considered **significant and unavoidable.**

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