4.4 Climate Change/Greenhouse Gas Emissions

This section describes environmental and regulatory settings related to greenhouse gas emissions in the proposed Project area; identifies impacts of the proposed Project and cumulative impacts from this and other projects in the region; and recommends mitigation measures to reduce those impacts. Alternatives to the proposed Project are discussed in Section 5.0. Compliance with California's greenhouse gas emissions management programs would serve to reduce or avoid certain impacts that might otherwise occur with the implementation of the proposed Project. This section draws from the Applicant's *Air Quality Impact Analysis, East Cat Canyon Redevelopment Project*, prepared by Insight Environmental Consultants (Revised July 2018), as peer-reviewed by Aspen Environmental Group. This technical study is provided in full in Appendix E of this EIR, and additional calculations of end-user emissions appear in Appendix H.

4.4.1 Environmental Setting

4.4.1.1 Physical Setting

The global climate depends on the presence of naturally occurring greenhouse gases (GHG) to provide what is commonly known as the "greenhouse effect" that allows heat radiated from the Earth's surface to warm the atmosphere. The greenhouse effect is driven mainly by water vapor, aerosols, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and other constituents. Globally, the presence of GHGs affects temperatures, precipitation, sea levels, ocean currents, wind patterns, and storm activity. Human activity directly contributes to emissions of six primary anthropogenic GHGs: CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The standard definition of anthropogenic GHGs includes these six substances under the 1997 Kyoto Protocol (UNFCCC, 1998).

The most important and widely occurring anthropogenic GHG is CO_2, primarily from the use of fossil fuels as a source of energy. Other anthropogenic activities that are major sources of CO_2 include deforestation, other changes in land use, and cement production. Fertilizer use, agriculture, and land use change are also major sources of CH_4 and N_2O, which are also long lived and among the most important anthropogenic drivers of climate change. Global objectives on climate change are measured against a 1990 base year (UNFCCC, 1998), and emissions of CO_2 in 2011 were determined to be 54 percent above the 1990 level (IPCC, 2013).

The second most important anthropogenic GHG in the atmosphere is CH_4. A principal component of natural gas is CH_4, and it is also produced biologically under anaerobic conditions in ruminant animals, landfills, and waste handling. The radiative efficiency of CH_4 per unit concentration is relatively large in comparison to CO_2; however, CH_4 is not as long lived as CO_2. Other short-lived climate pollutants include black carbon and tropospheric ozone, which are air pollutants subject to management for protecting air quality and public health (ARB, 2016a).

Each GHG has a global warming potential (GWP) that is calculated to reflect how long each different gas remains in the atmosphere and how strongly the pollutant absorbs energy relative to CO_2. The GWP indicates the relative and cumulative ability of a given mass of emissions to absorb energy and force climate change over the time the emissions remain in the atmosphere. Methane in the atmosphere over a 100-year horizon has a GWP of 25 according to the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report and 28 according to the IPCC Fifth Assessment Report. This GWP number means that one pound of CH_4 causes the equivalent warming potential of 25 to 28 pounds of CO_2. California regulators recognize the short-lived nature of CH_4 by using a GWP of 25 for CH_4 over the 100-year timespan and a GWP of 72 over a 20-year timespan (ARB, 2016a). The GWP is used to quantify GHG emissions by

multiplying the different GWP of each GHG pollutant by the mass of that pollutant to arrive at a CO_2-equivalent (CO2e) mass.

4.4.1.2 Physical Effects of GHG Emissions

Changing temperatures, precipitation, sea levels, ocean currents, wind patterns and storm activity provide indicators and evidence of the effects of climate change. For the period 1950 onward, relatively comprehensive data sets of observations are available. Various indicators and evidence illustrate the many aspects of climate change, namely, how temperature and precipitation are changing, and how these changes are affecting the environment, specifically freshwater and marine systems, as well as humans, plants and animals (OEHHA, 2013; OEHHA, 2018). Consensus expressed by the Fifth Assessment Report of the IPCC shows that: "warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased" (IPCC, 2014).

Since California's initial GHG strategy set forth in the 2008 Climate Change Scoping Plan, scientific evidence has continued to indicate that the climate is changing. This evidence includes rising temperatures, shifting snow and rainfall patterns, and increased incidence of extreme weather events (ARB, 2014).

The Third U.S. National Climate Assessment, released on May 6, 2014, provides the most authoritative and comprehensive source of scientific information to date about climate-change impacts across all U.S. regions and on critical sectors of the economy. For the Southwestern U.S. region, including Santa Barbara County, the National Climate Assessment emphasizes the risks to scarce water resources as follows:

> *Climate changes pose challenges for an already parched region that is expected to get hotter and, in its southern half, significantly drier. Increased heat and changes to rain and snowpack will send ripple effects throughout the region's critical agriculture sector, affecting the lives and economies of 56 million people — a population that is expected to increase 68 percent by 2050, to 94 million. Severe and sustained drought will stress water sources, already over-utilized in many areas, forcing increasing competition among farmers, energy producers, urban dwellers, and plant and animal life for the region's most precious resource.*

The effects of global climate change to California's public health, infrastructure and natural resources are described in the *2009 Biennial Report of the California Climate Action Team* (CAT, 2009) and *Our Changing Climate* 2012 from the California Climate Change Center (CEC, 2012). According to the Climate Action Team findings "extreme events from heat waves, floods, droughts, wildfires and bad air quality are likely to become more frequent in the future and pose serious challenges to Californians. These impacts pose growing demands on individuals, businesses and governments at the local, State, and federal levels to minimize vulnerabilities, prepare ahead of time, respond effectively, and recover and rebuild with a changing climate and environment in mind" (CAT, 2009).

Additional research by the CalEPA Office of Environmental Health Hazard Assessment (OEHHA) documented effects of climate change including impacts on terrestrial, marine, and freshwater biological systems, with resulting changes in habitat, agriculture, and food supply. These changes are occurring in conjunction with the potential to impact human well-being (OEHHA, 2018). The OEHHA categorizes climate change indicators as: changes in California's climate; impacts to physical systems including oceans, lakes, rivers, and snowpack; and impacts to biological systems including humans, vegetation and wildlife. The primary observed changes in California's climate include increased annual average air temperatures, more-frequent extremely hot days and nights, and increasingly severity of drought. Impacts to physical systems affected by warming tempera-

tures and changing precipitation patterns show decreasing snowmelt runoff, shrinking glaciers, and rising sea levels (OEHHA, 2018). Examples of the terrestrial effects include increasing tree mortality, large wildfires, and changes in vegetation density and distribution (OEHHA, 2013). Land use planning decisions that take into account the effects of climate change would contemplate potential effects to biological resources, water resources, and agricultural resources.

4.4.1.3 California Inventory of GHG Sources

California first formalized a strategy to achieve GHG reductions in 2008, when California produced approximately 487 million metric tons of CO_2 equivalent (MMTCO2e), an amount equal to about 537 million tons for 2008, according to the Air Resources Board inventory (ARB, 2018a). One metric ton (MT) equals 1,000 kilograms, which is 2,204.6 pounds or about 1.1 short tons. By 2016, California's emissions had declined to approximately 429.4 MMTCO2e (ARB, 2018a). In a global context, California emits less than one percent of the 49,000 MMTCO2e emitted globally (IPCC, 2014). Table 4.4-1 summarizes the current GHG inventory for California.

Table 4.4-1. California GHG Emissions Inventory (million metric tons per year, MMTCO2e)

Source Category	2008	2010	2012	2014	2016
Transportation[1]	177.58	165.07	161.22	162.28	169.38
Industrial[2]	90.54	91.50	91.07	93.96	89.61
Electric Power	120.14	90.34	95.09	88.24	68.58
Commercial and Residential	43.52	45.05	42.89	37.37	39.36
Agriculture	35.79	34.27	36.08	35.95	33.84
High GWP	11.65	13.52	15.54	17.70	19.78
Recycling and Waste	8.11	8.37	8.49	8.59	8.81
Total Emissions	**487.34**	**448.11**	**450.38**	**444.10**	**429.35**

1 - Transportation category includes off-road equipment used in construction, mining, oil drilling, and other vehicles and mobile sources.
2 - Industrial category includes refineries, oil and gas extraction, and other industries including combustion of fuels plus fugitive emissions.
Source: ARB, 2018a. California Greenhouse Gas Inventory for 2000-2016, by Category as Defined in the 2008 Scoping Plan.

Most GHG emissions related to the oil and gas industry in California come from the consumption of fossil fuels such as gasoline and diesel, not the extraction of oil (CCST, 2015). Globally, anthropogenic activity results in approximately 49,000 MMTCO2e of annual GHG emissions (IPCC, 2014), and the U.S. GHG inventory for 2014 was 6,870 MMTCO2e (U.S. EPA, 2016), or roughly 14 percent of the global emissions. The U.S. EPA's "natural gas and petroleum systems" category that includes oil and gas production across the U.S. results in about 270 to 290 MMTCO2e emissions annually, depending on the year (U.S. EPA, 2016). Of that amount, about 18 MMTCO2e of annual GHG emissions are due to oil and gas extraction and processing, before refining, occurring in California (ARB, 2018a).

4.4.1.4 County GHG Inventory

Pursuant to the direction provided by the County's Board of Supervisors in March of 2009 (BOS Resolution 09-059), the County has developed a Climate Action Strategy (CAS) to address GHG emissions. The CAS outlines a two phase process to reduce emissions; Phase 1 included the preparation of a Climate Action Study, and Phase 2 included the development of an Energy and Climate Action Plan (ECAP). As part of the Climate Action Study, a GHG inventory including future forecasts for the unincorporated County was developed. This GHG inventory used 2007 numbers to establish a baseline for community-wide emissions in unincorporated Santa Barbara County to measure ECAP progress. The inventory excludes incorporated

cities, the University of California, Santa Barbara, the Chumash reservation, and state and federal lands including Los Padres National Forest, Vandenberg Air Force Base, and offshore oil and gas production facilities. Additionally, the GHG emissions from air pollution stationary source facilities were excluded by the County from the ECAP because the facilities are under the jurisdiction of the Santa Barbara County APCD for criteria air pollutants and toxic air contaminants (Santa Barbara County, 2015).

The County GHG inventory for unincorporated areas totaled 1,192,970 MTCO2e in 2007 as published in the ECAP:

- Transportation: 521,160 MTCO2e
- Residential energy: 195,490 MTCO2e
- Commercial energy: 121,580 MTCO2e
- Off-road: 102,140 MTCO2e
- Solid waste: 91,920 MTCO2e
- Agriculture: 62,110 MTCO2e
- Water and wastewater: 49,520 MTCO2e
- Industrial energy: 46,780 MTCO2e
- Aircraft: 2,270 MTCO2e

Emissions from stationary sources in the unincorporated areas that were not included within the GHG inventory in the ECAP were found to emit approximately 315,890 MTCO2e in the 2007 baseline year. The ARB maintains public reports of GHG from stationary source facilities in the County, and six facilities are subject to ARB's Cap-and-Trade Program. The ARB data in Table 4.4-2 shows how GHG from these stationary source facilities have declined to 144,125 MTCO2e in 2016 (ARB, 2018a), reflecting the effects of the Plains pipeline rupture in May 2015.

Table 4.4-2. Santa Barbara County Stationary Sources, GHG Emissions (MTCO2e per year)

Facility ARB ID Number and Name		2014	2015	2016
101054	Freeport-McMoRan Oil & Gas LLC – Gaviota Oil Heating Facility	13,155	6,608	802
101318	Imerys Minerals California Inc.	47,425	36,409	37,298
104460	ExxonMobil LFC Facility	281,616	119,532	45,411
104459	ExxonMobil POPCO Facility	41,546	17,345	1,128
101674	Pacific Coast Energy Company LP	64,738	38,640	29,952
104458	ERG Operating Company LLC, Santa Maria Basin	63,580	31,678	29,534
ARB Mandatory Reporting Data (MTCO2e per year)		**512,060**	**250,212**	**144,125**

Source: ARB Facility Search for Santa Barbara County, Pollution Mapping Tool search (ARB, 2018a).

4.4.1.5 Existing Site Conditions

The site for the Aera East Cat Canyon Oil Field Redevelopment Project is in the eastern area of the State-designated Cat Canyon Oil Field, which has been used for oil production purposes from 1917 through 1989. Nearly all facilities were removed by 2002 with the exception of four non-producing test wells (Victory G1, G3, and G7, as well as Field Fee G2). These non-producing test wells were drilled in 2012 in support of reservoir sampling and testing efforts. The proposed Project site is currently inactive and is not an active source of GHG emissions.

Carbon Intensity of Crude Supply from Cat Canyon. The ARB conducts an annual review of California's various crude oil supplies as part of the Low Carbon Fuel Standard (LCFS) program, called the Crude Oil Lifecycle Assessment. The program determines a carbon intensity for each global source of crude oil

supplied to California for refining and use as fuels. In the most-recent Crude Oil Lifecycle Assessment, ARB found the three-year California crude average carbon intensity value for each unit of energy delivered to California refineries, 12.04 grams of carbon dioxide-equivalent emissions per mega-Joule (g CO2e/MJ) for years 2015 to 2017 (ARB, 2018b). This is the lifecycle factor of CO2e emissions that can be attributed to the production and transport of the crude oil supplied as petroleum feedstock to California refineries during the most recent three calendar years (2015, 2016, and 2017). ARB calculated the carbon intensity for production and transport of each hypothetical unit of energy from crude from the Cat Canyon Oil Field to be 5.09 g CO2e/MJ (ARB, 2016c) and 4.08 g CO2e/MJ (ARB, 2018b), and when compared to the carbon intensities of California's other crude supplies from all other global sources, this is much lower than the carbon intensity for the average barrel of crude supplied to California's refineries (12.04 g CO2e/MJ) (ARB, 2018b).

4.4.2 Regulatory Setting

Federal, State, and local agencies have established standards and regulations that govern the proposed Project. A summary of the regulatory setting for GHG is provided below.

4.4.2.1 Federal Regulations

U.S. EPA GHG Mandatory Reporting Program (40 CFR Part 98)

On October 30, 2009, the EPA published a rule for mandatory reporting of GHG from stationary sources emitting at or above 25,000 MTCO2e per year. The Greenhouse Gas Reporting Program applies to direct GHG emitters, fossil fuel suppliers, industrial gas suppliers, and facilities that inject carbon dioxide underground for sequestration or other purposes. The program does not require control of GHGs, rather it requires that sources above 25,000 MTCO2e per year monitor and report emissions and other related data. The Petroleum and Natural Gas Systems source category of the GHG Reporting Program (40 CFR 98, Subpart W) includes most of the largest emission sources from the petroleum and natural gas industry.

U.S. EPA Methane Challenge Program

The U.S. EPA sponsors the Natural Gas STAR Methane Challenge Program, which is a voluntary program that encourages oil and natural gas companies to commit to and adopt cost-effective technologies and practices to improve operational efficiency and prevent emissions of methane. The program defines protocols for methane control by oil and natural gas production companies that may operate many different facilities. Examples of cost-effective controls include, recovering for beneficial use all associated gas produced from oil reservoirs, regardless of well type, except for gas produced from wildcat and delineation wells or as a result of system failures and emergencies, and avoiding flaring when gas recovery is feasible.

Federal New Source Performance Standards (NSPS) under CAA Section 111

NSPS (40 CFR 60), Subpart OOOOa: Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources. U.S. EPA released emission standards in NSPS Subpart OOOOa for controlling emissions from new oil well completions with hydraulic fracturing, and to expand the oil and gas equipment standards to reduce greenhouse gases (GHG), specifically methane. [Final Rule: June 3, 2016.] New wells drilled and completed for the proposed Project would not involve hydraulic fracturing, but certain oil and gas equipment including pumps and compressors may be subject to the NSPS for regulation of volatile organic compounds (VOC) and GHG.

4.4.2.2 California State Regulations

California Governor's Office of Planning and Research, Guidelines on GHG (SB 97)

In late December 2009, the California Natural Resources Agency adopted certain amendments to the State CEQA Guidelines for reviewing the environmental impacts of greenhouse gas emissions, to implement the California Legislature's directive in PRC Section 21083.05 (enacted as part of SB 97 (Chapter 185, Statutes, 2007)). These amendments became effective in March 2010. As part of the administrative rulemaking process, the Natural Resources Agency developed a Final Statement of Reasons explaining the legal and factual bases, intent, and purpose of the CEQA Guidelines amendments. The Final Statement of Reasons guides the scope of GHG analyses for CEQA documents and addresses the subject of life-cycle analysis.

Life-cycle analysis (i.e., assessing economy-wide GHG emissions from the processes in manufacturing and transporting all raw materials used in developing a given project and infrastructure) depends on emission factors or econometric factors that are not well established for all processes. The basis of State CEQA Guidelines set forth by the California Natural Resources Agency indicate that a full life-cycle analysis would be beyond the scope of a given CEQA document because of a lack of consensus guidance on life-cycle analysis methodologies.

California Governor's Executive Orders on GHG Emissions

The California Governor's Executive Order S-3-05 (June 2005) declared California's particular vulnerability to climate change and sets a target of an 80 percent reduction of California greenhouse gas emissions from 1990 levels by 2050 and a target to achieve 1990 levels by 2020. In response to Executive Order S-3-05 and increasing societal concern about the effects of climate change, the California Legislature enacted California Global Warming Solutions Act of 2006, Assembly Bill 32 (AB 32). In passing the bill, the California Legislature found that:

> *Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems [HSC Section 38501, Division 25.5, Part 1].*

In September 2018, Executive Order B-55-18 established a new statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter. The ARB was directed to develop the framework for implementing the goal of carbon neutrality. Executive Order B-30-15 (April 2015) established a California greenhouse gas reduction target of 40 percent below 1990 levels by 2030. One purpose of this interim target is to ensure California meets its target of reducing greenhouse gas emissions to 80 percent below 1990 levels by 2050. This executive order also specifically addresses the need for climate adaptation and directs State agencies to update the California Climate Adaptation Strategy to identify how climate change will affect California infrastructure and industry and what actions the State can take to reduce the risks posed by climate change. Senate Bill 32 (SB 32) of 2016 codified the GHG emissions target to 40 percent below the 1990 level by 2030.

California Renewables Portfolio Standard (RPS) Program

Electric utilities in California must procure a minimum quantity of the sales from eligible renewable energy resources as specified by RPS requirements. The Clean Energy and Pollution Reduction Act of 2015

(SB 350), signed into law on October 7, 2015, established California's state policy objectives on long-term energy planning and procurement. The 100 Percent Clean Energy Act of 2018 [Senate Bill 100 (SB 100)] revised the RPS targets to establish the policy that eligible renewable energy resources and zero-carbon resources supply 100 percent of retail sales of electricity to California end-use customers and 100 percent of electricity procured to serve all state agencies by December 31, 2045. With SB 350 and SB 100, California's renewable energy objectives include:

- To set the Renewable Portfolio Standard (RPS) for the procurement of California's electricity from renewable sources at 33 percent by 2020, 50 percent by 2026, and 60 percent by 2030;
- To plan for 100 percent of total retail sales of electricity in California to come from eligible renewable energy resources and zero-carbon resources by December 31, 2045; and
- To double the energy efficiency savings in electricity and natural gas end uses by retail customers by 2030.

AB 32 Climate Change Scoping Plan and Scoping Plan Updates

With AB 32, the 2020 GHG emissions reduction goal became law and requires California to maintain and continue reductions beyond 2020. AB 32 also directed the ARB to develop regulations and market mechanisms to reduce GHG and prepare a scoping plan to identify how best to reach the 2020 limit. AB 32 requires ARB to update the Scoping Plan at least every five years. Accordingly, the 2017 Scoping Plan Update, approved on December 14, 2017, provides the strategy for achieving California's 2030 target in SB 32 (ARB, 2017).

The AB 32 initial Climate Change Scoping Plan (ARB, 2008) identified the strategies for achieving the maximum technologically feasible and cost-effective GHG reductions by 2020, and to maintain and continue reductions beyond 2020. The first statewide AB 32 Scoping Plan was adopted by ARB in December 2008, and the ARB approved the First Update to the Scoping Plan in May 2014 (ARB, 2014). The initial AB 32 Scoping Plan included oil and gas measures and regulations that have since been promulgated. The ARB has also released a Concept Paper and a Proposed Strategy for controlling methane from oil and gas operations, and from landfills, as part of a new statewide strategy for short-lived climate pollutants (ARB, 2016a).

AB 32 Scoping Plan Measures

The initial AB 32 Scoping Plan identified a mix of direct regulations, market-based approaches, voluntary measures, policies, and other emission reductions calculated to limit California's GHG emissions to no greater than the 2020 statewide GHG limit and to initiate the transformations needed to achieve the long-range AB 32 objectives beyond 2020 (ARB, 2014). The ARB monitors progress in meeting the 2020 limit, and the First Update of the Scoping Plan finds California is on track to meet the near-term 2020 GHG limit and is well positioned to maintain and continue reductions beyond 2020 as required by AB 32 (ARB, 2014).

The 2008 AB 32 Scoping Plan identified a potential reduction of 1.1 MMTCO2e for two oil and gas industry measures, as follows:

- **AB 32 Scoping Plan Industry Measure I-2. Oil and Gas Extraction GHG Emission Reduction.** Controls for the fugitive sources range from applying simple fixes to existing technologies, to deploying new technologies to replace inefficient equipment and detect leaks. These controls could include: installing compressor rod packing systems; substituting high bleed with low bleed pneumatic devices; improving leak detection; replacing older equipment (flanges, valves, and fittings); and installing vapor recovery devices. These are proven technologies in the EPA's voluntary efficiency program, Natural Gas STAR,

which may achieve a short payback of capital costs. To implement this measure, in April 2017, the ARB approved regulations (17 CCR 95665-95677) to specify improvements at new wells and existing wells, including those undergoing well stimulation treatments.

- **AB 32 Scoping Plan Industry Measure I-3. GHG Leak Reduction from Oil and Gas Transmission (*In Progress)*.** This measure could include improving operating practices to reduce emissions when compressors along the pipeline are taken off-line, installing compressor rod packing systems and replacing older equipment (flanges valves and fittings) along the pipelines. It is anticipated that the measure would be based, to a large degree, upon the EPA's Natural Gas STAR program aimed at cost effective approaches to reducing methane emissions. This measure may also eventually address combustion sources that are not captured by the Cap-and-Trade Program. In 2015 and in response to Senate Bill 1371 (Leno, 2014), the CPUC opened a rulemaking that defined the best practices to implement this measure.

Mandatory Reporting of Greenhouse Gas Emissions (17 CCR 95100-95158)

The ARB Regulation for the Mandatory Reporting of Greenhouse Gas Emissions, or mandatory reporting rule (MRR), applies to entities within certain regulated source categories, including sources related to "Petroleum and Natural Gas Systems" [17 CCR 95150], if combustion or process emissions for the facility exceed 10,000 MTCO2e per calendar year or if stationary combustion, process, fugitive, and vented emissions equal or exceed 25,000 MTCO2e or more per year [17 CCR 95151]. Vented emissions are defined as intentional releases of vapors to the atmosphere. Fugitive emissions are defined as unintentional releases of vapors to the atmosphere (ARB, 2013).

The definition of the Petroleum and Natural Gas Systems category and the procedures for calculating, monitoring, and reporting GHG emissions from various activities appear in 17 CCR 95150-95158. Certain well stimulation treatments at gas wells are specifically addressed in Section 95153(f), although oil wells are not specifically addressed for well completions. For well testing in Section 95153(j), ARB approved modifications to the rule in 2014 to clarify that reporting procedures apply to both oil wells and gas wells.

Cap-and-Trade Program (17 CCR 95800 to 96022)

The California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation (Cap-and-Trade Program) was approved by ARB in October 2011. The Cap-and-Trade Program applies to covered entities that fall within certain source categories, including operators of facilities of Petroleum and Natural Gas Systems [17 CCR 95852(h)] with emissions exceeding 25,000 MTCO2e in any data year, as evidenced through the MRR requirements. Fuel suppliers became covered on January 1, 2015 for the 2015 combustion emissions of the fuel delivered to end-users in California [17 CCR 95852(d)] that are not otherwise covered entities in the Cap-and-Trade Program.

Covered entities comply with the statewide emissions cap and the Cap-and-Trade Program by submitting eligible compliance instruments equivalent to their GHG emissions by November 1 of each year. Valid compliance instruments include allowances and compliance offset credits (up to an 8 percent usage limit) issued by ARB. While allowances and offset credits are both known as "compliance instruments," an allowance is a tradable permit provided by ARB, and an offset credit is equivalent to a GHG reduction achieved by an offset project that must be real, additional, quantifiable, permanent, verifiable, and enforceable. Offset projects can be verified by an ARB-approved Offset Project Registry.[1] Examples of projects that may create an ARB offset credit towards Cap-and-Trade program compliance are urban forestry, forestry, livestock digesters, and destruc-

[1] Offset Project Registries may be approved by ARB to perform certain GHG credit accounting actions (17 CCR 95986). For more information: https://www.arb.ca.gov/cc/capandtrade/offsets/registries/registries.htm.

tion of ozone-depleting substances. Each compliance instrument represents one metric ton of carbon dioxide equivalent. The first surrender date for the initial 30 percent of 2013 vintage emissions was November 1, 2014 [17 CCR 95856]. The current version of the program, effective October 1, 2017, extends major elements beyond 2020 to continue reducing emissions and reduce the overall cap towards the 2030 target.

Covered entities can obtain allowances several ways. A portion of the Cap-and-Trade Program allowances are held in a reserve as a mechanism for limiting large fluctuations in market driven allowance costs; a portion are distributed to covered entities for free; and the remaining allowances can be purchased by buyers via quarterly auctions:

- **Freely Allocated Allowances**. Under the provisions of ARB's Allocation for Industry Assistance in the Cap-and-Trade Program, allowances within the declining cap are directly and freely allocated to provide assistance to the operators of facilities. The intent of the direct allocations is to prevent against the risk of leakage, where the GHG emissions from an industry like oil and gas production could be inadvertently driven to occur outside California. The emissions efficiency benchmark for every California producer of crude oil using thermal enhanced oil recovery is 0.0811 allowances per barrel of oil equivalent produced using thermally enhanced oil recovery [17 CCR 95891, Table 9-1]. Entities that aggressively reduce their emissions can trade or sell their surplus allowances to those that find it more expensive to reduce their GHG emissions.
- **Auction Purchased Allowances**. Auctions include allowances sold by California, other linked Cap-and-Trade systems, and electrical distribution utilities. The State's portion of the Cap-and-Trade auction proceeds are deposited into the Greenhouse Gas Reduction Fund (GGRF), and used to further the objectives of AB 32 and California's climate priorities. With these funds, State agencies can administer GHG emission reduction programs and projects, such as those for transportation, sustainable communities, or clean energy and energy efficiency that are collectively referred to as California Climate Investments (ARB, 2018c).

California ARB Regulation for GHG Emission Standards for Crude Oil and Natural Gas Facilities

The ARB approved regulations, effective October 1, 2017 (17 CCR 95665-95677) to reduce methane emissions from oil and gas production, processing, storage, and transmission compressor stations by requiring regulated entities to take actions to limit intentional (vented) and unintentional (leaked or fugitive) emissions from active and idle equipment and operations (ARB, 2016d). These types of controls would also have the effect of reducing emissions of ozone-precursor VOCs. The APCD has agreed to implement and enforce these ARB GHG Emission Standards for Crude Oil and Natural Gas Facilities. The regulation helps to implement the AB 32 Scoping Plan and the statewide strategy for short-lived climate pollutants (ARB, 2016a) through the following requirements:

- Vapor collection on uncontrolled oil and water separators and storage tanks with emissions above a set methane standard;
- Vapor collection on all uncontrolled well stimulation circulation tanks;
- Leak Detection and Repair (LDAR) on components, such as valves, flanges, and connectors, currently not covered by local air district rules, as well as from soil at underground natural gas storage well sites;
- Vapor collection of large reciprocating compressors' vent gas, or require repair of the compressor when it is leaking above a set emission flow rate;
- Vapor collection of centrifugal compressor vent gas, or replacement of higher emitting "wet seals" with lower emitting "dry seals";

- "No bleed" pneumatic devices and pumps; and
- More frequent methane monitoring at underground natural gas storage facilities.

4.4.2.3 Local Regulations

County Energy and Climate Action Plan (ECAP)

In March 2009, the County Board of Supervisors directed County staff "to take immediate, cost-effective and coordinated steps to reduce the County's collective greenhouse gas (GHG) emissions." In response to this direction, the County's Climate Action Strategy (CAS) was developed, which includes a two-phase strategy to reduce GHG emissions comprising (1) the Climate Action Study (2011), including a countywide GHG inventory, forecast, and evaluation of potential emission reduction measures, and (2) an Energy and Climate Action Plan (2015), which seeks to reduce the GHG emissions through implementation of specific selected measures with the goal of achieving a GHG reduction target of 15 percent below 2007 baseline levels by 2020.

The ECAP adopted by the Board of Supervisors in May 2015 identifies strategies, or GHG emission reduction measures, that the County can implement. However, most GHG programs are subject to ARB oversight (Section 4.4.2.2), and while the APCD regulates stationary sources of criteria air pollutants and toxic air contaminants (EIR Section 4.2), the APCD has limited authority over GHG pollutants. Industrial stationary sources of air pollutants and certain commercial or residential projects are outside the scope of the ECAP, although they may be subject to GHG thresholds and/or project-specific analysis through the CEQA process.

4.4.3 Environmental Thresholds

The impacts caused by GHG emissions are, by their nature, cumulative impacts. Emissions from all GHG sources contribute to the total amount of GHG in the atmosphere, and the effects of GHG emissions are not limited to the localities where they are generated.

Analysis of a project's GHG emissions under CEQA focuses solely on the incremental contribution of estimated project emissions to global climate change. A CEQA lead agency may determine that a project's incremental contribution to an existing cumulatively significant issue, such as climate change, is not significant based on supporting facts and analysis (§15130(a)(2)). The State CEQA Guidelines direct that a project's contribution to a significant cumulative impact will be rendered less than significant if the project is required to implement or fund its fair share of a mitigation measure designed to alleviate the cumulative impact (§15130(a)(3)). Such determinations must be based on analysis in the environmental document with substantial evidence to demonstrate that mitigation required of a project represents the project's "fair-share" contribution towards alleviating the cumulative impact.

The Santa Barbara County Environmental Thresholds and Guidelines Manual (Santa Barbara County, 2015b) specifies that:

> *All industrial stationary-source projects shall be subject to a numeric, bright-line threshold of 1,000 MTCO2e per year to determine if greenhouse gas emissions constitute a significant cumulative impact. Annual GHG emissions that are equivalent to or exceed the threshold are determined to have a significant cumulative impact on global climate change unless mitigated.*

4.4.4 Environmental Impacts and Mitigation Measures

This Section assesses the proposed Project's construction and operation impacts as they relate to climate change resulting from the generation of GHG emissions.

Applicant proposed Avoidance and Minimization Measure (AMM) are listed in Appendix C. Table 4.4-3 lists the AMMs specific to climate change and GHG emissions.

Table 4.4-3. Applicant Proposed Avoidance and Minimization Measures Related to Climate Change/ GHG Emissions

AMM No.	Measure
Air Quality	
AQ-4	**Greenhouse Gas Emissions**. Aera will implement a program to quantify, and where practicable and feasible, to reduce emissions. Operational stationary and mobile greenhouse gas emissions levels (including achieved reductions) will be quantified and reported to the California Air Resources Board as required. Greenhouse gas emissions exceeding the Santa Barbara County CEQA Greenhouse Gas significance threshold will be reduced, where practicable and feasible, through onsite reductions and/or offsite reduction programs approved by the County. Emissions off-sets or purchases required to satisfy California Assembly Bill 32 requirements will be completed according to the California Air Resource Board Cap-and-Trade Program requirements.
Greenhouse Gas	
GHG-1	As local GHG mitigation for our East Cat Canyon Project, Aera proposes to perform a one-time, approximately ¼-inch deep application of certified compost on 110 acres of grassland within the proposed Conservation Area. This practice, commonly referred to as 'carbon farming', sequesters carbon from the atmosphere, while at the same time, enhances grassland agricultural productivity. Areas within the Conservation Area suitable for carbon farming were selected using Global Information Systems (GIS) based on the following criteria: ▪ Slopes less than 25 percent; ▪ Existing grassland habitat; and ▪ Greater than 100 feet from National Wetlands Inventory (NWI) channels. The proposed carbon farming mitigation plan will comply with American Carbon Registry and Cachuma Resource Conservation District guidelines. These guidelines include: ▪ Application area criteria; ▪ Compost selection from a certified supplier (Agromin, Engle and Gray) and application rates; ▪ Soil sampling (baseline and post-application); and ▪ Reporting requirements. The Compost Planner (http://bfuels.nrel.colostate.edu/compost/Home/Index) was used to determine the resulting carbon reductions. This carbon farming project would create 473.7 tonnes of CO_2e reductions per year, or 9474 tonnes over the 20 year mitigation project lifetime.
GHG-2	Aera will purchase and donate, or donate the funds for purchasing, three new, all-electric passenger vans: one for the Boys and Girls Clubs of Santa Maria Valley, one for Girl's Inc., in Carpentaria, and one for the Santa Maria Valley YMCA. The electric vans will be used in lieu of the existing gas-powered vans currently used to shuttle (mostly children and young adults) to various community service activities and programs. Together, these electric vans would create 109.7 Metric Tons of CO_2e emissions offsets. These offsets would be created through purchase and provided only after the East Cat Canyon Project EIR has been certified, after all Project permits have been issued, after all permit conditions have been found by Aera to be satisfactory, and only if/when Aera initiates construction of the Project. Aera expects that these purchases will be eligible for the California state electric vehicle purchase credit.
GHG-3 (PG&E)	Diesel fueled off-road construction equipment with 50 horsepower or greater engines shall meet U.S. Environmental Protection Agency (EPA) and California Air Resources Board (CARB) Tier 1 engine standards. This APM is not applicable to equipment permitted by the local air quality district or certified through CARB's Statewide Portable Equipment Registration Program, or single specialized equipment that will be used for less than five total days.

4.4.4.1 Oil Field Development & Operation

Impact GHG-1: Proposed Project emissions could generate greenhouse gas emissions (GHG) that may have a significant impact on the environment.

Directly-Emitted GHG

Construction-Phase Emissions. Construction includes the use of gasoline and diesel-powered heavy equipment for site preparation and grading, installation of new well equipment, paving for well pads and access roads, and installing facilities for thermal enhanced oil recovery steam generation, field systems, central processing, and other support infrastructure. For the proposed Project, the Applicant expects to develop the site, create construction emissions, and incrementally complete drilling over 30 years. Year-by-year activity levels would vary widely. However, the Applicant predicts the peak year for construction GHG emissions to occur in Year 8 (as in EIR Table 2-3 and Table 2-4) during the full buildout of Phase II, with the emissions primarily from drilling wells (variously shown as either 2024 or year "5" in the AQIA).

The Santa Barbara County Environmental Thresholds and Guidelines Manual indicates that construction-related GHG emissions should be accounted for in the year they occur. This means that the year-by-year GHG impact would therefore vary widely, as the intensity of the actual construction and drilling activities would vary, and the timing cannot be precisely predicted until the proposed Project is implemented. The AQIA anticipates that peak year construction and drilling could potentially overlap with peak levels of long-term operational activities during later years of the proposed Project life. This results in a conservatively high estimate of overall annual GHG emissions because the full peak of operational activities may not actually occur simultaneously with high levels of construction activity.

The detailed emissions estimates appear in the AQIA. This technical study is provided in full in Appendix E of this EIR. Table 4.4-4 summarizes the estimated peak year rate of GHG emissions from oil field development construction activities.

Table 4.4-4. Proposed Project Construction, Estimated Peak Year GHG Emission Rates (MTCO2e per year)

Construction-Phase Sources	Proposed Project Construction
Construction Equipment Exhaust	5,461
Well Drilling Equipment	8,527
Replacement Well Drilling Equipment	99
Well Drilling Muds (fugitive CH_4)	576
Offsite Construction Traffic (mobile)	349
Offsite Traffic for Well Drilling (mobile)	308
Offsite Traffic for Replacement Well Drilling (mobile)	2
Construction-Phase, Annual (MTCO2e per year)	**15,322**
Significance Threshold	1,000
Significant without Mitigation?	Yes

Source: AQIA Table 5-16 (Short Term Mitigated Construction); AQIA Attachment p.90.
Notes: Construction peak year of GHG emissions occur with 84 wells drilled in 2024 (or year "5" in the AQIA Attachments).
Emissions from well drilling mud based on 605 lb CH_4/well, at 7.5 standard cubic feet of gas per barrel of mud returns.

Operational Emissions. The proposed Project would facilitate a production rate of up to 10,000 barrels of oil per day (bpd). This would contribute to an increase in County-wide oil and gas production, and the operations would increase the direct and indirect GHG emissions from onsite and offsite sources. The

proposed Project would add 296 new wells for production, steam injection, and other operations, and a variety of new combustion sources, primarily for thermal enhanced oil recovery steam generation, and would increase the emissions from onsite maintenance activities, as well as traffic offsite.

Table 4.4-5 summarizes the proposed Project-related GHG emissions increase for operations and maintenance as they would be at the peak levels of long-term operational activities (2031). Emissions shown in Table 4.4-5 exclude the GHG from consumers or end users of the produced oil (see Section 4.4.6, Cumulative Effects).

Table 4.4-5. Proposed Project Operations, GHG Emissions Increase (MTCO2e per year)

Project Sources	Proposed Project Operation
Stationary Sources (proposed steam generators, wells, tanks, and fugitive leaks)	235,111
O&M Portable and Off-road Equipment and Mobile Sources	2,769
Offsite Motor Vehicle Traffic (mobile sources, except tankers)	1,060
Offsite Motor Vehicle Traffic (mobile tankers)	14,126
Indirect GHG (electricity use)	30,698
Indirect GHG (loss of natural carbon uptake)	3,446
Project Operations Emissions (MTCO2e per year)	**287,210**
Construction-Phase, Estimated Peak Year	15,322
Total Project Operations plus Construction Emissions (MTCO2e per year)	**302,532**
Significance Threshold	1,000
Significant without Mitigation?	Yes
GHG Emissions to Reduce with Mitigation (MTCO2e per year)	**301,532**

Source: AQIA Table 5-23 (Long Term Operational Emissions after Mitigation) for 2031; AQIA Attachment p.92.

Emissions due to Combustion. The proposed Project would add new stationary sources of combustion-related GHG, including six steam generators fired on natural gas, one steam generator fired on produced gas, an emergency flare, and an emergency generator engine for backup electrical power fired on natural gas. The seven steam generators, when taken together, would operate at a maximum of 88 percent utilization, according to the Applicant's proposal to limit the heat input to the steam generators (AQIA, p.41 and p.46). Most of the GHG emissions from stationary sources (235,111 MTCO2e per year) is from combustion-related GHG. Other combustion-related GHG sources would occur with maintenance activities, portable equipment, traffic and mobile sources, including the off-road equipment and on-highway vehicles. The GHG emissions from non-stationary sources, which make up about five percent of the GHG from operations, would be primarily from combustion of the motor vehicle fuels by the portable and mobile sources.

Vented and Fugitive Emissions, including Components and Pigging. Fugitive GHG, primarily CH_4, would also occur in addition to the combustion GHG. Field gas would escape from equipment components and storage tanks, and depending on the constituents of the gas, some quantities of CH_4 would be emitted from the oil field facilities along with the reactive organic compounds (ROC), separately quantified for air quality impacts. During the peak year for construction GHG, well drilling muds would contain CH_4 that would be released from the wellbore or through the mud handling system at a rate of 576 MTCO2e (Table 4.4-4). Other vented and fugitive GHG emissions would occur in conjunction with oil production, which would result in hydrocarbons escaping from the proposed and new thermal wells, plant fugitives, tank vents, and natural gas pipeline pigging. These onsite emissions that are not combustion related would occur at a rate of approximately 617 MTCO2e per year or up to 734 MTCO2e per year, if a GWP of 25 for

CH_4 is used over a 100-year timespan for this GHG. These emissions from equipment and fugitives during operations are included in the total for stationary sources in Table 4.4-5.

Indirectly-Emitted GHG

Electricity. The Applicant anticipates the proposed Project to consume electricity from the grid at a peak rate of approximately 105,120 megawatt-hours (MWh) per year. This electricity would be supplied by the PG&E grid and produced by the region's mix of conventional and renewable power plants. The AQIA estimated the GHG emissions indirectly occurring as a result of this power supply. Using a CO_2 factor of 641 lb per MWh electricity delivered, plus CH_4 and N_2O, the net increase in GHG due to electricity consumed annually by the proposed Project would be 30,698 MTCO2e per year.

Land Use Change and Vegetation Removal. The proposed Project would require grading of 305 acres of the proposed Project site, with the majority of that (241 acres) being a permanent net new disturbance of the site. The permanent ground disturbance would reduce the ongoing natural carbon uptake by vegetation and soil. The actual amount of this loss is uncertain because it would depend on the particular characteristics of the site, and data on rates of sequestration by vegetation and soils are approximations. The carbon storage capability of the vegetation and soil removed with the net new disturbance of 241 acres, approximated as mostly "forest land" with scrub, would be 14.3 MT of CO_2 per acre per year, as reported by the California Emissions Estimator Model (CalEEMod, 2017); at this rate, the permanent disturbance translates to a loss of sequestration capability of 3,446 MTCO2e per year.

Indirect Effects of Increased Production and the Carbon Intensity of Crude Supply

The proposed Project intends to increase the crude oil production from the Cat Canyon Oil Field, and this could theoretically displace petroleum supplies originating from other locations inside and outside of California. According to the ARB Crude Oil Lifecycle Assessment, the modeled carbon intensity for an average barrel of crude delivered to California's refineries is substantially higher than the carbon intensity of crude produced in the complex of Cat Canyon fields (ARB, 2016c; ARB, 2018b). Based on the modeled carbon intensity, a given barrel of petroleum supplied by the Cat Canyon Oil Field under baseline conditions would have a lower life-cycle GHG emissions impact than an average barrel of California's crude supply.

An indirect change could occur in the GHG emitted for production and transport of crude that is displaced by increasing Cat Canyon production. To the extent that increasing production from Cat Canyon might displace another "average" crude supply, the life-cycle GHG emissions of the overall California crude supply may decrease. If the increase in production anticipated by the proposed Project can be accomplished without changing the life-cycle factor of emissions for Cat Canyon, the crude supplied by the proposed Project could theoretically result in a decrease in GHG if another field with a higher carbon intensity experiences a decrease in production. However, depending on the Project's actual ability to efficiently recover crude oil, the proposed Project could increase the life-cycle factor by increasing the amount of GHG emitted per unit of energy derived from crude from Cat Canyon. Additionally, there would be no way of knowing whether a field outside of Cat Canyon might decrease its production in response to the proposed Project's growth. Fields outside of California always have the option of producing crude to serve the demand outside of California.

The regulatory setting for GHG within California ensures that operators of GHG sources related to oil and gas production have a Cap-and-Trade compliance obligation for their GHG emissions. Additionally, any incremental change in the life-cycle GHG emissions of the overall California crude supply would be subject to the Low Carbon Fuel Standard (LCFS), which ensures overall progress towards reducing the full fuel-cycle, carbon intensity of transportation fuels statewide.

Overall Project GHG Emissions and Mitigation

During infrastructure construction and drilling activities, project-related GHG emissions would vary up to 14,746 MTCO2e per year (Table 4.4-4), and with all project-related wells in routine operation and maintenance, the annual rate of GHG emissions from operations would be 287,210 MTCO2e (Table 4.4-5). Taken together, overall proposed Project GHG emissions rate would range up to 302,532 MTCO2e per year. This level of GHG emissions would exceed Santa Barbara County "bright line" threshold of 1,000 MTCO2e per year and would have a significant impact on the environment, before considering mitigation. The impact to global climate change is, by definition, cumulative (Santa Barbara County, 2015b).

The Santa Barbara County Environmental Thresholds and Guidelines Manual indicates that projects found to result in a significant cumulative impact, by causing GHG emissions equivalent to or exceeding the 1,000 MTCO2e per year threshold, would be required to reduce their greenhouse gas emissions to the threshold level, where feasible, through onsite reductions and/or offsite reduction programs approved by the County.

In a manner consistent with the County guidelines and California's regulatory setting for GHG emissions (Section 4.4.2), the proposed Project includes an Applicant Proposed Avoidance and Minimization Measure (AQ-4) that would achieve onsite GHG emissions reductions and/or offsite reductions for emissions exceeding the significance threshold (see Appendix C of this EIR).

The Applicant's approach to reducing GHG emissions to a level below the 1,000 MTCO2e per year threshold is not detailed. However, the Applicant's AQIA indicates a plan to rely on a combination of onsite and offsite GHG reductions, the purchase of offset credits, and the participation in the Cap-and-Trade program.

Construction emissions and all other direct and indirect emissions are subject to the "bright line" threshold of 1,000 MTCO2e per year set by the County Environmental Thresholds and Guidelines Manual. To achieve full (100%) mitigation and to offset the project-related emissions at a 1-to-1 (1:1) ratio, mitigation would need to achieve a reduction that varies from year to year, up to 302,532 MTCO2e per year for the direct and indirect GHG emissions plus construction-related emissions that make up the proposed Project's contribution to the cumulative climate change impact.

Mitigation recommended here would require the Applicant to offset proposed Project-related emissions through any of three optional ways:

- Onsite GHG reductions created by improving operations or avoiding emissions at Aera's East Cat Canyon facilities;
- GHG reductions achieved offsite and represented by credits, preferably from offset projects in Santa Barbara County to the extent feasible; or
- GHG reductions administered by the State of California through the GGRF, when funded by the Applicant purchasing State-owned allowances.

Freely allocated allowances held by the Applicant and allowances purchased by the Applicant from entities other than the State of California could not be used as part of the mitigation requirement to offset, avoid, or reduce proposed Project-related emissions. Although these allowances are designed for and valid for Cap-and-Trade Program compliance, they are tradable compliance instruments for the Cap-and-Trade Program and may not be surrendered as part of the mitigation demonstration required by the County for the proposed Project.

Up to 302,532 MTCO2e per year of reductions would fully mitigate the potentially significant impact of the proposed Project-related emissions. Onsite GHG reductions and feasible local GHG reductions would be preferred, and all feasible onsite mitigation should be exhausted prior to surrendering credits from offsite projects. For the mitigation to be enforceable, the quantity of GHG reductions achieved in any one year must match or exceed the actual incremental GHG emissions of the proposed Project-related activities, which are not anticipated to exceed 302,532 MTCO2e in any one year.

The purpose of the mitigation is to achieve GHG reductions through onsite or offsite GHG offset projects initiated by the Applicant or a third-party on the Applicant's behalf. Offset credits allow a third-party to fulfill the responsibility to monitor, report, and verify the GHG emissions reductions, then the Applicant would take control of the credits and surrender them to the County as mitigation.

Impact GHG-1 is considered potentially significant but mitigable to a less than significant level with the implementation of Applicant proposed AMMs and Mitigation Measure (MM) GHG-1 (Class II).

Mitigation Measures

MM GHG-1 **Reduce GHG Emissions or Surrender Offset Credits.** The Permittee shall reduce or offset annual incremental greenhouse gas (GHG) emissions from Project-related sources. The incremental GHG emissions are those GHG emissions resulting from Project construction, operations and related sources. These incremental emissions are estimated to be less than or equal to 302,532 MTCO2e per year, assuming worst-case simultaneous construction and operation activities, minus the County's threshold of 1,000 MTCO2e per year.

The Permittee shall prepare and implement a GHG Reduction and Reporting Plan that describes how annual GHG emissions could be reduced or offset. The Plan shall include provisions for and outline of an annual report to the County that summarizes the emission reduction measures implemented, quantifies the Project-related estimated GHGs emissions for the year, and demonstrates the quantity of credits surrendered. Each annual report shall reconcile the actual emissions of the previous year with the mitigation quantity, in terms of MTCO2e. The standard of performance for this mitigation is a reduction or offset of greenhouse gas emissions from Project-related sources at a one-to-one (1:1) ratio. The Permittee may demonstrate that lower levels of GHG mitigation are needed during certain years of low activity or by implementing reductions at Aera's East Cat Canyon facilities.

Onsite GHG reductions should be exhausted to the extent feasible prior to surrendering credits or offsets from offsite projects. If credits are derived from offsite mitigation, preference should be given to those generated in Santa Barbara County. Implementing the required amount of any of the following types of emission reductions shall be an acceptable means of mitigation:

- GHG reductions generated within the County by implementing a GHG reduction project consistent with any methodology approved by either the Santa Barbara County Board of Supervisors or the Santa Barbara County Air Pollution Control District for the purpose of providing CEQA mitigation.
- GHG reductions represented by registry offset credits listed with and verified by an ARB-approved Offset Project Registry pursuant to Section 95980.1 of Title 17, Public Health Code (17 CCR 95980.1).

- GHG reductions represented by registry offset credits listed with and verified by: American Carbon Registry (ACR); Climate Action Reserve (CAR); or Verified Carbon Standard (VCS).
- GHG reductions created as a result of complying with Cap-and-Trade Program requirements, as evidenced by the Permittee making auction purchases of State-owned Cap-and-Trade Program allowances or ARB offset credits issued pursuant to Section 95981.1 of Title 17, Public Health Code (17 CCR 95981.1).

Freely allocated allowances held by the Applicant and allowances purchased by the Applicant from entities other than the State of California shall not be used as mitigation under this measure because they are tradable compliance instruments for the Cap-and-Trade Program.

If the Permittee has made auction purchases of State-owned Cap-and-Trade Program allowances to comply with Cap-and-Trade Program requirements and it has transferred funds to the State (e.g., for deposit into the Greenhouse Gas Reduction Fund (GGRF) for statewide GHG reductions), the levels of GHG offsets needed for mitigation under this measure may be reduced by the quantity of previously State-owned allowances purchased by the Permittee. The Permittee's demonstration of making auction purchases to fund acceptable mitigation shall occur in the GHG Reduction and Reporting Plan annual report after the applicable Cap-and-Trade compliance period, and the demonstration may rely on publicly available reports.

General criteria for acceptable credits include:

- Real: emission reduction must have actually occurred, as the result of a project yielding quantifiable and verifiable reductions or removals.
- Additional or Surplus: an emission reduction cannot be required by a law, rule, or other requirement.
- Quantifiable: reductions must be quantifiable through tools or tests that are reliable, based on applicable methodologies, and recorded with adequate documentation.
- Verifiable: The action taken to produce credits can be audited and there is sufficient evidence to show that the reduction occurred and was quantified correctly.
- Enforceable: An enforcement mechanism must exist to ensure that the reduction project is implemented correctly.
- Permanent: Emission reductions or removals must continue to occur for the expected life of the reduction project.

PLAN REQUIREMENTS and TIMING: The GHG reductions achieved, credits surrendered, or any GHG offset project sponsored by the Permittee, must be supported by a demonstration to P&D that the GHG reduction is real, additional, quantifiable, permanent, verifiable, and enforceable, as these terms are used in the mitigation measure. The GHG Reduction and Reporting Plan shall be reviewed and approved by P&D, in consultation with the APCD, prior to issuance of the Zoning Clearance. The necessary annual quantity of verified credits under this plan shall be surrendered prior to April 15 of each calendar year following the year of initiating construction.

MONITORING: P&D, in consultation with the APCD, will review and approve the GHG Reduction and Reporting Plan and any proposed GHG reduction credits prior to their use as mitigation. Subsequent annual reporting of GHG emissions and reduction/offset measures implemented will be reviewed and approved by P&D in consultation with the APCD.

Impact GHG-2: Proposed Project emissions could conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

California's regulatory setting for GHG emissions (Section 4.4.2) ensures that most of the existing and foreseeable GHG sources in the business of oil and gas production are subject to one or more programs aimed at reducing GHG emission levels. County policies do not address GHGs from industrial stationary sources such as those making up the majority of the proposed Project-related GHG emissions, as these are outside the scope of the County's Energy and Climate Action Plan.

The primary requirements for the proposed Project include the ARB GHG Emission Standards for Crude Oil and Natural Gas Facilities, which would be implemented and enforced by the APCD, the ARB Mandatory Reporting Rule, the Low Carbon Fuel Standard (LCFS), and the Cap-and-Trade Program. Although end-users of oil and gas resources that are not otherwise covered entities in the Cap-and-Trade Program do not directly bear a compliance obligation, all fuel suppliers, including refiners, pipeline companies, and railroads, must cover the end-user's GHG emissions. In addition to the capped combustion emissions of fuels delivered to end-users, the requirements within the LCFS simultaneously force fuel suppliers to reduce the full fuel-cycle, carbon intensity of transportation fuels. The LCFS applies to all providers of transportation fuels in California.

Similarly, producers of oil and gas and fuel suppliers in California obtain and use electricity that is subject to the Renewable Portfolio Standard (as the RPS is codified pursuant to SB 350 & SB 100). California's GHG reduction strategies are on target to achieve GHG reductions by 2020, and ARB has adopted the plan to maintain and continue reductions from all sectors of the economy beyond 2020 to 2030 (ARB, 2017).

The proposed Project-related combustion emissions of GHGs from stationary sources, including all steam generators, at the facility would be covered under the Cap-and-Trade program as these would have a compliance obligation that the Project owner or operator must satisfy. Within the declining statewide cap, the ARB would directly allocate a number of allowances to the proposed Project through the Allocation for Industry Assistance to substantially cover the entire compliance obligation, based on the statewide benchmark for every California producer of crude oil of 0.0811 allowances per barrel of oil equivalent produced using thermally enhanced oil recovery methods [17 CCR 95891, Table 9-1]. If the owner/operator realizes an annual production rate equivalent to 10,000 bpd in 2020, the ARB would allocate about 252,000 allowances to Aera for that year. [The allowance allocation can be calculated as: 10,000 bpd x 365 days x 0.851 cap adjustment factor (2020) x 0.0811 allowances per barrel.] In the near-term years, the direct allocation should be sufficient to cover most, if not all, of the facility's compliance obligation. Cap-and-Trade then requires the facility to purchase additional compliance instruments to cover any shortfall.

Project-related GHG emissions for which the owner/operator is not likely to have a compliance obligation are all construction-phase emissions and the operational-phase mobile source emissions, fugitives, and indirect emissions; however, most of these emissions would be "covered" by entities other than Aera. For example, the proposed Project-related mobile source GHG emissions are covered by the fuel suppliers because they cover the end-user's GHG emissions. Proposed Project-related mobile sources would be end-users of the refined motor vehicle fuels from the fuel suppliers. The GHG emissions that likely would not be covered by any entity include: emissions without a compliance obligation, which are certain oil and gas-related process, vented, and fugitive emissions allowed by exemptions in the Cap-and-Trade program;

and emissions that may be under-reported or un-inventoried, such as methane from leaks or venting or unique events such as an accident or upset conditions.

California's regulations for reducing GHG generally do not apply to GHG sources outside of California. This is notable because the oil and gas produced by the proposed Project would be mostly for use in California and in response to demand for energy by California customers. Over half of the products produced by California's refineries are California-compliant gasoline or diesel for exclusive in-state use, and less than half of the products are other fuels, such as jet fuel, fuel oils, or export gasoline and other refined products that can be easily exported like petroleum coke (CEC, 2018). Producing crude oil from oil fields that are outside of California causes GHG emissions from sources that are not subject to California's GHG programs.

Given the oversight of project-related sources and progress of California's ongoing efforts to implement policies and a regulatory setting for reducing GHG emissions, the proposed Project is not likely to conflict with any applicable plan, policy or regulation adopted for the purpose of reducing GHG emissions; therefore, **Impact GHG-2 would be a less than significant impact (Class III).**

4.4.4.2 Power Line Construction and Operation

Impact GHG-1: Proposed Project emissions could generate greenhouse gas emissions (GHG) that may have a significant impact on the environment.

Installation of the PG&E Electrical Power Line Interconnection would require a brief duration of construction activities and construction-related GHG emissions, which could occur at the same time as the early phases of oil field development GHG emissions. The overall duration of construction for the 0.3-mile power line would be less than one year. Little to no operational-phase emissions would occur.

Construction of the PG&E power line would create approximately 104 MTCO2e of GHG emissions in addition to GHG emissions quantified for oil field development (Section 4.4.4.1). The detailed emissions estimates appear in the AQIA (Appendix E). The power line construction GHG emissions would be caused by the use of gasoline and diesel-powered heavy equipment at a rate that would be less than the County's "bright line" threshold of 1,000 MTCO2e per year applicable to industrial stationary source projects. Although the power line would be constructed and operated separately from the proposed Project, the power line would be associated with the proposed Project that exceeds the "bright line" threshold of 1,000 MTCO2e per year. **Impact GHG-1 is considered potentially significant but mitigable to less than significant level with the implementation of AMM GHG-3 (PG&E) and Mitigation Measure (MM) GHG-1 (Class II).**

Impact GHG-2: Proposed Project emissions could conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

The transmission line construction activities would be subject to California's regulatory setting for GHG emissions (Section 4.4.2). The minor quantity of GHG emissions would not conflict with any applicable plan, policy or regulation adopted for the purpose of reducing GHG emissions. Accordingly, **Impact GHG-2 for transmission line GHG emissions would be less than significant (Class III).**

4.4.4.3 Natural Gas Pipeline Construction and Operation

Impact GHG-1: Proposed Project emissions could generate greenhouse gas emissions (GHG) that may have a significant impact on the environment.

Installation of the SoCalGas Natural Gas Pipeline would require a limited duration of construction activities and construction-related GHG emissions, which could occur at the same time as the early phases of oil field development GHG emissions. The overall duration of construction for the 14-mile natural gas pipeline would be limited to one construction season. Operational and maintenance activities would also contribute minor quantities of GHG emissions due to routine pipeline maintenance according to industry requirements and unquantifiable, but small volumes of natural gas that may escape as fugitives.

Construction of the SoCalGas natural gas pipeline would create approximately 4,040 MTCO2e of GHG emissions in addition to GHG emissions quantified for oil field development (Section 4.4.4.1). The detailed emissions estimates appear in the AQIA (Appendix E). The natural gas pipeline construction GHG emissions would be caused by the use of gasoline and diesel-powered heavy equipment during construction at a rate that would exceed the "bright line" threshold of 1,000 MTCO2e per year applicable to industrial stationary source projects. Additionally, minor quantities of natural gas pipeline operational and maintenance emissions would contribute to the impact of oil field operation. **Impact GHG-1 as it relates to the natural gas pipeline construction and operations would be less than significant with the implementation of MM GHG-1 (Class II).**

Impact GHG-2: Proposed Project emissions could conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

The natural gas pipeline construction activities would be subject to California's regulatory setting for GHG emissions (Section 4.4.2). The GHG emissions would not conflict with any applicable plan, policy or regulation adopted for the purpose of reducing GHG emissions. Accordingly, **Impact GHG-2 for natural gas pipeline GHG emissions would be less than significant (Class III).**

4.4.5 Cumulative Effects

As discussed in Section 4.4.3 and 4.4.4, the geographic extent and context of climate change is global, and the impacts caused by GHG emissions are, by their nature, cumulative. Emissions of CO_2 and CH_4 are long-lived and contribute to the total amount of GHG in the atmosphere, and the effects of GHG emissions are not limited to the localities where they are generated.

As listed in Section 3.0, Cumulative Scenario, Table 3-2, and shown in Figure 3-1, the cumulative projects that would also cause GHG emissions within the immediate area of Aera Project-related activities, include the following. In addition, there are several oil and gas projects near Garey that are either currently under construction or proposed, involving facility replacement/upgrades. The proposed ExxonMobil interim trucking project would introduce tanker trucks, and the Plains Pipeline replacement project would introduce additional construction traffic to the region, along with increased GHG emissions.

- Cumulative Project 1, ERG West Cat Canyon Revitalization Plan Project, 233 wells steam flooded.
- Cumulative Project 3, PetroRock UCCB Production Plan, 231 wells cyclic steaming.
- Cumulative Project 4, ERG Foxen Petroleum Pipeline.

Table 4.4-6 provides a review of the peak GHG emissions forecasted to occur as a result of these cumulative oil and gas projects in the immediate area of Aera proposed Project-related activities. The impact of

these foreseeable projects would occur in addition to the impact of global GHG emissions. For comparison with past emissions, these cumulative projects would add to the baseline GHG inventory of approximately 1.5 MMTCO2e in the unincorporated areas of Santa Barbara County, based on data published in the ECAP for 2007 showing 1,192,970 MTCO2e under County jurisdiction and 315,890 MTCO2e from stationary sources under APCD jurisdiction (see Section 4.4.1.4). The table below reflects the most conservative scenarios by adding together the peak emission years for both construction and operations. The combined construction and operations emissions would represent the worst-case scenario and actual emissions are expected to be much lower on an annual basis.

Table 4.4-6. Cumulative Projects, Estimated GHG Emission Rates (MTCO2e per year)

Selected Cumulative Sources	Project Construction (Peak Year)	Project Operations (Peak Year)	Construction and Operations
Proposed Project, Aera East Cat Canyon Oil Field Redevelopment Plan	15,322	287,210	302,532
Cumulative Project 1, ERG West Cat Canyon Revitalization Plan Project	6,298	244,578	250,876
Cumulative Project 3, PetroRock UCCB Production Plan	34,384	166,281	200,665
Cumulative Project 4, ERG Foxen Petroleum Pipeline	(included in operations)	6,348	6,348
Sum of Selected Cumulative Projects	**56,004**	**704,417**	**760,421**

Sources: ERG, 2018 (Draft EIR); PetroRock LLC, 2017 (EIR in process); Foxen Petroleum Pipeline EIR (Table 4.3-13, 2015)

End Use GHG Emissions

The produced oil from the proposed Project would be fed into to California's refineries and refined into transportation fuels like gasoline, diesel, or jet fuel, and other petroleum-based end use products like lubricants, asphalt, or synthetic materials. The produced oil would serve a large and existing demand for petroleum products in California (see EIR Section 6.3, Energy Conservation), and the market demand would continue to be served through California's existing pipeline, refining, and distribution infrastructure.

As a result, the change in the oil supply brought about by the proposed Project would not require or create any new markets or use of new or different refineries or refining methods from those that exist today to serve California's end use demand for transportation fuels. The overall consumption of fuels and other petroleum products by end-users would not change as a result of the produced oil supplied by the proposed Project.

Among the programs in place to reduce the overall end-use demand for transportation fuels across California's economy are efforts to transition to battery-electric and fuel-cell electric vehicles and to increase transportation fuel efficiencies. Examples of actions within the ARB 2017 Scoping Plan Update are the implementation of a statewide Mobile Source Strategy that transitions vehicles to cleaner technologies and fuels, and the Sustainable Freight Action Plan that would deploy zero and near-zero emission freight vehicles (ARB, 2017). Locally, strategies in the County's ECAP and GHG mitigation strategies researched by the APCD show how project-specific reductions can be achieved within the County by reducing fuel use and otherwise avoiding GHG, where necessary to achieve additional local benefits. The mitigation recommended for the proposed Project in MM GHG-1 would allow for GHG reductions either locally or outside the proposed Project area.

The APCD researched various strategies for achieving local GHG mitigation and presented estimates of the cost-effectiveness of these strategies (APCD, 2018).[2] The APCD estimates that these strategies could achieve

[2] APCD GHG Mitigation Strategies in Santa Barbara County: https://www.ourair.org/ghgmitigation-sbc/.

GHG reductions in Santa Barbara County with cost-effectiveness ranging from $28 to $954 per metric ton. If reductions equal to the quantity of overall proposed Project GHG emissions (up to 302,532 MTCO2e per year) could be achieved in Santa Barbara County through the lowest cost programs (for example, carbon farming at $28/MT), the mitigation cost would become approximately $8.47 million per year or about $23,210 per day. Putting this cost in terms of the anticipated production of 10,000 barrels of oil per day translates to a mitigation cost of roughly $2.32 per barrel. Available mitigation from outside the proposed Project area would likely be more cost-effective.

Eventual end-users of California's oil, and subsequent refined products, produce quantifiable GHG emissions. In addition to the GHG emissions that would occur during construction and operation of the proposed Project, analyzed in Section 4.4.4, the annual GHG emissions due to the consumption of oil produced by the proposed Project would total approximately 1.6 MMTCO2e for 10,000 barrels of oil per day [based on general and default emission factors for use of crude oil as a fuel under federal GHG reporting regulations (U.S. EPA, 2017)]. This calculation of end-user emissions is included in Appendix H of this EIR. Because the proposed Project would not change how California's overall supply of oil is refined or used, these end use GHG emissions would occur regardless of the source of the crude oil. As a result, the quantity of end use emissions is provided here for informational purposes only.

4.4.6 Mitigation Monitoring Program

Table 4.4-7. Mitigation Monitoring and Reporting Plan

MM #	MM Title	Monitoring/ Reporting Action	Timing & Method of Verification	Agency or County Responsibilities	Applicant Responsibilities
GHG-1	Reduce GHG Emissions or Surrender Offset Credits	Obtain evidence of GHG reductions achieved or surrendered GHG offset credits	Applicant submits evidence of GHG reductions or surrendering GHG offset credits	County reviews Applicant evidence of reducing GHG or surrendering GHG offset credits	Reduce GHG or obtain and surrender GHG offset credits