Air Quality and Greenhouse Gas Technical Report

Lancaster Solar R&D Project

Los Angeles County, California

SEPTEMBER 2022

PREPARED FOR

Heliogen, Inc.

PREPARED BY

SWCA Environmental Consultants

AIR QUALITY AND GREENHOUSE GAS TECHNICAL REPORT

LANCASTER SOLAR R&D PROJECT LOS ANGELES COUNTY, CALIFORNIA

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CONTENTS

1 Introduction 1

2 Project Description and Location 1

2.1 Operations 4

2.2 Construction Scheduling and Phasing 4

3 Environmental Setting 4

3.1 Air Quality Background 4

3.2 Existing Conditions 5

3.2.1 Climate and Topography 5

3.2.2 Local Air Quality 5

3.2.3 City of Lancaster 7

3.2.4 Attainment Status 7

3.2.5 Air Pollutants 8

4 Regulatory Setting 10

4.1 Criteria Pollutants 10

4.1.1 Federal 10

4.1.2 State 11

4.1.3 Toxic Air Contaminants Regulations 13

4.1.4 Regional 14

4.1.5 Local 14

4.2 Climate Change and Greenhouse Gases 15

4.2.1 Federal 16

4.2.2 State 16

4.2.3 Local 18

5 Impacts and Mitigation Measures 19

5.1 Thresholds of Significance 19

5.1.1 Air Quality 19

5.1.2 Greenhouse Gases 20

6 Methodology 21

6.1 Construction Emissions 21

6.2 Operational Emissions 22

7 Impact Analysis 22

Impact AQ-1 Would the project conflict with or obstruct implementation of the applicable air quality plan? 22

Impact AQ-2 Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard? 24

Impact AQ-3 Would the project expose sensitive receptors to substantial pollutant concentrations? 24

Impact AQ-4 Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people? 25

Impact GHG-1 Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment? 25

Impact GHG-2 Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs? 26

7.1 Cumulative 27
7.1.1 Construction 27
7.1.2 Operation 27
7.1.3 Greenhouse Gases 28
8 Literature Cited 29

Tables

Table 1: Climatological Conditions Near Lancaster, California 5
Table 2: Existing Local Ambient Air Quality from 2019–2021 6
Table 3: California GHG Inventory 7
Table 4: Federal and State Attainment Status 8
Table 5: State and Federal Ambient Air Quality Standards 12
Table 6: AVAQMD CEQA GHG Thresholds of Significance 19
Table 7: Construction Anticipated Equipment 22
Table 8: Unmitigated Construction Emissions Summary 23
Table 9: Unmitigated Operational Emissions Summary 23
Table 10: Greenhouse Gas Emissions Summary 26

Appendices

Appendix A. CalEEMod Results – Air Pollutant & GHG Emission Calculations

Figures

Figure 1. Vicinity map. 2
Figure 2. Project site plan. 3

1 INTRODUCTION

Heliogen, Inc. (Applicant), retained SWCA Environmental Consultants (SWCA) to conduct an air quality and greenhouse gas (GHG) emissions technical report in support of the proposed Lancaster Solar R&D Project (project) in the City of Lancaster (Lancaster or City), Los Angeles County, California (county). The purpose of this report is to explain the methodologies used to evaluate the effects of a research, development, and demonstration of Concentrating Solar Power (CSP) technology on ambient air quality and GHGs. This air quality technical report provides a summary of the air pollutant and GHG emissions calculation methodologies, a summary of any mitigation measures assumed and the results of the air pollutant and GHG emissions calculations. The evaluation of project impacts was conducted as recommended in the Antelope Valley Air Quality Management District (AVAQMD) in its California Environmental Quality Act (CEQA) and Federal Conformity Guidelines (AVAQMD 2016) and is consistent with the goals set forth in Lancaster's General Plan (City of Lancaster 2009), which are incorporated into this technical document by reference.

2 PROJECT DESCRIPTION AND LOCATION

The approximate 20-acre project site is located at 431 East Avenue K-4, Lancaster, CA 93535, which is the site of the currently abandoned Lancaster Golf Center in Los Angeles County (Figure 1). The purpose of this project is to perform research, development, and demonstration of technology to use CSP to produce green hydrogen through solar thermochemical water splitting. The project includes a heliostat field for collecting and concentrating sunlight, and tower-mounted heliostat control equipment and solar flux measurement devices. In addition to the solar equipment, there will be an office building and maintenance and storage building at the project site.

The project will include the heliostat field and control system (Figure 2). This phase will demonstrate Heliogen's heliostat technology, verifying that it meets the performance requirements necessary for thermochemical water splitting. The project is planned for approximately 3 to 5 years during which solar research and technology development will occur.

The heliostat field will consist of approximately 400 heliostats, or sun-tracking mirrors, that collect solar energy by tracking the sun throughout the day. Each heliostat is controlled by computers to direct its reflected beam of sunlight toward the solar receiver. In this way, the field collects solar energy and concentrates it at a single location. The heliostat field occupies a box that is approximately 150 feet × 150 feet.

During construction, the heliostat field will be mowed and rolled, but will not be graded and the heliostats will be installed by driven pile conforming to the previous grading of the site. The solar receiver tower will be constructed at a height of approximately 46 feet, with equipment mounted to the tower adding an additional 9 feet (total of approximately 55 feet tall). Gravel access roads will be placed around the perimeters of the field and the tower.

Figure 1. Vicinity map.

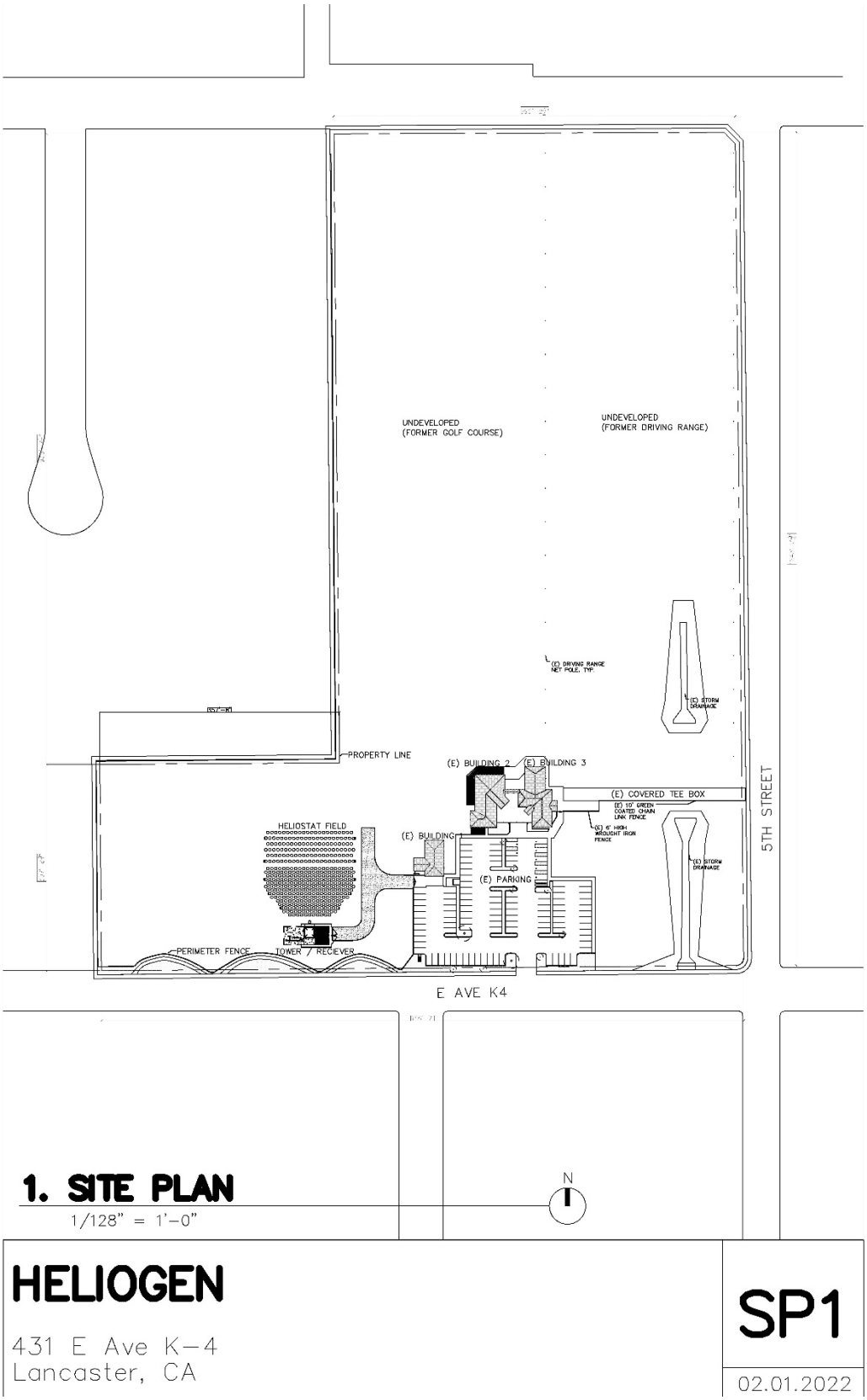

Figure 2. Project site plan.

The tower will be of a simple steel lattice design and will be painted white. Operations

The heliostat field would be operational each morning and shut down in the evening and any associated stationary equipment will run based on electricity demand. Within the heliostat field, operations may include routine washing of mirrors requiring approximately 20,800 gallons of water per year. The public would not have access to the facility, and access to the project site would be limited to authorized personnel. The project operations would also include one aerial lift and one forklift; assumptions were made based on the predicted project needs to estimate emissions from each proposed piece of operational equipment.

2.1 Construction Scheduling and Phasing

Construction of the project, from mobilization to the site to final completion, is expected to occur between January 2023 and March 2023, and would last for approximately 3 months. Further details about the construction phasing are provided in the Methodology section of this report.

3 ENVIRONMENTAL SETTING

3.1 Air Quality Background

The project is in the high-desert portion of Los Angeles County, California, which is part of the Mojave Desert Air Basin (air basin) and is under the jurisdiction of AVAQMD. Ambient air quality is affected by the climate, topography, and the type and amount of pollutants emitted. The Antelope Valley is a 3,000-square-mile high-desert closed basin that straddles northern Los Angeles County and southern Kern County. One of nine California valleys with the same name, this one lies in the western Mojave high desert and includes the communities of Lancaster, Palmdale, Rosamond, and Mojave. The air quality assessment includes estimating emissions associated with short-term construction and long-term operation of the project.

Air pollutant emissions within the air basin are generated primarily by stationary and mobile sources. Stationary sources can be divided into two major subcategories: point and area sources. Point sources occur at a specific location and are often identified by an exhaust vent or stack (such as combustion equipment that produce electricity or generate heat). Area sources are widely distributed and include such sources as residential and commercial water heaters, agriculture fields, landfills, and others. Mobile sources refer to emissions from motor vehicles, including tailpipe and evaporative emissions, and are classified as either on-road or off-road. On-road sources may be legally operated on roadways and highways. Off-road sources include aircraft, ships, trains, and self-propelled construction equipment. Air pollutants can also be generated by the natural environment, such as when high winds suspend fine dust particles.

Both the federal and state governments have established ambient air quality standards for outdoor concentrations of various pollutants in order to protect the public health and welfare. These pollutants are referred to as “criteria air pollutants” and the national and state standards have been set at levels considered safe to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly with a margin of safety; and to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

3.2 Existing Conditions

3.2.1 Climate and Topography

The Lancaster meteorological station outside of Lancaster, California, was selected as having representative historical climatic conditions for the project area. The meteorological station is located approximately 7 miles northwest of the project area.

The climate in this area is characterized by hot summers and generally mild to cool winters. Temperatures range from an average low of 43.8 degrees Fahrenheit (°F) in December to an average high of 82.3°F in July (Table 1). Lancaster meteorological station has an average annual precipitation of 7.4 inches with most of the rain falling in the winter. According to the NCDC, there was an average of 16 days per year when rainfall exceeded 0.1 inch during the 1981 through 2010 period. Snow is a negligible form of precipitation in the project region; many years passed with no measurable snow. Lancaster meteorological station has an average annual snowfall of 2.3 inches, all occurring from December through March.

Table 1: Climatological Conditions Near Lancaster, California

PARAMETER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVERAGE
Normal daily maximum temperature (°F)	58.7	61.7	67.1	73.2	82.3	90.0	97.8	97.5	90.7	79.4	66.9	57.9	77.0
Normal daily minimum temperature (°F)	31.1	34.9	39.3	44.9	54.0	61.3	66.8	64.3	56.6	45.9	35.9	29.7	47.1
Normal daily mean temperature (°F)	44.9	48.3	53.2	59.1	68.1	76.1	82.3	80.9	73.7	62.6	51.4	43.8	62.0
Average precipitation (inches)	1.50	1.78	1.14	0.35	0.09	0.05	0.09	0.10	0.15	0.44	0.54	1.15	N/A
Average no. days with ≥ 0.10-inch precipitation	3.2	3.4	2.5	1.0	0.3	0.1	0.2	0.2	0.4	1.0	1.4	2.4	N/A
Average snowfall (inches)	0.4	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	N/A

Source: Data are 30-year averages (1981–2010) from National Climatic Data Center (NCDC) Local Climatological Data Monthly Climate Normals for Lancaster, CA (USW00003159; NOAA 2022).

3.2.2 Local Air Quality

3.2.2.1 CRITERIA AIR POLLUTANTS

Existing levels of ambient air concentrations and historical trends and projections in the project area are best documented by measurements made by the AVAQMD and California Air Resources Board (CARB 2022a). The closest most representative air monitoring station to the project site is the Lancaster monitoring station on Division Street. The Lancaster monitoring station monitors ozone (O_3), nitrogen dioxide (NO_2), particulate matter 2.5 ($PM_{2.5}$; fine particles less than 2.5 microns in diameter), and particular matter 10 (PM_{10}; respirable particles less than 10 microns in diameter). This was determined to be appropriate because the project area is only nonattainment for O_3 and PM_{10}. The most recent published

data for the monitoring stations is presented in Table 2, which encompasses the years of 2019 through 2021.

Table 2: Existing Local Ambient Air Quality from 2019–2021

Pollutant	Pollutant Concentrations and AAQS	Year		
		2019	2020	2021
O3	Maximum 1-hour concentration (ppm)	0.096	0.099	0.086
	Days exceeding California Ambient Air Quality Standards (CAAQS;(0.09 ppm)	1	4	0
	Maximum 8-hour concentration (ppm)	0.081	0.083	0.079
	Days exceeding National Ambient Air Quality Standards (NAAQS; 0.07 ppm)	13	8	3
	Days exceeding CAAQS (0.07 ppm)	13	8	3
Respirable PM_{10}	Maximum 24-hour concentration (µg/m3)	165.1	192.3	411.2
	Days exceeding NAAQS (150 µg/m3)	2	1	1
	Days exceeding CAAQS (50 µg/m3)	*	*	*
	Annual arithmetic mean (AAM; µg/m3)	22.5	30.6	29.6
	Does measured AAM exceed CAAQS (20 µg/m3)	Yes	Yes	Yes
Fine $PM_{2.5}$	Maximum 24-hour concentration (µg/m3)	13.6	74.7	35.7
	Days exceeding NAAQS (35 µg/m3)	0	9	1
	AAM (µg/m3)	6.1	9.2	8.1
	Does measured AAM exceed NAAQS/CAAQS (12 µg/m3)	No	No	No
NO_2	Maximum 1-hour concentration (µg/m3)	49.8	51.5	46.1
	Days exceeding CAAQS (339 µg/m3)	No	No	No
	AAM (µg/m3)	8	8	8
	Does measured AAM exceed NAAQS (100 µg/m3)	No	No	No
	Does measured AAM exceed CAAQS (57 µg/m3)	No	No	No

Source: (CARB 2022a)

*Insufficient data available to determine the value

Notes: ppm = parts per million; µg/m³ = micrograms per cubic meter

3.2.2.2 GREENHOUSE GASES

Per the U.S. Environmental Protection Agency's (USEPA) *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2020* (USEPA 2020b), total emissions in the United States have decreased by 6.6% from 1990 to 2020; 2005 emissions were 15.8% above 1990 levels (USEPA 2022b). The largest source of GHG emissions from human activities in the United States is from burning of fossil fuels for electricity, heat, and transportation. The latest national GHG emissions are for calendar year 2020, in which total gross U.S. GHG emissions were reported at 5,981.4 million metric tons of carbon dioxide equivalent (MMT CO_2e). Emissions decreased from 2019 to 2020 by 543.4 MMT CO_2e and net emissions (including sinks) were 5,222.4 MMT CO_2e. (USEPA 2022b)

According to California's 2000–2019 GHG emissions inventory, California emitted 409.3 MMT CO_2e in 2019 (CARB 2022b). The sources of GHG emissions in California include transportation, industrial uses, electric power production from both in-state and out-of-state sources, commercial and residential uses,

agriculture, high global-warming potential substances, and recycling and waste. The California GHG emission source categories (as defined in CARB's 2008 *Climate Change Scoping Plan: A Framework for Change* (CARB 2011) and their relative contributions in 2019 are presented in Table 3. Total GHG emissions in 2019 were approximately 22.9 MMT CO_2e less than 2015 emissions (CARB 2022b). The declining trend in GHG emissions, coupled with programs that will continue to provide additional GHG reductions going forward, demonstrates that California will continue to reduce emissions below the 2020 target of 431 metric tons (MT) CO_2e (CARB 2022b).

Table 3: California GHG Inventory

Parameter	Unit	Year				
		2015	2016	2017	2018	2019
Transportation	MMT CO_2e	166.2	169.8	171.2	169.6	166.1
	Percentage	38.5%	40.4%	41.2%	40.7%	40.6%
Electric power	MMT CO_2e	84.8	68.6	62.1	63.1	58.8
	Percentage	19.6%	16.3%	14.9%	15.2%	14.4%
Industrial	MMT CO_2e	90.3	89	88.8	89.2	88.2
	Percentage	20.9%	21.2%	21.4%	21.4%	21.5%
Commercial and residential	MMT CO_2e	38.8	40.6	41.3	41.4	43.8
	Percentage	9.0%	9.7%	9.9%	9.9%	10.7%
Agriculture	MMT CO_2e	33.5	33.3	32.5	32.7	31.8
	Percentage	7.8%	7.9%	7.8%	7.9%	7.8%
High global warming potential	MMT CO_2e	18.6	19.2	20	20.4	20.6
	Percentage	4.3%	4.6%	4.8%	4.9%	5.0%
Total net emissions	**MMT CO_2e**	**432.2**	**420.5**	**415.9**	**416.4**	**409.3**
Source: CARB 2022a						

3.2.3 City of Lancaster

According to the City of Lancaster's 2016 *Draft Climate Action Plan* (CAP), Lancaster emitted approximately 777,350 CO_2e in 2015. The largest portion of the 2015 emissions were from transportation (45%), followed by emissions from residential energy (29%) (City of Lancaster 2016).

3.2.4 Attainment Status

Depending on whether or not the applicable ambient air quality standards (AAQS) are met or exceeded, the air basin is classified as being in "attainment" or "nonattainment." The USEPA and CARB determine the air quality attainment status of designated areas by comparing ambient air quality measurements from state or local ambient air monitoring stations with the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS). These designations are determined on a pollutant-by-pollutant basis. Consistent with federal requirements, an unclassifiable/unclassified designation is treated as an attainment designation.

Table 4 presents the federal and state attainment status for the project area. As shown in the Table 4, the AVAQMD jurisdiction is designated as in nonattainment for the federal and state 8-hour O_3 and state PM_{10} standards. The area is currently in attainment or unclassified status for all other AAQS.

Table 4: Federal and State Attainment Status

Pollutant	Federal Designation	State Designation
O_3 – 8 hours	Nonattainment	Nonattainment
PM_{10}	Unclassified/Attainment	Nonattainment
$PM_{2.5}$	Unclassified/Attainment	Unclassified
Carbon Monoxide (CO)	Unclassified/Attainment	Attainment
NO_2	Unclassified/Attainment	Attainment
Sulfur Dioxide (SO_2)	Unclassified/Attainment	Attainment
Lead (Pb)	Unclassified/Attainment	Attainment
Hydrogen Sulfide (H_2S)	-	Unclassified
Sulfates	-	Attainment
Visibility reducing particles	-	Unclassified
Notes: (-) = Not Identified/No Status. Source: USEPA 2022a, AVAQMD 2022b		

3.2.5 Air Pollutants

3.2.5.1 CRITERIA AIR POLLUTANTS

The federal and state governments have established ambient air quality standards for six criteria pollutants: carbon monoxide (CO), O_3, particulate matter (PM), NO_2, sulfur dioxide (SO_2), and lead (Pb). O_3 and particulate matter are generally considered as regional pollutants because they or their precursors affect air quality across a region. Pollutants such as CO, NO_2, SO_2, and Pb are local pollutants in that they tend to accumulate in the air locally. In addition to being a regional pollutant, PM is also considered a local pollutant. In the area of the project site, O_3 and PMs are of particular concern because of their attainment status at the regional level.

3.2.5.2 TOXIC AIR CONTAMINANTS

The federal toxic air contaminant (TACs) are air pollutants that may cause or contribute to an increase in mortality or serious illness, or which may pose a hazard to human health. Although, there are no ambient standards established for TACs. Many pollutants are identified as TACs because of their potential to increase the risk of developing cancer or other acute (short-term) or chronic (long-term) health problems. For TACs that are known or suspected carcinogens, the CARB has consistently found that there are no levels or thresholds below which exposure is risk free. Individual TACs vary greatly in the risks they present; at a given level of exposure, one TAC may pose a hazard that is many times greater than another. For certain TACs, a unit risk factor can be developed to evaluate cancer risk. For acute and chronic health effects, a similar factor, called a Hazard Index, is used to evaluate risk. TACs are identified and their toxicity is studied by the California Office of Environmental Health Hazard Assessment. Examples of TAC sources include industrial processes, dry cleaners, gasoline stations, paint and solvent operations,

and fossil fuel combustion sources. The TACs that are relevant to the implementation include diesel particulate matter (DPM) and airborne asbestos.

DPM was identified as a TAC by the CARB in August 1998 (CARB 1998). DPM is emitted from both mobile and stationary sources. In California, on-road diesel-fueled vehicles contribute approximately 40% of the statewide total, with an additional 57% attributed to other mobile sources such as construction and mining equipment, agricultural equipment, and transport refrigeration units. Stationary sources, contributing about 3% of emissions, include shipyards, warehouses, heavy equipment repair yards, and oil and gas production operations. Emissions from these sources are from diesel-fueled internal combustion engines. Stationary sources that report DPM emissions also include heavy construction, manufacturers of asphalt paving materials and blocks, and diesel-fueled electrical generation facilities.

Exposure to DPM can have immediate health effects. DPM can have a range of health effects including irritation of eyes, throat, and lungs, causing headaches, lightheadedness, and nausea. Exposure to DPM also causes inflammation in the lungs, which may aggravate chronic respiratory symptoms and increase the frequency or intensity of asthma attacks. Children, the elderly and people with emphysema, asthma, and chronic heart and lung disease are especially sensitive to fine-particle pollution. In California, DPM has been identified as a carcinogen (CARB 2022c).

Airborne asbestos occurs naturally in ultramafic rock (which includes serpentine). When this material is disturbed in connection with construction, grading, quarrying, or surface mining operations, asbestos-containing dust can be generated. Asbestos is a known carcinogen. Exposure to asbestos can result in adverse health effects such as lung cancer, mesothelioma (cancer of the linings of the lungs and abdomen), and asbestosis (scarring of lung tissues that results in constricted breathing) (Van Gosen, B.S., and J.P. Clinkenbeard. 2011).

3.2.5.3 GREENHOUSE GASES

Global climate change is the observed increase in the average temperature of the Earth's atmosphere and oceans in recent decades. There is a general scientific consensus that global climate change is occurring, caused in whole or in part by increased emissions of GHGs that keep Earth's surface warm by trapping heat in Earth's atmosphere, in much the same way as glass traps heat in a greenhouse. Earth's climate is changing because human activities, primarily the combustion of fossil fuels, are altering the chemical composition of the atmosphere through the buildup of GHGs (NASA 2021). GHGs are released by the combustion of fossil fuels, land clearing, agriculture, and other activities, and lead to an increase in the greenhouse effect.

Carbon Dioxide (CO_2)

In the atmosphere, carbon generally exists in its oxidized form, as carbon dioxide (CO_2). Natural sources of CO_2 include the respiration (breathing) of humans, animals and plants, volcanic outgassing, decomposition of organic matter and evaporation from the oceans. Anthropogenic sources of CO_2 include the combustion of fossil fuels and wood, waste incineration, mineral production and deforestation. Anthropogenic sources of CO_2 amount to over 30 billion tons per year, globally. Natural sources release substantially larger amounts of CO_2. Nevertheless, natural removal processes, such as photosynthesis by land and ocean-dwelling plant species, cannot keep pace with this extra input of man-made CO_2, and, consequently, the gas is building up in the atmosphere (USEPA 2022c).

Methane (CH_4)

Methane (CH_4) is produced when organic matter decomposes in environments lacking sufficient oxygen. Natural sources include wetlands, termites, and oceans (USEPA 2022c). Decomposition occurring in

landfills accounts for the majority of human generated CH_4 emissions in California and in the United States as a whole. Agricultural processes such as intestinal fermentation, manure management, and rice cultivation are also significant sources of CH_4 in California (CARB 2022d).

Nitrous Oxide (N_2O)

Nitrous oxide (N_2O) is produced naturally by a wide variety of biological sources, particularly microbial action in soils and water. Tropical soils and oceans account for the majority of natural source emissions. Nitrous oxide is a product of the reaction that occurs between nitrogen and oxygen during fuel combustion. Both mobile and stationary combustion produce N_2O, and the quantity emitted varies according to the type of fuel, technology, and pollution control device used, as well as maintenance and operating practices (USEPA 2022c). Agricultural soil management and fossil fuel combustion are the primary sources of human-generated N_2O emissions in California (CARB 2022d).

Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur Hexafluoride (SF_6)

Hydrofluorocarbons (HFCs) are primarily used as substitutes for O_3 depleting substances regulated under the Montreal Protocol (1987), an international treaty that was approved on January 1, 1989, and was designated to protect the O_3 layer by phasing out the production of several groups of halogenated hydrocarbons believed to be responsible for O_3 depletion. Perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6) are emitted from various industrial processes, including aluminum smelting, semiconductor manufacturing, electric power transmission and distribution, and magnesium casting (USEPA 2022c). There is no primary aluminum or magnesium production in California; however, the rapid growth in the semiconductor industry leads to greater use of PFCs (CARB 2022d).

The magnitude of the impact on global warming differs among the GHGs. The effect each GHG has on climate change is measured as a combination of the volume of its emissions, and its global warming potential (GWP), expressed as a function of how much warming would be caused by the same mass of CO_2. Thus, GHG emissions are typically measured in terms of pounds or tons of CO_2e. HFCs, PFCs, and SF_6 have a greater GWP than CO_2. In other words, these other GHGs have a greater contribution to global warming than CO_2 on a per-mass basis. However, CO_2 has the greatest impact on global warming because of the relatively large quantities of CO_2 emitted into the atmosphere (USEPA 2022c).

4 REGULATORY SETTING

Federal, state, and local agencies have set AAQS for certain air pollutants through statutory requirements and have established regulations and various plans and policies to maintain and improve air quality, as described below.

4.1 Criteria Pollutants

4.1.1 Federal

The federal Clean Air Act (CAA), which was passed in 1970 and last amended in 1990, forms the basis for the national air pollution control effort. The CAA delegates primary responsibility for clean air to the USEPA. The USEPA develops rules and regulations to preserve and improve air quality and delegates specific responsibilities to state and local agencies. Under the act, the USEPA has established the NAAQS for six criteria air pollutants that are pervasive in urban environments and for which state and national health-based ambient air quality standards have been established. O_3, CO, NO_2, SO_2, Pb, and PM are the six criteria air pollutants. O_3 is a secondary pollutant, Nitrogen oxides (NO_X) and volatile organic

compounds (VOCs) are of particular interest as they are precursors to O_3 formation. The NAAQS are divided into primary and secondary standards; the primary standards are set to protect human health within an adequate margin of safety, and the secondary standards are set to protect environmental values, such as plant and animal life. The standards for all criteria pollutants are presented in Table 5.

The CAA requires USEPA to designate areas as in attainment, nonattainment, or maintenance (previously nonattainment and currently attainment) for each criteria pollutant based on whether the NAAQS have been achieved. The act also mandates that the state submit and implement a state implementation plan (SIP) for areas not meeting the NAAQS. These plans must include pollution control measures that demonstrate how the standards will be met.

4.1.2 State

The State of California began to set its AAQS (i.e., CAAQS) in 1969 under the mandate of the Mulford-Carrell Act. The California Clean Air Act (CCAA) was adopted by the CARB in 1988. The CCAA requires all air districts of the state to achieve and maintain the CAAQS by the earliest practical date (see Table 5). The CAAQS are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

Table 5: State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	National Standards	
			Primary	Secondary
O_3	1 Hour	0.09 ppm (180 µg/m³)	--	Same as Primary
	8 Hour	0.070 ppm (137 µg/m³)	0.070 ppm (137 µg/m³)	
PM_{10}	24 Hour	50 µg/m³	150 µg/m³	Same as Primary
	Annual Mean	20 µg/m³	--	
$PM_{2.5}$	24 Hour	--	35 µg/m³	Same as Primary
	Annual Mean	12 µg/m³	12.0 µg/m³	15 µg/m³
CO	1 Hour	20 ppm (23 µg/m³)	35 ppm (40 mg/m³)	--
	8 Hour	9.0 ppm (10 mg/m³)	9 ppm (10 mg/m³)	--
NO_2	1 Hour	0.18 ppm (339 µg/m³)	100 ppb (188 µg/m³)	--
	Annual Mean	0.030 ppm (57 µg/m³)	0.053 ppm (100 µg/m³)	Same as Primary
SO_2	1 Hour	0.25 ppm (655 µg/m³)	75 ppb (196 µg/m³)	--
	3 Hour	--	--	0.5 ppm (1300 µg/m³)
	24 Hour	0.04 ppm (105 µg/m³)	0.14 ppm	--
	Annual Mean	--	0.030 ppm	--
Pb	30 Day Average	1.5 µg/m³	--	--
	Calendar Quarter	--	1.5 µg/m³	Same as Primary
	Rolling 3-Month Average	--	0.15 µg/m³	Same as Primary
Visibility reducing particles	8 Hour	10-mile visibility standard, extinction of 0.23 per kilometer	No National Standards	
Sulfates	24 Hour	25 µg/m³		
H_2S	1 Hour	0.03 ppm (42 µg/m³)		
Vinyl chloride	24 Hour	0.01 ppm (265 µg/m³)		

Notes: ppm = parts per million; ppb = parts per billion; µg/m³ = micrograms per cubic meter; "--" = no standard.Source: CARB 2016.

The CARB and local air districts are responsible for achieving CAAQS, which are to be achieved through district-level air quality management plans (AQMPs) that would be incorporated into the SIP. In California, the USEPA has delegated authority to prepare SIPs to CARB, which in turn, has delegated that authority to individual air districts. Each district plan is required to either 1) achieve a 5% annual reduction, averaged over consecutive 3-year periods, in district-wide emissions of each non-attainment pollutant or its precursors, or 2) to provide for implementation of all feasible measures to reduce emissions. Any planning effort for air quality attainment would thus need to consider both state and federal planning requirements.

Other CARB duties include monitoring air quality (in conjunction with air monitoring networks maintained by air districts) and setting emissions standards for new motor vehicles and for other emission sources, such as consumer products and certain off-road equipment.

The CCAA substantially adds to the authority and responsibilities of air districts. CCAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures (TCMs). The CCAA also emphasizes the control of indirect and area-wide sources of air pollutant emissions and gives local air pollution control districts explicit authority to regulate indirect sources of air pollution.

4.1.2.1 AIR QUALITY AND LAND USE HANDBOOK

CARB published the *Air Quality and Land Use Handbook* on April 28, 2005 (CARB Handbook), to serve as a general guide for considering health effects associated with siting sensitive receptors proximate to sources of TAC emissions. The recommendations provided therein are voluntary and do not constitute a requirement or mandate for either land use agencies or local air districts. The goal of the guidance document is to protect sensitive receptors, such as children, the elderly, acutely ill, and chronically ill persons, from exposure to TAC emissions. Some examples of CARB's siting recommendations include the following: 1) avoid siting sensitive receptors within 500 feet of a freeway, urban road with 100,000 vehicles per day, or rural roads with 50,000 vehicles per day; 2) avoid siting sensitive receptors within 1,000 feet of a distribution center that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units per day, or where transport refrigeration unit operations exceed 300 hours per week; and 3) avoid siting sensitive receptors within 300 feet of any dry cleaning operation using perchloroethylene and within 500 feet of operations with two or more machines.

4.1.2.2 CALIFORNIA CODE OF REGULATIONS

The California Code of Regulations (CCR) is the official compilation and publication of regulations adopted, amended, or repealed by the state agencies pursuant to the Administrative Procedure Act. The CCR includes regulations that pertain to air quality emissions. Specifically, Section 2485 in Title 13 of the CCR states that the idling of all diesel-fueled commercial vehicles (weighing over 10,000 pounds) during construction shall be limited to five minutes at any location. In addition, Section 93115 in Title 17 of the CCR states that operation of any stationary, diesel-fueled, compression-ignition engine shall meet specified fuel and fuel additive requirements and emission standards.

4.1.3 Toxic Air Contaminants Regulations

California regulates TACs primarily through the Toxic Air Contaminant Identification and Control Act of 1983 (AB 1807–Tanner) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588–Connelly). In the early 1980s, the CARB established a statewide comprehensive air toxics program to reduce exposure to air toxics. AB 1807 created California's program to reduce exposure to air toxics and AB 2588 supplemented the AB 1807 program by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks (CARB 2011).

In August 1998, CARB identified DPM emissions from diesel-fueled engines as a TAC. In September 2000, CARB approved a comprehensive diesel risk reduction plan to reduce emissions from both new and existing diesel-fueled engines and vehicles. The goal of the plan was to reduce diesel PM_{10} emissions and the associated health risk by 75% in 2010 and by 85% by 2020. The plan identified 14 measures that target new and existing on-road vehicles (e.g., heavy-duty trucks and buses, etc.), off-road equipment (e.g., graders, tractors, forklifts, sweepers, and boats), portable equipment (e.g., pumps, etc.), and stationary engines (e.g., stand-by power generators, etc.). During the control measure phase, specific statewide regulations designed to further reduce diesel PM emissions from diesel-fueled engines and vehicles were evaluated and developed. The goal of each regulation is to make diesel engines as clean as

possible by establishing state-of-the-art technology requirements or emission standards to reduce diesel PM emissions. The project would be required to comply with applicable diesel control measures.

AVAQMD has adopted two rules to limit cancer and noncancer health risks from facilities located within its jurisdiction. Rule 1401 (New Source Review of Toxic Air Contaminants) regulates new or modified facilities, and Rule 1402 (Control of Toxic Air Contaminants from Existing Sources) regulates facilities that are already operating. Rule 1402 incorporates requirements of the AB 2588 program, including implementation of risk reduction plans for significant risk facilities.

4.1.4 Regional

AVAQMD and Southern California Association of Governments are responsible for formulating and implementing the AQMP for the basin. The main purpose of an AQMP is to bring the area into compliance with federal and State air quality standards. AVAQMD has adopted an attainment plan for O_3. The latest plan is the *Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Nonattainment Area)* (AVAQMD 2017), which includes planning assumptions regarding population, vehicle activity, and industrial activity. The AVAQMD has reviewed and updated all elements of the O_3 plan. The portion of the AVAQMD designated as a federal 8-hour O_3 nonattainment area will be in attainment of the 75-parts per billion O_3 NAAQS by July 2027 (AVAQMD 2017). The document addresses all existing and forecast O_3 precursor producing activities within the Antelope Valley through the year 2026.

The following AVAQMD rules and regulations would be applicable to the project:

- AVAQMD Rule 403 requires projects to incorporate fugitive dust control measures (AVAQMD 2010).
    - Watering disturbed open areas;
    - Limiting track-out distance and removed track-out at the conclusion of each workday;
    - Watering during grading;
    - Implementing Best Available Control Measures (BACM) for all sources such that visible emissions do not exceed this limit 100 feet from the point of origin of earth-moving activities. A list of BACM is contained in the Rule 403 Implementation Handbook; and
    - Posting a sign that provides a telephone number to call and receive information about the construction project or to report complaints regarding excessive fugitive dust generation at the entrance to the construction site (only if site is <10 acres).
- AVAQMD Rule 1113 limits the VOC content of architectural coatings (AVAQMD 2013).

4.1.5 Local

The AVAQMD is the agency responsible for monitoring air quality, as well as planning, implementing, and enforcing programs designed to attain and maintain state and federal ambient air quality standards in the district.

The AVAQMD adopted its *Antelope Valley AQMD California Environmental Quality Act (CEQA) and Federal Conformity Guidelines* in 2016 (AVAQMD 2016). The AVAQMD CEQA Guidelines provides guidance on how to determine the significance of impacts, including air pollutant emissions, related to the development of residential, commercial, and industrial projects. Where impacts are determined to be

significant, the AVAQMD CEQA Guidelines provides guidance to mitigate adverse impacts to air quality from development projects.

City of Lancaster General Plan 2030

The City's General Plan was adopted on July 14, 2009, and the horizon year for the adopted General Plan is currently 2030. The General Plan contains air quality policies in the Plan for the Natural Environment and Plan for Public Health and Safety sections (City of Lancaster 2009). The Housing Element includes:

> Policy 6.1.1: Ensure that a mix of housing types are provided, including single- and multi-family housing within a variety of price ranges which will provide a range of housing options for those wishing to reside within the City of Lancaster, and which will enable the City to achieve Objective 6.1.
>
> Policy 6.1.2: Promote infill housing development within areas presently approved for urban density residential development, as well as areas which have been committed to urban development.
>
> Policy 6.1.3: Promote efforts to slow the rising costs of new and existing housing to the extent that government actions can reasonably do so while protecting the public health, safety, and welfare.
>
> Policy 6.1.5: Facilitate housing for extremely low, very low, low, and moderate income-households to be distributed at locations throughout the urban portions of the City.

4.2 Climate Change and Greenhouse Gases

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of Earth's climate system. An ever-increasing body of scientific research attributes these climatological changes to GHGs, particularly those generated from the production and use of fossil fuels. While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change by the United Nations and World Meteorological Organization in 1988 has led to increased efforts devoted to GHG emissions reduction and climate change research and policy (Forster, et al 2007). These efforts are primarily concerned with the emissions of GHGs generated by human activity, including CO_2, CH_4, N_2O, SF_6, tetrafluoromethane, hexafluoroethane, HFC-23 (fluoroform), HFC-134a (1,1,1,2-tetrafluoroethane), and HFC-152a (difluoroethane).

GHGs refer to atmospheric gases that absorb solar radiation and subsequently emit radiation in the thermal infrared region of the energy spectrum, trapping heat in Earth's atmosphere. These gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and water vapor, among others. A growing body of research attributes long-term changes in temperature, precipitation, and other elements of Earth's climate to large increases in GHG emissions since the mid-nineteenth century, particularly from human activity related to fossil fuel combustion. Anthropogenic GHG emissions of particular interest include CO_2, CH_4, N_2O, and fluorinated gases (USEPA 2022c).

GHGs differ in how much heat each can be trapped in the atmosphere, which is referred to as GWP. The GWP is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and length of time that the gas remains in the atmosphere (atmospheric lifetime). The GWP of each gas is measured relative to CO_2, the most abundant GHG. The definition of GWP for a particular GHG is expressed relative to CO_2 over a specified time period. GHG emissions are typically measured in terms of pounds or tons of carbon dioxide equivalent (CO_2e). For example, the 2007 International Panel on

Climate Change Fourth Assessment Report calculates the GWP of CH_4 as 25 and the GWP of N_2O as 298, over a 100-year time horizon (Forster et al. 2007). Generally, estimates of all GHGs are summed to obtain total emissions for a project or given time period, usually expressed in metric tons ($MTCO_2e$), or million metric tons ($MMTCO_2e$).

4.2.1 Federal

At the federal level there is currently no overarching law related to climate change or the reduction of GHGs. The USEPA is developing regulations under the CAA to be adopted in the near future, pursuant to the USEPA's authority under the CAA. Foremost amongst recent developments have been the settlement agreements between the USEPA, several states, and nongovernmental organizations to address GHG emissions from electric generating units and refineries; the U.S. Supreme Court's decision in *Massachusetts v. USEPA*; and USEPA's "Endangerment Finding," "Cause or Contribute Finding," and "Mandatory Reporting Rule." On Sept. 20, 2013, the USEPA issued a proposal to limit carbon pollution from new power plants. The USEPA is proposing to set separate standards for natural gas-fired turbines and coal-fired units. Although periodically debated in Congress, no federal legislation concerning GHG limitations is has yet been adopted. In *Coalition for Responsible Regulation, Inc., et al. v. EPA*, the U.S. Court of Appeals upheld the USEPA's authority to regulate GHG emissions under CAA. Furthermore, under the authority of the CAA, the USEPA is beginning to regulate GHG emissions starting with large stationary sources. In 2010, the USEPA set GHG thresholds to define when permits under the New Source Review Prevention of Significant Deterioration standard and Title V Operating Permit programs are required for new and existing industrial facilities.

4.2.2 State

California has been innovative and proactive in addressing GHG emissions through passage of legislation including Senate and Assembly bills and executive orders, some of which are listed below.

Executive Order (EO) S-3-05. In 2005, the governor issued EO S-3-05, establishing statewide GHG emissions reduction targets. The goal of this EO was to reduce California's GHG emissions to year 1990 levels by 2020, and to 80% below 1990 levels by 2050. The EO further directed the secretary of the California EPA to oversee the efforts made to reach these targets, and to prepare biannual reports on the progress made toward meeting the targets and on the impacts to California related to global warming. The first such *Climate Action Team Assessment Report* was produced in March 2006 and has been updated every 2 years thereafter. This goal was further reinforced with the passage of Assembly Bill 32 (AB 32) in 2006 and Senate Bill 32 (SB 32) in 2016.

Assembly Bill 32 (AB 32 California Global Warming Solution Act). In 2006, California passed the California Global Warming Solutions Act of 2006 (AB 32; California Health and Safety Code Division 25.5, Sections 38500, et seq.), which codified the 2020 GHG emissions reduction goals as outlined in EO S-3-05, while further mandating that CARB create a scoping plan and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." The Legislature also intended that the statewide GHG emissions limit continue in existence and be used to maintain and continue reductions in emissions of GHGs beyond 2020 (Health and Safety Code Section 38551(b)). The law requires CARB to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective GHG reductions. The Scoping Plan was prepared and approved on December 11, 2008 and has had several updates since. The 2022 update both assesses progress towards achieving the State's 2030 emissions reduction goal and draws on a decade and a half of proven regulations, incentives, and carbon pricing policies alongside new approaches to outline a balanced and aggressive course of effective actions to achieve carbon neutrality by 2045 or sooner (CARB 2022). It also evaluates how to align the

State's longer-term GHG reduction strategies with other State policy priorities, such as for water, waste, natural resources, clean energy and transportation, and land use.

Senate Bill 97 (SB 97). Chapter 185, 2007, Greenhouse Gas Emissions: This bill requires the Governor's Office of Planning and Research (OPR) to develop recommended amendments to the CEQA Guidelines (2018) for addressing GHG emissions. The amendments became effective on March 18, 2010.

Executive Order (EO) S-01-07 (January 18, 2007). This order, signed by Governor Schwarzenegger, sets forth the low carbon fuel standard (LCFS) for California. Under this EO, the carbon intensity of California's transportation fuels is to be reduced by at least 10% by the year 2020. CARB re-adopted the LCFS regulation in September 2015, and the changes went into effect on January 1, 2016. The program establishes a strong framework to promote the low-carbon fuel adoption necessary to achieve the Governor's 2030 and 2050 GHG reduction goals.

Senate Bill 375 (SB 375). Chapter 728, 2008, Sustainable Communities and Climate Protection: This bill requires CARB to set regional emissions reduction targets for passenger vehicles. The Metropolitan Planning Organization for each region must then develop a "Sustainable Communities Strategy" (SCS) that integrates transportation, land-use, and housing policies to plan how it will achieve the emissions target for its region.

Executive Order B-30-15. On April 20, 2015, Governor Brown signed EO B-30-15 to establish a GHG reduction target of 40% below 1990 levels by 2030. The Governor's EO aligns California's GHG reduction targets with those of leading international governments such as the 28-nation European Union, which adopted the same target in October 2014. California is on track to meet or exceed its legislated target of reducing GHG emissions to 1990 levels, as established in the California Global Warming Solutions Act of 2006 (AB 32, summarized above). California's new emission reduction target of 40% below 1990 levels by 2030 will make it possible to reach the ultimate goal of reducing emissions 80 percent below 1990 levels by 2050. This is in line with the scientifically established levels needed in the United States to limit global warming below 2°C, the warming threshold at which there will likely be major climate disruptions such as severe droughts and rising of sea levels. The targets stated in EO B-30-15 have not been adopted by the state legislature.

Senate Bill 32 (SB 32) September 2016. Chapter 249 of the bill codifies the GHG reduction targets established in EO B-30-15 to achieve a mid-range goal of 40 percent below 1990 levels by 2030. SB 32 provides another intermediate target between the 2020 and 2050 targets set in EO S-3-05.

Renewable Energy Portfolio. The Renewable Portfolio Standard (RPS) promotes diversification of the state's electricity supply and decreased reliance on fossil fuel energy sources. Originally adopted in 2002 with the initial requirement that 20% of electricity retail sales must be served by renewable resources by 2017 (referred to as the initial RPS). The goals have been accelerated and increased by EOs S-14-08 and S-21-09 to a goal of 33% by 2020.

The program was accelerated in 2015 with SB 350, which mandated a 50% RPS by 2030. SB 350 includes interim annual RPS targets with three-year compliance periods and requires 65% of RPS procurement to be derived from long-term contracts of 10 or more years. In 2018, SB 100 was signed into law, which again increases the RPS to 60% by 2030 and requires all the state's electricity to come from carbon-free resources by 2045.

In April 2011, the Governor signed SB 2 (1X) codifying California's 33% RPS goal; Section 399.19 requires the California Public Utilities Commission, in consultation with the California Energy Commission, to report to the Legislature on the progress and status of RPS procurement and other benchmarks. The purpose of the RPS, upon full implementation, was to provide 33% of the state's

electricity needs through renewable energy sources. Renewable energy includes (but is not limited to) wind, solar, geothermal, small hydroelectric, biomass, anaerobic digestion, and landfill gas.

The RPS is included in CARB's Scoping Plan list of GHG reduction measures to reduce energy sector emissions. It is designed to accelerate the transformation of the electricity sector through such means as investment in the energy transmission infrastructure and systems to allow integration of large quantities of intermittent wind and solar generation. Increased use of renewables would decrease California's reliance on fossil fuels, thus reducing emissions of GHGs from the electricity sector. In 2008, as part of the Scoping Plan original estimates, CARB estimated that full achievement of the RPS would decrease statewide GHG emissions by 21.3 MMT CO_2e. In 2010, CARB revised this number upwards to 24.0 MMT CO_2e.

4.2.3 Local

4.2.3.1 COUNTY OF LOS ANGELES GENERAL PLAN

The adopted *Los Angeles County General Plan* contains a new Air Resources Element that addresses air quality and GHG emissions. Relevant goals encourage mixed-use development, the use of green building principles, energy and water efficiency, reducing vehicle miles traveled and vehicle trips, and promoting alternative modes of transportation (County of Los Angeles 2022). The Air Quality Element of the County General Plan establishes the following goals and policies applicable to the project pertaining to GHGs:

- Goal AQ3: Implementation of plans and programs to address the impact of climate change.
    - Policy AQ 3.2 - Reduce energy consumption by County operations by 20 percent by 2015.
    - Policy AQ 3.3 - Reduce water consumption by County operations.
    - Policy AQ 3.5 - Encourage energy conservation for new development and municipal operations.
    - Policy AQ 3.6 - Support rooftop solar facilities on new and existing buildings.

4.2.3.2 ENERGY AND ENVIRONMENTAL POLICY

The Countywide Energy and Environmental Policy (2014) provides guidelines for development and enhancement of energy conservation and environmental policies within County departments. The County Energy and Environmental Policy consists of the Energy and Water Efficiency Program and the Sustainable Design Program.

4.2.3.3 GREEN BUILDING STANDARDS CODE (TITLE 31)

The County adopted the Los Angeles County Green Building Standards Code (Title 31), which adopts and incorporates by reference specified provisions of the California Green Building Standards Code (CALGreen Code), which was first adopted in 2009 and is updated every three years. The code sets minimum requirements for sustainable practices for residential and commercial construction projects throughout the state. The purpose of Title 31 is to facilitate sustainability via planning and design; energy efficiency; water efficiency and conservation; material conservation and resource efficiency; and environmental air quality. Title 31 also references County Code Chapter 12.84, which provides low impact development like requirements that address water conservation. CalGreen, part of the California

Building Standards Code, became effective on January 2, 2017. CalGreen mandates green building requirements throughout the state of California. Specific mandatory requirements and elective measures are provided for three categories: 1) low rise residential buildings; 2) non-residential and high-rise residential buildings; and 3) additions and alterations to non-residential and high-rise residential buildings.

4.2.3.4 CITY OF LANCASTER CLIMATE ACTION PLAN 2016

In November 2015, the City staff was tasked with the development of a CAP that would document Lancaster's GHG emissions baseline inventory (2010) and current emissions (2015), document the progress the City has made through its alternative-energy and sustainability programs, and identify projects that would enhance Lancaster and further reduce its GHG emissions. This plan contains GHG emission reduction measures for the categories of transportation, energy, municipal operations, water, waste, the built environment, the community, and land use (City of Lancaster 2016). This CAP is considered a qualified CAP under CEQA Guidelines Section 15183.5.

5 IMPACTS AND MITIGATION MEASURES

5.1 Thresholds of Significance

5.1.1 Air Quality

The project is based on criteria presented in CEQA Appendix G, which stipulates that a project would have a significant impact on air quality if it would:

- Conflict with or obstruct implementation of the applicable air quality plan (Impact AQ-1) or violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under applicable federal or state ambient air quality standards (Impact AQ-2);
- Expose sensitive receptors to substantial pollutant concentrations (Impact AQ-3); or
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people (Impact AQ-4).

Certain air districts (e.g., AVAQMD) have created guidelines and requirements to conduct air quality analysis. AVAQMD's current guidelines and the *California Environmental Quality Act (CEQA) and Federal Conformity Guidelines* (AVAQMD 2016) were followed in this assessment of air quality and GHG emissions impacts for the project.

AVAQMD has established annual and daily GHG emissions thresholds for construction and operation of a proposed project (Table 6).

Table 6: AVAQMD CEQA GHG Thresholds of Significance

Criteria Pollutant	Significance Level	
	Daily Emissions (pounds)	Annual Emissions (tons)
GHGs (CO_2e)	548,000	100,000
CO	548	100

NO_x	137	25
Reactive organic gases (ROG)*	137	25
SO_x	137	25
PM_{10}	82	15
$PM_{2.5}$	65	12

Source: AVAQMD 2016

**Reactive Organic Compounds(ROG) are determined by multiplying the reported Total Organic Gases (TOG) by the Fraction of Reactive Organic Gases (FROG).*

5.1.2 Greenhouse Gases

Based on criteria presented in CEQA Appendix G, a project would have a significant impact on air quality if it would:

- Generate GHG emissions, either directly or indirectly, that may have an adverse effect on the environment (Impact GHG-1), or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs (Impact GHG-2).

Global climate change is a cumulative impact; a project contributes to this potential impact through its incremental contribution combined with the cumulative increase of all other sources of GHGs. There are currently no established thresholds for assessing whether the GHG emissions of a project would be considered a cumulatively considerable contribution to global climate change; however, all reasonable efforts should be made to minimize a project's contribution to global climate change. In addition, while GHG impacts are recognized exclusively as cumulative impacts (California Air Pollution Control Officers Association [CAPCOA] 2008), GHG emissions impacts must also be evaluated at a project level under CEQA.

The CEQA Guidelines do not prescribe specific methodologies for performing an assessment, do not establish specific thresholds of significance, and do not mandate specific mitigation measures. Rather, the CEQA Guidelines emphasize the lead agency's discretion to determine the appropriate methodologies and thresholds of significance consistent with the manner in which other impact areas are handled in CEQA (California National Resource Association 2009). The State of California has not adopted emission-based thresholds for GHG emissions under CEQA. The Governor's Office of Planning and Research Technical Advisory titled *CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act Review* states that

> "public agencies are encouraged but not required to adopt thresholds of significance for environmental impacts. Even in the absence of clearly defined thresholds for GHG emissions, the law requires that such emissions from CEQA projects must be disclosed and mitigated to the extent feasible whenever the lead agency determines that the project contributes to a significant, cumulative climate change impact" (OPR 2008).

Furthermore, the advisory document indicates that

> "in the absence of regulatory standards for GHG emissions or other scientific data to clearly define what constitutes a 'significant impact,' individual lead agencies may undertake a project-by-project analysis, consistent with available guidance and current CEQA practice."

Section 15064.7(c) of the CEQA Guidelines specifies that

> "when adopting thresholds of significance, a lead agency may consider thresholds of significance previously adopted or recommended by other public agencies, or recommended by experts, provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence."

To address Threshold GHG-1, this analysis assesses compliance with applicable laws and regulations, as well as uses the AVAQMD adopted numeric CEQA significance thresholds for GHG emissions for lead agencies to use in assessing GHG impacts. In 2016, the AVAQMD adopted a 548,000 pound per day and 100,000 MT CO_2e per year threshold (AVAQMD 2016).

6 METHODOLOGY

This analysis focuses on the potential change in the air quality environment due to implementation of the project. Air pollution emissions would result from both construction and operation of the project. Specific methodologies used to evaluate these emissions are discussed below.

The project would result in both short-term and long-term emissions of air pollutants associated with construction and operations of the project. Construction emissions would include exhaust from the operation of conventional construction equipment, on-road emissions from employee vehicle trips and vendor/haul truck trips, and fugitive dust as a result of on-site vehicle travel. Operational emissions would include emissions from potential off-site equipment and emissions associated with routine washing of the mirrors.

Construction and operational emissions were estimated using the current version of California Emissions Estimator Model (CalEEMod), version 2022.1 (CAPCOA 2022). CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions associated with both construction and operation of a variety of land use projects. The model utilizes widely accepted federal and state models for emission estimates and default data from sources such as USEPA AP-42 emission factors, CARB vehicle emission models, and studies from California agencies such as the California Energy Commission. The model quantifies direct emissions from construction and operations, as well as indirect emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use.

The model was developed in collaboration with the air districts in California. Default data (e.g., emission factors, trip lengths, meteorology, source inventory, etc.) have been provided by the various California air districts to account for local requirements and conditions.

6.1 Construction Emissions

Construction emissions associated with the project, including emissions associated with the operation of off-road equipment, on road worker and vendor/haul-truck trips, on-site vehicle travel and fugitive dust from material handling activities were calculated using CalEEMod version 2022.1. Emissions modeling included emissions generated during the following activities: site preparation, building of heliostat field and tower, and gravel access road. These construction activities have been conservatively assumed to take place in one phase. Modeling input data was based on this anticipated construction schedule and phasing. Construction equipment and usage required for each phase were obtained using information provided by the Applicant, or derived from similar projects, and default parameters contained in the model for the project area (Los Angeles – Mojave Desert). The construction duration is assumed to be approximately 3 months. Project construction would consist of different activities which would be undertaken in a single

phase, through to the operation of the project. Table 7 presents an estimate of the maximum number of pieces of equipment for the single phase and conservatively assumes equipment will be operating 8 hours per day, 5 days per week for the three-month construction duration.

Table 7: Construction Anticipated Equipment

Phase (Duration)	Equipment Used			Daily Vehicle Trips
	Type	Number	Hrs/day	
Building Phase (65 working days)	Crane	1	8	24 worker one-way trips; 4 vendor one-way trips; 0 haul one-way trips; 0.20 mi. of on-site travel
	Excavator	1	8	
	Forklift	1	8	
	Air compressors	1	8	
	Cement and mortar mixers	1	8	
	Dumpers/Tenders	1	8	
	Rubber-tired dozer	1	8	
	Rubber-tired loader	1	8	
	Concrete/Industrial saws	1	8	
	Skid steer loaders	1	8	
	Rough terrain forklifts	1	8	
Notes: For the parameters that are not provided in the table (e.g., equipment horsepower and load factor) CalEEMod defaults were used.				

6.2 Operational Emissions

The heliostat field would be operational each morning after sunrise and shut down in the evening. Power generation equipment would run based on electricity demand. Within the heliostat field, operations would include routine washing of mirrors. The annual operations are assumed to be as follows:

- Daily employee and routine maintenance activities would not require additional workers.
- Washing would require approximately 20,800 gallons per year of water and was included in the model as outdoor water use.

The operational emissions associated with the project were quantified using CalEEMod version 2022.1. Operational emissions from an on-site aerial lift (four hours per day) and forklift (six hours per day) were calculated using CalEEMod defaults and applicant assumptions based on the proposed operations.

7 IMPACT ANALYSIS

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations.

Impact AQ-1 **Would the project conflict with or obstruct implementation of the applicable air quality plan?**

Less Than Significant Impact. A project is conforming with applicable adopted plans if it complies with the applicable AVAQMD rules and regulations and emission control strategies in the applicable air

quality attainment plans. The project would comply with the applicable rules and regulations, including the use of BACM.

Consistency with air quality plans is typically conducted based on a comparison of project-generated growth in employment, population, and vehicle miles traveled within the region, which is used for development of the emissions inventories contained in the air quality plans. While the project would contribute to energy supply, which is one factor of population growth, the project would not significantly increase employment or growth within the region. Moreover, development of the project would increase the amount of renewable energy and help California meet its RPS.

Furthermore, the thresholds of significance, adopted by the AVAQMD, determine compliance with the goals of attainment plans in the region. As such, emissions below the AVAQMD regional mass daily emissions thresholds presented in Table 6 would not conflict with or obstruct implementation of the applicable air quality plans. The project implementation would generate emissions of criteria air pollutants during construction and operation. The emissions from project construction (Table 8) and operation (Table 9) are below the thresholds of significance; therefore, the project does not conflict with implementation of the AVAQMD applicable AQMPs. The detailed assumptions and calculations, as well as CalEEMod outputs are provided in Appendix A of this report.

Table 8: Unmitigated Construction Emissions Summary

Construction Phase	**Unmitigated Construction Emissions Summary**					
	ROGs	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**
	Pollutant Emission (pounds per day)					
2023	2.81	25.7	27.0	1.71	1.10	0.04
AVAQMD Significance Thresholds	*137*	*137*	*548*	*82*	*65*	*137*
Threshold Exceeded?	*No*	*No*	*No*	*No*	*No*	*No*
	Pollutant Emission (tons per year)					
2023	0.09	0.83	0.88	0.06	0.04	<0.005
AVAQMD Significance Thresholds	*25*	*25*	*100*	*15*	*12*	*25*
Threshold Exceeded?	*No*	*No*	*No*	*No*	*No*	*No*

NA = Not applicable, no threshold

Emissions were quantified using CalEEMod, version 2022.1 using "user defined industrial" land use category and modifying default values where applicable.

Summer model results are presented above.

Model results (summer, winter and annual) and assumptions are provided in Appendix A.

Table 9: Unmitigated Operational Emissions Summary

Operation Phase	**Unmitigated Operation Emissions Summary**					
	Reactive organic gasses	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**
	Pollutant Emission (pounds per day)					
2023	0.09	1.01	1.18	0.04	0.04	<0.005

AVAQMD Significance Thresholds	*137*	*137*	*548*	*82*	*65*	*137*
Threshold Exceeded?	*No*	*No*	*No*	*No*	*No*	*No*
	Pollutant Emission (tons per year)					
2023	0.01	0.13	0.15	0.01	0.01	<0.005
AVAQMD Significance Thresholds	*25*	*25*	*100*	*15*	*12*	*25*
Threshold Exceeded?	*No*	*No*	*No*	*No*	*No*	*No*
NA = Not applicable, no threshold Emissions were quantified using CalEEMod, version 2022.1 using "user defined industrial" land use category and modifying default values where applicable. Summer model results are presented above. Model results (summer, winter and annual) and assumptions are provided in Appendix A.						

The project is planned for approximately 3–5 years during which solar research and technology development will occur.

As presented above, the project would not conflict with or obstruct implementation of the applicable AQMPs. The impact is less than significant, and no mitigation is required; however, per requirements of AVAQMD, any applicable BACM would be implemented during construction and operation of the project.

Impact AQ-2 **Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard?**

Less Than Significant Impact. The project would occur in a region that is in nonattainment for O_3 and PM_{10}. Concurrent construction of other projects in proximity to project activities could result in increased local air quality impacts for the duration of simultaneous construction activities; however, this would be limited to the circumstances of an approved or proposed project occurring in the same timeframe and location as the project. Simultaneous construction activities occurring in proximity to the proposed work sites would also need to comply with AVAQMD rules regarding dust control. Construction related O_3 precursors would not be at a cumulatively considerable level. With implementation of applicable AVAQMD BACM, the project would not result in a cumulatively considerable net increase of any criteria pollutants for which the project region in is in nonattainment. Operational emissions would result from potential on-site off-road equipment and routine cleaning of the mirrors. The associated emission levels (see Table 9) would be below the AVAQMD thresholds, and these emissions would not result in a cumulatively considerable net increase of any criteria pollutant.

Impact AQ-3 **Would the project expose sensitive receptors to substantial pollutant concentrations?**

Less Than Significant Impact. Some population groups, such as children, the elderly, and acutely and chronically ill persons are considered more sensitive to air pollution than others. Sensitive receptor locations typically include residential areas, hospitals, elder-care facilities, rehabilitation centers, daycare centers, and parks. The project is located in an area of Lancaster that is surrounded by both commercial and residential uses.

Implementation of the project would not result in the long-term operation of any emission sources that would adversely affect nearby sensitive receptors. Short-term construction activities (3 months) could

result in temporary increases in pollutant concentrations. The construction-related emissions would be short-term and located at different locations within the project site. The limited duration and limited quantities of construction emissions ensure that no individual receptor would be exposed to substantial pollutant concentrations.

During project operations, emissions would result from the occasional use of on-site off-road equipment (aerial lift and forklift) and routine cleaning of the mirrors that would not expose sensitive receptors to substantial concentrations of air pollutants.

Emissions of all criteria pollutants are below the AVAQMD thresholds and would not have any significant impact. The project's emissions of toxic air pollutants would be minimal and would consist of DPM emissions during construction activities. The employees commuting to the site during project construction or operation would use electric or gasoline-fueled vehicles.

Naturally Occurring Asbestos. Airborne asbestos is classified as a known human carcinogen and was identified by as a TAC by CARB in 1986. The California Geological Survey prepared maps and lists of the naturally occurring asbestos areas within California counties. According to the 2011 report, the project location is not an area of naturally occurring asbestos (Van Gosen and Clinkenbeard 2011).

Impact AQ-4 **Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?**

No Impact. Project construction is short-term, therefore the odors from construction equipment would not affect sensitive receptors. Operation of the project does not include any component with the potential to generate odorous emissions that could affect a substantial number of people. No impact would occur.

Impact GHG-1 **Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?**

Less than Significant Impact. The project-related direct and indirect emissions of GHGs were estimated using the similar methods for quantification of criteria air pollutants (Table 10). Detailed assumptions and calculations, as well as CalEEMod outputs are provided in Appendix A of this report. Construction of the project would result in emission of GHGs from construction equipment and off-site motor vehicle trips carrying workers and materials. Motor vehicles, off-road equipment, and other construction equipment would directly emit CO_2, CH_4, and N_2O due to fuel use and combustion. Motor vehicle fuel combustion emissions in terms of CO_2e are approximately 95% CO_2. CH_4, and N_2O emissions occur at rates of less than 1% of the mass of combustion CO_2 emissions. Other GHGs such as SF_6, HFCs, and PFCs were not included in the construction emission calculations because construction activities would not emit these GHG constituents. Emissions for the single phase and for each month of proposed activity are calculated based on the proposed quantities and types of equipment and activities. Based on the construction activity forecast, emissions would be below threshold levels adopted by the AVAQMD. Total project construction emissions are approximately 4,738 pounds per day and 140 MT CO_2e per year (see Table 10), therefore construction-related GHG emissions would not have a significant impact on the environment, and the impact would be less than significant.

Operations and maintenance of the project would result in low levels of GHG emissions from the on-site off-road equipment and water use during routine cleaning of the mirrors. Total project operations emissions are approximately 189 pounds per day and 22 MT CO_2e per year (see Table 10), which is below threshold levels adopted by AVAQMD, therefore operation-related GHG emissions would not have a significant impact on the environment, and the impact would be less than significant.

Table 10: Greenhouse Gas Emissions Summary

Emissions Source	GHG Emissions (pounds/day)
Construction	4,738
Significance threshold	548,000
Threshold exceeded?	No
Operations	189
Significance threshold	548,000
Threshold exceeded?	No
Emissions Source	**GHG Emissions (MT CO2e/yr)**
Construction	140
Significance threshold [1]	101,605
Threshold exceeded?	No
Operations	22
Significance threshold [1]	101,605
Threshold exceeded?	No

1. 100,000 tons/year = 101,605 MT/yr

Calculations, assumptions and model outputs are provided in Appendix A

Impact GHG-2 **Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs?**

Less Than Significant Impact. Currently, there are no federal, state, or local climate change or GHG emissions regulations that address the GHG emissions project construction other than the local construction GHG thresholds for which the project is consistent. For project operation there are a number of federal, State, and local plans and policies, and GHG emissions reduction strategies that are potentially applicable to the project, either directly or indirectly. The project operation is consistent with the following:

- The project is consistent with the AB 32 Scoping Plan strategies to increase the total amount of renewable energy sources consistent with the goal of the State's RPS.
- The project is consistent with the CARB's emission reduction strategy presented in the Scoping Plan. The 2008 Scoping Plan specifically addresses critical measures directed at emission sources that are included in the cap-and-trade program that are designed to achieve cost-effective emissions reductions while accelerating the necessary transition to a low-carbon economy.

The project would help promote California's GHG policies by creating renewable energy resources (green hydrogen) and would not exceed applicable GHG screening levels. Therefore, the project would not conflict with an applicable plan, policy, or regulation adopted to reduce GHG emissions. Moreover, projects that are consistent with an applicable plan, policy, or regulation adopted to reduce GHG emissions are considered less than significant during construction, operation, and decommission.

7.1 Cumulative

7.1.1 Construction

With respect to the project's construction, air quality emissions and cumulative air basin-wide conditions, the AVAQMD has developed strategies (e.g., AVAQMD Rule 403) to reduce criteria pollutant emissions outlined in the AQMP pursuant to federal CAA mandates. As such, the project would comply with regulatory requirements, including any applicable AVAQMD Rule 403 requirements. In addition, the project would comply with adopted AQMP emission control measures. Per AVAQMD rules and mandates, as well as the CEQA requirement that significant impacts be mitigated to the extent feasible, all construction projects air basin-wide would comply with these same requirements and would also implement all feasible mitigation measures when significant impacts are identified.

According to the AVAQMD, individual construction projects that exceed the AVAQMD's recommended daily threshold for project specific impacts would cause a cumulative considerable increase in emissions for those pollutants for which the air basin is in nonattainment. Construction-related daily emissions at the project site would not exceed AVAQMD significance thresholds. Consequently, the project would not have a cumulative impact due to construction related regional emissions. In terms of localized air quality impacts, construction of the project would have a less than significant cumulative impact.

Similar to the project, the greatest potential for TAC emissions with respect to each related project would generally involve DPM emissions associated with equipment during construction. However, there will be minimal heavy equipment operations because there is no demolition or grading activities as part of the project. According to AVAQMD methodology, health effects from carcinogenic TACs are usually described in terms of individual cancer risk. Individual cancer risk is the likelihood that a person exposed to concentrations of TACs over a 70-year lifetime will contract cancer, based on the use of standard risk assessment methodology. Construction activities with respect to each related project would not result in a long-term (i.e., 70-year) substantial source of TAC emissions. It is therefore not required or meaningful to evaluate long term cancer impacts from construction activities that occur over relatively short durations. As such, cumulative toxic emission impacts during construction would be less than significant.

7.1.2 Operation

According to the AVAQMD, if an individual project results in, and air emissions of criteria pollutants exceed the AVAQMD's recommended daily threshold for project specific impacts, then the project would also result in a cumulatively considerable net increase of these criteria pollutants. Operational emissions from the project would not exceed any of the AVAQMD's regional or localized significance thresholds at project build out. Therefore, the emissions of nonattainment pollutants and precursors generated by project operation would not be cumulatively considerable.

The project operation would not represent a substantial source of TAC emissions, which are more typically associated with large scale industrial, manufacturing, and transportation hub facilities. The project and related projects would be consistent with the recommended screening level sighting distances for TAC sources, as set forth in CARB's Land Use Guidelines (2005), and the project and related projects would not result in a cumulative impact requiring further evaluation. Pursuant to California Assembly Bill 1807, which directs CARB to identify substances such as TAC and adopt Airborne Toxic Control Measures (ATCMs) to control such substances, the AVAQMD has adopted numerous rules (primarily in Regulation XIV) that specifically addressed TAC emissions. These AVAQMD rules have resulted in and will continue to result in substantial air basin-wide TAC emissions reductions. As such, cumulative TAC

emissions during long term operations would be less than significant. In addition, the project would not result in any substantial source of TACs that have been identified in CARB's Land Use Guidelines and, thus would not result in a cumulatively considerable impact or a cumulatively significant impact.

In conclusion, during construction, the project would not have a cumulatively considerable impact to regional,, localized, or TAC emissions. During operation, the project would not result in cumulative impact air quality as the project's contribution to regional, localized, and TAC emissions would not be cumulatively considerable.

7.1.3 Greenhouse Gases

As explained previously, the analysis of a project's GHG emissions is inherently a cumulative impacts analysis because climate change is a global problem and the emissions from any single project alone would be negligible. Accordingly, the analysis above took into the account that the potential for the project to contribute to the cumulative impact of global climate change. Estimated annual project-generated GHG emissions as a result of project construction and operations would not exceed the AVAQMD daily or annual thresholds (see Table 10). Therefore, the project's GHG contribution would not be cumulatively considerable and is less than significant. In addition, the project would comply with the Regional Transportation Plan/Sustainable Communities Strategies (RTP/SCS) regulatory requirements, CARB's Scoping Plan, and any local or regional plans, all of which emphasize improving energy conservation and energy efficiency, increasing renewable generation energy generation, and changing transportation and land use patterns to reduce auto dependence. For these reasons the project's cumulative contribution to global climate change is less than significant period.

8 LITERATURE CITED

Antelope Valley Air Quality Management District (AVAQMD). 2010. Rule 403 Fugitive Dust. Available at: avaqmd.ca.gov/files/14c64d1ae/AV403.pdf. Accessed August 2022.

———. 2013. Rule 1113 Architectural Coatings. Available at: avaqmd.ca.gov/files/977cf20dc/AV1113.pdf. Accessed August 2022.

———. 2016. *Antelope Valley AQMD California Environmental Quality Act (CEQA) and Federal Conformity Guidelines*. Available at: avaqmd.ca.gov/files/818bd8682/AVCEQA2016+Updated+Contact+Info.pdf. Accessed August 2022.

———. 2017. *AVAQMD Federal 75 ppb Ozone Attainment Plan (Western Mojave Desert Nonattainment Area)*. Available at: https://avaqmd.ca.gov/files/de07ac191/AVAQMD+2016+75ppb+Final+Ozone+Attainment+Plan.pdf. Accessed August 2022.

———2022a. Antelope Valley AQMD Ambient Air Monitoring. Available at: https://avaqmd.ca.gov/ambient-air-monitoring. Accessed August 2022.

———2022b. Antelope Valley AQMD Attainment Status. Available at: avaqmd.ca.gov/files/e0986ab83/AVAQMD+2017+Attainment+Status+Table.pdf. Accessed August 2022.

California Air Pollution Control Officers Association (CAPCOA). 2008. *CEQA and Climate Change: Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act*. Available at: https://www.placer.ca.gov/DocumentCenter/View/8483/Appendix-B---Attachments-to-the-Center-for-Biological-Diversity-Comment-Letter---Pages-202-through-302-PDF. Accessed August 2022.

———. 2022. California Emissions Estimator Model (CalEEMod). Version 2022.1. Available at: http://www.caleemod.com/. Accessed August 2022.

Berkley Lab Electricity Markets and Policy. 2021. Renewable Portfolio Standards. Available at: https://emp.lbl.gov/projects/renewables-portfolio. Accessed August 2021.

California Air Resources Board (CARB). 1998. *Report to the Air Resources Board on the Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant, Part A Exposure Assessment (as approved by the Scientific Review Panel).* Available at: https://ww2.arb.ca.gov/sites/default/files/classic/toxics/dieseltac/de-fnds.htm. Accessed August 2022.

———. 2005. Air Quality and Land Use Handbook. Available at: https://ww3.arb.ca.gov/ch/landuse.htm. Accessed August 2022. ———. 2011.

CARB's 2008 *Climate Change Scoping Plan: A Framework for Change. Accessed at: https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2008-scoping-plan-documents. Accessed August 2022.*

———. 2011. CARB Identified Toxic Air Contaminants. Available at: https://ww2.arb.ca.gov/resources/documents/carb-identified-toxic-air-contaminants. Accessed August 2022.

———. 2016. Ambient Air Quality Standards. Available online at: https://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed August 2022.

———. 2018. California Greenhouse Gas Emission Inventory – 2018 Edition: https://ww3.arb.ca.gov/cc/inventory/data/data.htm. Accessed August 2022.

———. 2022a. iADAM: Air Quality Data Statistics. Available online: https://www.arb.ca.gov/adam/. Accessed August 2022.

———. 2022b. GHG 1990 Emissions Level & 2020 Limit. Available at: https://ww2.arb.ca.gov/ghg-2020-limit. Accessed August 2022.

———. 2022c. Overview: Diesel Exhaust and Health. Available at: https://www.arb.ca.gov/research/diesel/diesel-health.htm. Accessed August 2022.

———. 2022d. Greenhouse Gas Descriptions Sources. Available at: https://ww2.arb.ca.gov/ghg-descriptions-sources. Accessed August 2022.

California Environmental Protection Agency. 2022. Climate Action Team Assessment Report. Available at: https://calepa.ca.gov/climate-action/. Accessed August 2022.

California National Resource Association. 2009. *2009 California Climate Adaptation Strategy*. Available at: https://resources.ca.gov/CNRALegacyFiles/docs/climate/Statewide_Adaptation_Strategy.pdf. Accessed August 2022.

City of Lancaster. 2009. General Plan 2030. Available at: https://www.cityoflancasterca.org/our-city/departments-services/development-services/planning/general-plan-2030. Accessed August 2022.

———. 2016. Draft Climate Action Plan. Available at: www.cityoflancasterca.org/Home/ShowDocument?id=32356. Accessed August 2022.

County of Los Angeles. 2022. Los Angeles County General Plan 2035. Available at: https://planning.lacounty.gov/generalplan/generalplan. Accessed August 2022.Forster, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn, G. Raga, M. Schulz and R. Van Dorland. 2007. Changes in Atmospheric Constituents and in Radiative Forcing. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller, Table 2.14, pp. 212. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Accessed August 2022.

Governor's Office of Planning and Research (OPR). 2008. Technical Advisory. *CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review.* Available at: https://opr.ca.gov/docs/june08-ceqa.pdf. Accessed August 2022.

———. 2018. CEQA Guidelines. Available at: https://www.opr.ca.gov/ceqa/guidelines/. Accessed August 2022.

National Aeronautics and Space Administration. 2021. Scientific Consensus: Earth's Climate is Warming. Available at: https://climate.nasa.gov/scientific-consensus/?mod=article_inline. Accessed August 2022.

NOAA's National Centers for Environmental Information. 2022. Local Climatological Data for Lancaster CA. Available at: https://www.ncdc.noaa.gov/cdo-web/search. Accessed August 2022.

Office of Energy Efficiency and Renewable Energy. 2014. Los Angeles County Countywide Energy and Environmental Policy. Available at: https://www.energy.gov/eere/better-buildings-neighborhood-program/los-angeles-county-california. Accessed August 2022.

United Nations Environment Programme. 1987. The Montreal Protocol on Substances that Deplete the Ozone Layer. Available at: https://ozone.unep.org/treaties/montreal-protocol. Accessed August 2022.

United States Environmental Protection Agency (USEPA). 2022a. Nonattainment Areas for Criteria Pollutants (Green Book). Available at: https://www.epa.gov/green-book.

———. 2022b. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2020*. EPA 430-R-22-003. Available at: https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2020. Accessed August 2022.

———. 2022c. Overview of Greenhouse Gases. Available at: https://www.epa.gov/ghgemissions/overview-greenhouse-gases. Accessed August 2022.

Van Gosen, B.S., and J.P. Clinkenbeard. 2011. *Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California, 2011*. Open-File Report 2011-1188. Denver, Colorado: U.S. Geological Survey and Sacramento: California Geological Survey. Available at: https://pubs.usgs.gov/of/2011/1188/. Accessed August 2022.

APPENDIX A

CalEEMod Results

Air Pollutant & GHG Emission Calculations