3.3 AIR QUALITY AND GREENHOUSE GASES

This section provides an analysis of air quality and climate change impacts resulting from the proposed project. It summarizes the overall regulatory framework for air quality management and greenhouse gas (GHG) emissions/climate change in California and the region, describes existing air quality conditions in the project vicinity, and identifies sensitive land uses. The section identifies environmental impacts related to air quality and GHG emissions, as well as mitigation measures to reduce or eliminate potential impacts.

3.3.1 Existing Conditions

3.3.1.1 Regulatory Setting

The agencies with regulatory authority over air emissions in Lancaster are the U.S. Environmental Protection Agency (EPA), the California Air Resources Board (ARB), and the AVAQMD. The EPA has established federal air quality standards for which ARB and AVAQMD have primary implementation responsibility. The ARB and AVAQMD are also responsible for ensuring that State air quality standards are met. The AVAQMD is responsible for ensuring that State air quality standards are met within the region.

Federal

Clean Air Act and National Ambient Air Quality Standards

The federal Clean Air Act (CAA), promulgated in 1963 and amended several times thereafter, including the 1990 Clean Air Act amendments (CAAA), establishes the framework for modern air pollution control. The CAA directs the EPA to establish national ambient air quality standards (NAAQS) for six criteria pollutants: ozone (O_3), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and particulate matter (PM). 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. Table 3.3-1 summarizes the NAAQS and the California Ambient Air Quality Standards (CAAQS).

Table 3.3-1: National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards (1,3)	National Standards (2)	
			Primary (3,4)	Secondary (3,5)
Ozone	1 hour	0.09 ppm	N/A	N/A
		(180 ug/m^3)	N/A	N/A
	8 hour	0.07 ppm	0.075 ppm	0.075 ppm
		(137 ug/m^3)	(147 ug/m^3)	(147 ug/m^3)
Carbon monoxide	8 hour	9 ppm	9 ppm	N/A
		(10 mg/m^3)	(10 mg/m^3)	N/A
	1 hour	20 ppm	35 ppm	N/A
		(23 mg/m^3)	(40 mg/m^3)	N/A
Nitrogen dioxide	Annual Average	0.03 ppm	0.053 ppm	0.053 ppm
		(57 mg/m^3)	(100 ug/m^3)	(100 ug/m^3)
	1 hour	0.18 ppm	N/A	N/A

Pollutant	Averaging Time	California Standards (1,3)	National Standards (2)	
			Primary (3,4)	Secondary (3,5)
		(339 mg/m^3)	N/A	N/A
Sulfur dioxide	Annual Average	N/A	80 ug/m^3	N/A
		N/A	(0.03 ppm)	N/A
	24 hour	0.04 ppm	0.14 ppm	N/A
		(105 mg/m^3)	(365 ug/m^3)	N/A
	3 hour	N/A	N/A	0.5 ppm
		N/A	N/A	1,300 ug/m^3
	1 hour	0.25 ppm	N/A	N/A
		(655 ug/m^3)	N/A	N/A
PM_{10}	Annual	20 ug/m^3	N/A	N/A
	24 hour	50 ug/m^3	150 ug/m^3	150 ug/m^3
$PM_{2.5}$	Annual	12 ug/m^3	15 ug/m^3	15 ug/m^3
	24 hour	N/A	35 ug/m^3	35 ug/m^3
Sulfates	24 hour	25 ug/m^3	N/A	N/A
Lead(6, 7)	30 day	1.5 ug/m^3	N/A	N/A
	Quarterly	N/A	1.5 ug/m^3	1.5 ug/m^3
	Rolling 3 Month Average(7)	N/A	0.15 ug/m^3	0.15 ug/m^3
Hydrogen Sulfide	1 hour	0.03 ppm	N/A	N/A
		(42 ug/m^3)	N/A	N/A
Vinyl Chloride(6)	24 hour	0.010 ppm	N/A	N/A
		(26 ug/m^3)	N/A	N/A
Visibility	1 observation	Extinction coefficient of 0.23 per kilometer; visibility of ten miles or more due to particles when relative humidity is less than 70 percent.	N/A	N/A

Notes:
ug/m^3 = micrograms per cubic meter
mg/m3 = milligrams per cubic meter

(1): California standards for ozone, carbon monoxide, sulfur dioxide (1 and 24 hour), nitrogen dioxide, particulate matter (PM) 10 and PM 2.5 and visibility reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded.

(2): National standards, other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean, are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8 hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM 10, the 24 hour standard is attained when the expected number of days per calendar year with a 24 hour average concentration above 150 µg/m^3 is equal to or less than one. For PM 2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

(3): Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based on a reference temperature of 250^C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 250^C and a reference pressure of 760 torr; ppm in this table refer to parts per million by volume (ppmv), or micromoles of pollutant per mole of gas.

(4): National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

(5): National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

(6): The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation

Pollutant	Averaging Time	California Standards (1,3)	National Standards (2)	
			Primary (3,4)	Secondary (3,5)
of control measures at levels below the ambient concentrations specified for these pollutants. (7): National lead standard, rolling three-month average: final rule signed October 15, 2008. Source: CARB 2014a.				

The CAA requires states to submit a state implementation plan (SIP) for areas in nonattainment for NAAQS. The SIP, which is reviewed and approved by EPA, must demonstrate how the NAAQS would be achieved. Failing to submit a plan or secure approval can lead to denial of federal funding and permits. In cases where the SIP fails to demonstrate achievement of the standards, EPA is directed to prepare a federal implementation plan.

Clean Air Non-Road Diesel Rule

To reduce emissions from off-road diesel equipment, the EPA established a series of increasingly strict emission standards for new engines. Locomotives and marine vessels are exempt from this rule. Manufacturers of off-road diesel engines are required to produce engines meeting certain emission standards based on the model year the engine was manufactured according to the following compliance schedule:

- Tier 1 standards were phased in from 1996 to 2000 (year of manufacture), depending on the engine horsepower category.
- Tier 2 standards were phased in from 2001 to 2006.
- Tier 3 standards were phased in from 2006 to 2008.
- Tier 4 standards, which require add-on emissions-control equipment to attain them, are currently being phased in, from 2008 to 2015.

Federal Climate Change Policy

Although there is currently no overarching federal law related to climate change or the reduction of GHGs, the EPA is developing regulations under the CAA that may be adopted pursuant to the EPA's authority under the CAA within the next 2 years. Foremost amongst recent developments have been the settlement agreements between the EPA, several states, and nongovernmental organizations (NGOs) to address GHG emissions from electric generating units and refineries; the U.S. Supreme Court's decision in Massachusetts v. EPA; and EPA's "Endangerment Finding," "Cause or Contribute Finding," and "Mandatory Reporting Rule." On Sept. 20, 2013, the EPA issued a proposal to limit carbon pollution from new power plants. The EPA 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 likely until at least 2016. In Coalition for Responsible Regulation, Inc., et al. v. EPA, the United States Court of Appeals upheld the EPA's authority to regulate GHG emissions under CAA.

Environmental Protection Agency's Endangerment and Cause and Contribute Findings (2009)

On December 7, 2009, the EPA signed the Endangerment and Cause or Contribute Findings for GHG sunder Section 202(a) of the CAA. Under the Endangerment Finding, EPA finds that the current and projected concentrations of the six key well-mixed GHGs; carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and hydrofluorocarbons (HFCs); in the atmosphere threaten the public health and welfare of current and future generations. Under the Cause or Contribute Finding, the EPA finds that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare.

These findings do not themselves impose any requirements on industry or other entities. However, this action is a prerequisite to finalizing the EPA's proposed new corporate average fuel economy standards for light-duty vehicles, which EPA proposed in a joint proposal including the California Department of Transportation's (Caltrans') proposed corporate average fuel-economy standards. EPA finalized the light-duty vehicle emission standards (2012–2016 model years) in May 2010 and the heavy-duty vehicle emission standards (2014–2018 model years) in August 2011.

Environmental Protection Agency's Regulation of Greenhouse Gas Emissions under the Clean Air Act (2010–2012, ongoing)

Under the authority of the CAA, the EPA is beginning to regulate GHG emissions starting with large stationary sources. In 2010, the EPA set GHG thresholds to define when permits under the New Source Review Prevention of Significant Deterioration (PSD) standard and Title V Operating Permit programs are required for new and existing industrial facilities. In 2012, EPA proposed a carbon pollution standard for new power plants.

State

California Clean Air Act and California Ambient Air Quality Standards

In 1988, the State legislature adopted the CCAA, which established a statewide air pollution control program. Unlike the federal CAA, the CCAA does not set precise attainment deadlines. Instead, the CCAA requires all air districts in the State to endeavor to meet the CAAQS by the earliest practical date. Each air district's clean air plan is specifically designed to attain the standards and must be designed to achieve an annual 5% reduction in district-wide emissions of each nonattainment pollutant or its precursors. When an air district is unable to achieve a 5% annual reduction, the adoption of all feasible measures on an expeditious schedule is acceptable as an alternative strategy (Health and Safety Code Section 40914[b][2]). CAAQS are generally more stringent than NAAQS and incorporate additional standards for sulfates (SO_4), hydrogen sulfide (H_2S), vinyl chloride (C_2H_3Cl), and visibility-reducing particles (Table 3.3-1).

The ARB 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 EPA has delegated authority to prepare SIPs to ARB, which in turn, has delegated that authority to individual air districts. The ARB traditionally has established state air quality standards; maintains oversight authority in air quality planning; develops programs for

reducing emissions from motor vehicles; develops air emission inventories; collects air quality and meteorological data; and approves SIPs.

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.

Statewide Truck and Bus Regulation

Originally adopted in 2005, the on-road truck and bus regulation requires heavy trucks to be retrofitted with PM filters. The regulation applies to privately and federally-owned diesel fueled trucks with a gross vehicle weight rating (GWR) greater than 14,000 pounds. Compliance with the regulation can be reached through one of two paths: (1) vehicle retrofits according to engine year or (2) a phase-in schedule. Compliance paths ensure that by January 2023 nearly all trucks and buses will have 2010 model year engines or newer.

State Tailpipe Emission Standards

To reduce emissions from off-road diesel equipment, on-road diesel trucks, and harbor craft, the ARB established a series of increasingly strict emission standards for new engines. New construction equipment used for the proposed project, including heavy duty trucks and off-road construction equipment will be required to comply with the standards.

Toxic Air Containment Regulation

California regulates toxic air containments (TACs) primarily through the Tanner Air Toxics Act (AB 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). In the early 1980s, the ARB established a statewide comprehensive air toxics program to reduce exposure to air toxics. The Toxic Air Contaminant Identification and Control Act (AB 1807) created California's program to reduce exposure to air toxics. The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588) supplements 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.

In August 1998, ARB identified diesel particulate matter (DPM) emissions from diesel-fueled engines as a TAC. In September 2000, ARB approved a comprehensive diesel risk reduction plan to reduce emissions from both new and existing diesel fueled engines and vehicles (ARB 2000). The goal of the plan is to reduce diesel PM_{10} (inhalable particulate matter) emissions and the associated health risk by 75% in 2010 and by 85% by 2020. The plan identifies 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.). The ARB will implement the plan over the next several years. Because the ARB measures are enacted prior to construction, the proposed project would be required to comply with applicable diesel control measures.

The Tanner Act sets forth a formal procedure for the ARB to designate substances as TACs. The procedure entails research, public participation, and scientific peer review before the ARB designates a substance as a TAC. To date, the ARB has identified 21 TACs and has also adopted EPA's list of hazardous air pollutants (HAPs) as TACs. In August 1998, DPM was added to the ARB list of TACs (ARB1998).

The ARB has adopted several regulations that will reduce diesel emissions from vehicles and engines throughout California. For example, the ARB adopted an idling regulation for on-road diesel fueled commercial vehicles in July 2004 and updated it in October 2005. The regulation applies to public and privately owned trucks with a GWR greater than 10,000 pounds. Vehicles subject to the regulation are prohibited from idling for more than 5 minutes in any one location. The ARB also adopted a regulation applicable to the operation of diesel powered construction and mining vehicles. Fleet owners are subject to retrofit or accelerated replacement/repower requirements. The regulation also imposes a 5-minute idling limitation on owners, operators, renters or lessees of off-road diesel vehicles. In some cases, the PM reduction strategies reduce smog-forming emissions such as nitrogen oxides (NO_X). The ARB continues to establish new programs and regulations for the control of TACs, including DPMs, as appropriate.

California Climate Change Policy

Executive Order S-3-05: The goal of this Executive Order is to reduce California's GHG emissions to (1) 2000 levels by 2010, (2) 1990 levels by 2020, and (3) 80% below the 1990 levels by 2050. This only directs state agency action, and does not apply directly to the City. In 2006, this goal was further reinforced with the passage of AB 32. Statewide GHG emissions generated in 2010 were 450 million metric tons CO2e which was a reduction from the 2000 levels of 463 million metric tons CO2e accomplishing the first goal.

AB 32: The Global Warming Solutions Act of 2006 sets the same overall GHG emissions reduction goals outlined in Executive Order S-3-05 while further mandating that the ARB create a plan that includes market mechanisms and implements rules to achieve "real, quantifiable, cost-effective reductions of GHG." The Scoping Plan was adopted by the ARB December 12, 2008. In August 2011, the initial Scoping Plan was re-approved by the ARB in order to satisfy environmental review requirements. Governor's Executive Order S-20-06 further directs State agencies to begin implementing AB 32, including the recommendations made by the State's Climate Action Team.

Executive Order S-01-07: Governor Schwarzenegger set forth the low-carbon fuel standard for California. Under this executive order, the carbon intensity of California's transportation fuels is to be reduced by at least 10% by 2020.

Senate Bill (SB) 97: Required the Governor's Office of Planning and Research (OPR) to develop amendments to the State CEQA Guidelines for addressing GHG emissions. The amendments became effective on March 18, 2010.

AB 1493—Pavley Rules (2002, amendments 2009)/Advanced Clean Cars (2011): Known as Pavley I, the standards set forth in AB 1493 were the nation's first GHG standards for automobiles. AB 1493 required the ARB to adopt vehicle standards that would lower GHG emissions from new light-duty autos to the maximum extent feasible beginning in 2009. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the 2009

model year. In June 2009, the EPA administrator granted a CAA waiver of preemption to California. This waiver allowed California to implement its own GHG emission standards for motor vehicles beginning with model year 2009. Additional strengthening of the Pavley standards (referred to previously as Pavley II, now referred to as the Advanced Clean Cars measure) has been proposed for vehicles built during model years 2017 through 2020. Together, the two standards are expected to increase average fuel economy to roughly 43 mpg by 2020 and reduce GHG emissions from the transportation sector in California by approximately 14%.

Renewable Energy Standard/Renewable Portfolio Standard (2002/2006/2011): SB 1078 (2002) and SB 107 (2006) created the Renewable Energy Standard (RES) program, which required electricity companies to increase their procurement of eligible renewable energy resources by at least 1% of their retail sales annually, until reaching 20% by 2010. SB 2X 1 (2011) requires a Renewable Portfolio Standard (RPS; functionally the same thing as the RES) of 33% to be implemented by 2020.

Local

City of Lancaster General Plan 2030

Local jurisdictions have the authority and responsibility to reduce air pollution through their policies, codes, and land use planning. The City of Lancaster assesses air quality impacts of new development projects, requires mitigation of potentially significant air quality impacts, and ensures implementation of such mitigation. The City of Lancaster Municipal Code contains provisions relevant to maintaining the quality of air for the area. There is a prohibition against disturbing surface or subsurface soils, such that the dust would contribute to dust emissions (Section 8.16.030).

The City of Lancaster's General Plan 2030 includes a goal of protecting the valley's clean air, unique natural environment, and pristine mountain views. To protect air quality in Lancaster, the General Plan presents an Air Quality Program. The Air Quality program focuses to minimize vehicular travel through efficient land uses, implement energy conservation programs, reduce air pollution emissions to protect sensitive receptors, reduce fugitive dust from construction activities, and to increase public awareness of air quality issues.

In addition to the above, the City's General Plan has the following objectives and policies related to air quality.

Objective 3.3: Preserve acceptable air quality by striving to attain and maintain national, state and local air quality standards.

Policy 3.3.1: Minimize the amount of vehicular miles traveled.

Policy 3.3.2: Facilitate the development and use of public transportation and travel modes such as bicycle riding and walking.

Policy 3.3.3: Minimize air pollutant emissions generated by new and existing development.

Policy 3.3.4: Protect sensitive uses such as homes, schools and medical facilities, from the impacts of air pollution.

Policy 3.3.5: Cooperate with the AVAQMD and other agencies to protect air quality in the Antelope Valley.

Antelope Valley Air Quality Management District

The AVAQMD has jurisdiction over the northern, desert portion of Los Angeles County. This region includes the incorporated cities of Lancaster and Palmdale, Air Force Plant 42, and the southern portion of Edwards Air Force Base. The Kern County-Los Angeles County boundary forms the northern boundary of the AVAQMD; the San Bernardino-Los Angeles County boundary forms the eastern boundary.

The AVAQMD has prepared CEQA and Federal Conformity guidelines to provide direction on the preferred analysis approach in preparing environmental analysis or document review. The guidelines characterize the topography and climate of the Basin, defines cumulative impacts, and provide emission thresholds for construction and operation.

The AVAQMD adopted the Ozone Attainment Plan in 2004 to develop the methods and reduction measures to ensure applicable ozone attainment goals and standards are met for the area. The attainment plan focuses on pollutants including NO_X and VOCs.

The AVAQMD established a program of rules and regulations directed at attainment of state and national air quality standards. All development projects within the AVAQMD are required to comply with existing rules as they apply to each specific project. The proposed project may be subject, but not limited to the following district rules:

- Rule 401 – Visible Emissions
- Rule 402 – Nuisance.
- Rule 403 – Fugitive Dust.
- Rule 431.2 - Sulfur Content of Liquid Fuels.
- Rule 2100 - Registration of Portable Equipment.

3.3.2 Environmental Setting

Regional Topography, Meteorology, and Climate

The project site is located within the boundaries of in the Mojave Desert Air Basin (MDAB). The mountain ranges bordering the air basin near the project site influence wind direction and speed and atmospheric inversion layers in the Antelope Valley. These mountain ranges channel winds through the valley, affecting both the climate and dispersion of air pollutants.

Temperature inversions, when the upper air is warmer than the air beneath it, occur frequently in the valley. The inversions trap pollutant emissions near the earth's surface and prevent upward dispersal to the atmosphere. Inversions occur frequently throughout the year in the Antelope Valley, though they are more prevalent and of a greater magnitude in late summer and fall.

Air Pollutants of Concern

The federal NAAQS and the state CAAQS are established for six criteria pollutants: ozone, CO, Pb, NO_2, SO_2, and PM. The following section discusses the criteria pollutants, as well as additional air pollutants of concern, TACs and DPM.

Ozone and NO_2 are regional pollutants because they (or their precursors) affect air quality on a regional scale; NO_2 reacts photochemically with reactive organic gases (ROGs) to form ozone and this reaction occurs at some distance downwind of the source of pollutants. Pollutants such as CO, SO_2, and Pb are local pollutants that tend to accumulate in the air locally. PM is a local as well as a regional pollutant.

The Division Street monitoring station, located at 43301 Division Street, is one of the stations in the MDAB and is located within the City of Lancaster. The Division Street monitoring station currently provides air quality data within the City of Lancaster. Emissions have been provided for CO, O_3, nitrogen oxides NO_X, and particulate matter less than or equal to 10 and 2.5 microns in aerodynamic diameter (PM_{10}, and $PM_{2.5}$, respectively). The primary pollutants of concern in the study area are ozone (including NO_X), and PM. Principal characteristics surrounding these pollutants are discussed below. TACs are also discussed, although no air quality standards exist for these pollutants.

Ozone

Ozone is a respiratory irritant that can cause severe ear, nose, and throat irritation and increase susceptibility to respiratory infections. It is also an oxidant that can cause extensive damage to plants through leaf discoloration and cell damage. It can cause substantial damage to other materials as well, such as synthetic rubber and textiles.

Ozone is not emitted directly into the air but is formed by a photochemical reaction in the atmosphere. Ozone precursors, ROG and NO_X, react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem. ROG and NO_X are mainly emitted by mobile sources and stationary combustion equipment.

Hydrocarbons are organic gases that are made up of hydrogen and carbon atoms. There are several subsets of organic gases, including ROGs and VOCs. ROGs are defined by State rules and regulations; VOCs are defined by federal rules and regulations. For the purposes of this assessment, hydrocarbons are classified and referred to as ROGs. Both ROGs and VOCs are emitted from the incomplete combustion of hydrocarbons or other carbon based fuels or as a product of chemical processes. The major sources of hydrocarbons are combustion engine exhaust, oil refineries, and oil fueled power plants. Other common sources are petroleum fuels, solvents, dry-cleaning solutions, and paint (through evaporation).

The health effects of hydrocarbons result from the formation of ozone. High levels of hydrocarbons in the atmosphere can interfere with oxygen intake by reducing the amount of available oxygen though displacement. Carcinogenic forms of hydrocarbons are considered TACs. There are no separate health standards for ROGs, although some are also toxic; for example, benzene is both a ROG and a carcinogen.

Nitrogen Oxides

Nitrogen oxides are a family of highly reactive gases that are a primary precursor to the formation of ground-level ozone and react in the atmosphere to form acid rain. NO_2, often used interchangeably with NO_X, is a brownish, highly reactive gas that is present in all urban environments. The major human sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2 (EPA 2013a). The combined emissions of NO and NO_2 are referred to as NO_X and reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with ozone, the NO_2 concentration in a particular geographical area may not be representative of local NO_X emission sources.

Inhalation is the most common route of exposure to NO_2. Because NO_2 has relatively low solubility in water, the principal site of toxicity is in the lower respiratory tract. The severity of the adverse health effects primarily depends on the concentration inhaled rather than the duration of exposure. An individual may experience a variety of acute symptoms, such as coughing, difficulty breathing, vomiting, headache, and eye irritation during or shortly after exposure. After a period of approximately 4 to 12 hours, an exposed individual may experience chemical pneumonitis or pulmonary edema with breathing abnormalities, cough, cyanosis, chest pain, and rapid heartbeat. Severe symptomatic NO_2 intoxication after acute exposure has been linked to prolonged respiratory impairment, with such symptoms as emphysema, bronchitis, and aggravating existing heart disease (EPA 2013b).

Carbon Monoxide

Carbon monoxide, a colorless and odorless gas, interferes with the transfer of oxygen to the brain. It can cause dizziness and fatigue and can impair central nervous system functions. CO is emitted almost exclusively from the incomplete combustion of fossil fuels. In urban areas, motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and trains emit CO. Automobile exhaust is responsible for most of the CO in urban areas. CO is a nonreactive air pollutant that dissipates relatively quickly, so ambient CO concentrations generally follows the spatial and temporal distributions of vehicular traffic. CO concentrations are influenced by local meteorological conditions; primarily wind speed, topography, and atmospheric stability. CO from motor vehicle exhaust can become locally concentrated when surface- based temperature inversions are combined with calm atmospheric conditions, a typical situation at dusk in urban areas between November and February. These locally concentrated peaks in CO are referred to as CO "hotspots." Because motor vehicles are the dominant source of CO emissions, CO hotspots are normally located near roads and freeways with high traffic volume.

Particulate Matter

Particulate matter pollution consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. PM also forms when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere. Particulate matter less than 10 microns in diameter, about 1/7th the thickness of a human hair, is referred to as PM_{10}. Particulate matter that is 2.5 microns or less in diameter, roughly 1/28th the diameter of a human hair, is referred to as $PM_{2.5}$. Major sources of PM_{10} include motor vehicles; wood burning

stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. $PM_{2.5}$ results from fuel combustion (from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, PM_{10} and $PM_{2.5}$ can be formed in the atmosphere from gases such as SO_2, NO_X, and VOCs.

PM_{10} and $PM_{2.5}$ pose a greater health risk than larger-size particles. When inhaled, these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. PM_{10} and $PM_{2.5}$ can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. Very small particles of substances, such as lead, SO_4, and nitrates, can cause lung damage directly. These substances can be absorbed into the blood stream and cause damage elsewhere in the body; they can also transport absorbed gases such as chlorides or ammonium into the lungs and cause injury. Whereas particles 2.5 to 10 microns in diameter tend to collect in the upper portion of the respiratory system, particles 2.5 microns or less are so tiny that they can penetrate deeper into the lungs and damage lung tissues. Suspended particulates also damage and discolor surfaces on which they settle, and contribute to haze and reduce regional visibility.

Toxic Air Contaminants

Although NAAQS and CAAQS exist for criteria pollutants, no ambient standards exist 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 ARB 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 (OEHHA). Examples of TAC sources include industrial processes, dry cleaners, gasoline stations, paint and solvent operations, and fossil fuel combustion sources.

Sulfur Oxides

Sulfur oxides are any of several compounds of sulfur and oxygen, of which the most relevant to air quality is SO_2. SO_2 is a respiratory irritant that causes the bronchioles to constrict with inhalation at 5 parts per million (ppm) or more. On contact with the moist mucous membranes, SO_2 produces sulfurous acid, which is a direct irritant. Concentration rather than duration of the exposure is an important determinant of respiratory effects. Exposure to high SO_2 concentrations may result in edema of the lungs or glottis and respiratory paralysis. SO_2 is produced by coal and oil combustion and such stationary sources as steel mills, refineries, and pulp and paper mills.

Lead

Lead is a natural metal constituent of air, water, and the biosphere; it is neither created nor destroyed in the environment, so it persists forever. Lead was used several decades ago to increase the octane rating in automotive fuel; therefore, gasoline-powered automobile engines were a major source of airborne lead. Since the use of leaded fuel has been phased out, the

ambient concentrations of lead have dropped dramatically. Short-term exposure to high levels of lead can cause vomiting, diarrhea, convulsions, coma, or even death. However, even small amounts of lead can be harmful, especially to infants, young children, and pregnant women. Lead exposure is most serious for young children because they absorb lead more easily than adults and are more susceptible to its harmful effects. Even low-level exposure may harm the intellectual development, behavior, size, and hearing of infants. During pregnancy, especially in the last trimester, lead can affect the fetus. Female workers exposed to high levels of lead have more miscarriages and stillbirths.

Symptoms of long-term exposure to lower lead levels may be less noticeable but are still serious. Anemia is common, and damage to the nervous system may cause impaired mental function. Other symptoms are appetite loss, abdominal pain, constipation, fatigue, sleeplessness, irritability, and headache. Continued excessive exposure, as in an industrial setting, can affect the kidneys.

Diesel Particulate Matter

In 1998, the ARB identified DPM as a TAC (ARB 1998). On a statewide basis, the average potential cancer risk associated with DPM is more than 500 potential cases per million people. OEHHA estimated the potential cancer risk from a 70-year exposure to DPM at a concentration of 1 microgram per cubic meter (µg/m^3) ranges from 130 to 2,400 excess cancer cases per million people. A scientific review panel concluded that an appropriate point estimate of unit risk for a 70-year exposure to DPM is 300 excess cancer cases per million people (ARB 2000).

The DPM of greatest health concern are those in the categories of fine (PM_{10}) and ultra-fine ($PM_{2.5}$). These fine and ultra-fine particles may be composed of elemental carbon with adsorbed compounds, such as organic compounds, SO_4, nitrate, metals, and other trace elements. The fine and ultra-fine particles are respirable, which means that they can avoid many of the human respiratory system defense mechanisms and enter deeply into the lungs.

Existing Air Quality Conditions

The AVAQMD operates a monitoring station located at 43301 Division Street in the City of Lancaster. The station monitors O_3, CO, PM, and NO_2.

Attainment Status

Local monitoring data (Table 3.3-2) are used to designate areas as nonattainment, maintenance, attainment, or unclassified for the NAAQS and CAAQS. The four designations are defined as follows.

Nonattainment: assigned to areas where monitored pollutant concentrations consistently violate the standard in question.

Maintenance: assigned to areas where monitored pollutant concentrations exceeded the standard in question in the past but are no longer in violation of that standard.

Attainment: assigned to areas where pollutant concentrations meet the standard in question over a designated period of time.

Unclassified: assigned to areas where data are insufficient to determine whether a pollutant is violating the standard in question.

Table 3.3-2: Ambient Air Quality

Air Pollutants Monitored at Division Street Station, Lancaster	Year		
	2011	2012	2013
Ozone (O_3)			
Maximum 1 hour concentration measured	0.115 ppm	0.112 ppm	0.108 ppm
Number of days exceeding national 0.12 ppm 1 hour standard	0	0	0
Number of days exceeding state 0.09 ppm 1 hour standard	19	13	9
Maximum 8 hour concentration measured	0.100 ppm	0.096 ppm	0.094 ppm
Number of days exceeding national 0.075 ppm 8 hour standard	53	39	34
Number of days exceeding state 0.07 ppm 8 hour standard	76	72	53
Particulate Matter (PM_{10})			
Maximum national 24 hour concentration measured	81.9 ppm	47.0 ppm	173.4 ppm
Number of days exceeding national 150 µg/m^3 24 hour standard	0	0	1
Maximum State 24 hour concentration measured	49.0 ppm	43.0 ppm	173.4 ppm
Number of days exceeding state 150 µg/m^3 24 hour standard	0	0	2
Particulate Matter ($PM_{2.5}$)			
Maximum 24 hour concentration measured	50.0 ppm	14.0 ppm	11.9 ppm
Number of days exceeding national 35 µg/m^3 24 hour standard	0	0	0
Number of days exceeding state 24 hour standard	0	0	0
Carbon Monoxide (CO)			
Maximum 1 hour concentration measured	*	*	*
Maximum 8 hour concentration measured	1.33 ppm	1.00 ppm	*
Number of days exceeding national 9.0 ppm 8 hour standard	0	0	0
Number of days exceeding state 9.0 ppm 8 hour standard	0	0	0
Nitrogen Dioxide (NO_2)			
Maximum 1 hour concentration measured	58.0 ppm	49.0 ppm	47.7 ppm
Number of days exceeding state 0.18 ppm 1 hour standard	0	0	0
Annual Arithmetic Mean	12	9	8
Does measured annual average exceed national 0.0534 ppm annual average standard?	*	*	*

Note:
ppm = parts per million.
µg/m^3 = micrograms per cubic meter.
* = Insufficient (or no) data was available to determine the value.
Source: California Air Resources Board 2014b.

The EPA and CARB have designated the AVAQMD as non-attainment for ozone and PM. Some of these designations have an associated classification (see Table 3.3-3). Pollutants that are in non-attainment status can be categorized as moderate, severe, and extreme, based on the concentration level of the pollutants.

Table 3.3-3: Federal and State Attainment Status

Ambient Air Quality Standard	AVAQMD
Ozone (1 hour) – historical information only; revoked standard	Non-attainment; Severe
Ozone (8 hour) (Federal 84 parts per billion [ppb])	Subpart 2 Non-attainment; Moderate
Ozone (8 hour) (Federal New Standard, 75 ppb or lower)	Non-attainment
Ozone (State)	Non-attainment; Extreme
Carbon Monoxide (State and Federal)	Attainment
PM10 (Federal)	Unclassified
PM10 (State)	Non-attainment
PM2.5 (Federal)	Unclassified/attainment
PM2.5 (State)	Unclassified
Nitrogen Dioxide (State and Federal)	Attainment/unclassified
Sulfur Dioxide (State and Federal)	Attainment/unclassified
Lead (State and Federal)	Attainment
Particulate Sulfate (State)	Unclassified
Hydrogen Sulfide (State)	Unclassified
Visibility Reducing Particles (State)	Unclassified
Source: AVAQMD 2011	

Sensitive Receptors

Sensitive land uses are defined as locations where human populations, especially children, seniors, and sick persons, are located and where there is reasonable expectation of continuous human exposure according to the averaging period for the air quality standards (e.g., 24 hour, 8 hour, and 1 hour). Typical sensitive receptors include residences, hospitals, and schools. While the project site is in a rural area of Lancaster, sensitive receptors in the vicinity of the project site include scattered residences. The nearest single family residence to the site is located approximately 70 feet north of Avenue L. There are additional residences located to the north, northeast, east, and southeast of the project site, although at greater distances. No other sensitive receptors are located in the vicinity of the project site.

Climate Change and Greenhouse Gas Emissions

The phenomenon known as the greenhouse effect keeps the atmosphere near the earth's surface warm enough for the successful habitation of humans and other life forms. Sunlight passes through the atmosphere. This includes infrared, visible, and ultraviolet light. Some of the sunlight that strikes the earth is absorbed and converted to heat, which warms the surface. The

surface emits infrared radiation to the atmosphere where some of it is absorbed by GHGs and directed back towards the surface; some of the heat is not trapped by GHGs and escapes into space. Human activities that emit additional GHGs to the atmosphere increase the amount of infrared radiation that gets absorbed before escaping into space, thus enhancing the greenhouse effect and amplifying the warming of the earth (Center for Climate and Energy Solutions 2011).

Increases in fossil fuel combustion and deforestation have exponentially increased concentrations of GHGs in the atmosphere since the Industrial Revolution. Rising atmospheric concentrations of GHGs in excess of natural levels enhance the greenhouse effect, which contributes to global warming of the earth's lower atmosphere and induces large-scale changes in ocean circulation patterns, precipitation patterns, global ice cover, biological distributions, and other changes to the earth system that are collectively referred to as climate change.

According to AB 32, California's Global Warming Solutions Act, GHGs of concern include the following gases: CO_2, CH_4, N_2O, PFCs, SF_6, and HFCs. The primary GHGs that would be generated by the proposed project would include CO_2, CH_4, and N_2O. Each of these gases is discussed in detail below. SF_6, PFCs, and HFCs are not discussed because these gases are generated primarily by industrial and manufacturing processes; while the project will include transmission lines, they will not be manufactured on site. As a method of simplifying reporting, GHG emissions are discussed in terms of metric tons of carbon dioxide equivalents (CO2e), which accounts for the relative warming capacity (i.e., global warming potential [GWP]) of each gas.

Table 3.3-4 lists the global warming potential of CO_2, CH_4, N_2O, HCFs, and SF_6, their lifetimes, and abundances in the atmosphere.

Table 3.3-4: Lifetimes and Global Warming Potentials of Several Greenhouse Gases

Greenhouse Gases	Global Warming Potential (100 Yrs)	Lifetime (Yrs)	Current Atmospheric Abundance
CO_2 (ppm)	1	50-200	399
CH_4 (ppb)	25	12.4	1,762-1893
N_2O (ppb)	298	121	324-326
HFC-23 (ppt)	12,400	222	18
HFC-134a (ppt)	1,300	13.4	64-75
HFC-152a (ppt)	138	1.5	3.9
SF_6 (ppt)	23,500	3,200	7.4-7.8

Note:
HFC = hydrofluorocarbons.
CH_4 = methane.
CO_2 = carbon dioxide.
N_2O = nitrous oxide.
ppb = parts per billion.
ppm = parts per million.
ppt = parts per trillion.
SF_6 = sulfur hexafluoride

Greenhouse Gases	Global Warming Potential (100 Yrs)	Lifetime (Yrs)	Current Atmospheric Abundance

Source: Intergovernmental Panel on Climate Change 2013; Carbon Dioxide Information Analysis Center 2014; National Oceanic and Atmospheric Administration 2014

Carbon Dioxide

Carbon dioxide is the most important man-made GHG and accounts for more than 75% of all GHG emissions caused by humans. Its atmospheric lifetime of 50–200 years ensures that atmospheric concentrations of CO_2 will remain elevated for decades, even after mitigation efforts to reduce GHG concentrations are promulgated (Intergovernmental Panel on Climate Change 2007a). The primary sources of man-made CO_2 in the atmosphere include the burning of fossil fuels (including those used in motor vehicles), gas flaring, cement production, and land use changes (e.g., deforestation, etc.). Carbon dioxide can also be removed from the atmosphere by photosynthetic organisms.

Atmospheric CO_2 has increased from a pre-industrial concentration of 280 ppm to 379 ppm in 2005 (Intergovernmental Panel on Climate Change 2007b) and is currently at 402 ppm as of May 2014 (National Oceanic and Atmospheric Administration 2014).

Methane

Methane, the main component of natural gas, is the second most abundant GHG and has a GWP of 25 (Intergovernmental Panel on Climate Change 2007b). Sources of man-made emissions of CH_4 include rice production, raising cattle, the use of natural gas, landfill outgassing, and coal mining (National Oceanic and Atmospheric Administration 2010). Certain land uses function as both a source and sink for CH_4. For example, wetlands are a terrestrial source of CH_4, whereas undisturbed aerobic soils act as a CH_4 sink (i.e., they remove CH_4 from the atmosphere). Atmospheric CH_4 has increased from a pre-industrial concentration of 715 ppb to 1,774 ppb in 2005 (Intergovernmental Panel on Climate Change 2007b). Recent measurements indicate that atmospheric CH_4 reached a concentration of nearly 1,800 ppb in 2010 (European Environmental Agency 2013a).

Nitrous Oxide

Nitrous oxide is a powerful GHG, with a GWP of 298 (Intergovernmental Panel on Climate Change 2007b). Man-made sources of N_2O include agricultural processes (e.g., fertilizer application), nylon production, power plants, nitric acid production, and vehicle emissions. N_2O is also used in rocket engines, racecars, and aerosol sprays (as a propellant). Natural processes, such as nitrification and denitrification, can also produce N_2O, which can be released to the atmosphere by diffusion. In the United States, more than 70% of N_2O emissions are related to agricultural soil management practices, particularly fertilizer application.

Nitrous oxide concentrations in the atmosphere have increased 18% from pre-industrial levels of 270 ppb to 319 ppb in 2005 (Intergovernmental Panel on Climate Change 2007b). Recent

measurements indicate that atmospheric N_2O reached a concentration of nearly 324 ppb in 2010 (European Environmental Agency 2013b).

Urban Heat Island Effect

The term "heat island" describes built up areas that are hotter than nearby rural areas. According to the U.S. EPA The annual mean air temperature of a city with 1 million people or more can be 1.8–5.4°F warmer than its surroundings. Heat islands can affect communities by increasing summertime peak energy demand, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality. Development of open spaces and addition of impervious surfaces can result in a cumulative heat island effect (EPA 2014).

3.3.3 Environmental Impacts

This section analyzes the proposed project's potential to result in significant air quality impacts. When an impact is determined to be significant, mitigation measures are identified that would reduce or avoid that impact.

Methodology for Analysis

The proposed project would result in both short- and long-term emissions of criteria air pollutants and GHG emissions. Construction emissions would include exhaust from the operation of conventional construction equipment/vehicles and from fugitive dust as a result of grading and equipment/vehicle travel on unpaved surfaces. Operational emissions would include two vehicle trips per each of six workers (total of twelve vehicle trips per day) to commute to and from the project site, move around the site while working, and the operation of limited maintenance equipment.

Construction and operational emissions were estimated using the California Emissions Estimator Model (version 2013.2.2) (CalEEMod). 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 quantifies direct emissions from construction and operations (including vehicle use), 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. The model is an accurate and comprehensive tool for quantifying air quality impacts from land use projects throughout California. The model can be used for a variety of situations where an air quality analysis is necessary or desirable such as CEQA documents. For the proposed project, site specific grading calculations, equipment vehicle use, construction schedule were developed in consultation with the applicant and the City of Lancaster. Information utilized in the emission modeling is documented in Section 2.0, Project Description, and Appendix B.

Thresholds of Significance

According to the CEQA Guideline's Appendix G Environmental Checklist and the AVAQMD's CEQA Guidelines, the following questions are analyzed and evaluated to determine whether impacts to air quality or GHG emissions were significant.

Would the proposed project:

- Conflict with or obstruct implementation of the applicable air quality plan?
- 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 non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors)?
- Expose sensitive receptors to substantial pollutant concentrations?
- The AVAQMD measures the significance of potential air quality impacts based on the following criteria:
    - Generates total emissions (direct and indirect) in excess of the thresholds presented below in Table 3.3-5;
    - Generates a violation of any ambient air quality standard when added to the local background;
    - Does not conform with the applicable attainment or maintenance plan(s); and
    - Exposes sensitive receptors to substantial pollutant concentrations, including those resulting in a cancer risk greater than or equal to 10 in a million and/or a Hazard Index (HI) (non-cancerous) greater than or equal to 1.
- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs?

The following question was determined to have no impact during the Notice of Preparation Scoping. This issue is summarized in Section 4, Effects Found Not To Be Significant, and is not discussed further in this section.

- Create objectionable odors affecting a substantial number of people?

3.3.3.1 Project Impact Analysis and Mitigation Measures

Air Quality Plan

Impact AQ-1	**The proposed project would not conflict with or obstruct implementation of the applicable air quality plan.**

Impact Analysis

A project is non-conforming if it conflicts with or delays implementation of any applicable attainment or maintenance plan. A project is conforming if it complies with all applicable AVAQMD rules and regulations, complies with all proposed control measures, and is consistent with the growth forecasts in the applicable air quality attainment plan. Conformity with growth forecasts can be established by demonstrating that the proposed project is consistent with the land use plan that was used to generate the growth forecast. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds estimates used to develop applicable air quality plans. Projects that propose development that is consistent with the growth anticipated by the relevant land use plans would be consistent with the current AVAQMD air quality plans. Likewise, projects that propose development that is less dense than anticipated within a general plan (or other governing land use document) would be consistent with the air quality plans because emissions would be less than estimated for the region. If a project proposes development that is greater than that anticipated by growth projections, the project would be in conflict with the AVAQMD air quality plans, and might have a potentially significant impact on air quality because emissions would exceed those estimated for the region. This situation would warrant further analysis to determine if a proposed project and surrounding projects would exceed the growth projections used in the AVAQMD air quality plans for a specific sub regional area.

The proposed project would allow for the construction, operation, and maintenance of a utility scale solar facility for the long-term generation of clean renewable energy. As noted in Section 3.9, Land Use, Population and Housing, the proposed project would not significantly increase employment or growth within the region beyond projections developed by SCAG.

Moreover, the proposed project would increase the amount of renewable energy available in California. Accordingly, the proposed project would contribute to the region's long-term goals of increasing energy efficiency and reducing air pollution. Because the proposed project would not result in any significant long-term changes in population or employment growth, it would be considered consistent with growth projections in the City's General Plan, and employment and growth projections developed by SCAG. Consequently, the proposed project would be consistent with current AVAQMD air quality plans. In addition, the proposed project would also comply with all AVAQMD rules and regulations. Based on the factors presented above the proposed project would not conflict with or obstruct implementation of any applicable land use plan or policy. Therefore, impacts would be less than significant.

Level of Significance Before Mitigation

Less Than Significant Impact.

Mitigation Measures

No mitigation is necessary.

Level of Significance After Mitigation

Less Than Significant Impact.

Air Quality Standards / Violations

Impact AQ-2	**The proposed project could potentially violate air quality standard or contribute substantially to an existing or projected air quality violation.**

Impact Analysis

A summary of construction and operational emissions that could result from the proposed project are summarized below in Tables 3.3-5 and 3.3-6. The complete CalEEMod output file including all assumptions used is included as Appendix B.

The proposed project involves mobile emissions sources and does not include stationary sources of air pollutants. Emissions during construction and operation are expected to be dispersed across the project site (1,191 total acres) and would not be concentrated. Considering the mobile nature of emissions sources, expected dispersion across the large site, and total annual and peak daily emissions below all applicable mass thresholds, the proposed project is not expected to violate any air quality standard or contribute substantially to an existing or projected air quality violation. Emissions of criteria air pollutants expected to be generated during construction and operation activities are presented in Tables 3.3-5 and 3.3-6. Both construction and operational emissions would be below the annual and peak daily quantitative thresholds of significance.

Table 3.3-5: Construction Emissions Summary

Pollutant	Peak Annual Emissions (tons)	Annual Threshold (tons)	Annual Threshold Exceeded?	Peak Daily Emissions (pounds)	Daily Threshold (Pounds)	Daily Threshold Exceeded?
Greenhouse Gases (CO2e)	1,753.24[a]	100,000[a]	No	11,670.65	548,000	No
Carbon Monoxide (CO)	12.97	100	No	78.78	548	No
Oxides of Nitrogen (NO_X)	15.77	25	No	102.92	137	No
Volatile Organic Compounds (VOC)	1.84	25	No	10.90	137	No
Oxides of Sulfur (SO_X)	0.02	25	No	0.12	137	No
Particulate Matter (PM_{10})	1.74	15	No	19.61	82	No

Pollutant	Peak Annual Emissions (tons)	Annual Threshold (tons)	Annual Threshold Exceeded?	Peak Daily Emissions (pounds)	Daily Threshold (Pounds)	Daily Threshold Exceeded?
Particulate Matter ($PM_{2.5}$)	1.06	15	No	10.35	82	No
Hydrogen Sulfide (H_2S)	n/a	10	n/a	n/a	54	n/a
Lead (Pb)	n/a	0.6	n/a	n/a	3	n/a
Notes: a: mass expressed in metric tons Emissions rounded to nearest hundredth Source: Stantec 2014						

As previously indicated, the AVAQMD requires that all construction activities comply with fugitive dust control requirements and guidance documents. Fugitive dust emissions from the proposed project were estimated based on the assumption that up to 300 acres would be graded during site preparation as a result of constructing Gen-tie Routes 3 and 6, the switching station, bike path, hydrant trenches, and solar array blocks. Implementation of Mitigation Measures AQ-1 through AQ-4 would ensure that fugitive dust emissions from construction activities would be less than significant.

The proposed project operational emissions would result from employee trips and panel washing. Table 3.3-6 summarizes modeled emissions that would occur with operation of the proposed project. As indicated in Table 3.3-6, all operational criteria pollutant emissions would remain below AVAQMD significance thresholds, resulting in a less than significant impact from proposed project operation emissions. Therefore, no mitigation is required.

Table 3.3-6: Operation Emissions Summary

Pollutant	Peak Annual Emissions (tons)	Annual Threshold (tons)	Annual Threshold Exceeded?	Peak Daily Emissions (pounds)	Daily Threshold (Pounds)	Daily Threshold Exceeded?
Greenhouse Gases (CO2e)	23.71[a]	100,000[a]	No	134.55[a]	548,000	No
Carbon Monoxide (CO)	0.54	100	No	5.76	548	No
Oxides of Nitrogen (NO_X)	0.02	25	No	0.17	137	No
Volatile Organic Compounds (VOC)	0.05	25	No	0.54	137	No
Oxides of	0.00	25	No	0.00	137	No

Pollutant	Peak Annual Emissions (tons)	Annual Threshold (tons)	Annual Threshold Exceeded?	Peak Daily Emissions (pounds)	Daily Threshold (Pounds)	Daily Threshold Exceeded?
Sulfur (SO_X)						
Particulate Matter (PM_{10})	0.01	15	No	0.12	82	No
Particulate Matter ($PM_{2.5}$)	0.00	15	No	0.05	82	No
Hydrogen Sulfide (H_2S)	n/a	10	n/a	n/a	54	n/a
Lead (Pb)	n/a	0.6	n/a	n/a	3	n/a
Notes: a: mass expressed in metric tons Emissions rounded to nearest hundredth Source: Stantec 2014						

Urban Heat Island Effect

The following discusses the potential for the air temperatures to increase resulting from an urban heat island effect which could impact the quality of the air surrounding project site. In the publication Analysis of the Potential for a Heat Island Effect in Large Solar Farms (Vasillis Fthenakis and Yuanhao Yu 2011), data was collected over an 18 month period to determine the temperature dissipation of thermal energy from a 1 MW section of a 500 MW solar farm. Field data consisted of the collection of the following measurements: temperature, wind speed, wind direction, solar irradiance, relative humidity and rain fall. Through graphing 2-D and 3-D simulations of this data, it was determined that while the back surface of the solar panels is up to 30°C warmer than the ambient temperature, the air above the arrays is only up to 2.5°C higher than the ambient temperature. The simulations showed that heat dissipated with height and cooling at night. The simulations also indicated that the access roads and spacing between the solar arrays allows for substantial cooling, and therefore, an increase of the size of the solar farm may not affect the temperature of the solar generating facility's farms surroundings. Overall data showed that in most days, the solar array was completely cooled at night (Vasilis Fthenakis and Yuanhao Yu 2011). Thus, it is unlikely that a heat island effect would occur, from the operation of the proposed project.

In summary, the proposed project would not violate any air quality standards or contribute substantially to an existing or projected air quality violation. However, out of an abundance of caution Mitigation Measures AQ-1 through AQ-4 will be implemented.

Level of Significance Before Mitigation

Potentially Significant Impact.

Mitigation Measures

MM AQ-1: The applicant shall submit a copy of the AVAQMD approved Dust Control Plan to the City of Lancaster prior to issuance of any construction related permits.

MM AQ-2: Fugitive dust emissions during construction and operational activities shall be controlled by regular watering or other dust preventive measures using the following procedures, as specified by the AVAQMD, including but not limited to AVAQMD Rule 401, Visible Emissions, and Rule 403, Fugitive Dust:

- On-site vehicle speed shall be limited to 15 miles per hour.
- All on-site construction roads with vehicle traffic shall be watered periodically.
- Streets adjacent to the project site shall be swept as needed to remove silt that may have accumulated from construction activities so as to prevent excessive amounts of dust.
- All material excavated or graded shall be sufficiently watered to prevent excessive amounts of dust. Watering shall occur at least twice daily with complete coverage, preferably in the late morning and after work is done for the day.
- All clearing, grading, earth-moving, or excavation activities shall cease during periods of high winds (i.e., greater than 25 miles per hour averaged over one hour) so as to prevent excessive amounts of dust.
- All material transported on-site or off-site shall be either sufficiently watered or securely covered to prevent excessive amounts of dust.
- The area disturbed by clearing, grading, earth-moving, or excavation operations shall be minimized so as to prevent excessive amounts of dust.

MM AQ-3: All trucks hauling excavated or graded material on-site shall comply with State Vehicle Code Section 23114 regarding the prevention of such material spilling onto public streets by use of shed boards, truck covers, and other protective measures.

MM AQ-4: During construction activities, excessive construction equipment and vehicle exhaust emissions shall be controlled by implementing the following procedures, as specified by the AVAQMD.

- Properly and routinely maintain all construction equipment, as recommended by manufacturer manuals, to control exhaust emissions;
- Shut down equipment when not in use for extended periods of time to reduce emissions associated with idling engines;
- Encourage ride sharing for construction employee commuting to the project site; and
- Use electric equipment for construction whenever possible in lieu of fossil fuel fired equipment.

Level of Significance After Mitigation

Less Than Significant Impact.

Criteria Pollutants

Impact AQ-3	**The proposed project could potentially result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors).**

Impact Analysis

By its very nature, air pollution is largely a cumulative impact. The criteria pollutants for which the AVAQMD is in non-attainment under applicable air quality standards are O_3, and PM_{10} (see Table 3.3-3). The AVAQMD's application of thresholds of significance for criteria air pollutants is relevant to the determination of whether a project's individual emissions would have a cumulatively significant impact on air quality. Per CEQA Guidelines (Cal. Code Regs., tit. 14 §15064(h)(3)) a lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project will comply with the requirements in a previously approved plan or mitigation program including, but not limited to, an air quality attainment or maintenance plan that provides specific requirements that will avoid or substantially lessen the cumulative problem within the geographic area in which the project is located. As discussed in Impact AQ-2, the proposed project could conflict with the air quality plans if applicable rules and regulations and control measures are not adhered to. In addition, Impact AQ-2 identifies impacts related to the proposed project's construction and operation impacts from criteria air emissions, which are below the thresholds of significance, but could contribute to a cumulatively considerable net increase in emission levels.

As such, implementation of Mitigation Measures AQ-1 through AQ-4 will ensure compliance with AVAQMD rules and regulations and applicable air quality plan control measures. Therefore, construction and operation of the proposed project would not conflict with the applicable air quality plan and would result in a less than significant impact with mitigation related to a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard. Impacts would be less than significant with mitigation.

Level of Significance Before Mitigation

Potentially Significant Impact.

Mitigation Measures

Implementation of Mitigation Measures AQ-1 through AQ-4 would ensure impacts are less than significant.

Level of Significance After Mitigation

Less Than Significant Impact.

Sensitive Receptors

Impact AQ-4	**The proposed project would not expose sensitive receptors to substantial pollutant concentrations.**

Impact Analysis

Some land uses are considered more sensitive to air pollution than others due to associated population groups and activities. Sensitive receptors include residences, schools, daycare centers, playgrounds and medical facilities. While the project site is in a rural area of the City of Lancaster, sensitive receptors in the vicinity of the project site include scattered rural residences. The nearest single family residence to the site is located approximately 70 feet north of the project site along Avenue L. There are additional residences located to the north, northeast, east, and southeast of the project site, although at greater distances, approximately 2,000 feet.

Off-road construction equipment and some support vehicles are expected to be diesel fueled. Diesel exhaust particulate matter has been identified by the State of California as a Toxic Air Contaminant. Construction activities would not occur in close proximity to sensitive receptors and potential idling would only occur in close proximity to sensitive receptors for a short-period of time, and would not involve significant numbers of emissions sources. The impact from these temporary diesel air emissions would be less than significant.

Carbon Monoxide Hotspots

Carbon monoxide emissions are a function of vehicle idling time, meteorological conditions and traffic flow. Under certain extreme meteorological conditions, CO concentrations near a congested roadway or intersection may reach unhealthy levels (i.e., adversely affect residents, school children, hospital patients, the elderly, etc.). To identify CO hotspots, the AVAQMD follows the South Coast Air Quality Management District criterion, which requires a CO micro-scale hotspot analysis when a project increases the volume to-capacity ratio (also called the intersection capacity utilization) by 0.02 (two percent) for any intersection with an existing level of service (LOS) D or worse. As noted in Table 3.3-5, a project will not create a CO violation or create a localized hotspot if LOS on one or more streets or intersections will be reduced to LOS E or F or if the project would substantially worsen an already LOS F street or intersection within the project vicinity.

According to the transportation impact analysis presented in Section 3.12, Transportation and Traffic, roadway segments within the vicinity of the proposed project would operate at LOS A or better and the project would contribute 1.68 percent of the surrounding readings volume to capacity ratio. Therefore, the proposed project would be below the 2 percent threshold, and not generate traffic conditions resulting in a CO hotspot. Therefore, this impact would be less than significant.

TAC Emissions

According to Section 39655 of the California Health and Safety Code, a toxic air contaminant is, "an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health." In addition,

189 substances that have been listed as federal hazardous air pollutants pursuant to Section7412 of Title 42 of the United States Code are toxic air contaminants under the State's air toxics program pursuant to Section 39657 (b) of the California Health and Safety Code. Toxic air contaminants can cause various cancers, depending on the particular chemicals, their type and duration of exposure. Additionally, some of the toxic air contaminants may cause other health effects over the short or long term. The ten toxic air contaminants posing the greatest health risk in California are acetaldehyde, benzene, 1-3 butadiene, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride perchlorethylene, and diesel particulate matter. The AVAQMD Health Risk Assessment Guidelines require preparers to: "... identify the maximally exposed individual within 100 meters of its actual location", as well as, "... estimate the individual lifetime cancer risk at all sensitive receptors. Sensitive receptors include the following: schools (public and private), day care centers, health care facilities, nursing homes"

Construction

Although construction and operation of the proposed project would involve the use of diesel fueled vehicles, the construction phases would occur over a limited duration. While operational emissions are ongoing, the construction phase emissions are short-term. The California OEHHA provides exposure variants for 9-, 30-, and 70-year exposures in its Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2002). These exposures are chosen to coincide with the EPA's estimates of the average (9 years), high-end estimates (30 years) of residence time, and a typical lifetime (70 years). OEHHA states its support for the use of cancer potency factors for estimating cancer risks for these exposure durations. However, as the exposure duration decreases, the uncertainties introduced by applying cancer potency factors derived from very-long-term studies increases. Short-term high exposures are not necessarily equivalent to longer-term lower exposures, even when the total dose is the same. OEHHA therefore does not support the use of current cancer potency factors to evaluate cancer risk for exposures of less than 9 years (refer to page 8-4 of OEHHA 2002).Construction phase risks would be considered acute health risks as opposed to cancer risks, which are long-term. OEHHA has yet to define acute risk factors for diesel particulates that would allow the calculation of a hazards risk index; thus, evaluation of this impact would be speculative and no further discussion is necessary.

Operation

The project is not anticipated to be a source of TACs during operation. The AVAQMD does not have an identified screening tool to determine if project impacts exceed the AVAQMD threshold of 10 in one million probability of contracting cancer for the Maximally Exposed Individual (MEI) (Pers. Comm-Rausch, 2015). However the San Joaquin Valley Air Pollution Control District (SJVAPCD) has an established screening tool which has been used to characterize probability of contracting cancer. The screening tool requires information on the anticipated number of heavy-heavy duty diesel trucks (HHDT) servicing the proposed project site. It was estimated that the project site would not require any HHDT trips for operational use. However, out of an abundance of caution, a total of 10 HHDT trips per year for maintenance and delivery of materials was used. The ARB's Airborne Toxic Control Measure (ATCM) limits diesel truck idling to 5 minutes; however, to provide a very conservative estimate, the idling was estimated at 15 minutes for the HHDT. Trucks were also assumed to travel along avenue L

adjacent to the residences to access the project site. Table 3.3-7: Cancer Risks provides an estimate of the cancer risks to the MEI, who are the residential receptors located north of the project site. As shown in the table, the proposed project would not exceed the AVAQMD threshold of 10 in one million; therefore, the project would not expose sensitive receptors to substantial concentrations of diesel particulate matter and TACs. Impacts would be less than significant.

Table 3.3-7: Cancer Risks

Project Year	Location	Cancer Risks (risk per million)	Significance Threshold (risk per million)	Exceed Threshold
2015	Maximum Exposed Residential Receptor	0.00000047	10	No
Source: Stantec 2015				

Level of Significance Before Mitigation

Less Than Significant Impact.

Mitigation Measures

No mitigation is necessary.

Level of Significance After Mitigation

Less Than Significant Impact.

Greenhouse Gases

Impact AQ-5	**The proposed project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.**

Impact Analysis

The proposed project would result in GHG emissions during the construction and operational phases. These emissions would be generated by the operation of conventional construction equipment and vehicles. Construction emissions would be short-term, occurring only during the estimated 24 month construction phase of the proposed project. GHG emissions during operation of the proposed project will be minor, consisting of exhaust from up to twelve vehicles used by workers to commute to and from the project site, move around the project site while working, and the operation of limited maintenance equipment.

The AVAQMD has adopted annual and daily mass emissions thresholds for evaluating the significance of GHG emissions. As shown in Tables 3.3-5 and 3.3-6, the proposed project would result in GHG emissions during construction (11,671 pounds daily) and operation (135 pounds daily) that are well below the annual and daily thresholds of significance.

The proposed project would generate up to 150 MWs of electricity from a renewable source (solar). This would be an important contribution to the State Mandate for 33% renewable energy supply requested to be achieved by the end of 2020. As such, the proposed project has the potential to offset some sources of GHG emissions by reducing the amount of electricity generated using fossil fuels that is currently obtained by utility providers. Lifecycle analyses have been completed that compare GHG emissions from solar power projects to other types of power plants. Such comparisons confirm that solar power has among the lowest GHG emissions among all options, especially compared to fossil fuels. As such, the minor GHG emissions that would occur from the operation of proposed project are less than significant and may be considered a beneficial impact because it would reduce the burden of generating electricity from fossil fuels and contributed to the State Mandate for 33% renewable energy supply to be achieved by the end of 2020.

Considering the above, the proposed project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.

Level of Significance Before Mitigation

Less Than Significant Impact.

Mitigation Measures

No mitigation is necessary.

Level of Significance After Mitigation

Less Than Significant Impact.

Greenhouse Gases

Impact AQ-6	**The proposed project would not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.**

Impact Analysis

Recommended Action E-3, Renewable Portfolio Standard, of CARB's Climate Change Scoping Plan enforces the Governor's call for a statewide Renewable Portfolio Standard of 33 percent. The proposed project would help the State meet this goal by adding a solar generating facility designed to generate up to 150 MW of power to California's current renewable portfolio. Therefore, in this regard, the proposed project would help the state meet its goals under AB32. The proposed project would therefore not conflict with the Scoping Plan; therefore impact would be less than significant.

Level of Significance Before Mitigation

Less Than Significant Impact.

Mitigation Measures

No mitigation is necessary.

Level of Significance After Mitigation

Less Than Significant Impact.

3.3.4 Cumulative Impacts

The analysis of air quality and GHG emissions is based on the regional impacts of criteria pollutants within the AVAQMD and global climate change resulting from GHG emissions globally. Both air quality and GHG emissions are less than significant impacts. As discussed in above, development of the proposed project and the project evaluated in Table 3-3 would result in an increase in construction dust and exhaust emissions from construction equipment and vehicles. This increase could violate or contribute to an existing violation of air quality standards, which would be an air quality impact during construction. The sources of construction dust and types of motor vehicle or off-road equipment sources would be similar at all development sites, as all sites would require mobilizing construction equipment and crews and creating permanent ground disturbances for various development activities. Construction-phase emissions would be distributed across the region and transmission corridors, and would occur at different times. For each specific project, a wide range of construction-phase emissions would occur, depending on, among other factors, each project's particular accessibility, phasing or sequencing of activity, and the fleet of construction equipment used.

Construction activities of the proposed project would generate emissions that could contribute to the existing ozone and PM violations. Therefore, the project listed in Table 3-3 would experience short-term air quality impacts during construction activities.

All cumulative projects listed in Table 3-3 would require environmental permitting and would likely incorporate mitigation measures to reduce the short-term air emissions. Cumulative project mitigation would likely be similar to mitigation measures in the following manner: AQ-1 through AQ-4. Such measures would reduce the impacts from cumulative projects to a less than significant level.

Development of the proposed project in conjunction with the future foreseeable projects and projected growth and development would not result in a cumulative effect to conflicts with an applicable plan, policy, or regulation. Projects presented in Table 3-3 would facilitate the GHG emissions reductions that California expects to achieve by generating electricity from renewable energy resources rather than fossil fuel technologies. This displacement of GHGs would be consistent with the Global Warming Solutions Act, AB 32, GHG reduction goals and the Climate Change Scoping Plan. Individual projects listed in Table 3-3 would cause no other potential conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. The projects listed in Table 3-3 and the projected growth would not conflict with an applicable plan, policy, or regulation intended to address climate change because they

would be required to comply with California's existing regulations. For example, much of the projected growth includes residential development. Prior to the construction of residential subdivisions, such projects would need to comply with California regulations and laws including those that pertain to climate change. Therefore, because the proposed project would have a less than significant GHG impact, the proposed project would also generate a less than significant cumulative impact for GHGs.