Section 3.3
Air Quality

This section addresses potential air quality impacts that may result from the project. The section discusses the existing air quality conditions in the project area, identifies applicable regulations, evaluates the project's consistency with applicable air quality plans, identifies and analyzes environmental impacts, and recommends measures to reduce or avoid adverse impacts anticipated from implementation of the project, as applicable.

The analysis in this section is based on the *Air Quality Technical Report* prepared by HDR (2019; see **Appendix D-1**), the *Dust Control Technical Memorandum* prepared by Tetra Tech (2018a; see **Appendix D-2**), and the *Heat Island Technical Memorandum* prepared by Tetra Tech (2018b; see Attachment 5 of **Appendix H-3**). All technical reports were peer reviewed by Michael Baker International.

ENVIRONMENTAL SETTING

Air quality and dispersion of air pollution in an area is determined by such natural factors as topography, meteorology, and climate, coupled with atmospheric stability. The factors affecting the dispersion of air pollution with respect to the air basin are described below.

TOPOGRAPHY

The project site is located in the Mojave Desert, east of Barstow, at an elevation of approximately 2,014 feet above mean sea level, where the Mojave River emerges from a constricted portion of its course and has historically spread deposits across a broad plain stretching between the locations of Interstate 15 to the north and Interstate 40 on the south. The width of alluvial deposition associated with the active Mojave River expands from less than 1,000 feet to over 4 miles near the project boundaries. Within the constriction, topographic relief extends upward a little over 600 feet from the river bottom to the adjacent ridgetop. The broad alluvial plain on which the project site is situated is relatively flat.

METEOROLOGY AND CLIMATE

Weather patterns in the area are generally influenced by moderately intense, anticyclonic circulation (associated with high pressure systems). During the summer, a large subtropical high-pressure system off the coast of California keeps the Mojave Desert area sunny and dry. However, the presence of a thermal low-pressure area above the Mojave Desert promotes atmospheric transport from the Los Angeles Basin. During the winter months, the strength of the

Pacific high-pressure area wanes, and 20 to 30 frontal systems may pass through the area each year. Some of these frontal systems are sufficiently strong to produce rain in the area. The most significant large-scale phenomena affecting air quality in the project area are the transport winds from the south and the west. These winds are responsible for bringing ozone and other pollutants through the mountain passes from the Los Angeles Basin and the San Joaquin Valley.

Climatic conditions for the project area are very arid, with an average annual rainfall of 4.1 inches and no month with an average of more than 1.0 inch. Temperature and precipitation data on the project site and in the vicinity have been recorded at a National Weather Service Station in Daggett since December 1, 1943. The area is characterized by very hot summer temperatures, with the mean maximum temperatures in July and August exceeding 100°F. Winter temperatures are more moderate, with mean maximum temperatures in the 60s and lows in the 30s. Minimum temperatures below freezing (32°F) occur on an average of 30 days per year.

SENSITIVE RECEPTORS

Sensitive receptors are more susceptible to the effects of air pollution than the general population. Sensitive populations (sensitive receptors) that are in proximity to localized sources of toxics and carbon monoxide are of particular concern. Land uses considered sensitive receptors include residences, schools, playgrounds, childcare centers, long-term healthcare facilities, rehabilitation centers, convalescent centers, and retirement homes. The nearest sensitive receptors are the rural residences along Valley Center Road. These residences are approximately 100 feet from the nearest proposed construction area.

AIR POLLUTANTS OF CONCERN

Pollutants of concern include ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$), and lead. These pollutants are discussed below. In California, sulfates, vinyl chloride, hydrogen sulfide, and visibility-reducing particles are also regulated as criteria air pollutants.

Ozone

Ozone is a colorless gas that is formed in the atmosphere when volatile organic compounds (VOCs), sometimes referred to as reactive organic gases (ROGs), and nitrogen oxides (NO_x) react in the presence of ultraviolet sunlight. O_3 is not a primary pollutant; it is a secondary pollutant formed by complex interactions of two pollutants directly emitted into the atmosphere. Automobile exhaust and industrial sources are the primary sources of VOCs and NO_x, the precursors of ozone. Meteorology and terrain play major roles in O_3 formation. Ideal conditions occur during summer and early autumn on days with low wind speeds or stagnant air, warm temperatures, and cloudless skies. Short-term exposures (lasting for a few hours) to O_3 at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes.

Nitrogen Dioxide

Most nitrogen dioxide, like ozone, is not directly emitted into the atmosphere but is formed by an atmospheric chemical reaction between nitric oxide (NO) and atmospheric oxygen. NO and NO_2 are collectively referred to as NO_x and are major contributors to ozone formation. High concentrations of NO_2 can cause breathing difficulties and result in a brownish-red cast to the atmosphere with reduced visibility. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. Some increase in bronchitis in children (2 and 3 years old) has also been observed at concentrations below 0.3 parts per million (ppm) by volume.

Carbon Monoxide

Carbon monoxide is a colorless and odorless gas formed by the incomplete combustion of fossil fuels. CO is emitted almost exclusively from motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and trains. Automobile exhaust accounts for a majority of CO emissions. Carbon monoxide is a nonreactive air pollutant that dissipates relatively quickly; therefore, ambient CO concentrations generally follow the spatial and temporal distributions of vehicular traffic. 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. The highest levels of CO typically occur during the colder months of the year when inversion conditions are more frequent. In terms of health, CO competes with oxygen, often replacing it in the blood, thus reducing the blood's ability to transport oxygen to vital organs. The results of excess CO exposure can be dizziness, fatigue, and impairment of central nervous system functions.

Sulfur Dioxide

Sulfur dioxide is a colorless, pungent gas formed primarily by the combustion of sulfur containing fossil fuels. Main sources of SO_2 are coal and oil used in power plants and industries; as such, the highest levels of SO_2 are generally found near large industrial complexes. In recent years, sulfur dioxide concentrations have been reduced by the increasingly stringent controls placed on stationary source emissions of SO_2 and limits on the sulfur content of fuels. SO_2 is an irritant gas that attacks the throat and lungs and can cause acute respiratory symptoms and diminished ventilator function in children. SO_2 can also yellow plant leaves and erode iron and steel.

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. Particulate matter can form when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere. $PM_{2.5}$ and PM_{10} represent fractions of particulate matter. Fine particulate matter, or $PM_{2.5}$, is roughly 1/28 the diameter of a human hair. $PM_{2.5}$ results from fuel combustion (e.g., motor vehicles, power generation, and industrial facilities), residential fireplaces, and woodstoves. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as sulfur oxides (SO_x), NO_x and VOC. Inhalable or coarse particulate matter, or PM_{10}, is about 1/7 the thickness of a human hair. Major sources of PM_{10} include crushing or grinding operations; dust stirred up by vehicles traveling on roads; 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.

$PM_{2.5}$ and PM_{10} 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. $PM_{2.5}$ and PM_{10} 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, sulfates, and nitrates, can cause lung damage directly or be absorbed into the bloodstream, causing damage elsewhere in the body. Additionally, these substances can transport absorbed gases, such as chlorides or ammonium, into the lungs, also causing injury. Whereas PM_{10} tends to collect in the upper portion of the respiratory system, $PM_{2.5}$ is so tiny that it can penetrate deeper into the lungs and damage lung tissues. Suspended particulates also damage and discolor surfaces on which they settle, as well as produce haze and reduce regional visibility.

Lead

Lead in the atmosphere occurs as particulate matter. Sources of lead include leaded gasoline; the manufacturing of batteries, paint, ink, ceramics, and ammunition; and secondary lead smelters. Prior to 1978, mobile emissions were the primary source of atmospheric lead. Between 1978 and 1987, the phase-out of leaded gasoline reduced the overall inventory of airborne lead by nearly 95 percent. With the phaseout of leaded gasoline, secondary lead smelters, battery recycling, and manufacturing facilities are becoming lead-emission sources of greater concern.

Prolonged exposure to atmospheric lead poses a serious threat to human health. Health effects associated with exposure to lead include gastrointestinal disturbances, anemia, kidney disease, and in severe cases, neuromuscular and neurological dysfunction. Of particular concern are low-level lead exposures during infancy and childhood. Such exposures are associated with decrements in neurobehavioral performance including intelligence quotient performance, psychomotor performance, reaction time, and growth.

Valley Fever

Valley fever is an illness caused by a fungus found in the soil and dirt of some areas of the southwestern United States and in parts of Mexico and Central and South America. It can cause fever, chest pain, and coughing, among other signs and symptoms. In California, the fungus is found in many areas of the San Joaquin Valley (Central Valley).

The fungi's spores can be stirred into the air by anything that disrupts the soil, such as farming, construction, and wind. The fungi can then be breathed into the lungs and cause valley fever, also known as acute coccidioidomycosis. Mild cases of valley fever usually resolve on their own. In more severe cases, doctors prescribe antifungal medications that can treat the underlying infection.

San Bernardino County is not considered a highly endemic region for valley fever. A report prepared by the California Department of Public Health (CDPH) identified that only 85 of the 7,466 suspected, probable, and confirmed annual cases of coccidioidomycosis recorded for California in 2017 occurred in San Bernardino County (CDPH 2018).

AMBIENT AIR QUALITY

Ambient air quality for the project site can be determined from ambient air quality measurements conducted at nearby air quality monitoring stations. Existing levels of ambient air quality and historical trends in the region are documented by measurements made by the Mojave Desert Air Quality Management District (MDAQMD), the air pollution regulatory agency in the air basin that maintains air quality monitoring stations which process ambient air quality measurements.

The closest ambient air quality monitoring station to the project site that monitors ozone and airborne particulates is the Barstow monitoring station, at 225 East Mountain View Street in Barstow, approximately 11.7 miles to the west of the project site. **Table 3.3-1, Ambient Air Quality Monitoring Data**, summarizes the data from 2014 to 2016 and the number of days exceeding the ambient air quality standards.

Table 3.3-1:
Ambient Air Quality Monitoring Data

Pollutant	Pollutant Concentration and Standard	Maximum Concentration		
		2014	2015	2016
Ozone	Maximum 1-Hour Concentration (ppm)	0.094	0.090	0.089
	Number of Days > 0.09 ppm (State 1-Hour Standard)	0	0	0
	Maximum 8-Hour Concentration (ppm)	0.087	0.082	0.083
	Number of Days > 0.070 ppm (State 8-Hour Standard)	33	18	25
	Number of Days > 0.070 ppm (Federal 8-Hour Standard)	33	18	25
Nitrogen Dioxide	Maximum 1-Hour Concentration (ppm)	0.0693	0.0613	0.0667
	Number of Days > 0.18 ppm (State 1-Hour Standard)	0	0	0
	Number of Days > 0.10 ppm (Federal 1-Hour Standard)	0	0	0
	Annual Arithmetic Mean (ppm)	0.017	0.016	0.016
	Exceed 0.030 ppm? (State Annual Standard)	No	No	No
	Exceed 0.053 ppm? (Federal Annual Standard)	No	No	No
Carbon Monoxide	Maximum 1-Hour Concentration (ppm)	3.1	2.2	3.8
	Number of Days > 20 ppm (State 1-Hour Standard)	0	0	0
	Number of Days > 35 ppm (Federal 1-Hour Standard)	0	0	0
	Maximum 8-Hour Concentration (ppm)	2.6	0.6	1.2
	Number of Days > 9 ppm (State 8-Hour Standard)	0	0	0
	Number of Days > 9 ppm (Federal 8-Hour Standard)	0	0	0
Sulfur Dioxide	Maximum 1-Hour Concentration (ppb)	4.8	60.2	26.3
	Number of Days > 250 ppb (State 1-Hour Standard)	0	0	0
	Number of Days > 75 ppb (Federal 1-Hour Standard)	0	0	0
	Maximum 24-Hour Concentration (ppb)	NA	NA	NA
	Number of Days > 40 ppb (State 24-Hour Standard)	NA	NA	NA
Coarse Particulate Matter (PM_{10})	Maximum 24-Hour Concentration (μg/m^3)	305.8	155.2	246.9
	Number of Days > 50 μg/m^3 (State 24-Hour Standard)	1	1	2
	Number of Days > 150 μg/m^3 (Federal 24-Hour Standard)	NA	NA	NA
	Annual Arithmetic Mean (μg/m^3)	27.7	24.8	27.0
	Exceed 20 μg/m^3? (State Annual Standard)	Yes	Yes	Yes
Fine Particulate Matter ($PM_{2.5}$)	Maximum 24-Hour Concentration (μg/m^3)	24.1	50.2	41.5
	Number of Days > 35 μg/m^3 (Federal 24-Hour Standard)	0	1	1
	Annual Arithmetic Mean (μg/m^3)	NA	6.6	7.5
	Exceed 12 μg/m^3? (State Annual Standard)	NA	No	No
	Exceed 12 μg/m^3? (Federal Annual Standard)	NA	No	No

Source: HDR 2019
Notes: NA = not available; μg/m^3 = micrograms per cubic meter; ppm = parts per million; ppb = parts per billion

Table 3.3-2, Federal and State Ambient Air Quality Attainment Status, lists the attainment status for various pollutants in the Mojave Desert Air Basin. Areas that meet ambient air quality standards are classified as attainment areas, while areas that do not meet these standards are classified as nonattainment areas. Areas for which there is insufficient data available are designated unclassified. As shown in **Table 3.3-2**, the project site is a federal nonattainment area for O_3 and PM_{10} and a state nonattainment area for O_3, PM_{10}, and $PM_{2.5}$.

Table 3.3-2:
Federal and State Ambient Air Quality Attainment Status

Pollutant	Federal	State
Ozone (O_3)	Nonattainment	Nonattainment
Nitrogen Dioxide (NO_2)	Unclassified/Attainment	Attainment
Carbon Monoxide (CO)	Attainment	Attainment
Sulfur Dioxide (SO_2)	Unclassified/Attainment	Attainment
Coarse Particulate Matter (PM_{10})	Nonattainment	Nonattainment
Fine Particulate Matter ($PM_{2.5}$)	Unclassified/Attainment	Nonattainment

Source: HDR 2019

TOXIC AIR CONTAMINANTS

A substance is considered toxic if it has the potential to cause adverse health effects in humans, including increasing the risk of cancer upon exposure, or acute and/or chronic noncancer health effects. A toxic substance released into the air is considered a toxic air contaminant (TAC). Examples include certain aromatic and chlorinated hydrocarbons, certain metals, and asbestos. TACs are generated by a number of sources, including stationary sources such as dry cleaners, gas stations, combustion sources, and laboratories; mobile sources such as automobiles; and area sources such as landfills.

Adverse health effects associated with exposure to TACs may include carcinogenic (i.e., cancer-causing) and noncarcinogenic effects. Noncarcinogenic effects typically affect one or more target organ systems and may be experienced either on short-term (acute) or long-term (chronic) exposure to a given TAC. The California Air Resources Board (CARB) has identified diesel engine exhaust particulate matter as the predominant TAC in California. Diesel particulate matter (DPM) is emitted into the air by diesel-powered mobile vehicles, including heavy-duty diesel trucks, construction equipment, and passenger vehicles. Certain reactive organic gases may also be designated as TACs.

REGULATORY FRAMEWORK

FEDERAL

Clean Air Act

The federal Clean Air Act (CAA), which was initially established by the US Congress in 1970 and substantially revised in 1977 and 1990, can be found in Title 42, Chapter 85 of the United States

Code. An important aspect of the CAA is its requirement for the US Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS). There are NAAQS in place for seven "criteria" pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particle pollution—further defined as particles having diameters equal to or less than 10 micrometers (PM_{10}) and particles having diameters equal to or less than 2.5 micrometers ($PM_{2.5}$)—and sulfur dioxide. Standards are classified as primary and secondary. Primary standards are designed to protect public health, including sensitive individuals, such as children and the elderly, whereas secondary standards are designed to protect public welfare, such as visibility and crop or material damage. The EPA sets the NAAQS based on a process that involves science policy workshops, a risk/exposure assessment (REA) that draws on the information and conclusions of the science policy workshops to development quantitative characterizations of exposures and associated risks to human health or the environment, and a policy assessment by EPA staff that bridges the gap between agency scientific assessments and the judgments required of the EPA administrator, who then takes the proposed standards through the federal rulemaking process.[1]

The Clean Air Act requires the EPA to routinely review and update the NAAQS in accordance with the latest available scientific evidence. For example, the EPA revoked the annual PM_{10} standard in 2006 due to a lack of evidence linking health problems to long-term exposure to PM_{10} emissions. The 1-hour standard for O_3 was revoked in 2005 in favor of a new 8-hour standard that is intended to better protect public health.

CAA Section 182(e)(5) allows the EPA administrator to approve provisions of an attainment strategy in an extreme area that anticipates development of new control techniques or improvement of existing control technologies if the state has submitted enforceable commitments to develop and adopt contingency measures to be implemented if the anticipated technologies do not achieve planned reductions.

Nonattainment areas that are classified as "serious" or "worse" are required to revise their air quality management plans to include specific emission reduction strategies to meet interim milestones in implementing emission controls and improving air quality. The EPA can withhold certain transportation funds from states that fail to comply with the planning requirements of the act. If a state fails to correct these planning deficiencies within two years of federal notification, the EPA is required to develop a Federal Implementation Plan for the identified nonattainment area or areas.

1 EPA, 2017. Available at https://www.epa.gov/criteria-air-pollutants/process-reviewing-national-ambient-air-quality-standards.

STATE

California Clean Air Act

The California Clean Air Act of 1988 requires all air pollution control districts in the state to aim to achieve and maintain state ambient air quality standards for O_3, CO, and NO_2 by the earliest practical date and to develop plans and regulations specifying how the districts will meet this goal. There are no planning requirements for the state PM_{10} standard. CARB, which became part of the California Environmental Protection Agency in 1991, is responsible for meeting state requirements of the federal Clean Air Act, administrating the California Clean Air Act, and establishing the California Ambient Air Quality Standards (CAAQS). The California Clean Air Act, amended in 1992, requires all air districts in the state to endeavor to achieve and maintain the CAAQS. The CAAQS are generally stricter than national standards for the same pollutants, but there is no penalty for nonattainment. Similar to the federal process, the standards for the CAAQS are adopted after review by CARB staff of the scientific literature produced by agencies such as the Office of Environmental Health Hazard Assessment (OEHHA), the Air Quality Advisory Committee, which is comprised of experts in health sciences, exposure assessment, monitoring methods, and atmospheric sciences appointed by the Office of the President of the University of California, and public review and comment.[2]

State Implementation Plans

An important component of the MDAQMD's air quality planning strategy is contained in the State Implementation Plan (SIP) for the State of California. The federal Clean Air Act requires all states to submit a SIP to the EPA. This statewide SIP is often referred to as an "infrastructure" SIP. Infrastructure SIPs are administrative in nature and describe the authorities, resources, and programs a state has in place to implement, maintain, and enforce the federal standards. It does not contain any proposals for emission control measures.

In addition to infrastructure SIPs, the Clean Air Act requires submissions of SIPs for areas that are out of compliance with the NAAQS. These area attainment SIPs are comprehensive plans that describe how an out-of-compliance area will attain and maintain the particular NAAQS standard(s) it does not conform to. Once an out-of-compliance area has attained the standard in question, a maintenance SIP is required for a period of time to ensure the area will continue to meet the standard.

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[2] ARB, 2009. Available at https://www.arb.ca.gov/research/aaqs/ozone-rs/ozone-rs.htm, https://www.arb.ca.gov/research/aaqs/std-rs/std-rs.htm, and https://www.arb.ca.gov/research/aaqs/no2-rs/no2-rs.htm.

State Implementation Plans are not single documents. They are a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, state regulations, and federal controls. Many of California's SIPs rely on the same core set of control strategies, including emission standards for cars and heavy trucks, fuel regulations, and limits on emissions from consumer products. State law makes CARB the lead agency for all purposes related to SIPs. Local air districts and other agencies prepare SIP elements and submit them to CARB for review and approval. CARB forwards those revisions to the EPA for approval and publication in the Federal Register.

LOCAL

Mojave Desert Air Quality Management District

The MDAQMD has primary responsibility for controlling emissions from stationary sources of air pollution within its jurisdiction. The MDAQMD is responsible for monitoring air quality and for planning, implementing, and enforcing programs designed to attain and maintain federal and state ambient air quality standards. The MDAQMD has developed the following plans:

- 2016 8-Hour Ozone SIP: Western Mojave Desert Nonattainment Area
- 2015 8-Hour Ozone Reasonably Available Control Technology (RACT) SIP Analysis: Mojave Desert Air Quality Management District
- Mojave Desert AQMD 1995 Mojave Desert Planning Area Federal PM10 Attainment Plan

The MDAQMD has adopted rules to limit air emissions. Many of these rules were put in place as required by measures specified in various SIPs and air quality management plans. The MDAQMD rules that are applicable to the project are:

- **Rule 401 – Visible Emissions**. This rule prohibits discharges of air contaminants or other material, which are as dark or darker in shade as that designated No. 1 on the Ringelmann Chart.
- **Rule 402 – Nuisance**. This rule prohibits the discharge of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public.
- **Rule 403 – Fugitive Dust**. The purpose of this rule is to control the amount of PM entrained in the atmosphere from manmade sources of fugitive dust. The rule prohibits emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area to be visible beyond the emission source's property line.

- **Rule 403.2 – Fugitive Dust Control for the Mojave Desert Planning Area**. This rule requires reasonable precautions be taken to minimize dust during construction and operational activities and prevent track out upon public roadways. These measures may include, adding freeboard to haul vehicles, covering loose material on haul vehicles, watering, using chemical stabilizers and/or ceasing all activities (such as during periods of high winds). In addition, a Dust Control Plan (DCP) would need to be submitted to MDAQMD describing the dust control measures that will be implemented.

San Bernardino County General Plan

The County's General Plan Conservation Element includes the following countywide and Desert Region goals and policies pertaining to air quality in the project area:

GOAL CO 4 The County will ensure good air quality for its residents, businesses, and visitors to reduce impacts on human health and the economy.

Policy CO 4.1 Because developments can add to the wind hazard (due to increased dust, the removal of wind breaks, and other factors), the County will require either as mitigation measures in the appropriate environmental analysis required by the County for the development proposal or as conditions of approval if no environmental document is required, that developments in areas identified as susceptible to wind hazards to address site-specific analysis of:

a. Grading restrictions and/or controls on the basis of soil types, topography or season.

b. Landscaping methods, plant varieties, and scheduling to maximize successful revegetation.

c. Dust-control measures during grading, heavy truck travel, and other dust generating activities.

Policy D/CO 1.4 Reduce disturbances to fragile desert soils as much as practicable in order to reduce fugitive dust. The County shall consider the following in the development of provisions to limit clearing.

a. Parcels of one acre or larger shall not be disturbed or cleared of natural vegetation unless for the installation of building pads, driveways, landscaping, agriculture or other reasonable uses associated with the primary use of the land, including fire clearance areas.

b. Fire abatement or local clean-up efforts shall be accomplished by mowing or means other than land scraping whenever possible to minimize fugitive dust and windblown sand. When de-brushing or blading is considered the most feasible alternative, additional methods shall be required for erosion control.

c. The County Office of Building and Safety may issue permits for further grading or clearance of vegetation subject to proper review.

Policy D/CO 1.7 Encourage and educate the public to maintain properties in a manner to minimize fugitive dust.

San Bernardino County Development Code

Development Code Section 83.01.040 (pertaining to construction air quality) will apply to the construction phase of the project. Relevant provisions of the section are listed below.

(c) Diesel Exhaust Emissions Control Measures. The following emissions control measures shall apply to all discretionary land use projects approved by the County on or after January 15, 2009:

(1) On-Road Diesel Vehicles. On-road diesel vehicles are regulated by the State of California Air Resources Board.

(2) Off-Road Diesel Vehicle/Equipment Operations. All business establishments and contractors that use off-road diesel vehicle/equipment as part of their normal business operations shall adhere to the following measures during their operations in order to reduce diesel particulate matter emissions from diesel-fueled engines:

(A) Off-road vehicles/equipment shall not be left idling on site for periods in excess of five minutes. The idling limit does not apply to:

(I) Idling when queuing;

(II) Idling to verify that the vehicle is in safe operating condition;

(III) Idling for testing, servicing, repairing or diagnostic purposes;

(IV) Idling necessary to accomplish work for which the vehicle was designed (such as operating a crane);

(V) Idling required to bring the machine system to operating temperature; and

(VI) Idling necessary to ensure safe operation of the vehicle.

(B) Use reformulated ultra-low-sulfur diesel fuel in equipment and use equipment certified by the U.S. Environmental Protection Agency (EPA) or that pre-dates EPA regulations.

(C) Maintain engines in good working order to reduce emissions.

(D) Signs shall be posted requiring vehicle drivers to turn off engines when parked.

(E) Any requirements or standards subsequently adopted by the South Coast Air Quality Management District, the Mojave Desert Air Quality Management District or the California Air Resources Board.

(F) Provide temporary traffic control during all phases of construction.

(G) On-site electrical power connections shall be provided for electric construction tools to eliminate the need for diesel-powered electric generators, where feasible.

(H) Maintain construction equipment engines in good working order to reduce emissions. The developer shall have each contractor certify that all construction equipment is properly serviced and maintained in good operating condition.

(I) Contractors shall use ultra-low sulfur diesel fuel for stationary construction equipment as required by Air Quality Management District (AQMD) Rules 431.1 and 431.2 to reduce the release of undesirable emissions.

(J) Substitute electric and gasoline-powered equipment for diesel-powered equipment, where feasible.

Development Code Section 84.29.035 (Required Findings for Approval of a Commercial Solar Energy Facility) includes the following requirements relevant to fugitive dust emissions:

(c) The finding of fact shall include the following:

(20) The proposed commercial solar energy generation facility will be designed, constructed, and operated so as to minimize dust generation, including provision of sufficient watering of excavated or graded soil during construction to prevent excessive dust. Watering will occur at a minimum of three (3) times daily on disturbed soil areas with active operations, unless dust is otherwise controlled by rainfall or use of a dust palliative, or other approved dust control measure.

(21) All clearing, grading, earth moving, and excavation activities will cease during period of winds greater than 20 miles per hour (mph), averaged over one hour, or when dust

plumes of 20 percent or greater opacity impact public roads, occupied structures, or neighboring property, and in conformance with AQMD regulations.

(22) For sites where the boundary of a new commercial solar energy generation facility will be located within one-quarter mile of a primary residential structure, an adequate wind barrier will be provided to reduce potentially blowing dust in the direction of the residence during construction and ongoing operation of the commercial solar energy generation facility.

(23) Any unpaved roads and access ways will be treated and maintained with a dust palliative or graveled or treated by another approved dust control Chapter 83.09 of the Development Code.

(24) On-site vehicle speed will be limited to 15 mph.

IMPACT ANALYSIS AND MITIGATION MEASURES

THRESHOLDS FOR DETERMINATION OF SIGNIFICANCE

A project would result in a significant impact if it would:

- 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.
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

PROJECT IMPACTS AND MITIGATION

CONFLICT WITH APPLICABLE AIR QUALITY MANAGEMENT PLAN

Impact 3.3-1	**The project could conflict with or obstruct implementation of the applicable air quality plan. Impacts would be significant and unavoidable.**

A project is nonconforming with an air quality plan if it conflicts with or delays implementation of any applicable attainment or maintenance plan. A project is conforming if it complies with all applicable MDAQMD rules and regulations, complies with all proposed control measures, and is consistent with the growth forecasts in the applicable plan. Zoning changes, specific plans, general plan amendments, and similar land use plan changes which do not increase dwelling unit density, do not increase vehicle trips, and do not increase vehicle miles traveled are also deemed to comply with the applicable air quality plan.

The proposed project is consistent with the land uses identified in the San Bernardino County General Plan for the project site; therefore, implementation of the project would not require an amendment to the General Plan. However, as discussed under Impact 3.3-2 below, project construction would exceed MDAQMD thresholds for PM_{10}, and $PM_{2.5}$, even with mitigation incorporated; refer to **Table 3.3-5, Mitigated Construction Emissions by Stage (Pounds per Day)**. Therefore, although the project is consistent with the General Plan, it is not consistent with the Western Mojave Desert Air Quality Management Plans (AQAP) because it would delay AQAP attainment goals.

Mitigation measure **AIR-1** would reduce air quality impacts by requiring implementation of a County approved Air Quality Construction Management Plan that outlines required fugitive dust control measures. Mitigation measure **AIR-2** would reduce air quality impacts by requiring compliance with the US Environmental Protection Agency's final Tier 4 exhaust emission standards. However, such mitigation would not reduce impacts to a less than significant level. Therefore, this impact is considered significant and unavoidable. The effects on the environment from this significant impact are discussed further in Impact 3.3-2.

Mitigation Measures:

AIR-1 Prior to the issuance of grading permits, the project applicant shall submit an Air Quality Construction Management Plan to the County for review and approval. The plan shall describe the fugitive dust control measures which would be implemented and monitored at all locations of proposed project construction. The plan shall comply with the mitigation measures described in the Fugitive Dust Control Rules enforced by the Mojave Desert Air Quality Management District (MDAQMD) (Rules 403 and 403.2), San Bernardino County Development Code Sections 83.01.040 and 84.29.035, as well as the existing State Implementation Plan available for PM_{10} and $PM_{2.5}$. The plan shall be incorporated into all contracts and contract specifications for construction work. The plan shall outline the steps to be taken to minimize fugitive dust generated by construction activities by:

- Describing each active operation that may result in the generation of fugitive dust.
- Identifying all sources of fugitive dust, e.g., earthmoving, storage piles, vehicular traffic.

- Describing the control measures to be applied to each of the sources identified. The descriptions shall be sufficiently detailed to demonstrate that the best available control measures required by air districts for solar projects are used.

- Providing the following control measures, in addition to or as listed in the applicable rules, but not limited to:

    - Manage and limit disturbance of ground surfaces from vehicle traffic, excavation, grading, vegetation removal, or other activities to lower the potential for soil detachment and reduce dust transport. Only trim vegetation (mow and roll) in areas where solar panels will be installed, rather than remove vegetation entirely (clear and grub) followed by excavation or grading where feasible. This process lessens the level of ground disturbance and leaves the root system in place for quicker regeneration of vegetative cover.

    - Maintenance and access vehicular roads and parking areas shall be stabilized with water, chemicals or gravel or asphaltic pavement sufficient to minimize visible fugitive dust from vehicular travel and wind erosion and comply with MDAQMD Rule 403.2. Actions, including sweeping sealed roads, use of stabilized construction/facility entrances, and, if needed, using one or more entrance/exit vehicle tire wash apparatuses, shall be taken to prevent project-related track-out. Any project-related track-out must be cleaned within 24 hours.

    - All perimeter fencing, as applicable, shall be wind fencing or the equivalent, to a minimum of 4 feet of height or the top of all perimeter fencing. The owner/operator shall maintain the wind fencing as needed to keep it intact and remove windblown dropout. Strategically placed wind barrier fencing, to be constructed as part of the construction and operation phases (in locations shown in **Exhibit 3.3-1, Wind Fence Locations**) would be maintained to minimize dust blowing in the direction of the adjacent residences or the Barstow-Daggett Airport.

    - Use natural vegetation to stabilize disturbed or otherwise unstable surfaces to the extent feasible. A water truck shall be used to maintain most disturbed surfaces and to actively spread water during visible dusting episodes to minimize visible fugitive dust and limit emissions to 20 percent opacity in areas where grading occurs, within the staging areas, and on any unpaved roads. For projects with exposed sand or fines deposits (and for projects that expose such soils through earthmoving), chemical stabilization or covering with a stabilizing layer of gravel may be required to eliminate visible dust/sand from sand/fines deposit, if water application does not achieve stabilization. Other controls could include application of hydromulch (with seed for re-establishment of vegetation), application of soil binders, or even the use of soil cement for particularly unstable areas.

  - Minimize the idling time of diesel-powered construction equipment to two minutes, except in extreme heat events where workers require conditioned air to avoid health and safety issues.
  - All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
  - On-site vehicle speed shall be limited to 15 miles per hour.
  - The following signage shall be erected not later than the commencement of construction:

    A minimum 48-inch-high by 96-inch-wide sign containing the following information shall be located within 50 feet of each project site entrance, meeting the specified minimum text height, black text on white background, on 1-inch A/C laminated plywood board, with the lower edge between 6 and 7 feet above grade, with the contact name of a responsible official for the site and a local or toll-free number that is accessible 24 hours per day.

    "Site Name" (4-inch text)
    "Project Name/Project Number" (4-inch text)
    IF YOU SEE DUST COMING FROM THIS PROJECT, CALL: (4-inch text)
    [Contact Name]. PHONE NUMBER: XXX-XXX-XXXX (6-inch text)
    IF YOU DO NOT RECEIVE A RESPONSE, PLEASE CALL the MDAQMD
    at 1-800-635-4617. (3-inch text)

- The project applicant or its designated representative shall obtain prior approval from the MDAQMD prior to any deviations from fugitive dust control measures specified in the approved Air Quality Construction Management Plan. A justification statement used to explain the technical and safety reason(s) for the substitute dust control measures required shall be submitted to the appropriate agency for review.

- The provisions of the Air Quality Construction Management Plan shall also apply to project decommissioning activities.

AIR-2 All off-road construction equipment shall comply with the US Environmental Protection Agency's final Tier 4 exhaust emission standards.

Level of Significance: Significant and unavoidable (construction phase only).

VIOLATE AN AIR QUALITY STANDARD

Impact 3.3-2 **The project could violate air quality standards and contribute substantially to an existing or projected air quality violation. Impacts would be significant and unavoidable.**

The project involves the construction and operation of a large-scale, solar photovoltaic electricity generation and energy storage facility. Construction of the project would result in the temporary addition of pollutants to the local air basin caused by on- and off-site sources. Operation of the project would generate emissions from mobile sources, including vehicle trips from employees commuting to work and maintenance vehicles. A project impact would result in a significant impact if it exceeds the MDAQMD thresholds listed in **Table 3.3-3, MDAQMD Air Quality Thresholds of Significance**.

Table 3.3-3:
MDAQMD Air Quality Thresholds of Significance

Pollutant	Annual Threshold (tons)	Daily Threshold (pounds)
Carbon Monoxide (CO)	100	548
Oxides of Nitrogen (NO_x)	25	137
Oxides of Sulfur (SO_x)	25	137
Particulate Matter (PM_{10})	15	85
Particulate Matter ($PM_{2.5}$)	12	65
Reactive Organic Gases/Volatile Organic Compounds (ROG / VOC)	25	137

Source: HDR 2019

CONSTRUCTION

The proposed project is expected to be constructed in three phases. Within each development phase, the construction activities are separated into three different stages: site clearing and preparation, solar panel installation and constructing electrical components, and finally the activities involved in electrification of the facility. The construction emissions of each stage were calculated using the equipment list and construction schedule contained in **Appendix D-1**. Because the same equipment and staging would be used for each phase of the proposed project, the peak emissions listed in **Table 3.3-4, Construction Emissions by Stage (Pounds per Day)**, are applicable to each phase. The peak day emissions shown in **Table 3.3-4** are calculated using the assumption that stages 1, 2, and 3 would occur simultaneously, and that construction of two of the three phases would overlap (Phases 1 and 2). Although the analysis assumes that construction of two of the three phases would overlap, construction of each phase also may occur separately. If construction of each phase occurs separately, the air quality impacts of the peak day would be less than reported in **Table 3.3-4**. **Table 3.3-4** shows the emissions for constructing Phases 1 and 2 over 27 months. Construction of Phase 3 will not occur simultaneously with Phases 1 and 2. Since Phase 3 will involve fewer acres and is only a 250 MW project, the emissions will be lower than those shown in **Table 3.3-4** and will occur over a separate 19-month period.

Table 3.3-4:
Construction Emissions by Stage (Pounds per Day)

Construction Stage	CO	ROG/VOC	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Stage 1	75.8	14.4	127.8	0.2	810.4	178.0
Stage 2	80.6	4.8	50.4	0.2	10.6	10.2
Stage 3	20.8	1.2	8.9	0.0	2.8	2.7
Peak Day	177.2	20.4	**187.1**	0.4	**823.8**	**190.9**
MDAQMD Threshold	548	137	137	137	82	65
Exceedance?	No	No	**Yes**	No	**Yes**	**Yes**

Source: HDR 2019

As shown in **Table 3.3-4**, peak daily construction emissions would exceed the MDAQMD's thresholds for NO_X, PM_{10}, and $PM_{2.5}$. Because the construction emissions would exceed the air district's thresholds, mitigation measures **AIR-1** and **AIR-2** are required to reduce the air quality impacts to the maximum extent feasible. Implementation of mitigation measures **AIR-1** and **AIR-2** would reduce air quality impacts from project construction by requiring implementation of an Air Quality Construction Management Plan and restricting exhaust emissions from off-road construction equipment, respectively.

Table 3.3-5, Mitigated Construction Emissions by Stage (Pounds per Day), lists the construction emissions after implementation of the mitigation measures. As shown, construction emissions would continue to exceed the thresholds for PM_{10}, and $PM_{2.5}$.

Table 3.3-5:
Mitigated Construction Emissions by Stage (Pounds per Day)

Construction Stage	CO	ROG/VOC	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Stage 1	17.1	4.8	82.2	0.2	402.0	86.0
Stage 2	68.7	3.3	40.0	0.2	9.0	8.7
Stage 3	17.8	0.7	7.5	0.0	2.2	2.2
Peak Day	103.6	8.8	129.7	0.4	413.2	96.9
MDAQMD Threshold	548	137	137	137	82	65
Exceedance?	No	No	No	No	Yes	Yes

Source: HDR 2019

The proposed project would be constructed in a nonattainment area for multiple pollutants. Therefore, emissions from project construction would contribute incrementally to existing exceedances of the air quality standards. As shown in **Table 3.3-5**, even with mitigation measures **AIR-1** and **AIR-2**, construction emissions would exceed the MDAQMD's thresholds. Therefore, the project's impacts during construction would be considered significant and unavoidable.

OPERATION

Because the project would have no major stationary emissions sources and a relatively low number of employees traveling to the facility site, operation of the proposed project would result in substantially lower emissions than project construction. **Table 3.3-6, Operational Emissions (Pounds per Day)**, lists the average daily operation emissions associated with the on-site maintenance equipment and employee commutes.

Table 3.3-6:
Operational Emissions (Pounds per Day)

Emission Source	CO	ROGs	NO_x	SO_x	PM_{10}	$PM_{2.5}$
On-Road Source	3.2	0.1	0.5	0.0	0.4	0.2
Off-Road Source	0.4	0.0	0.1	0.0	0.0	0.0
Maintenance Equipment	4.0	0.8	14.6	0.0	0.3	0.3
Total	7.5	0.9	15.1	0.0	0.7	0.4
MDAQMD Threshold	548	137	137	137	82	65
Exceedance	No	No	No	No	No	No

Source: HDR 2019

As shown, operational emissions would not exceed the MDAQMD thresholds. Therefore, impacts from operations would be less than significant and no mitigation measures are required.

CRITERIA POLLUTANTS AND HEALTH IMPACTS

A number of adverse health impacts have been associated with exposure to PM_{10}. Short-term exposures to PM_{10} have been associated primarily with worsening of respiratory diseases, including asthma and chronic obstructive pulmonary disease, leading to hospitalization and emergency department visits. The effects of long-term exposure to PM_{10} are less clear, although several studies suggest a link between long-term PM_{10} exposure and respiratory mortality. The International Agency for Research on Cancer (IARC) published a review in 2015 that concluded that particulate matter in outdoor air pollution causes lung cancer.[3]

A number of adverse health impacts have been associated with exposure to both $PM_{2.5}$. Short-term exposures to $PM_{2.5}$ (up to 24-hour duration) have been associated with premature mortality, increased hospital admissions for heart or lung causes, acute and chronic bronchitis, asthma attacks, emergency room visits, respiratory symptoms, and restricted activity days. These adverse health effects have been reported primarily in infants, children, and older adults with preexisting heart or lung diseases. Long-term (months to years) exposure to $PM_{2.5}$ has been linked to premature death, particularly in people who have chronic heart or lung diseases, and reduced lung function growth in children.[4]

Health endpoints associated with increased $PM_{2.5}$ levels include increased acute myocardial infarction (i.e., heart attack), asthma-induced hospital admission, asthma-induced emergency room visits, asthma exacerbation, lower respiratory symptoms, upper respiratory symptoms, premature mortality from lung cancer, and premature mortality from ischemic heart disease. Health impacts from PM_{10} include those of $PM_{2.5}$ (since $PM_{2.5}$ is a subset of PM_{10}), but generally are less severe than $PM_{2.5}$.

Mitigated construction emissions are presented in **Table 3.3-5** and show that peak daily construction emissions for PM_{10} and $PM_{2.5}$ exceed the daily significance thresholds, shown in **Table 3.3-3**. Specifically, the peak daily emissions of PM_{10} are 414 lb/day which is approximately 5 times the daily threshold of 82 lb/day. The peak daily emissions of $PM_{2.5}$ are 98 lb/day which is approximately 1.5 times the daily threshold of 65 lb/day. The peak daily emissions represent a worst-case scenario in which Phases 1 and 2 overlap and when Stages 1, 2, and 3 of each phase occur simultaneously. As stated before, if Phases 1 and 2 do not overlap, then the emissions would be less than reported in **Table 3.3-5**. Also, the peak daily emissions are not expected to

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3 CARB, Inhalable Particulate Matter and Health ($PM_{2.5}$ and PM_{10}), available at https://www.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm.

4 Ibid.

occur every day during construction. Rather, they represent the maximum emissions that may occur during a given day of construction and it is anticipated that such conditions would only be reached on an intermittent basis.

Potential health impacts resulting from construction emissions from the project would be minimal. First, construction activities are temporary and the emissions from construction activities would end once construction of the project is complete. Phases 1 and 2 are assumed to be concurrent over 27 months, a little over two years. Phase 3 would occur after Phases 1 and 2 and would be over 19 months. In total, the construction duration would be roughly 46 months or just under four years. Therefore, any health impacts associated with construction emissions would be limited to the construction period.

Second, while the peak daily emissions exceed the daily significance thresholds for PM_{10} and $PM_{2.5}$, the annual emissions over 46 months do not exceed the annual significance thresholds. In fact, the annual emissions are well below the significance thresholds. Annualized emissions for PM_{10} and $PM_{2.5}$ are 2 and 1.9 tons per year, respectively, while the annual thresholds are 15 and 12 tons per year, respectively.[5] The peak daily emissions would potentially exceed daily significance thresholds for the length of construction during the week but would not exceed the thresholds every day or on the weekend days when construction activities are not occurring.

Third, in comparison to other published studies in California where health impacts are evaluated, the project's construction emissions would be less than those in the published studies. It is important to note that emissions are not proportional to health effects. In 2011, the South Coast Air Quality Management District (SCAQMD) prepared a study for their Rule 1315.[6] In that study, they analyzed the operational emissions from three proposed large power plants (in the range of 500 - 850 megawatts of electricity). Operational $PM_{2.5}$ emissions ranged from 723 to 1,819 lbs/day and PM_{10} emissions ranged from 731 to 1,837 lbs/day from each power plant. In the study, they estimated 0.05 to 1.77 annual premature deaths due to the power plants. In comparison, the project's construction emissions are 23 - 57% of the PM_{10}, and 5 - 14% of the $PM_{2.5}$ emissions of the SCAQMD study. Moreover, as mentioned previously, the Project's construction emissions are temporary, in contrast to the ongoing, daily operations of the three power plants that would occur for the life of the power plants (about 35 years). The health

5 Annualized emissions are calculated by dividing the total emissions by the duration of 27 months and multiplying by 12 months (i.e., one year).

6 SCAQMD. 2011. Final Program Environmental Assessment for: Re-Adoption of Proposed Rule 1315 – Federal New Source Review Tracking System. January 7. Available at: http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2011/2011-feb4-026.pdf (see Attachment G).

impacts are anticipated to be much lower than that was shown in the SCAQMD study due to much lower emissions and the temporary nature of construction.

MDAQMD currently has no guidance on evaluating potential human health impacts associated with criteria air pollutants. The SCAQMD, another air district in Southern California covering an air basin near the project, is forming a working group to develop a methodology for quantifying the health effects of criteria pollutants but has no current guidance regarding how to effectively evaluate the estimated health effects of criteria air emissions.

As described above, the project will exceed MDAQMD standards on a temporary basis during days of peak emissions in the construction phase. During the operational phase, the project will result in air quality benefits because, as a renewable energy project, it creates electricity without burning fossil fuel. In light of state goals to rely solely on carbon-free energy sources by 2045, the project likely would replace energy that otherwise would be generated from a fossil fuel burning source, thereby reducing overall air emissions and contributing a net positive impact on human health during the life of the project.

Additional health impact data is provided below under **Impact 3.3-3**, which examines health risks on nearby sensitive receptors from diesel particulate matter, the primary source of particulate matter emitted during construction.

Mitigation Measures: Implement mitigation measures **AIR-1** and **AIR-2.**

Level of Significance: Significant and unavoidable (construction phase only).

EXPOSE SENSITIVE RECEPTORS TO SUBSTANTIAL POLLUTANT CONCENTRATIONS

Impact 3.3-3	**The project could expose sensitive receptors to substantial pollutant concentrations. Impacts would be less than significant with mitigation.**

CONSTRUCTION IMPACTS

Toxic Air Contaminants (TACs)

Project construction would result in emissions of diesel particulate matter (DPM) from heavy-duty construction equipment and trucks (e.g., water trucks and haul trucks) operating in the project study area. More than 90 percent of DPM is a subset of $PM_{2.5}$.

CARB characterizes DPM as a toxic air contaminant (TAC). The Office of Environmental Health Hazard Assessment (OEHHA) has identified carcinogenic and chronic noncarcinogenic effects from long-term (chronic) exposure. For construction activities, the primary hazard is DPM emissions from construction equipment (e.g., excavators, bulldozers, backhoes, graders, etc.)

and vehicles associated with construction of the Project. DPM is a complex mixture of chemicals and particulate matter with potential cancer and chronic non-cancer effects. Although other exposure pathways exist (i.e., ingestion, dermal contact), the inhalation pathway is the dominant exposure pathway from DPM for both cancer risk and chronic non-cancer health effects.[7] Therefore, only the inhalation cancer and chronic non-cancer effects of diesel exhaust are evaluated for the health impacts from construction activities.

Several farms and rural residences are located in close proximity to the proposed construction areas. Therefore, a human risk assessment (HRA) was conducted to assess the risk associated with the construction emissions. The Office of Environmental Health Hazard Assessment (OEHHA) has determined that the health risk from DPM is only of a concern for cancer and chronic non-cancer health effects, and potential acute (short-term) non-cancer health effects are not a concern. Therefore, the HRA focuses on the risk for cancer and chronic non-cancer health impacts from project construction.

Cancer risks are calculated for the project's DPM emissions during construction and summed to calculate the overall increase in cancer risk to an individual. The calculation procedure assumes that cancer risk is proportional to concentrations at any level of exposure and that risks from the Project's DPM and other TACs are additive.

Non-cancer health impacts from inhaled DPM is measure by the hazard quotient, which is the ratio of ambient concentration of a DPM in units of $\mu g/m^3$ divided by the reference exposure level (REL), also in $\mu g/m^3$. The inhalation REL is typically based on health effects to a particular target organ system, such as the respiratory system, liver, or central nervous system. Hazard quotients are then summed for each target organ system to obtain a hazard index.

The DPM emissions for all diesel trucks and associated construction equipment at the project site were estimated using the EPA's AERMOD v18081 air quality dispersion model. Project emissions were limited to the hours of 7 a.m. to 7 p.m. to simulate dispersion times of expected construction activities. Concentrations were calculated for a three-year annual average and listed in units of $\mu g/m^3$.

Cancer risk calculations were performed by multiplying the predicted annual DPM concentrations from AERMOD by the appropriate risk values. The exposure and risk equations that are used to calculate the cancer risk at residential, recreation, and school receptors are taken from the OEHHA Air Toxics Hot Spots Program Guidance Manual (OEHHA, 2015).

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[7] OEHHA, The Air Toxics Hot Spots Program Guidance for Preparation of Health Risk Assessments, August 2003.

Cancer risks were evaluated using the inhalation Cancer Potency Factor published by the OEHHA. The cancer risks were calculated using the "derived (adjusted) approach in the OEHHA risk assessment manual. The cancer potency factor for DPM is 1.1 per milligram per kilogram of body weight per day.

A chronic hazard index is calculated by dividing the annual average concentration of a toxic pollutant by the chronic REL for that pollutant. For DPM, the chronic REL is 5.0.

Table 3.3-7, Modeled Cancer Risks and Chronic Hazard Indexes, identifies the modeled annual average DPM concentration, and the associated cancer risks and chronic hazard index, at the closest land uses to the project site. **Exhibit 3.3-2, Air Quality Modeling Locations**, shows the modeling locations (ML) of sensitive receptors relative to the project site.

Table 3.3-7:
Modeled Cancer Risks and Chronic Hazard Indexes

Receptor	Land Use Type	Modeled Annual Concentrations (μg/m^3)	Cancer Risks (per million)	Chronic Hazard Index
ML-1	Residential	0.00030	0.1	0.00006
ML-2	Residential	0.00251	0.7	0.00050
ML-3	Residential	0.00095	0.3	0.00019
ML-4	Residential	0.00364	1.1	0.00073
ML-5	Residential	0.00138	0.4	0.00028
ML-6	Residential	0.00444	1.3	0.00089
ML-7	Residential	0.00032	0.1	0.00006
ML-8	Residential	0.00314	0.9	0.00063
		Thresholds	10	1.0

Source: HDR 2019

As shown in **Table 3.3-7**, the peak cancer risks during construction would be less than the threshold of 10 in 1 million. In addition, the chronic hazard indexes would be less than the threshold of 1.0. Therefore, project construction would not expose sensitive receptors to substantial TAC pollutant concentrations that would have significant health impacts related to increased cancer and non-cancer chronic health risks.

OPERATIONAL IMPACTS

Emissions generated by daily maintenance activities would be below the MDAQMD thresholds, which are set forth in **Table 3.3-3**. Therefore, project operations would not expose sensitive receptors to substantial pollutant concentrations.

Urban Heat Island Effect

As urban areas are developed, changes to the landscape can cause areas to become warmer than rural surrounding areas, forming an "island" of higher temperatures. The key to understanding urban heat islands is the concept of albedo, which is how much light bounces off a surface versus how much is absorbed. A pitch-black surface has an albedo of 0; a perfect mirror's albedo is 1. Every material used by people has an albedo between these two extremes.

In an urban heat island, dark surfaces absorb sunlight and immediately convert it to heat during the day. Light surfaces immediately reflect some of that light away, before it can become heat. Dark colored materials tend to retain heat, releasing it well after sunset, making the environment hotter for longer into the night than it otherwise would be.

When incoming light hits a solar panel at a shallow angle, it tends to reflect off the top surface and go back into space. As the angle of the sun changes, the solar panel will absorb more and more sunlight. At solar noon, the albedo of the solar panel is nearly 0 and all the sunlight is absorbed and converted into electric or heat energy. However, bare ground and soil absorbs the same amount of sunlight regardless of the solar angle. Consequently, the bare ground around a solar panel would absorb more heat over the course of a day than the solar panel does.

Therefore, development of the project would decrease surface temperatures and would not result in a heat island and impacts would be less than significant. Refer also to Attachment 5 of **Appendix H-3** for additional information pertaining to urban heat island effects.

Wind-Transported Materials

Wind direction in the area remains very consistent throughout the year, blowing essentially from the west to the east. Wind speeds range from 9 mph to 15 mph throughout the year, with higher wind speeds (more than 13-17 mph) occurring between April and June. Soils in the area are predominantly sand. The combination of warm temperatures, limited rainfall, and windy conditions results in aeolian processes. Aeolian processes involve the erosion, transportation, and deposition of sediments by the wind.

The Mojave River bed is one of the primary natural source areas adjacent to the project where materials could be picked up by winds and moved significant distances. Though the river's watershed is of significant size, at this location, the channel is still ephemeral and is dry for most of the year, so bed materials are available to winds of a certain velocity for movement. Additional source areas could include the agricultural lands adjacent to the project site, as well as the project site itself during construction.

Aeolian processes can result in two impacts: (1) the potential for air quality degradation and (2) physical impacts, including covering (burial) of facilities and equipment. Due to the local soil types with high sand texture content, and the common occurrence of windy conditions, airborne particles of a very fine size are a frequent occurrence under natural or disturbed conditions in the area. These particles pose a human health hazard due to the ease with which they can be inhaled.

The other potential impacts from winds and the materials they carry are the physical results from blowing sands primarily, but also from smaller-sized particles. Damage can occur from the impact of particles on surfaces, in effect a form of sand-blasting. Also, deposition of wind-transported materials can cause problems through burial of equipment or facilities (like roads) or even from the deposition of a coating of dust on a photovoltaic cell.

Wind erosion currently occurs at the project site, resulting in significant impacts to sensitive receptors. The wind erosion causes dust to move from the site to nearby receptors at residences where the airborne particulates can be inhaled by residents. Although impacts from wind-blown sand are not caused by the project, they could be exacerbated by the project's construction.

Mitigation measure **AIR-1** requires the project to develop an Air Quality Construction Management Plan with fugitive dust control measures that satisfy the requirements of MDAQMD's Rules 403 and 403.2, San Bernardino County Development Code Sections 83.01.040 and 84.29.035, and SIPs for PM_{10} and $PM_{2.5}$. Mitigation measure **AIR-1** addresses impacts during project construction and decommissioning and requires measures such as the installation of wind fencing; surface treatment on disturbed areas, roads and parking areas, as well as vehicle speed limits. Mitigation measure **AIR-3** requires the applicant to develop a Dust Control Plan to address impacts from project operation. Similar to mitigation measure **AIR-1**, mitigation measure **AIR-3** includes measures such as the installation of wind fencing (see **Exhibit 3.3-1, Wind Fence Locations**), surface treatments for areas where natural vegetation has been removed, as well as vehicle speed limits which would reduce air quality impacts during project operations. Implementation of these measures will reduce impacts related to wind-transported materials to less than significant**.**

VALLEY FEVER

Coccidioidomycosis, more commonly known as Valley Fever, is primarily a disease of the lungs caused by the spores of the *Coccidioides immitis* fungus. The spores can occur naturally in some soils and there is the potential that spores could be stirred up during excavation, grading, and earth-moving activities and inhaled into the lungs.

Valley Fever is endemic to the southwestern United States, so fugitive dust emissions from the proposed project could cause exposure to the spores. Reduction of the potential for exposure to dust and the spores can be accomplished by providing dust control, training, job hazard assessments, and personal protective respiratory equipment when appropriate (CDPH 2018).

The primary way to avoid Valley Fever is to limit exposure to the spores. During construction, operation, and decommissioning phases of the project, the implementation of mitigation measures **AIR-1** and **AIR-3** would provide significant control of fugitive dust emissions and limit the potential for exposure. Therefore, implementing mitigation measures **AIR-1** and **AIR-3** would reduce the exposure to Valley Fever to a less than significant level.

Mitigation Measures:

Implement mitigation measures **AIR-1** and **AIR-3.**

AIR-3 Prior to the issuance of grading or building permits, the project applicant shall develop a Dust Control Plan (DCP) per the requirements of MDAQMD Rule 403.2. The DCP shall comply with MDAQMD Rules 403 and 403.2 to control fugitive dust, including PM_{10}, by addressing objectives, key contacts, roles and responsibilities, dust sources, and control measures.

The DCP shall address the following sources:

- Project-created dust sources
- Disturbed surfaces
- Unstable surfaces
- Unpaved roads
- Paved roads
- Unspecified sources

To mitigate each of the sources identified above during facility operation, including post-closure of a facility, there are often multiple mitigation measures available that can feasibly mitigate impacts to less than significant levels. The DCP would include but not be limited to the following measures:

- **Limit Ground Disturbance.** Manage and limit disturbance of ground surfaces from vehicle traffic, excavation, grading, vegetation removal, or other activities to lower the potential for soil detachment and reduce dust transport. Only trim vegetation (mow and roll) in areas where solar panels will be installed, rather than remove vegetation entirely (clear and grub) followed by excavation or grading where feasible. This process lessens the level of ground disturbance and leaves the root system in place for quicker regeneration of vegetative cover.

- **Vegetation.** Use natural vegetation to stabilize disturbed or otherwise unstable surfaces to the extent feasible.
- **Wind Fencing.** Strategically placed wind barrier fencing shall be installed as part of the construction and operation phases (shown in **Exhibit 3.3-1, Wind Fence Locations**) and be maintained to minimize dust blowing in the direction of the adjacent residences or the Barstow-Daggett Airport. Wind barrier fencing should be inspected by the contractor no less than once quarterly and repaired or replaced as needed to maintain full functionality. Any accumulated sediment would be removed and either re-distributed onsite or transferred off-site for use or disposal elsewhere.
- **Surface Treatment.** Water trucks shall apply water and/or other controls to minimize the production of airborne dust, and limit emissions to 20 percent opacity in areas where grading occurs, within the staging areas, and on any unpaved roads used during project construction. Other controls could include application of hydromulch (with seed for re-establishment of vegetation), application of soil binders, or even the use of soil cement for particularly unstable areas.
- **Vehicle Speed Limits.** Vehicle speed shall be limited speeds to 15 mph. Speed limit signs shall be displayed prominently at all project/facility entrances.
- **Street Sweeping.** Sealed roads shall be swept as needed and track out opportunities limited through the use of stabilized construction/facility entrances or, if necessary, with one or more entrance/exit vehicle tire wash apparatuses.

Level of Significance: Less than significant with mitigation.

CREATE OBJECTIONABLE ODORS

Impact 3.3-4	The project would not create objectionable odors affecting a substantial number of people. Impacts would be less than significant.

Individual responses to odors are highly variable and can result in various effects, including psychological (i.e., irritation, anger, or anxiety) and physiological (i.e., circulatory and respiratory effects, nausea, vomiting, and headache). Generally, the impact of an odor results from a variety of interacting factors such as frequency, duration, offensiveness, location, and sensory perception.

The frequency is a measure of how often an individual is exposed to an odor in the ambient environment. The intensity refers to an individual's or group's perception of the odor strength or concentration. The duration of an odor refers to the elapsed time over which an odor is experienced. The offensiveness of the odor is the subjective rating of the pleasantness or unpleasantness of an odor. The location accounts for the type of area in which a potentially affected person lives, works, or visits; the type of activity they are engaged in; and the sensitivity of the impacted receptor.

CARB's (2005) Air Quality and Land Use Handbook identifies the sources of the most common odor complaints received by local air districts. Typical sources include facilities such as sewage treatment plants, landfills, recycling facilities, petroleum refineries, and livestock operations. The project does not contain any of the land uses identified as typically associated with emissions of objectionable odors.

Construction of the project could result in the emission of odors from construction equipment and vehicles (e.g., diesel exhaust). It is anticipated that these odors would be short term, limited in extent at any given time, and distributed throughout the project area during the duration of construction. Additionally, project operations would not involve activities with the potential for producing objectionable odors. Therefore, they would not affect a substantial number of individuals. This impact is considered less than significant.

Mitigation Measures: None required.

Level of Significance: Less than significant.

CUMULATIVE IMPACTS

Impact 3.3-5	The project could have a cumulatively considerable contribution to significant cumulative impacts related to air quality. Impacts would be significant and unavoidable.

Air pollution is largely a cumulative impact. The nonattainment status of regional pollutants is a result of past and present development, and the MDAQMD develops and implements plans for future attainment of ambient air quality standards. Based on these considerations, project-level thresholds of significance for criteria pollutants are relevant in the determination of whether the project's individual emissions would have a cumulatively significant impact on air quality. The MDAQMD significance thresholds take into account the cumulative impact of a project that adds emissions to the air basin. Therefore, this cumulative analysis considers all projects identified in **Table 3.0-1**, including the three solar projects located within ten miles of the proposed project; Minneola Solar,[8] Silver Valley, and Ned Araujo. Overall, the air quality emissions from the projects considered in this cumulative analysis along with the proposed project's construction emissions would increase to levels exceeding MDAQMD significance thresholds.

CONSTRUCTION IMPACTS

The Mojave Desert Air Basin is a nonattainment area for O_3, PM_{10}, and $PM_{2.5}$ under the NAAQS and/or CAAQS. The poor air quality in the basin is the result of cumulative emissions from motor vehicles, off-road equipment, commercial and industrial facilities, and other emissions sources. Projects that emit these pollutants or their precursors (i.e., VOC and NO_x for ozone) potentially contribute to poor air quality. The MDAQMD significance thresholds take into account the cumulative impact of a project that adds emissions to the entire air basin, in this case a basin already in nonattainment for several criteria. As indicated in **Table 3.3-5**, daily project construction emissions would exceed the MDAQMD significance thresholds, even with mitigation, resulting in a cumulatively significant contribution to the overall cumulative impact to the basin. Other projects included on the cumulative project list could similarly contribute to the overall cumulative air impact in the basin by further exceeding the MDAQMD thresholds.

Based on the fact that the basin is already in nonattainment for O_3, PM_{10}, and $PM_{2.5}$, and other similar projects that could result in emissions that further exceed the MDAQMD thresholds for these pollutants, construction of the project, along with the other projects identified in **Table 3.0-1**, could result in a cumulatively considerable increase in emissions of nonattainment pollutants. Therefore, cumulative construction impacts would be significant and the project's

8 The project application for Minneola Solar was withdrawn in January 2019.

contribution to these significant cumulative impacts would be cumulatively considerable. Implementation of mitigation measures **AIR-1** to **AIR-3** would reduce the project's incremental contribution to exceedances of the air quality standards. However, even with mitigation measures **AIR-1** and **AIR-2**, impacts as a result of project construction activities would remain significant and unavoidable.

Sensitive Receptors

As discussed above, a HRA was conducted to assess the risk associated with the project's DPM emissions during construction which are categorized as TAC pollutants. The Office of Environmental Health Hazard Assessment (OEHHA) has determined that the health risk from DPM is only of a concern for cancer and chronic non-cancer health effects, and potential acute (short-term) non-cancer health effects are not a concern.

The results of the HRA show that peak cancer risks during construction would be less than the threshold of 10 in 1 million. In addition, the chronic hazard indexes would be less than the threshold of 1.0. Therefore, project construction would not expose sensitive receptors to substantial TAC pollutant concentrations that would have significant health impacts related to increased cancer and non-cancer chronic health risks.

As it is unlikely that other projects considered in this cumulative analysis would be under construction at the same time as the project and the lack of any nearby existing sources of DPM with which the project's construction emissions could combine, the project's contribution to cumulative TAC pollutant concentrations would be less than significant.

Valley Fever

During construction and decommissioning of the project, implementation of mitigation measures **AIR-1** and **AIR-3** would provide control of fugitive dust emissions and limit the potential for exposure. In addition, other cumulative projects in the area would implement similar measures to reduce fugitive dust emissions and the potential of Valley Fever. Therefore, with implementation of mitigation measures **AIR-1** and **AIR-3,** the project's contribution to potential dust emissions that may result in the exposure to Valley Fever would be less than significant.

Odors

As noted above, construction of the project could result in the emission of odors from construction equipment and vehicles (e.g., diesel exhaust). It is anticipated that these odors would be short term, limited in extent at any given time, and distributed throughout the project area during the duration of construction. In light of the location of other projects that likely would be under construction at the same time as the project and the lack of any nearby existing sources of odors with which the project's construction emissions could combine, the project's contribution to cumulative orders would be less than cumulative considerable.

OPERATIONAL IMPACTS

Because the proposed project would have no major stationary emission sources, operation of the proposed solar farm would result in substantially lower emissions than project construction. The proposed facility does not burn fossil fuel to generate electricity and as a result does not produce a significant amount of emissions. Long-term operation of solar power generating facilities would result in a decrease of harmful emissions such as carbon dioxide, nitrogen dioxide, sulfur dioxide, mercury and particulates since it could replace fossil fuel-based energy production. In addition, the solar facility would replace agricultural uses that likely use fossil-fuel derived pesticides. Operation of the proposed project, along with projects identified in **Table 3.0-1** would not result in significant cumulative impacts. Cumulative operational impacts would be less than significant.

Valley Fever

During operation of the project, the implementation of mitigation measures **AIR-1** and **AIR-3** would provide significant control of fugitive dust emissions and limit the potential for exposure. In addition, other cumulative projects in the area would implement similar measures to reduce fugitive dust emissions and the potential of Valley Fever. Therefore, with implementation of mitigation measures **AIR-1** and **AIR-3,** the project's contribution to potential dust emissions that may result in the exposure to Valley Fever would be less than significant.

Odors

Project operations would not involve activities with the potential for producing objectionable odors and would not contribute to a significant cumulative impact relative to objectionable odor sources in the surrounding area. A less than significant cumulative impact would occur.

Mitigation Measures: Implement mitigation measures **AIR-1** through **AIR-3.**

Level of Significance: Significant and unavoidable (construction phase only).

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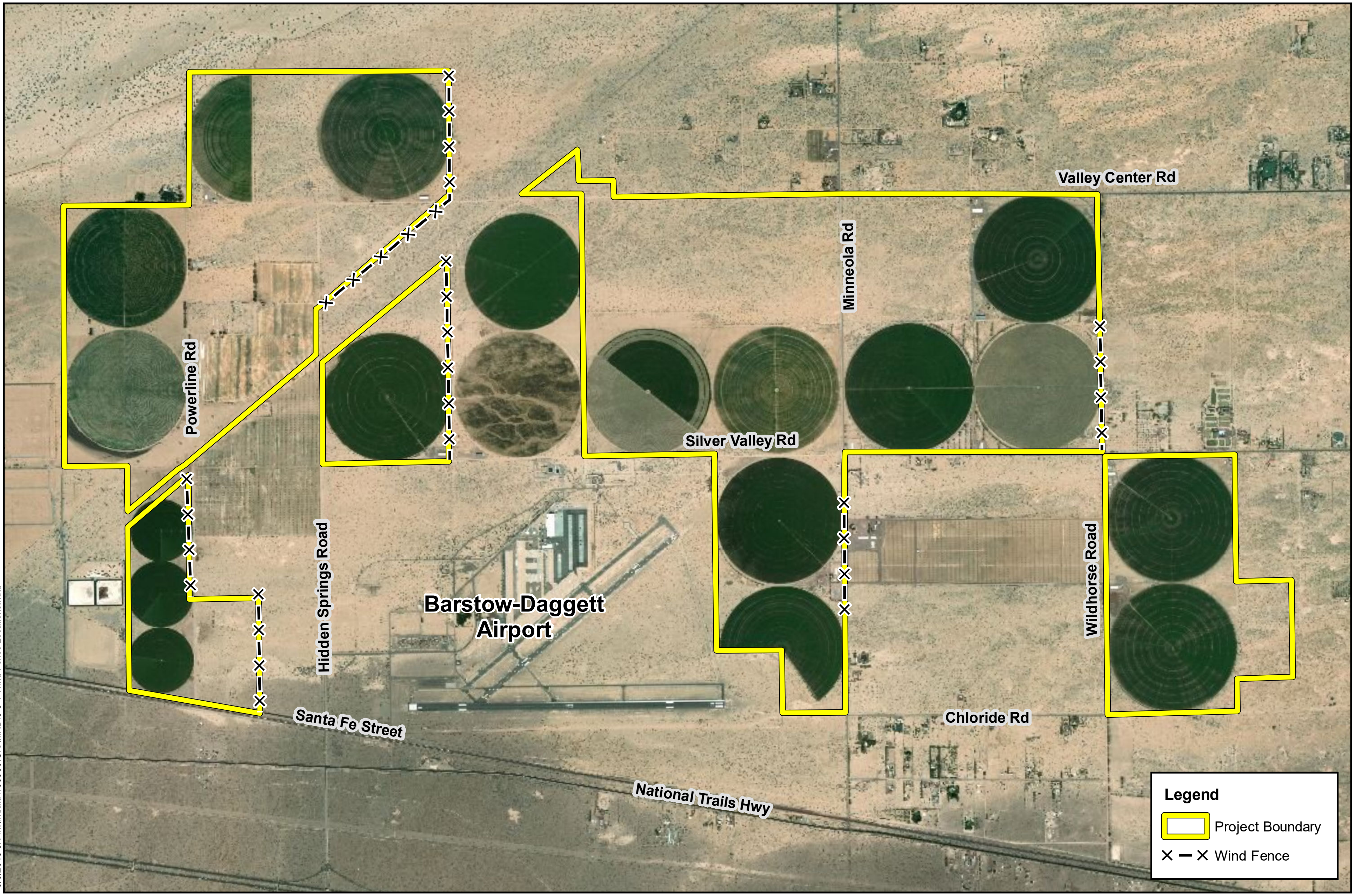

9/6/2018 JN M:\Mdata\166360\GIS\MXD\3-3-1 Wind Fence Locations.mxd

Michael Baker INTERNATIONAL

0 1,250 2,500 5,000 Feet

Source: Tetra Tech 2018

DAGGETT SOLAR POWER FACILITY
ENVIRONMENTAL IMPACT REPORT

Wind Fence Locations

Exhibit 3.3-1

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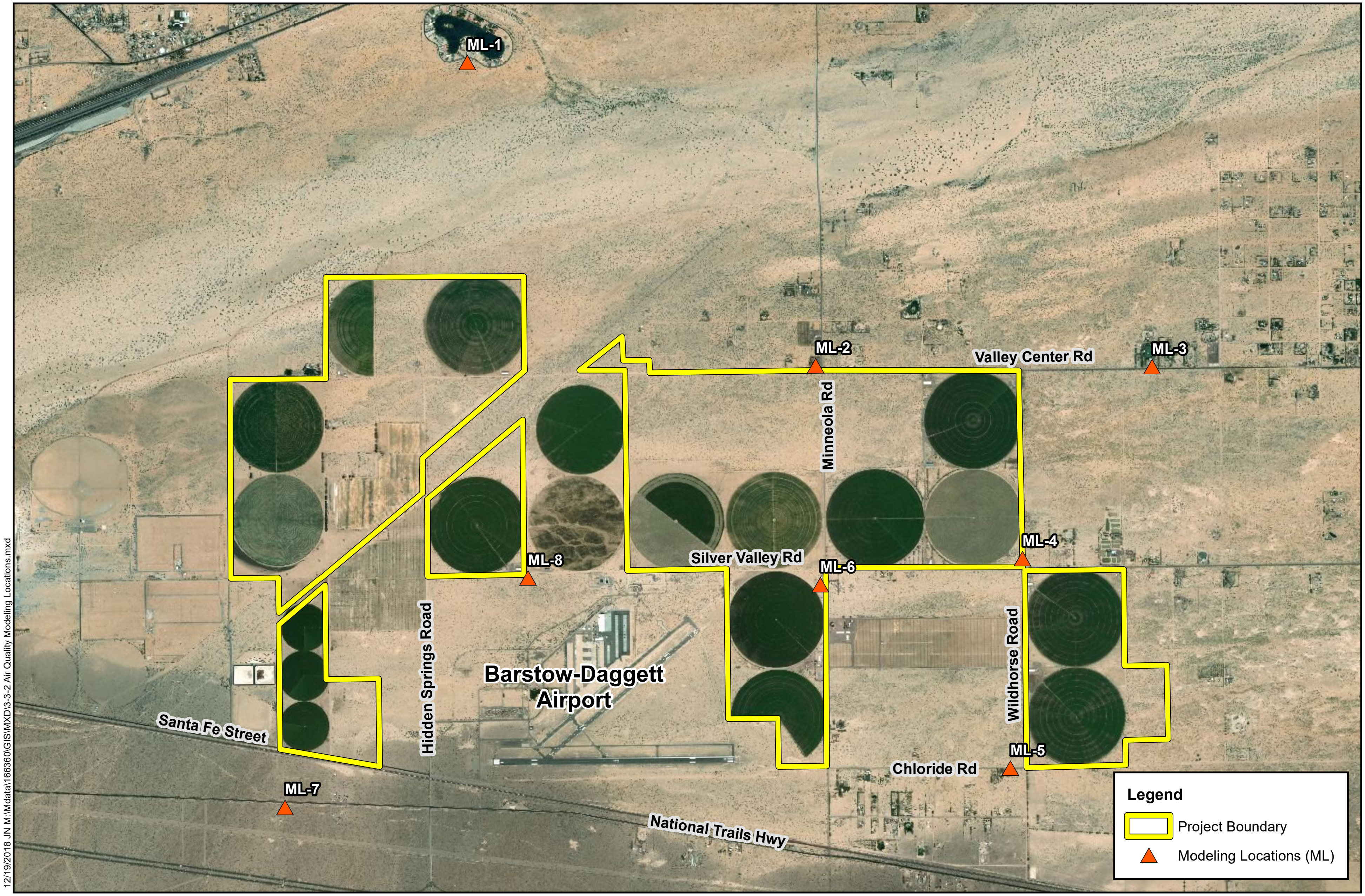

Michael Baker INTERNATIONAL

0 1,500 3,000 6,000 Feet

Source: HDR 2018, ESRI World Imagery

DAGGETT SOLAR POWER FACILITY
ENVIRONMENTAL IMPACT REPORT

Air Quality Modeling Locations

Exhibit 3.3-2

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