

APPENDIX B

Air Quality and GHG Assessment

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AQUAMARINE SOLAR PROJECT AND GEN-TIE LINE AIR QUALITY ASSESSMENT

Kings and Fresno Counties, California

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INTRODUCTION

This report assesses the air quality impacts associated with the Aquamarine Solar Project proposed in Kings County, California. The Project will occupy an approximately 1,825-acre site located at the intersection of the Laurel Avenue and the 25th Avenue alignments, approximately 1.5 miles southeast of Avenal Cutoff Road in central Kings County. The project also includes a 15.0-mile-long generation-interconnection tie line (Gen-Tie) extending south from the Aquamarine site to Nevada Avenue, where it will turn west and follow Nevada Avenue and Jayne Avenue to the existing PG&E Gates Substation in Fresno County.

The Aquamarine Solar Project is planned to generate a total of 250 megawatts (MW) of electrical output from solar photovoltaic (PV) modules. The project is planned to be constructed over an approximate 24-month period from mid-2019 through mid-2021. The solar modules will be mounted on a series of horizontal single-axis trackers which will be oriented north-south and rotate the solar arrays in an east-west direction. The solar modules output direct current (DC) power and the electricity travels to an inverter via underground cables to be converted to alternating current (AC) power.

The Gen-Tie line is planned as a 230-kV transmission line to be constructed within a 100- to 350-foot wide right-of-way along the north side of Nevada Avenue in Kings County and extending west into Fresno County along Jayne Avenue to the Gates Substation. The gen-tie is planned to be constructed over an 8-month period in 2019. The Kings County segments of the gen-tie line are to be completed over a 5-month period, and the Fresno County segments are scheduled to be completed over an additional 3 months.

The project's potential impacts on the local and regional air quality during construction and operation are assessed in this report. Development projects of this type in the San Joaquin Valley are most likely to cause air quality impacts from emissions generated during construction and indirect emissions from vehicles used to transport site employees and for vehicles dedicated for onsite maintenance uses. The San Joaquin Valley Air Pollution Control District (SJVAPCD) has published the Guide for Assessing and Mitigating Air Quality Impacts (GAMAQI) that was used to conduct this air quality analysis.¹ This report describes existing air quality conditions, construction period air quality impacts, operational air quality impacts (at both a local and regional scale), and identifies mitigation measures necessary to reduce or eliminate air quality impacts identified as significant.

SETTING

TOPOGRAPHIC CONSIDERATIONS

The project site is located in Kings and Fresno Counties in the south-western portion of the San Joaquin Valley Air Basin. The California Air Resources Board (CARB) defines the boundaries of the basin by the San Joaquin Valley within the Sierra Nevada Mountains to the east, the Coast

¹ SJVAPCD. 2015. Guide for Assessing and Mitigating Air Quality Impacts. March.

Ranges in the west, and the Tehachapi mountains in the south. The valley is basically flat with a slight downward gradient to the northwest. The valley opens to the ocean at the Carquinez Straits where the San Joaquin-Sacramento Delta empties into San Francisco Bay. The San Joaquin Valley, thus, could be considered a “bowl” with the primary opening to the north. The surrounding topographic features restrict air movement through and out of the basin and, as a result, impede the dispersion of air pollutants from the basin. Wind flow is usually down the valley from the north, but the Tehachapi Mountains block or restrict the southward progression of airflow. The Sierra Nevada is a substantial barrier from the usual winds that have a general westerly flow. The topographical features result in weak airflow. The flow is further restricted vertically by inversion layers that are common in the San Joaquin Valley air basin throughout the year. An inversion layer is created when a mass of warm dry air sits over cooler air near the ground, preventing vertical dispersion of pollutants from the air mass below. During the summer, the San Joaquin Valley experiences daytime temperature inversions at elevations from 1,500 to 3,000 feet above the valley floor. Airflow is considerably restricted since mountain ranges surrounding the valley are generally above the inversion. These inversions lead to a buildup of ozone and ozone precursor pollutants. During the fall and winter months, strong surface-based inversions occur from 500 to 1,000 feet above the valley floor (SJVAPCD 1998). Wintertime inversions trap very stable air near the surface and lead primarily to a buildup of particulate matter air pollutants. Very light winds are also characteristic with these wintertime surface-based inversions.

AIR BASIN CHARACTERISTICS

The climate of the project area is characterized by hot dry summers and cool, mild winters. Clear days are common from spring through fall. Daytime temperatures in the summer often approach or exceed 100 degrees, with lows in the 60s. In the winter, daytime temperatures are usually in the 50s, with lows around 35 degrees. Radiation fog is common in the winter and may persist for days. Partly to mostly cloudy days are common in winter, as most precipitation received in the Valley falls from November through April.

Winds are predominantly up-valley (flowing from the north) in all seasons, but more so in the summer and spring months (CARB 1984). In this flow, winds are usually from the north end of the Valley and flow in a south-southeasterly direction, through Tehachapi Pass, into the Southeast Desert Air Basin. Annually, up-valley wind flow (i.e., northwest flow with marine air) is most common, occurring about 40% of the time. This type of flow is usually trapped below marine and subsidence inversions, restricting outflow through the Sierra Nevada and Tehachapi Mountains. The occurrence of this wind flow is almost 70% of the time in summer, but less than 20% of the time in winter. Winter and fall are characterized by mostly light and variable wind flow. Pacific storm systems do bring southerly flows to the valley during late fall and winter. Light and variable winds, less than 10 miles per hour (mph), are common in the colder months.

Superimposed on this seasonal regime is the diurnal wind cycle. In the Valley, this cycle takes the form of a combination of a modified sea breeze-land breeze and mountain-valley regimes. The sea breeze-land breeze regime typically has a modified sea breeze flowing into the Valley from the north during the late day and evening and then a land breeze flowing out of the Valley late at night and early in the morning. The mountain-valley regime has an upslope (mountain) flow during the

day and a down slope (valley) flow at night. These effects create a complexity of regional wind flow and pollutant transport within the Valley.

The pollution potential of the San Joaquin Valley is very high. The San Joaquin Valley has one of the most severe air pollution problems in the State and the Country. Surrounding elevated terrain in conjunction with temperature inversions frequently restrict lateral and vertical dilution of pollutants. Abundant sunshine and warm temperatures in late spring, summer, and early fall are ideal conditions for the formation of ozone, where the Valley frequently experiences unhealthy air pollution days. Low wind speeds, combined with low inversion layers in the winter, create a climate conducive to high respirable particulate matter (PM₁₀) concentrations and elevated carbon monoxide (CO) levels.

REGULATORY SETTING

The Federal and California Clean Air Acts have established ambient air quality standards for different pollutants. National ambient air quality standards (NAAQS) were established by the Federal Clean Air Act of 1970 (amended in 1977 and 1990) for six "criteria" pollutants. These criteria pollutants now include carbon monoxide (CO), ozone (O₃), nitrogen dioxide (NO₂), respirable particulate matter with a diameter less than 10 microns (PM₁₀), sulfur dioxide (SO₂), and lead (Pb). In 1997, The Environmental Protection Agency (EPA) added fine particulate matter (PM_{2.5}) as a criteria pollutant. The air pollutants for which standards have been established are considered the most prevalent air pollutants that are known to be hazardous to human health. California ambient air quality standards (CAAQS) include the NAAQS pollutants and also hydrogen sulfide, sulfates, vinyl chloride, and visibility reducing particles. These additional CAAQS pollutants tend to have unique sources and are not typically examined in environmental air quality assessments. In addition, lead concentrations have decreased dramatically since it was removed from motor vehicle fuels.

Federal Regulations

At the federal level, the United States Environmental Protection Agency (US EPA) administers and enforces air quality regulations. Federal air quality regulations were developed primarily from implementation of the Federal Clean Air Act. If an area does not meet NAAQS over a set period (three years), EPA designates it as a "nonattainment" area for that particular pollutant. EPA requires states that have areas that do not comply with the national standards to prepare and submit air quality plans showing how the standards would be met. If the states cannot show how the standards would be met, then they must show progress toward meeting the standards. These plans are referred to as the State Implementation Plan (SIP). Under severe cases, EPA may impose a federal plan to make progress in meeting the federal standards.

EPA also has programs for identifying and regulating hazardous air pollutants. The Clean Air Act requires EPA to set standards for these pollutants and sharply reduce emissions of controlled chemicals. Industries were classified as major sources if they emitted certain amounts of hazardous air pollutants. The US EPA also sets standards to control emissions of hazardous air pollutants through mobile source control programs. These include programs that reformulated gasoline, national low emissions vehicle standards, Tier 2 motor vehicle emission standards, gasoline sulfur control requirements, and heavy-duty engine standards.

The San Joaquin Valley Air Basin is subject to major air quality planning programs required by the federal Clean Air Act (CAA) (1977, last amended in 1990, 42 United States Code [USC] 7401 *et seq.*) to address ozone, particulate matter air pollution, and carbon monoxide. The CAA requires that regional planning and air pollution control agencies prepare a regional Air Quality Plan to outline the measures by which both stationary and mobile sources of pollutants can be controlled in order to achieve all standards within the deadlines specified in the Clean Air Act. These plans are submitted to the State, which after approval, submits them to US EPA as the SIP.

State Regulations

The California Clean Air Act of 1988, amended in 1992, outlines a program for areas in the State to attain the CAAQS by the earliest practical date. CARB is the state air pollution control agency and is a part of the California EPA. The California Clean Air Act sets more stringent air quality standards for all of the pollutants covered under national standards, and additionally regulates levels of vinyl chloride, hydrogen sulfide, sulfates, and visibility-reducing particulates. If an area does not meet CAAQS, CARB designates the area as a nonattainment area. The San Joaquin Valley Air Basin does not meet the CAAQS for ozone, PM₁₀, and PM_{2.5}. CARB requires regions that do not meet CAAQS for ozone to submit clean air plans that describe plans to attain the standard or show progress toward attainment.

In addition to the US EPA, CARB further regulates the amount of air pollutants that can be emitted by new motor vehicles sold in California. Motor vehicle emissions standards have always been more stringent than federal standards since they were first imposed in 1961. CARB has also developed Inspection and Maintenance (I/M) and "Smog Check" programs with the California Bureau of Automotive Repair. Inspection programs for trucks and buses have also been implemented. CARB also sets standards for motor vehicle fuels sold in California.

San Joaquin Valley

The San Joaquin Valley Air Pollution Control District (SJVAPCD) is made up of eight counties in California's Central Valley: San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and the San Joaquin Valley portion of Kern. The primary role of the SJVAPCD is to develop plans and implement control measures in the San Joaquin Valley to control air pollution. These controls primarily affect stationary sources such as industry and power plants. Rules and regulations have been developed by SJVAPCD to control air pollution from a wide range of air pollution sources. In March 2007, an Indirect Source Review (ISR) rule was adopted that controls air pollution from new land developments. SJVAPCD also conducts public education and outreach efforts such as the Spare the Air, Wood Burning, and Smoking Vehicle voluntary programs.

Kings County 2035 General Plan. The Air Quality Element establishes goals, objectives, and policies to guide planning decisions and provides the platform for local action in addressing air quality and climate change issues.

Applicable goals, objectives, and policies presented in the General Plan are as follows:

C. Air Quality Management

AQ GOAL C1 Use Air Quality Assessment and Mitigation programs and resources of the SJVAPCD and other agencies to minimize air pollution, related public health effects, and potential climate change impacts within the County.

AQ OBJECTIVE C1.1 Accurately assess and mitigate potentially significant local and regional air quality and climate change impacts from proposed projects within the County.

The environmental assessment process required under the California Environmental Quality Act (CEQA) is by far the most important tool for local government to communicate with other agencies and the public on the air quality impacts of new development within a community. Strong and consistent application of CEQA requirements can make a significant difference in preventing or minimizing project level air quality impacts. In addition, the County can also offer its assistance to existing land uses to reduce their air pollution and greenhouse gas emissions.

AQ Policy C1.1.1: Assess and mitigate project air quality impacts using analysis methods and significance thresholds recommended by the SJVAPCD.

AQ Policy C1.1.2: Assess and mitigate project greenhouse gas/climate change impacts using analysis methods and significance thresholds as defined or recommended by the SJVAPCD, KCAG or California Air Resources Board (ARB) depending on the type of project involved.

AQ Policy C1.1.3: Ensure that air quality and climate change impacts identified during CEQA review are minimized and consistently and fairly mitigated at a minimum, to levels as required by CEQA.

AQ Policy C1.1.4 Identify and maintain an on-going inventory of the cumulative transportation, air quality, and climate change impacts of all general plan amendments approved during each year.

AQ Policy C1.1.5 Assess and reduce the air quality and potential climate change impacts of new development projects that may be insignificant by themselves but, taken together, may be cumulatively significant for the County as a whole.

AQ Policy C1.1.6 Encourage and support the development of innovative and effective mitigation measures and programs to reduce air quality and climate change impacts through proactive coordination with the SJVAPCD, project applicants, and other knowledgeable and interested parties.

AQ Policy C1.1.7 Initiate through the Community Development Agency discussions with the SJVAPCD to develop a program and identify mitigation projects that would permit the expenditure of SJVAPCD Rule 9510 – Indirect Source Review

air quality mitigation fees generated in Kings County on air quality projects in Kings County to maximize local benefits to air quality and the economy.

- AQ Policy C1.1.8 Actively work with project sponsors to maximize their participation in Voluntary Emission Reduction Agreements (VERA) with the SJVAPCD that fulfill the requirements of CEQA and Rule 9510 and provide emission reductions at least as large as those required by Rule 9510. The VERA process provides an opportunity for the County to identify local air emission reduction projects and expand the County's active participation in the project selection process.

E. Energy Efficiency and Conservation

AQ GOAL E1 Minimize air emissions and potential climate change impacts related to energy consumption in the County.

AQ OBJECTIVE E1.1 Increase the use of energy conservation features, renewable sources of energy and low-emission equipment in new and existing development projects within the County.

Natural gas burning appliances used for space heating, water heating, and cooking are a sizable source of NO_x and CO₂ emissions. Consumption of electricity also causes pollutant emissions from the operation of power plants fueled by fossil fuels. Reduction in local energy demand will also reduce overall energy demand, which decreases the expediency for new energy production plant construction. Local efforts to reduce energy consumption can save consumers money and improve air quality. Simple and cost-effective designs, technologies, and methods are available to achieve energy savings and reduce air pollutant emissions.

- AQ Policy E1.1.1 Initiate and sustain ongoing efforts with local water and energy utilities and developers to establish and implement voluntary incentive based programs to encourage the use of energy efficient designs and equipment in new and existing development projects within the County.

- AQ Policy E1.1.2 Initiate and sustain ongoing efforts with agriculture, the building industry, water and energy utilities and the SJVAPCD to promote enhanced energy conservation and sustainable building standards for new construction.

- AQ Policy E1.1.3 Work with local water and energy utilities and the building industry to develop or revise County design standards relating to solar orientation of building occupancies, water use, landscaping, reduction in impervious surfaces, parking lot shading and such other measures oriented towards reducing energy demand.

- AQ Policy E1.1.4 Actively promote the more efficient location of industries within the County

which are labor intensive, utilize cogeneration or renewable sources of energy, support and enhance agricultural activities, and are consistent with other policies of the General Plan.

- AQ Policy E1.1.5 County staff will proactively work with the Cooperative Agricultural Extension office, California Energy Commission, local water and energy utilities, the agricultural industry, and other potential partners to seek funding sources and implement programs which reduce water and energy use, reduce air emissions and reduce the creation of greenhouse gases.

F. Hazardous Emissions and Public Health

- AQ GOAL F1 Minimize exposure of the public to hazardous air pollutant emissions, particulates and noxious odors from freeways, major arterial roadways, industrial, manufacturing, and processing facilities.

- AQ OBJECTIVE F1.1 Locate adequate sites for industrial development and roadway projects away from existing and planned sensitive land uses which minimize or avoid potential health risks to people that might result from hazardous air pollutant emissions.

Decisions for locating industrial and residential development has the potential to create land use conflicts due to exposure to hazardous emissions. In addition, planning sensitive land uses in proximity to major transportation routes and facilities can also result in public health concerns. Providing appropriate locations and separation for incompatible land uses for all types of development can minimize conflicts and promote economic growth.

- AQ Policy F1.1.1 Locate residential development projects and projects categorized as sensitive receptors an adequate distance from existing and potential sources of hazardous emissions such as major transportation corridors, industrial sites, and hazardous material locations in accordance with the provisions of ARB's Air Quality and Land Use Handbook.

- AQ Policy F1.1.2 Locate new air pollution point sources such as, but not limited to industrial, manufacturing, and processing facilities an adequate distance from residential areas and other sensitive receptors in accordance with the provisions of ARB's Air Quality Land Use Handbook.

- AQ OBJECTIVE F2.1 Reduce emissions of PM₁₀, PM_{2.5} and other particulates from sources with local control potential or under the jurisdiction of the County.

Levels of PM₁₀ (particulate matter less than 10 microns in diameter) no longer exceed federal health based standards. However, maintenance of the federal standard and achieving the state standard while accommodating growth will require continued effort. The San Joaquin Valley was recently reclassified as

a maintenance area for PM₁₀ under the federal criteria. Because of this classification, the SJVAPCD is required to take actions to ensure continued maintenance of the standard in the future. This is accomplished by the continued implementation of Best Available Control Measures (BACM) on all significant sources of emissions. Control efforts for sources under the jurisdiction of the County can significantly reduce these emissions. The SJVAB also exceeds the annual PM_{2.5} (particulate matter less than 2.5 microns in diameter) standards. Some actions to reduce PM₁₀ and ozone precursors will also reduce PM_{2.5}.

- AQ Policy F2.1.1 Coordinate with the SJVAPCD to ensure that construction, grading, excavation and demolition activities within County's jurisdiction are regulated and controlled to reduce particulate emissions to the maximum extent feasible.
- AQ Policy F2.1.2 Require all access roads, driveways, and parking areas serving new commercial and industrial development are constructed with materials that minimize particulate emissions and are appropriate to the scale and intensity of use.
- AQ Policy F2.1.3 Develop a program to reduce PM₁₀ emissions from County maintained roads to the maximum extent feasible.

G. Climate Change

AQ GOAL G1 Reduce Kings County's proportionate contribution of greenhouse gas emissions and the potential impact that may result on climate change from internal governmental operations and land use activities within its authority.

AQ OBJECTIVE G1.1 Identify and achieve greenhouse gas emission reduction targets consistent with the County's proportionate fair share as may be allocated by ARB and KCAG.

Global climate change is an emerging issue that requires all levels of government to take action to reduce emissions under their jurisdiction and influence.

- AQ Policy G1.1.1 As recommended in ARB's Climate Change Adopted Scoping Plan (December 2008), the County establishes an initial goal of reducing greenhouse gas emissions from its internal governmental operations and land use activities within its authority to be consistent with ARB's adopted reduction targets for the year 2020. The County will also work with KCAG to ensure that it achieves its proportionate fair share reduction in greenhouse gas emissions as may be identified under the provisions of SB 375 (2008 Chapter 728) for any projects or activities requiring approval from KCAG.

- AQ Policy G1.1.2 Progress in meeting the goals specified in AQ Policy G1.1.1 will be monitored and reported to the Board of Supervisors in the Annual Progress Report required by Government Code Section 65400(a)(2). Should the Board determine that sufficient progress is not being made to achieve the identified goals, or that proposed measures are ineffective or insufficient in meeting the goals, additional measures will be adopted as necessary.
- AQ Policy G1.1.3 County staff should explore opportunities to utilize the net emission reductions identified through the confined animal feeding operation approval process to offset greenhouse gas emissions on a regional basis.

Fresno County 2000 General Plan. The Fresno County 2000 General Plan contains the following goals and policies related to air quality that are relevant to the project:

- Goal OS-G To improve air quality and minimize the adverse effects of air pollution in Fresno County.

Environmental Assessment and Mitigation

- Policy OS-G.1 The County shall develop standard methods for determining and mitigating project air quality impacts and related thresholds of significance for use in environmental documents. The County will do this in conjunction with the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) and the cities in Fresno County.
- Policy OS-G.2 The County shall ensure that air quality impacts identified during the CEQA review process are fairly and consistently mitigated. The County shall require projects to comply with the County's adopted air quality impact assessment and mitigation procedures.

Coordination and Cooperation

- Policy OS-G.3 The County shall participate with cities, surrounding counties, and regional agencies to address cross-jurisdictional and regional transportation and air quality issues.
- Policy OS-G.4 The County shall consult with the SJVUAPCD during CEQA review for projects that require air quality impact analysis and ensure that the SJVUAPCD is on the distribution list for all CEQA documents.
- Policy OS-G.5 The County shall participate with cities, surrounding counties, and regional agencies in the San Joaquin Valley in efforts to promote consistent air quality programs and implementation programs to the extent possible (e.g., transportation control measures, trip reduction ordinances, indirect source programs, etc.).

Integrated Planning

- Policy OS-G.6 The County shall require all Fresno County transportation improvement projects that increase capacity by adding additional through lanes to be included in regional transportation plans and be consistent with the air quality goals and policies of the General Plan.

Public Facilities/Operation

- Policy OS-G.7 The County shall develop and implement employer-based trip reduction programs for County employees.
- Policy OS-G.8 The County shall encourage its departments to consider telecommuting programs as a trip reduction strategy.
- Policy OS-G.9 The County fleet vehicle operators shall implement vehicle replacement practices that place a priority on replacement of older higher-emission vehicles and on purchasing new vehicles with engines using best available technologies and advanced fuels where feasible, consistent with cost effective management of the program.
- Policy OS-G.10 The County shall support the use of teleconferencing in lieu of employee travel to conferences and meetings when feasible.

Congestion Management/Transportation Control Measures

- Policy OS-G.11 The County shall encourage the establishment of public/private partnerships to develop satellite and neighborhood work centers for telecommuting.

Toxic and Hazardous Emissions

- Policy OS-G.12 The County shall continue, through its land use planning processes, to avoid inappropriate location of residential uses and sensitive receptors in relation to uses that include but are not limited to industrial and manufacturing uses and any other use which have the potential for creating a hazardous or nuisance effect.

Particulate Matter/Fugitive Dust

- Policy OS-G.13 The County shall include fugitive dust control measures as a requirement for subdivision maps, site plans, and grading permits. This will assist in implementing the SJVUAPCD's particulate matter of less than ten (10) microns (PM₁₀) regulation (Regulation VIII). Enforcement actions can be coordinated with the Air District's Compliance Division.

Policy OS-G.14 The County shall require all access roads, driveways, and parking areas serving new commercial and industrial development to be constructed with materials that minimize particulate emissions and are appropriate to the scale and intensity of use.

Policy OS-G.15 The County shall continue to work to reduce PM₁₀ and PM_{2.5} emissions from County-maintained roads by considering shoulder treatments for dust control as part of road reconstruction projects.

Wood burning

Policy OS-G.16 The County shall require the use of natural gas or the installation of low emission, EPA-certified fireplace inserts in all open hearth fireplaces in new homes. The County shall promote the use of natural gas over wood products in space heating devices and fireplaces in all existing and new homes.

NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS

The CAA and CCAA promulgate, respectively, national and State ambient air quality standards. Air quality standards have been established by US EPA (i.e., NAAQS) and California (i.e., CAAQS) for specific air pollutants most pervasive in urban environments. The NAAQS and CAAQS are shown in Table 1. Ambient standards specify the concentration of pollutants to which the public may be exposed without adverse health effects. Individuals vary widely in their sensitivity to air pollutants, and standards are set to protect more pollution-sensitive populations (e.g., children and the elderly). National and State standards are reviewed and updated periodically based on new health studies. California ambient standards tend to be at least as protective as national ambient standards and are often more stringent. For planning purposes, regions like the San Joaquin Valley Air Basin are given an air quality status designation by the federal and State regulatory agencies. Areas with monitored pollutant concentrations that are lower than ambient air quality standards are designated “attainment” on a pollutant-by-pollutant basis. When monitored concentrations exceed ambient standards within an air basin, it is designated “nonattainment” for that pollutant. US EPA designates areas as “unclassified” when insufficient data are available to determine the attainment status; however, these areas are typically considered to be in attainment of the standard.

TABLE 1 Ambient Air Quality Standards²

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1-hour	0.09 ppm (180 µg/m ³)	—
	8-hour	0.070 ppm (137 µg/m ³)	0.070 ppm (137 µg/m ³) (3-year average of annual 4 th highest daily maxima)
Carbon Monoxide	8-hour	9.0 ppm (10,000 µg/m ³)	9 ppm (10,000 µg/m ³)
	1-hour	20 ppm (23,000 µg/m ³)	35 ppm (40,000 µg/m ³)
Nitrogen dioxide	Annual Average	0.030 ppm (57 µg/m ³)	0.053 ppm (100 µg/m ³)
	1-hour	0.18 ppm (339 µg/m ³)	0.100 ppm (188 µg/m ³) (3-year average of annual 98 th percentile daily maxima)
Sulfur dioxide			
	24-hour	0.04 ppm (105 µg/m ³)	—
	3-hour	—	0.5 ppm (1,300 µg/m ³)
	1-hour	0.25 ppm (655 µg/m ³)	0.075 ppm (196 µg/m ³) (3-year average of annual 99 th percentile daily maxima)
Respirable particulate matter (10 micron)	24-hour	50 µg/m ³	150 µg/m ³
	Annual Arithmetic Mean	20 µg/m ³	—
Fine particulate matter (2.5 micron)	Annual Arithmetic Mean	12 µg/m ³	12.0 µg/m ³ (3-year average)
	24-hour	—	35 µg/m ³ (3-year average of annual 98 th percentile daily concentrations)
Sulfates	24-hour	25 µg/m ³	—
Lead	30-day	1.5 µg/m ³	—
	3 Month Rolling Average	—	0.15 µg/m ³
Source: CARB website, 12/1/16. SO ₂ Federal 24 hour and annual standards are not applicable in the SJVAPCD. µg/m ³ = micrograms per cubic meter ppm = parts per million			

CRITERIA AIR POLLUTANTS AND THEIR HEALTH EFFECTS

The primary criteria air pollutants that would be emitted by the project include ozone (O₃) precursors (NO_x and ROG), carbon monoxide (CO), and suspended particulate matter (PM₁₀ and PM_{2.5}). Other criteria pollutants, such as lead (Pb) and sulfur dioxide (SO₂), would not be substantially emitted by the Aquamarine Solar and Gen-Tie project or traffic, and air quality standards for them are being met throughout the San Joaquin Valley Air Basin. A description of

² Source: California Air Resources Board (<http://www.arb.ca.gov>)

each pollutant is provided below, as described by SJVAPCD (2015) and the Bay Area Air Quality Management District.³

Ozone (O₃)

CARB describes the ozone and health impacts (CARB 2016a). While O₃ serves a beneficial purpose in the upper atmosphere (stratosphere) by reducing ultraviolet radiation potentially harmful to humans, when it reaches elevated concentrations in the lower atmosphere (troposphere) it can be harmful to the human respiratory system and to sensitive species of plants. Ozone concentrations build to peak levels during periods of light winds, bright sunshine, and high temperatures. Short-term O₃ exposure can reduce lung function in children, make persons susceptible to respiratory infection, and produce symptoms that cause people to seek medical treatment for respiratory distress. Long-term exposure can impair lung defense mechanisms and lead to emphysema and chronic bronchitis. A healthy person exposed to high concentrations may become nauseated or dizzy, may develop headache or cough, or may experience a burning sensation in the chest.

Ozone is formed in the atmosphere by a complex series of photochemical reactions that involve “ozone precursors” that consist of two families of pollutants: oxides of nitrogen (NO_x) and reactive organic gases (ROG). NO_x and ROG are emitted from a variety of stationary and mobile sources. While NO₂, an oxide of nitrogen, is another criteria pollutant itself, ROGs are not in that category, but are included in this discussion as O₃ precursors. In 2007, CARB adopted an 8-hour health-based standard for O₃ of 0.070 ppm. The U.S. EPA revised the 8-hour NAAQS for O₃ from 0.080 ppm in 2008 and reduced it again in 2015 to 0.070 ppm⁴ (CARB 2005, 2012, US EPA 2018).

Carbon Monoxide (CO)

CARB describes carbon monoxide and the health effects (CARB 2016b). Carbon monoxide or CO is a colorless, odorless, poisonous gas. Carbon monoxide’s health effects are related to its affinity for hemoglobin in the blood. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause dizziness and fatigue, and causes reduced lung capacity, impaired mental abilities and central nervous system function, and induces angina in persons with serious heart disease. Primary sources of CO in ambient air are exhaust emissions from on-road vehicles, such as passenger cars and light-duty trucks, and residential wood burning. The monitored CO levels in the Valley during the last 10 years have been well below ambient air quality standards.

Nitrogen Dioxide (NO₂)

As described by CARB (2016c), the major health effect from exposure to high levels of NO₂ is the risk of acute and chronic respiratory disease. Nitrogen dioxide is a combustion by-product, but it can also form in the atmosphere by chemical reaction. Nitrogen dioxide is a reddish-brown colored gas often observed during the same conditions that produce high levels of O₃ and can affect

³ Bay Area Air Quality Management District (BAAQMD). 2011. *BAAQMD CEQA Air Quality Guidelines*. May (updated May 2017). http://www.baaqmd.gov/~media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en

⁴ U.S. EPA. 2017. *2008 National Ambient Air Quality Standards (NAAQS) for Ozone*. See <https://www.epa.gov/ozone-pollution/2008-national-ambient-air-quality-standards-naaqs-ozone>. Accessed 06/19/18.

regional visibility. Nitrogen dioxide is one compound in a group of compounds consisting of oxides of nitrogen (NO_x). As described above, NO_x is an O_3 precursor compound. Monitored levels of NO_2 in the Valley are below ambient air quality standards.

Particulate Matter (PM)

CARB describes unhealthy particulate matter and the health effects (CARB 2016d). Respirable particulate matter (PM_{10}) and fine particulate matter ($\text{PM}_{2.5}$) consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. PM_{10} and $\text{PM}_{2.5}$ represent fractions of particulate matter that can be inhaled and cause adverse health effects. PM_{10} and $\text{PM}_{2.5}$ are a health concern, particularly at levels above the Federal and State ambient air quality standards. $\text{PM}_{2.5}$ (including diesel exhaust particles) is thought to have greater effects on health because minute particles are able to penetrate to the deepest parts of the lungs. Scientific studies have suggested links between fine particulate matter and numerous health problems including asthma, bronchitis, acute and chronic respiratory symptoms such as shortness of breath and painful breathing. Children are more susceptible to the health risks of $\text{PM}_{2.5}$ because their immune and respiratory systems are still developing. These fine particulates have been demonstrated to decrease lung function in children. Certain components of PM are linked to higher rates of lung cancer. Very small particles of certain substances (e.g., sulfates and nitrates) can also directly cause lung damage or can contain absorbed gases (e.g., chlorides or ammonium) that may be injurious to health.

Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as mining and demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. In addition to health effects, particulates also can damage materials and reduce visibility. Dust comprised of large particles (diameter greater than 10 microns) settles out rapidly and is more easily filtered by human breathing passages. This type of dust is considered more of a soiling nuisance rather than a health hazard.

The current State PM_{10} standard, approved in 2002, is 20 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for an annual average. The 24-hour average standard is 50 $\mu\text{g}/\text{m}^3$. $\text{PM}_{2.5}$ standards were first promulgated by the U.S. EPA in 1997 and were revised in 2006 to lower the 24-hour $\text{PM}_{2.5}$ standard to 35 $\mu\text{g}/\text{m}^3$ for 24-hour exposures (Federal Register, Vol. 71, No. 10, January 17, 2006). That same action by U.S. EPA also revoked the annual PM_{10} standard due to lack of scientific evidence correlating long-term exposures of ambient PM_{10} with health effects. CARB has only adopted an annual average $\text{PM}_{2.5}$ standard, which is set at 12 $\mu\text{g}/\text{m}^3$. This is equal to the NAAQS of 12 $\mu\text{g}/\text{m}^3$ (CARB 2016f).

TOXIC AIR CONTAMINANTS

Besides the "criteria" air pollutants, there is another group of substances found in ambient air referred to as Hazardous Air Pollutants (HAPs) under the CAA and Toxic Air Contaminants (TACs) under the CCAA. These contaminants tend to be localized and are found in relatively low concentrations in ambient air. However, they can result in adverse chronic health effects if exposure to low concentrations occurs for long periods. They are regulated at the local, state, and federal level.

HAPs are the air contaminants identified by U.S. EPA as known or suspected to cause cancer, serious illness, birth defects, or death. Many of these contaminants originate from human activities, such as fuel combustion and solvent use. Mobile source air toxics (MSATs) are a subset of the 188 HAPs. Of the 21 HAPs identified by U.S. EPA as MSATs, a priority list of six priority HAPs were identified that include: diesel exhaust, benzene, formaldehyde, acetaldehyde, acrolein, and 1,3-butadiene. The Federal Highway Administration (FHWA 2012) reports that while vehicle miles traveled (VMT) in the United States is expected to increase by 64 percent over the period 2000 to 2020, emissions of MSATs are anticipated to decrease substantially as a result of efforts to control mobile source emissions (by 57% to 67% depending on the contaminant).

California developed a program under the Toxic Air Contaminant Identification and Control Act (Assembly Bill [AB] 1807, Tanner 1983), also known as the Tanner Toxics Act, to identify, characterize and control TACs. Subsequently, AB 2728 (Tanner, 1992) incorporated all 188 HAPs into the AB 1807 process. TACs include all HAPs plus other contaminants identified by CARB. These are a broad class of compounds known to cause morbidity or mortality (cancer risk). TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, state, and federal level.

The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, 1987, Connelly), described by CARB (2016e), was enacted in 1987, and requires stationary sources to report the types and quantities of certain substances routinely released into the air. The goals of the Air Toxics "Hot Spots" Act are to collect emission data, to identify facilities having localized impacts, to ascertain health risks, to notify nearby residents of significant risks, and to reduce those significant risks to acceptable levels.

Particulate matter from diesel exhaust is the predominant TAC in urban air and is estimated to represent about 70 percent of the cancer risk from TACs, based on the statewide average reported by CARB (2012). According to CARB, diesel exhaust is a complex mixture of gases, vapors and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by CARB, and are listed as carcinogens either under State Proposition 65 or under the Federal Hazardous Air Pollutants programs.

CARB (2012) reports that recent air pollution studies have shown an association that diesel exhaust and other cancer-causing toxic air contaminants emitted from vehicles are responsible for much of the overall cancer risk from TACs in California. Particulate matter emitted from diesel-fueled engines (diesel particulate matter [DPM]) was found to comprise much of that risk. In 1998, CARB formally identified DPM as a TAC (CARB 2012). Diesel particulate matter is of particular concern since it can be distributed over large regions, thus leading to widespread public exposure. The particles emitted by diesel engines are coated with chemicals, many of which have been identified by U.S. EPA as HAPs, and by CARB as TACs. The vast majority of diesel exhaust particles (over 90 percent) consist of PM_{2.5}, which are the particles that can be inhaled deep into the lung (CARB

2012). Like other particles of this size, a portion will eventually become trapped within the lung possibly leading to adverse health effects. While the gaseous portion of diesel exhaust also contains TACs, CARB's 1998 action was specific to DPM, which accounts for much of the cancer-causing potential from diesel exhaust. California has adopted a comprehensive diesel risk reduction program to reduce DPM emissions 85 percent by 2020 (CARB 2000). The EPA and CARB adopted low sulfur diesel fuel standards in 2006 that reduce diesel particulate matter substantially.

Smoke from residential wood combustion can be a source of TACs. Wood smoke is typically emitted during winter when dispersion conditions are poor. Localized high TAC concentrations can result when cold stagnant air traps smoke near the ground and, with no wind the pollution can persist for many hours, especially in sheltered valleys during winter. Wood smoke also contains a significant amount of PM₁₀ and PM_{2.5}. Wood smoke is an irritant and is implicated in worsening asthma and other chronic lung problems.

EXISTING AIR QUALITY

As previously discussed, the San Joaquin Valley experiences poor air quality conditions, due primarily to elevated levels of ozone and particulate matter (SJVAPCD 2015a). CARB, in cooperation with SJVAPCD, monitors air quality throughout the San Joaquin Valley Air Basin. Monitoring data presented in Table 2 was derived for each pollutant based upon the closest monitoring station to the project site.

Ozone

In California, ozone concentrations are generally lower near the coast regions than inland regions. The inland regions, such as the San Joaquin Valley, typically experience some of the higher ozone concentrations. This is because of the greater frequency of hot days (that is, higher temperatures) and stagnant air conditions (that is, very calm atmospheric conditions with very gentle winds) that are conducive to ozone formation. Many areas of the Valley lie downwind of urban areas that are sources of ozone precursor pollutants. While Kings County is fairly rural, exceedances of the ozone standard occurred on up to 49 days per year, based on the last 3 years of monitoring data.

Carbon Monoxide

State and federal standards for carbon monoxide are met throughout California as a result of cleaner vehicles and fuels that were reformulated in the 1990s. For CO, the 2012 monitored value of 2.2 ppm for an 8-hour average was used as the air basin maximum level (CARB 2016f). Because CO levels are so low in the air basin, monitoring was discontinued after 2012.

TABLE 2 Summary of Criteria Air Pollution Monitoring Data for Kings County

Pollutant	Standard	Monitored Values ⁽¹⁾ and Exceedance Days		
		2015	2016	2017
Ozone (ppm)	State 1-Hour	.119 / 4	.097 / 2	.106 / 7
Ozone (ppm)	State 8-Hour	.094 / 42	.088 / 49	.094 / 38
Ozone (ppm)	Federal 8-Hour	0.094 / 42	0.088 / 49	0.094 / 38
PM ₁₀ (ug/m ³)	State 24-Hour	109/ 17	111/ 20	149/ 20
PM ₁₀ (ug/m ³)	Federal 24-Hour	137/ 0	152/ 0	298/ 1 ⁽²⁾
PM _{2.5} (ug/m ³)	Federal 24-Hour	99.2 / 28	59.7/ 25	112.3 / 17
PM _{2.5} (ug/m ³)	State Annual	18	16	17
PM _{2.5} (ug/m ³)	Federal Annual	16.5	15.5	15.0
Carbon Monoxide (ppm)	State/Fed.8-Hour	NA / -- ⁽³⁾	NA / -- ⁽³⁾	NA / -- ⁽³⁾
Nitrogen Dioxide (ppm)	State 1-Hour	0.051 / 0	0.052 / 0	0.057 / 0
Nitrogen Dioxide (ppm)	Federal 1-Hour	0.051 / 0	0.052 / 0	0.057 / 0
Nitrogen Dioxide (ppm)	Federal Annual	9	9	8

Note: (1) Monitored values are the high values considering the form of the applicable standard,

(2) affected by October 2017 firestorms, and

(3) NA = not available in summaries, but last measured levels in 2012 were 2 ppm.

Source: CARB ADAM Data at <http://www.arb.ca.gov/adam/index.html>, Accessed 10/20/18

Particulate Matter (PM_{2.5} and PM₁₀)

Most areas of California have either 24-hour or annual PM₁₀ concentrations that exceed the State standards. Most urban areas exceed the State annual standard and the 2006 24-hour federal standard. In the San Joaquin Valley (S.J. Valley or Valley), there is a strong seasonal variation in PM, with higher PM₁₀ and PM_{2.5} concentrations occurring in the fall and winter months. These higher concentrations are caused by increased activity for some emission sources and meteorological conditions that are conducive to the build-up of particulate matter. Industry and motor vehicles consistently emit particulate matter. Seasonal sources of particulate matter in San Joaquin Valley include wildfires, agricultural activities, windblown dust, and residential wood burning. In California, area sources, which primarily consist of fugitive dust, account for the majority of directly emitted particulate matter. This includes dust from paved and unpaved roads. The ARB estimates that 85 percent of directly emitted PM₁₀ (and 66 percent of directly emitted PM_{2.5}) is from area sources (SJVAPCD 2016). During the winter, the PM_{2.5} size fraction makes up much of the total particulate matter concentrations. The major contributor to high levels of ambient PM_{2.5} is the secondary formation of particulate matter caused by the reaction of NO_x and ammonium to form ammonium nitrate. ARB estimates that the secondary portion of PM_{2.5} makes up about 50 percent of the annual concentrations in the Valley (SJVAPCD 2016). The S.J. Valley also records high PM₁₀ and PM_{2.5} levels during the fall. During this season, both the coarse fraction (from dust) and the PM_{2.5} fraction result in elevated PM_{2.5} and PM₁₀ concentrations. Monitored PM_{2.5} levels exceeded federal standards on 17 to 28 days based on sampling every sixth day.

Other Pollutants

Current and past air monitoring data indicate that the San Joaquin Valley meets ambient air quality standards for NO₂, SO₂, and lead. Monitoring of lead, sulphates, hydrogen sulfide and vinyl chloride is not routinely conducted by CARB in the air basin (CARB 2018).

Air Quality Trends

Air quality in the Valley has improved significantly despite a natural low capacity for pollution, created by unique geography, topography, and meteorology. Emissions have been reduced at a rate similar or better than other areas in California. Since 1990, emissions of ozone precursors (i.e., NO_x and ROG) reduced by 80 percent (CARB 2016g), resulting in much fewer days where ozone standards have been exceeded. Direct emissions of PM₁₀ and PM_{2.5} have been reduced by 10 to 13 percent (CARB 2013). As a result, the San Joaquin Valley is the first air basin that was previously classified as “serious nonattainment” under the NAAQS to come into attainment of the PM₁₀ standards.

ATTAINMENT STATUS

Areas that do not violate ambient air quality standards are considered to have attained the standard. Violations of ambient air quality standards are based on air pollutant monitoring data and are judged for each air pollutant. The San Joaquin Valley as a whole does not meet State or federal ambient air quality standards for ground level O₃ and State standards for PM₁₀ and PM_{2.5}. The attainment status for the Valley with respect to various pollutants of concern is described in Table 3

TABLE 3 Project Area Attainment Status

Pollutant	Federal Status	State Status
Ozone (O ₃) – 1-Hour Standard	No Designation	Severe Nonattainment
Ozone (O ₃) – 8-Hour Standard	Extreme Nonattainment	Nonattainment
Respirable Particulate Matter (PM ₁₀)	Attainment-Maintenance	Nonattainment
Fine Particulate Matter (PM _{2.5})	Nonattainment	Nonattainment
Carbon Monoxide (CO)	Attainment	Attainment
Nitrogen Dioxide (NO ₂)	Attainment	Attainment
Sulfur Dioxide (SO ₂)	Attainment	Attainment
Sulfates and Lead	No Designation	Attainment
Hydrogen Sulfide	No Designation	Unclassified
Visibility Reducing Particles	No Designation	Unclassified

Under the CAA, the U.S. EPA has classified the Air Basin as *extreme nonattainment* for the 8-hour O₃ standard. As mentioned earlier, the Air Basin has attained the NAAQS for PM₁₀. The Air

Basin is designated *nonattainment* for the older 1997 PM_{2.5} NAAQS. U.S. EPA recently designated the Air Basin as nonattainment for the newer 2006 24-hour PM_{2.5} standard. The U.S. EPA classifies the Air Basin as *attainment* or *unclassified* for all other air pollutants, which include CO and NO₂.

At the state level, the Air Basin is considered *severe nonattainment* for ground level O₃ and *nonattainment* for PM₁₀ and PM_{2.5}. In general, California ambient air quality standards are more stringent than the national ambient air quality standards. The Air Basin is required to adopt plans on a triennial basis that show progress towards meeting the State O₃ standard. The Air Basin is considered *attainment* or *unclassified* for all other pollutants.

REGIONAL AIR QUALITY PLANS

In response to not meeting the NAAQS, the region is required to submit attainment plans to US EPA through the State, which are referred to as SIP.

CARB submitted the 2004 Extreme Ozone Attainment Demonstration Plan to EPA in 2004, which addressed the old 1-hour NAAQS. The region's 2007 Ozone Plan, addressing the 8-hour ozone NAAQS, was submitted to US EPA and approved in March 2012. That plan predicts attainment of the standard throughout 90 percent of the district by 2020 and the entire district by 2024. To accomplish these goals, the plan would reduce NO_x emissions further by 75 percent and ROG emissions by 25 percent. A wide variety of control measures are included in these plans, such as reducing or offsetting emissions from construction and traffic associated with land use developments. The air basin was recently designated as an extreme ozone nonattainment area for the more stringent 2008 8-hour ozone NAAQS. The plan to address this standard is expected to be due to EPA in 2016. Addressing the 2008 8-hour ozone standard will pose a tremendous challenge for the Valley, given the naturally high background ozone levels and ozone transport into the Valley.

On April 25, 2008, US EPA proposed to approve the 2007 PM₁₀ Maintenance Plan and Request for Re-designation. The region now meets the NAAQS for PM₁₀. The SJVAPCD adopted the 2008 PM_{2.5} Plan on April 30, 2008. US EPA has designated the basin as Attainment.

The SJVAPCD adopted the 2012 PM_{2.5} Plan on December 20, 2012. This plan was approved by CARB on January 24, 2013. This plan will assure that the Valley will attain the 2006 PM_{2.5} NAAQS by the 2019 deadline. The plan uses control measures to reduce NO_x, which also leads to fine particulate formation in the atmosphere. The plan incorporates measures to reduce direct emissions of PM_{2.5}, including a strengthening of regulations for various SJVAB industries and the general public through new rules and amendments. The plan estimates that the SJVAB will reach the PM_{2.5} standard by 2014.

Both the ozone and PM_{2.5} plans include all measures (i.e., federal, state and local) that would be implemented through rule making or program funding to reduce air pollutant emissions. Transportation Control Measures (TCMs) are part of these plans. The plans described above addressing ozone also meet the state planning requirements.

SJVAPCD RULES AND REGULATIONS

The SJVAPCD has adopted rules and regulations that apply to land use projects, such as the proposed project. These are described below.

SJVAPCD Indirect Source Review Rule

In 2005, the SJVAPCD adopted Rule 9510 Indirect Source Review (ISR or Rule 9510) to reduce NO_x and PM₁₀ emissions from new land use development projects. The rule, which became effective March 1, 2006, is the result of state requirements outlined in the region's portion of the State Implementation Plan (SIP). Rule 9510 was amended in December 2017 (and became effective March 21, 2018) to ensure that all large development projects are subject to the rule (SJVAPCD 2017). The SJVAPCD's SIP commitments are contained in the 2004 Extreme Ozone Attainment Demonstration Plan and the 2003 PM₁₀ Plan. These plans identified the need to reduce PM₁₀ and NO_x substantially in order to attain and maintain the ambient air-pollution standards on schedule.

New projects that would generate substantial air pollutant emissions are subject to this rule. The rule requires projects to mitigate both construction and operational period emissions by applying the SJVAPCD-approved mitigation measures and paying fees to support programs that reduce emissions. The rule requires mitigated exhaust emissions during construction based on the following levels:

- 20% reduction from unmitigated baseline in total NO_x exhaust emissions
- 45% reduction from unmitigated baseline in total PM₁₀ exhaust emissions

For operational emissions, Rule 9510 requires the following reductions:

- 33.3% of the total operational NO_x emissions from unmitigated baseline
- 50% of the total operational PM₁₀ exhaust emissions from unmitigated baseline

Fees apply to the unmitigated portion of the emissions and are based on estimated costs to reduce the emissions from other sources plus estimated costs to cover administration of the program. In accordance with ISR, the project applicant will submit an application for approval of an Air Impact Assessment (AIA) to the SJVAPCD.

Regulation VIII – Fugitive PM₁₀

SJVAPCD controls fugitive PM₁₀ through Regulation VIII (Fugitive PM₁₀ Prohibitions). The purpose of this regulation is to reduce ambient concentrations of PM₁₀ by requiring actions to prevent, reduce or mitigate anthropogenic (human caused) fugitive dust emissions. This applies to activities such as construction, bulk materials, open areas, paved and unpaved roads, material transport, and agricultural areas. Sources regulated are required to provide dust control plans that meet the regulation requirements. Fees are collected by SJVAPCD to cover costs for reviewing plans and conducting field inspections.

Other SJVAPCD Rules

Other SJVAPCD Rules and Regulations that may be applicable to the project include, but are not limited to:

- Rule 4101 (Visible Emissions): The purpose of this rule is to prohibit the emissions of visible air contaminants to the atmosphere. The provisions of this rule apply to any source operation which emits or may emit air contaminants.
- Rule 4102 (Nuisance): The purpose of this rule is to protect the health and safety of the public, and applies to any source operation that emits or may emit air contaminants or other materials.
- Rule 4601 (Architectural Coatings): The purpose of this rule is to limit Volatile Organic Compounds (VOC) emissions from architectural coatings. Emissions are reduced by limits on VOC content and providing requirements on coatings storage, cleanup, and labeling.
- Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations): The purpose of this rule is to limit VOC emissions from asphalt paving and maintenance operations. Paving operations will be subject to Rule 4641.

The Air District is anticipated to provide a determination of applicable rules/regulations to the project when specific building, grading, etc. plans are provided to the Air District prior to initiation of construction- and operation-related activities that fall within the purview of the Air District's regulatory authority.

SENSITIVE RECEPTORS

“Sensitive receptors” are defined as facilities where sensitive population groups, such as children, the elderly, the acutely ill, and the chronically ill, are likely to be located. Land uses that include sensitive receptors are residences, schools, playgrounds, childcare centers, retirement homes, convalescent homes, hospitals, and medical clinics.

There are no residential receptors within 1.0 mile of the Aquamarine Solar project site. The nearest residences consist of a series of five dispersed rural residences located along 22nd Avenue and Laurel Avenue at distances ranging from 1.0 to 2.0 miles east of the Aquamarine site. The next nearest residences consist of 20 single-family dwellings at the Shannon Ranch complex located at the southwest corner of Avenal Cutoff Road and Lincoln/Gale Avenue approximately 2.0 miles southwest of the project. The next nearest sensitive receptors consist of the base housing at NAS Lemoore, with the nearest base housing located on the north side of SR-198 approximately 3.0 miles north of the project site.

Along the gen-tie corridor there are two groups of rural dwellings located along the south side of Nevada Avenue and Jayne Avenue. The first group consists of two ranch dwellings at the Stone Land Company Ranch on the south side of Nevada Avenue, approximately 1.4 miles east of Avenal Cutoff Road, where the facades of both dwellings are 200 feet from the southern edge of the gen-tie right-of-way. The second group of dwellings consists of a series of eight rural dwellings located on the south side of Jayne Avenue, approximately 1.3 miles east of SR-269, where the nearest dwellings are located 140 feet from the southern edge of the gen-tie right-of-way.

IMPACT ANALYSIS

STANDARDS OF SIGNIFICANCE

Appendix G, of the California Environmental Quality Act (CEQA) Guidelines (Environmental Checklist) contains a list of project effects that may be considered significant. The 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;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area for an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations;
- Create objectionable odors affecting a substantial number of people;
- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant effect on the environment;
- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

The SJVAPCD has developed the Guide for Assessing and Mitigating Air Quality Impacts (SJVAPCD 2015), also known as the GAMAQI. The following thresholds of significance, obtained from the SJVAPCD's GAMAQI, are used to determine whether a proposed project would result in a significant air quality impact:

- 1) Construction Emissions of PM. Construction projects are required to comply with Regulation VIII as listed in the SJVAPCD; however, the size of the project and the proximity to sensitive receptors may warrant additional measures.
- 2) Criteria Air Pollutant Emissions. SJVAPCD current adopted thresholds of significance for criteria pollutant emissions and their application is presented in Table 4. These thresholds address both construction and operational emissions. Note that the District treats permitted equipment and activities separately.
- 3) Ambient Air Quality. Emissions that are predicted to cause or contribute to a violation of an ambient air quality would be considered a significant impact. SJVAPCD recommends that dispersion modeling be conducted for construction or operation when on-site emissions exceed 100 pounds per day after implementation of all mitigation measures.
- 4) Local CO Concentrations. Traffic emissions associated with the proposed project would be considered significant if the project contributes to CO concentrations at receptor locations in excess of the ambient air quality standards.

- 5) Toxic Air Contaminants or Hazardous Air Pollutants. Exposure to HAPs or TACs would be considered significant if the probability of contracting cancer for the Maximally Exposed Individual would exceed 20 in 1 million or would result in a Hazard Index greater than 1 for non-cancer health effects.
- 6) Odors. Odor impacts associated with the proposed project would be considered significant if the project has the potential to frequently expose members of the public to objectionable odors through development of a new odor source or placement of receptors near an existing odor source.
- 7) GHGs. In SJVAPCD's *Guidance for Valley Land-Use Agencies in Addressing GHG Emissions Impacts for New Projects Under CEQA*, the District establishes a requirement that land use development projects demonstrate a 29 percent reduction in GHG emissions from Business-As-Usual (BAU).
- 8) With respect to cumulative air quality impacts, the GAMAQI provides that any proposed project that would individually have a significant air quality impact (i.e., exceed significance thresholds for criteria pollutants ROG, NO_x, or PM₁₀) would also be considered to have a significant cumulative impact. In cases where project emissions are all below the applicable significance thresholds, a project may still contribute to a significant cumulative impact if there are other projects nearby whose emissions would combine with project emissions to result in an exceedance of one or more significance thresholds for criteria pollutants.

TABLE 4 SJVAPCD Air Quality Thresholds of Significance – Criteria Pollutant Emission Levels in tons per year (tpy)

Pollutant/Precursor	Construction Emissions	Operational Emissions	
		Permitted Equipment and Activities	Non-Permitted Equipment and Activities
Carbon Monoxide (CO)	100	100	100
Nitrogen Oxides (NO _x)	10	10	10
Reactive Organic Gases	10	10	10
Sulfur Dioxide (SO _x)	27	27	27
Particulate Matter – PM ₁₀	15	15	15
Particulate Matter – PM _{2.5}	15	15	15
Source: San Joaquin Valley Air Pollution Control District, GAMAQI, Page 80, Table 2 or website at http://www.valleyair.org/transportation/0714-GAMAQI-Criteria-Pollutant-Thresholds-of-Significance.pdf .			

AIR QUALITY IMPACTS

Project-related air quality impacts fall into two categories: short-term impacts due to construction, and long-term impacts due to the proposed project operation. During construction, the proposed project would affect local particulate concentrations primarily due to fugitive dust sources and contribute to ozone and PM₁₀/PM_{2.5} levels due to exhaust emissions. Over the long-term, the proposed project would result in an increase in emissions of ozone precursors such as ROG and

NO_x, primarily due to increased motor vehicle trips (employee trips, site deliveries, and onsite maintenance activities).

Impact 1: Construction Dust. Construction activity involves a high potential for the emission of fugitive particulate matter emissions that would affect local air quality. This would be *less-than-significant* with implementation of Regulation VIII.

Construction activities would temporarily affect local air quality, causing a temporary increase in particulate dust and other pollutants. Dust emission during periods of construction would increase particulate concentrations at neighboring properties. This impact is potentially significant, but normally it can be mitigated.

The project is separated into two construction sections. The Aquamarine solar construction activities are anticipated to take place over an approximate 24-month period from mid-2019 through mid-2021. The gen-tie construction activities are anticipated to take place over an 8-month period in 2019. The Kings County segments of the gen-tie line are to be completed over a 5-month period, and the Fresno County segments are scheduled to be completed over an additional 3 months.

Site preparation and disturbance (e.g., vehicle travel on exposed areas) would likely result in the greatest emissions of dust and PM₁₀/PM_{2.5}. Windy conditions during construction could cause substantial emissions of PM₁₀/PM_{2.5}.

There are no residential receivers within 1.0 mile of the Aquamarine project site. Along the gen-tie corridor there are 10 rural dwellings located along the south side of Nevada Avenue and Jayne Avenue and approximately 140 to 200 feet from the southern edge of the gen-tie right-of-way. The SJVAPCD's GAMAQI, emphasizes implementation of effective and comprehensive control measures. SJVAPCD adopted a set of PM₁₀ fugitive dust rules collectively called Regulation VIII. This regulation essentially prohibits the emissions of visible dust (limited to 20-percent opacity) and requires that disturbed areas or soils be stabilized. Compliance with Regulation VIII during the construction phase of the proposed project would be required. Prior to construction of each project phase, the applicant would be required to submit a dust control plan that meets the regulation requirements. These plans are reviewed by SJVAPCD and construction cannot begin until District approval is obtained. The provisions of Regulation VIII and its constituent rules pertaining to construction activities generally require:

- Effective dust suppression (e.g., watering) for land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill and demolition activities.
- Effective stabilization of all disturbed areas of a construction site, including storage piles, not used for seven or more days.
- Control of fugitive dust from on-site unpaved roads and off-site unpaved access roads.
- Removal of accumulations of mud or dirt at the end of the workday or once every 24 hours from public paved roads, shoulders and access ways adjacent to the site.
- Cease outdoor construction activities that disturb soils during periods with high winds.
- Record keeping for each day dust control measures are implemented.
- Limit traffic speeds on unpaved roads to 15 mph.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.

- Landscape or replant vegetation in disturbed areas as quickly as possible.
- Prevent the tracking of dirt on public roadways. Limit access to the construction sites, so tracking of mud or dirt on to public roadways can be prevented. If necessary, use wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site.
- Suspend grading activity when winds (instantaneous gusts) exceed 25 mph or dust clouds cannot be prevented from extending beyond the site.

Anyone who prepares or implements a Dust Control Plan must attend a training course conducted by the District. Construction sites are subject to SJVAPCD inspections under this regulation. Compliance with Regulation VIII, including the effective implementation of a Dust Control Plan that has been reviewed and approved by the SJVAPCD, would reduce dust and PM₁₀ emissions to a less-than-significant level.

Impact 2: Construction Exhaust Emissions. Equipment and vehicle trips associated with construction would emit ozone precursor and particulate matter air pollutants on a temporary basis. Construction emissions would be above the GAMAQI significance threshold. This would be a *significant* impact.

Construction equipment exhaust effects air quality both locally and regionally. Emissions of diesel particulate matter, a TAC, can affect local air quality. This impact is discussed under Impact 5. Emissions of air pollutants that could affect regional air quality were addressed by modeling emissions and comparing them to the SJVAPCD significance thresholds. Construction period air pollutant emissions were modeled using the California Emissions Estimator Model, CalEEMod 2016.3.2 model, with project construction information. This model was developed by the South Coast AQMD and other California Air Districts. SJVAPCD recommends the use of this model for construction and operational analysis of land use development projects. The model predicts emissions of ozone precursor pollutants (i.e., ROG and NO_x) and particulate matter (i.e., PM₁₀ and PM_{2.5}).

Construction build-out scenarios were developed based on the construction schedules, construction vehicle trips, and equipment proposed for use in the project description. Construction emissions were predicted for the construction of the Aquamarine Solar Generating Facility, the Gen Ties for both Kings and Fresno County and use of helicopter(s) in threading the power lines during the Gen Tie construction. The emissions computed using CalEEMod for this assessment address use of construction equipment, worker vehicle travel, on-site vehicle and truck use, and off-site truck travel by vendors or equipment/material deliveries. Both criteria air pollutant exhaust and fugitive dust (i.e., PM₁₀ and PM_{2.5}) were computed by CalEEMod. Helicopter emissions were computed separately from CalEEMod. Note that the unmitigated CalEEMod modeling does not include the effects of SJVAPCD Regulation VIII that would substantially reduce fugitive PM₁₀ and PM_{2.5} emissions. Attachment 1 includes the construction assumptions that were used to model emissions. Attachment 2 includes the CalEEMod modeling outputs for both uncontrolled and controlled emissions. Attachment 3 includes emissions associated with helicopter operations for Line Threading.

Unmitigated emissions from all phases of construction are reported in Table 5a. As shown, unmitigated construction emissions would exceed the applicable SJVAPCD thresholds for NO_x and PM₁₀ in 2019, and would exceed the NO_x threshold in 2020. Unless mitigated (and controlled under Regulation VIII), this would represent a significant air quality impact.

The SJVAPCD Indirect Source Review Rule (Rule 9510) applies to construction of the proposed Project. Regardless of whether a project's construction emissions of regional pollutants would exceed the Air District's significance thresholds for each pollutant, the project is still required to comply with Rule 9510, to ensure that the project contributes its fair share of emissions reductions in order to achieve the basin-wide reduction targets established in the Air District's Ozone and PM attainment plans. Rule 9510 requires that the project reduce uncontrolled construction exhaust emissions by 20 percent for NO_x and 45 percent for PM₁₀ from calculated unmitigated levels. The basis for the reductions is use of the CalEEMod emissions for statewide construction fleets. Use of newer equipment could result in substantially lower emissions. SJVAPCD encourages reductions through on-site mitigation measures. (Note: The use of the term "mitigation" under Rule 9510 does not refer to mitigation of impacts under CEQA; i.e., the ISR emission reduction percentages are required without regard to whether the CEQA emissions thresholds are exceeded or not.) Fees to purchase or sponsor off-site reductions through SJVAPCD apply when on-site mitigation measures do not achieve the required percentage of emissions reduction. Using less-polluting construction equipment, such as newer equipment or retrofitting older equipment reduces construction emissions on-site. A combination of on-site and off-site measures can be implemented to meet the overall emission reduction requirements. The emissions reported in Table 5a do not include the reductions required by Rule 9510.

The Aquamarine solar facility would be decommissioned at the end of its productive life, after 25 to 30 years of operation. The activities associated with deconstruction would be comparable to construction, but emissions are expected to be substantially lower given anticipated reductions in vehicle and equipment emissions to be phased-in over time per State and federal regulations, and also because of the generally lower intensity of equipment use associated with decommissioning. At the time of decommissioning, emission levels for NO_x and ROG are expected to be about 25 percent of construction emissions, and PM₁₀ and PM_{2.5} (as exhaust) would be about 45 percent and 23 percent of construction emissions, respectively (Kings County 2012). With the application of Regulation VIII dust control requirements, fugitive PM₁₀ emissions are likewise expected to be below the applicable significance thresholds, as they are for construction. Therefore, the emissions associated with project decommissioning would be less than significant.

Mitigation Measure AQ-1: All off-road diesel construction equipment greater than 25 horsepower and operating at the site for more than 20 hours shall meet U.S. EPA Tier 3 engine standards for emissions of nitrogen oxides and particulate matter. The effect of this mitigation measure was modeled using CalEEMod.

Mitigation Measure AQ-2: Develop a plan to use off-road diesel construction equipment that meets U.S. EPA Tier 4 engine standards for emissions of nitrogen oxides and particulate matter, to the extent feasible. This measure recognizes that specialized equipment may not be reasonably available for this project. This measure was not modeled using CalEEMod.

Mitigation Measure AQ-3: To ensure that project construction-related NOx emissions are adequately mitigated, the project proponent shall execute a Voluntary Emissions Reduction Agreement (VERA) with the SJVAPCD. The amount of NOx emissions to be mitigated through this agreement would be the uncontrolled emissions minus the emissions reduction attributable to Mitigation Measures AQ-1 and AQ-2. Prior to the issuance of grading permits for each project phase, the project proponent shall submit evidence to the County demonstrating that the project's construction-related emissions of NOx will be reduced to below the SJVAPCD's CEQA significance thresholds of 10 tons per year NOx.

TABLE 5a Annual Construction Emissions in Tons per Year – Unmitigated

Year	Construction Phase	ROG	NO_x	CO	PM₁₀*	PM_{2.5}*
2019	Solar Generating Facility	1.37	11.64	8.93	4.27	1.82
	Gen-Tie Kings County	0.94	9.21	6.19	15.43	2.31
	Gen Tie Fresno County	0.47	4.63	3.03	7.60	1.15
	Gen Tie Helicopter Kings County	1.02	0.40	1.30	0.01	0.01
	Gen Tie Helicopter Fresno County	0.52	0.20	0.65	0.01	0.01
	Total 2019	4.32	26.08	20.10	27.32	5.30
2020	Solar Generating Facility	1.40	11.80	10.07	3.00	0.97
2021	Solar Generating Facility	0.04	0.29	0.29	0.09	0.03
<i>Significance thresholds</i>		10	10	100	15	-
<i>Exceed threshold?</i>		No	YES	No	YES	-

* Values reported for PM₁₀ and PM_{2.5} include fugitive dust emissions and diesel exhaust emissions combined. Fugitive dust emissions do not include the effect of measures implemented under Regulation VIII.

TABLE 5b Controlled/Mitigated Construction Emissions in Tons per Year

Year	Construction Phase	ROG	NO _x	CO	PM ₁₀ *	PM _{2.5} *
2019	Solar Generating Facility	0.89	7.95	9.41	1.77	0.72
	Gen-Tie Kings County	0.36	5.38	7.13	5.39	0.65
	Gen Tie Fresno County	0.18	2.70	3.50	2.66	0.32
	Gen Tie Helicopter Kings County	1.02	0.40	1.30	0.01	0.01
	Gen Tie Helicopter Fresno County	0.52	0.20	0.65	0.01	0.01
	Total 2019	2.97	16.62	21.99	9.84	1.71
	ISR/VERA Reduction**	--	6.62	--	--	--
2020	Total 2020	1.16	10.62	10.05	1.76	0.61
	ISR/VERA Reduction**	--	0.62	--	--	--
2021	Total 2021	0.03	0.25	0.30	0.06	0.02
	ISR/VERA Reduction**	--	--	--	--	--
<i>Significance thresholds</i>		10	10	100	15	-
<i>Exceed threshold?</i>		No	No	No	No	-

* Values reported for PM₁₀ and PM_{2.5} include fugitive dust emissions and diesel exhaust emissions combined.

** Minimum amount of reduction required to meet the CEQA threshold. Additional reductions may be required to meet ISR requirements.

Effectiveness of Mitigation

Table 5b reports annual construction period emissions utilizing fugitive dust control measures (e.g., Regulation VIII) and implementation of Mitigation Measures AQ-1, AQ-2, and AQ-3. Control measures required by SJVAPCD were selected as mitigation measures in the CalEEMod model. In addition, mitigation measures for equipment usage were selected in CalEEMod that include use of Tier 3 or newer diesel construction equipment. SJVAPCD regulations that would apply to construction activities include Regulation VIII, regarding dust control, Rule 4102, regarding creation of a nuisance, Rule 4601 which limits volatile organic compound emissions from architectural coatings, storage and cleanup, and Rule 4641 which limits emissions from asphalt paving materials. Based on CalEEMod modeling, implementation of Mitigation Measure AQ-1 could reduce NO_x emissions by over 20 percent and PM₁₀ exhaust emissions by over 40 percent. Use of Tier 4 equipment, under Mitigation Measure AQ-2, would further reduce NO_x and PM₁₀ exhaust emission from on-site construction equipment. A substantial portion of the emissions associated with construction would be emitted by haul trucks or vendors that travel both near and away from the project sites. These emissions would be unaffected by the application of Mitigation Measures AQ-1 and AQ-2. Mitigation Measure AQ-3 would indirectly address these emissions.

To implement a VERA required under Mitigation Measure AQ-3, the project proponent and SJVAPCD will enter into a contractual agreement in which the project proponent agrees to mitigate project-specific emissions by providing off-site emissions reduction funds to the SJVAPCD. The SJVAPCD's role is to administer the implementation of the VERA consisting of identifying emissions reductions projects, funding those projects and verifying that emissions reductions have been successfully achieved. The types of emission reduction projects that have been funded in the past include electrification of stationary internal combustion engines (such as agricultural irrigation pumps), replacing old heavy-duty trucks with new, cleaner, more efficient heavy-duty trucks, and replacement of old farm tractors. The SJVAPCD has been successfully developing and implementing VERA contracts with project proponents since 2005. It is the SJVAPCD's experience that implementation of a VERA is a feasible mitigation measure, which effectively achieves the emission reductions by supplying real and contemporaneous emissions reductions measures (SJVAPCD 2015a, pp. 116-117). Therefore, the implementation of the executed VERA would be considered by the SJVAPCD to reduce the project's air quality impacts to less-than-significant levels.

With implementation of required mitigation measures, construction period emissions of ROG, NO_x and PM₁₀ would be below the thresholds used by SJVAPCD to judge the significance of construction air quality impacts under CEQA. Thus, while the residual construction-related emissions of ozone precursors and particulates may result in a small decrease in overall air quality, and may therefore have a small adverse health affect (as described earlier in this section under "Criteria Air Pollutants and Their Health Effects"), the overall health impact would be insignificant.

It was previously noted that under Rule 9510 (ISR), the project would be responsible for reducing construction PM₁₀ emissions by 45 percent, and NO_x emissions by 20 percent. These reductions are required regardless of whether the project emissions exceed the CEQA significance thresholds. This CEQA analysis does not account for ISR reductions, as they are treated separately by the SJVAPCD. The final emissions calculations for the project will be performed in an Air Impact Assessment (AIA), as required under ISR to determine the specific ISR reductions (i.e., in tons) as well additional reductions required under the VERA for any emissions that are not mitigated to below CEQA significance thresholds through ISR reduction.

Impact 3: Operational Emissions. Proposed Project operational emissions, generated primarily by traffic and maintenance equipment, would increase emissions of ozone precursors and particulate matter, but they would be below GAMAQI significance thresholds. These increases would be *less-than-significant*.

The CalEEMod model was also used to estimate annual emissions from operation of the Aquamarine Solar Project. (Note: Once completed, the Gen-Tie Line would involve very low levels of activity for annual inspections and maintenance. As such, the operational emissions associated with Gen-Tie operation would be negligible and thus were not estimated.) 2022 is the first full year that the Aquamarine project could be operational and was used as the analysis year. Maintenance vehicle and some off-road equipment usage would occur on-site as well as workers traveling and occasional equipment or vendor deliveries would result in some emissions.

Emissions were computed using the CalEEMod model. Activity input to the model included the on-site travel activity, travel conditions (paved or unpaved), on-site equipment usage and off-site vehicle travel. Note that on-site travel and activity were assumed to occur on unpaved roadways. However, the project would have internal gravel roadways that must be treated with dust palliatives to minimize dust generation.

The effect of the proposed project on regional air quality was evaluated by estimating emissions for the full project operating in 2022. The annual emissions associated with the proposed project are shown in Table 6. Output from CalEEMod is contained in Attachment 1.

Stationary combustion equipment that could emit air pollution during facility operation is not proposed for the project. Photovoltaic energy projects, such as this one, do not usually include these sources. If stationary sources are included in the project at a later date, they may require permits from SJVAPCD. Such sources could include combustion emissions from standby emergency generators (rated 50 horsepower or greater). These sources would normally result in minor emissions, compared to those from traffic generation and off-road maintenance equipment reported above. Sources of stationary air pollutant emissions complying with all applicable SJVAPCD regulations generally will not be considered to have a significant air quality impact. Stationary sources that are exempt from SJVAPCD permit requirements due to low emission thresholds would not be considered to have a significant air quality impact.

As previously mentioned, the project is subject to SJVAPCD's Indirect Source Review or Rule 9510 (ISR) to reduce NO_x and PM₁₀ emissions. Although the project's operational emissions of regional pollutants would not exceed the Air District's significance thresholds for each pollutant, as shown in Table 6, the project is still required to comply with Rule 9510, to ensure that the project contributes its share of emissions reductions in order to achieve the basin-wide reduction targets established in the Air District's Ozone and PM₁₀ attainment plans. Under Rule 9510, the project would be required to reduce operational NO_x emissions by 33 percent and operational PM₁₀ emissions by 50 percent over 10 years. The emissions in Table 6 do not reflect any reductions that may be required under ISR.

TABLE 6 Annual Project Operational Emissions in Tons Per Year

Project	ROG	NO_x	PM₁₀¹	PM_{2.5}¹
Operations	0.12	1.24	8.6	0.9
<i>Significance Thresholds</i>	10	10	15	15
<i>Exceed Thresholds?</i>	No	No	No	No

¹ Includes both exhaust and fugitive dust emissions.

Mitigation Measure for Impact 3: None Required

Impact 4: Carbon monoxide concentrations from operational traffic. Mobile emissions generated by project traffic would increase carbon monoxide concentrations at intersections in the project vicinity. However, resulting concentrations would

be below ambient air quality standards, and therefore, considered a *less-than-significant* impact.

Project traffic would slightly increase concentrations of carbon monoxide along roadways providing access to the project. Carbon monoxide is a localized air pollutant, where highest concentrations are found very near sources. The major source of carbon monoxide is automobile traffic. Elevated concentrations, therefore, are usually only found near areas of high traffic volume and congestion.

Emissions and ambient concentrations of CO have decreased greatly in recent years. These improvements are due largely to the introduction of cleaner burning motor vehicles and reformulated motor vehicle fuels. No exceedances of the State or federal CO standards have been recorded at any of San Joaquin Valley's monitoring stations in the past 15 years. The San Joaquin Valley Air Basin has attained the State and National CO standards.

However, despite this progress, localized CO concentrations are still a concern in the San Joaquin Valley and are addressed through the SJVAPCD screening method that can be used to determine with fair certainty that the effect a project has on any given intersection would not cause a potential CO hotspot. A project can be said to have no potential to create a CO violation or create a localized hotspot if either of the following conditions are not met: level of service (LOS) on one or more streets or intersections would be reduced to LOS E or F; or the project would substantially worsen an already LOS F street or intersection within the project vicinity. As the proposed project will not do either of these, the potential impact on CO would be considered less than significant.

Mitigation Measure for Impact 4: None Required

Impact 5: Exposure of Sensitive Receptors to Toxic Air Contaminants. Construction activity, delivery trucks, employee traffic and emissions from onsite vehicles used in maintenance activities would expose nearby receptors to toxic air contaminants. Based on the small levels of construction toxic air contaminants and the distance to the nearest sensitive receptor, a screening health risk assessment to assess the potential cancer risk would not be required and the emissions impacts would be *less than significant*.

The Toxic Air Contaminant (TAC) of concern is diesel particulate matter (DPM) emitted from diesel-fueled vehicles and equipment during construction of the Aquamarine solar project and Gen-Tie line.

For the Aquamarine project, the highest daily levels of DPM would be emitted during construction activities from use of heavy-duty diesel equipment such as bulldozers, excavators, loaders, graders and diesel-fueled haul trucks. However, these emissions would be intermittent, vary throughout the project site area, and be of a temporary duration (approximately 2 years of total construction activity). During project operations, low-level DPM emissions would result from worker vehicles and maintenance activities, but they would be constant over the lifetime of the project. Operational DPM emissions would mainly result from the use of pickup trucks with a portable water trailer (and pump) which would be used for panel cleaning.

Levels of DPM emissions can be generally inferred from PM₁₀ emissions, of which diesel exhaust constitutes a substantial component. Tables 5a and 5b, above, show that PM₁₀ emissions from solar project construction would be well below the applicable significance threshold. Table 6, above, shows that PM₁₀ emissions from operational activities would also be well below the significance threshold.

Because of the relatively small levels of DPM emissions during project construction and operation, and due to the substantial distances to the nearest sensitive receptors (e.g., the nearest residence is at least 1.2 miles from the nearest project boundary), DPM emissions from project construction would disperse to negligible levels, and thus the health impacts associated with exposure to DPM from project construction and operation are not anticipated to be significant. Therefore, the Aquamarine Solar Project would result in a *less-than-significant impact* in terms of exposing sensitive receptors to substantial concentrations of Toxic Air Contaminants.

Along the Gen-Tie Line, there are 10 sensitive receptors (all residences) located within 1,000 feet of the gen-tie corridor. The nearest 10 residences, located along Nevada and Jayne Avenues, are situated 125 feet to 180 feet from the corridor boundary. It is anticipated that nearest transmission towers would be located approximately 300 feet from the nearest dwelling at the Stone Land Company Ranch and 400 feet from the nearest of the 8 dwellings on the south side of Jayne Avenue. Also, few if any new access driveways would need to be constructed, given that all tower sites would be readily accessible from the adjacent county roads. that the planned construction staging area, located at the northeast corner of Jayne Avenue and SR-269, would be located well away from any existing residences.

Construction of the gen-tie towers would proceed quickly. The total time required at each tower site for clearing, grading, excavation of footings, and tower assembly and erection, and clean up, would be 1 to 2 weeks. The area subject to temporary grading at each tower site would be approximately one acre, so the duration of grading equipment operation would be brief. Similarly, the time required for auguring holes for the concrete footings at each tower site would also be short.

The maximally exposed sensitive receptor along Nevada and Jayne Avenues would be 300 feet or more away from the nearest tower site. However, even under worst-case conditions with the nearest tower placed in proximity to the maximally exposed receptor, the total duration of nearby construction could be up to two weeks, but likely much shorter, with total operating time for diesel equipment shorter still. Construction of other towers and access driveways in the vicinity would occur at least 800 feet away and farther. At this distance, most diesel particulate matter would be dispersed and concentrations reaching the receptor would be low.

Operational emissions would be negligible given the very low frequency of inspection and maintenance activities that would take place at the nearest tower. The very low level of exhaust emissions associated with construction of the transmission projects and related facilities is indicated by the low levels of PM₁₀/PM_{2.5} estimated for Gen-Tie construction.

Given the very brief duration of construction that would occur at the nearest residential receptor, and considering the negligible operational emissions, and the lifetime exposure period considered in evaluating cancer risk, it is expected that the increased cancer risk at the maximally exposed receptor would be very low and would be well below the risk threshold of 20 in 1 million. Therefore, the overall health risk due to emissions of diesel particulate matter from construction of the Gen-Tie Line would be less than significant.

Mitigation Measure for Impact 5: None required.

Impact 6: Odors. The project would result in temporary odors during construction. This impact would be *less-than-significant*.

During construction, the various diesel powered vehicles and equipment in use on-site would create localized odors. These odors would be temporary and not likely to be noticeable for extended periods of time much beyond the project's site boundaries. The potential for diesel odor impacts is, therefore, less than significant.

During project operations, the project is not expected to generate any objectionable odors. Therefore, the odor impacts associated with operations would be less than significant.

Mitigation Measure for Impact 6: None proposed.

Impact 7: Consistency with Clean Air Planning Efforts. The project would not conflict with the current clean air plan or obstruct its implementation. This would be a *less-than-significant impact*.

The GAMAQI does not include methodologies for assessing the effect of a project on consistency with clean air plans developed by the SJVAPCD. Regional clean air plans developed by SJVAPCD rely on local land use designations to develop population and travel projections that are the basis of future emissions inventories. Air pollution control plans are aimed at reducing these projected future emissions. The project land uses would not alter population and vehicle related emissions projections contained in regional clean air planning efforts in any measurable way, and would not conflict with achievement of the control plans aimed at reducing these projected emissions. Therefore, the project would not conflict with or obstruct implementation of efforts outlined in the region's air pollution control plans to attain or maintain ambient air quality standards. This would be a less-than-significant impact.

Also, as discussed above, in 2005 the SJVAPCD adopted the Indirect Source Review (ISR) Rule in order to fulfill the District's emission reduction commitments in its PM₁₀ and Ozone attainment plans. The District has determined that implementation and compliance with the ISR would reduce the cumulative PM₁₀ and NO_x impacts of growth anticipated in the air quality plans to a less-than-significant level. Since the project would be required to implement the emissions reductions under ISR, it would fulfill its share of achieving the District's emission reduction commitments in the PM₁₀ and Ozone attainment plans. Therefore, the project would result in a *less-than-significant impact* since it would not conflict with or obstruct implementation of the applicable air quality plans.

Mitigation Measure for Impact 7: None required.

CUMULATIVE AIR QUALITY IMPACTS

Methodology

The SJVAPCD has developed criteria to determine if a development Project could result in potentially significant regional emissions. According to the GAMAQI, any proposed project that would individually have a significant air quality impact (i.e., exceed significance thresholds for ROG or NO_x) would also be considered to have a significant cumulative air quality impact. Impacts of local pollutants (CO and TACs) are cumulatively significant when modeling shows that the combined emissions from the project and other existing and planned projects will exceed air quality standards. For local impacts of PM₁₀ from unrelated construction projects, the GAMAQI recommends a qualitative approach where construction activities from unrelated projects in the area should be examined to determine if enhanced dust suppression measures are necessary.

Regional Air Pollutants

As discussed under ‘Significance Criteria’ above, cumulative ozone impacts would be considered significant - if the project-specific emissions exceed the SJVAPCD significance thresholds for ozone precursors ROG or NO_x, or the project is not consistent with the regional clean air plan. As discussed in Impact 2 (and shown in Table 5b) above, project-specific construction emissions of ozone precursor pollutants (ROG and NO_x) and PM were found to be less-than-significant after mitigation. As discussed in Impact 3 (and shown in Table 6) above, project-specific operational emissions of ozone precursor pollutants (ROG and NO_x) and PM were found to be less-than-significant without mitigation. As discussed under Impact 7 above, the project would be consistent with clean air planning efforts and would not conflict with or obstruct their implementation. Therefore, the project contribution to cumulative regional air quality impacts would be less than significant.

Local Air Pollutant Emissions

Construction period PM₁₀ emissions would be localized. With implementation of SJVAPCD Regulation VIII, construction period impacts would be less than significant. Additional construction that may occur in the area concurrently with the project would be subject to SJVAPCD Regulation VIII, as well as the District’s Indirect Source Review Rule 9510, which would reduce cumulative construction emissions to less-than-significant levels.

In summary, the cumulative project impacts to localized air quality impacts would be less-than-significant.

Cumulative Toxic Air Pollutant Impacts

As discussed above, the project would not have a significant impact related to community health risk from project construction or operation and, therefore, would also not contribute to a cumulatively considerable community risk impact in the project vicinity.

Summary of Cumulative Contribution to Air Quality Impacts

The project would not contribute to local cumulative air quality impacts with respect to any standard or significance criteria. In addition, the project's contribution to cumulative regional air quality impacts would be less than considerable. In conclusion, the project would not have a cumulatively significant impact on air quality.

GHG Emissions

GHG emissions in terms of CO₂e are low for both the construction and operational phases of the proposed project. A photovoltaic power production facility inherently represents “best performance standards” as compared to other typical forms of electrical power production, i.e., such as fossil-fueled power plants. The operation of the project would provide electric power with negligible GHG emissions over the life of the project compared with traditional fossil-fueled power plants. Therefore, the project is consistent with State GHG policy to encourage solar power development as a means to reduce fossil fuels and GHG emissions and improve air quality.

GHG Emissions are reported in Table 7 for both construction and operation of the project.

TABLE 7 Annual Project GHG Emissions in Metric Tons Per Year

Phase	GHG Emissions
2019 Construction Activities	
Aquamarine Solar Generation Facility	2,909
Gen Tie in Kings County	1,181
Gen Tie in Fresno County	596
Gen Tie Helicopter Use	345
Total 2019	5,031
2020 Construction Activity	4,635
2021 Construction Activity	108

REFERENCES

- BAAQMD 2011 Bay Area Air Quality Management District (BAAQMD). 2011.
BAAQMD CEQA Air Quality Guidelines. May (updated May 2017).
http://www.baaqmd.gov/~media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en

CARB 2000 California Air Resources Board (CARB). 2000. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*. October.
<https://www.arb.ca.gov/diesel/documents/rrpFinal.pdf>

CARB 2005 California Air Resources Board (CARB). 2005. *Air Quality and Land Use Handbook: A Community Health Perspective*.
<https://www.arb.ca.gov/ch/handbook.pdf>

CARB 2012 California Air Resources Board (CARB) 2012. Overview: Diesel Exhaust and Health. <https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health> Accessed May 20, 2018.

CARB 2013 California Air Resources Board (CARB) 2013. *The California Almanac of Emissions and Air Quality - 2013 Edition*.
<https://www.arb.ca.gov/aqd/almanac/almanac13/almanac13.htm>

CARB 2016a California Air Resources Board (CARB). 2016. *Ozone (O₃) and Health*. <https://www.arb.ca.gov/research/aaqs/common-pollutants/ozone/ozone.htm>

CARB 2016b California Air Resources Board (CARB). 2016. *Carbon Monoxide and Health*. <https://www.arb.ca.gov/research/aaqs/common-pollutants/co/co.htm>

CARB 2016c California Air Resources Board (CARB). 2016. *Nitrogen Dioxide (NO₂) and Health*. <https://www.arb.ca.gov/research/aaqs/common-pollutants/no2/no2.htm>

CARB 2016d California Air Resources Board (CARB). 2016. *Inhalable Particulate Matter and Health (PM_{2.5} and PM₁₀)*.
<https://www.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm>

CARB 2016e California Air Resources Board (CARB). 2016. *AB 2588 Air Toxics "Hot Spots" Program*. <https://www.arb.ca.gov/ab2588/ab2588.htm>

CARB 2016f California Air Resources Board (CARB). 2016. *iADAM: Air Quality Data Statistics*. <https://www.arb.ca.gov/adam/index.html> accessed 10/18/2018.

CARB 2016g California Air Resources Board (CARB). 2016. *2016 Plan for the 2008 8-Hour Ozone Standard*. June.
http://valleyair.org/Air_Quality_Plans/Ozone-Plan-2016.htm

CARB 2018 California Air Resources Board (CARB). 2009. California State and Local Air Monitoring Plan – 2009. June.

https://www.arb.ca.gov/adam/netrpt/report_2009.pdf Note this plan is currently being updated – see: California Air Resources Board 2018 Annual Network Plan

FHWA 2016	Federal Highway Administration, 2016. <i>Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents</i> . https://www.fhwa.dot.gov/Environment/air_quality/air_toxics/policy_and_guidance/msat/
Kings County 2012	Kings County. 2012. <i>Initial Study and Negative Declaration – Conditional Use Permit No. 11-03 (SunPower Henrietta Solar Project)</i> . June.
SJVAPCD 2004	San Joaquin Valley Air Pollution Control District (SJVAPCD). 2004. <i>Extreme Ozone Attainment Demonstration Plan</i> . October.
SJVAPCD 2007	San Joaquin Valley Air Pollution Control District (SJVAPCD). 2007. <i>2007 Ozone Plan Volumes 1-3</i> . April.
SJVAPCD 2015a	San Joaquin Valley Air Pollution Control District (SJVAPCD). 2015. <i>Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI) – Final Draft</i> . March. http://www.valleyair.org/transportation/GAMAQI_3-19-15.pdf
SJVAPCD 2015b	San Joaquin Valley Air Pollution Control District (SJVAPCD). 2015. <i>Air Quality Thresholds of Significance – Toxic Air Contaminants</i> . July. http://www.valleyair.org/transportation/0714-GAMAQI-TACs-Thresholds-of-Significance.pdf
SJVAPCD 2016a	San Joaquin Valley Air Pollution Control District (SJVAPCD). 2016. <i>2016 Ozone Plan for 2008 8-Hour Ozone Standard</i> . June 16. http://www.valleyair.org/Air_Quality_Plans/Ozone-Plan-2016/plancover.pdf
SJVAPCD 2016b	San Joaquin Valley Air Pollution Control District (SJVAPCD). 2016. <i>2016 Moderate Area Plan for the 2012 PM_{2.5} Standard</i> . September. http://www.valleyair.org/Air_Quality_Plans/docs/PM25-2016/b.pdf
SJVAPCD 2017	San Joaquin Valley Air Pollution Control District (SJVAPCD). 2017. <i>Rule 9510 Indirect Source Review (ISR) (Adopted December 15, 2005; Amended December 21, 2017, but not in effect until March 21, 2018)</i> . http://www.valleyair.org/rules/currnrules/r9510-a.pdf

Attachment 1: Activity Assumptions used for CalEEMod Modeling

Aquamarine Solar - Construction - Off-Site Vehicle Usage

Vehicles	Estimated Usage			CalEEMod inputs				Construction Schedule
	Units	Miles/Round Trip	Round Trips per Unit	Total trips	Total VMT	Trips	mi/trip	
Phase 1 – Site Preparation								Phase 1
Water Trucks	5	85	1	10	425	9106	total haul	210 days (43 weeks)
Flat Bed Trucks	12	85	4	96	4080			Begin ~ March 1, 2019
Gravel Trucks (End Dump)(Delivery)	18	56	210	7560	211680			End ~ Dec 31, 2019
Equipment Transport Trucks (Delivery)	24	85	30	1440	61200			
Worker Vehicles	140	68	210	58800	1999200	280	daily	
Phase 2 – Installation of Solar Arrays								Phase 2
Water Trucks	4	85	1	8	340	12248	total haul	300 days (61 weeks)
Freight Trucks (Delivery)	19	400	275	10450	2090000			Begin ~ Oct 1, 2019
Equipment Transport Trucks (Delivery)	7	85	10	140	5950			End ~ Nov 30, 2020
Service Trucks	3	85	275	1650	70125			(overlap w/ Ph 1 = 13 weeks)
Worker Vehicles	290	68	300	174000	5916000	580	daily	
			1722					
Phase 3 – Installation of Inverters, Transformers, Substation, Interconnection								Phase 3
Water Trucks	1	85	1	2	85	1838	total haul	160 days (30 weeks)
Ready Mix (Delivery)	3	50	250	1500	37500			Begin ~ Aug 1, 2020
Freight (Delivery)	1	400	150	300	60000			End ~ Feb 28, 2021
Equipment Transport Trucks (Delivery)	1	85	18	36	1530			(overlap w/ Ph 2 = 17 weeks)
Worker Vehicles	40	68	160	12800	435200	80	daily	
			1158					Total Duration
								510 days (102 weeks)

Aquamarine Solar - Construction - On-Site Equipment Usage

Equipment	Estimated Usage			Average Hrs/day
	Units	Hours/Day (5 days/week)	days	
Phase 1 – Site Preparation				210 days
Water Trucks	5	7	210	
Bulldozers	3	7	210	7.0 hr/day
Graders	5	7	108	3.6
Compactors	1	7	42	1.4
Skid Loaders	1	7	188	6.3
Asphalt Pavers	1	4	28	0.5
Front-End Loaders	1	7	83	2.8
Phase 2 – Installation of Solar Arrays				300 days
Water Trucks	1	7	154	
Tractors – post drivers	2	7	245	5.7 hr/day
Forklifts	6	7	220	5.1
Trenchers	9	4	245	3.3
Flat Bed Trucks	12	7	220	5.1 delivery?
Phase 3 – Installation of Inverters, Transformers, Substation, Interconnection				160.0 days
Water Trucks	1	7	140	
Forklifts	2	4	140	3.5 hr/day
Trenchers	1	4	144	3.6
Backhoes	1	4	158	4.0
Cranes	1	2	94	1.2
Aerial Lifts	1	6	94	3.5

17.6

AQUAMARINE SOLAR PROJECT - Operational Equipment and Vehicle Use - Sheet 2 of 4

Operations - On-Site Vehicle and Equipment Usage

Equipment	Estimated Usage (Annual)			hours/day	
	Units	Hours/Day/Unit	Total Days/Unit/Year		
All-Terrain Vehicle (ATV)	2	4	5	0.1	
Tractor	2	8	100	2.2	
Portable Generator	2	8	60	1.3	
Portable Water Trailer w/Pump	5	8	80	1.8	
Vehicles	Units	Daily Miles/ Unit	Total Days/ Unit/Year		
Pickup Truck (Routine O&M)	8	30	130	2080	31200
Pickup Truck (Panel Washing)	15	40	80	2400	48000
				4480	79200
				12.27	17.7
				trip/day	mi/trip
				90% on dirt	

Operations - Off-Site Vehicle Usage

Personnel	Estimated Annual			Miles/Round Trip	trips	vmt
	Workers	Days	Round Trips			
Permanent	2	252	504	68	1,008	34,272
Repair Crew	20	25	500	68	1,000	34,000
Shepherds	3	110	330	68	660	22,440
Panel Washing Crew	25	40	1,000	68	2,000	68,000
Total Annual Round Trips			2,334			
					4,668	158,712
					12.79	34
					trip/day	mi/trip
					on paved	

Total
25.06 trip/day
26.01 mi/trip
30% % on dirt (on-site)

GEN-TIE GENERAL DATA - Sheet 3 of 4				
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Gen-Tie Construction Schedule

	Days	Weeks	Begin	End
Kings County Segments	133	22.2	14-May	13-Oct-19
Fresno County Segments	67	11.1	15-Oct-19	31-Dec-19
Totals	200	33.3		

Note: Construction scheduled for 6 days per week

Land Disturbance Estimates - Gen-Tie Construction

Transmission Segment	Corridor Length (Miles)	Number of Towers (1)	Land Disturbance Areas (Acres)						Totals
			At Tower Sites		Tower Access Spur Roads (4)		Pulling Sites (1)	Material Storage	
			Temporary (2)	Permanent (3)	Temporary (4)	Permanent (5)	(All Temporary)	Sites (1) (Temp.)	
1. Kings County Segments	8.7	57	57.0	0.9	6.0	0.0	68.0	0.0	
2. Fresno County Segments	6.3	40	40.0	0.6	0.0	0.0	45.0	17.0	
Total Corridor Length	15.0								15.0
Total Number of Towers		97							97.0
Total Area of Temporary Disturbance			97.0		6.0	0.0	113.0	17.0	233.0
Total Area of Permanent Disturbance				1.5					1.5

Notes

(1) Per preliminary engineering plans by Cupertino Electric

(2) Temporary disturbance area at each tower site = 1.0 acres

(3) Permanent disturbance area at each tower site = 0.016 acres (assumes monopoles throughout)

(10 foot wide monopole base plus 10 foot wide surrounding disturbance area = 706 sf)

(4) Consists only of 2.5-mile long temporary access road along 25th Ave alignment from Nevada Avenue north to Aquamarine substation.

All other access will be directly from adjacent Nevada or Jayne Avenues.

(5) No permanent tower access roads will remain after construction.

GEN-TIE CONSTRUCTION INPUTS - SHEET 4 of 4

(Prepared by Cupertino Electric)

CIVIL CREWS (QTY 2)			
CLASS	QTY	EQUIPMENT	QTY
GF	1	DOZER	2
FM	2	BACKHOE	2
OP	4	BOBCAT	2
		SKIP LOADER	2
		WATER TRUCK	2
workers/day		PICKUPS	4

Vendors/day

CIVIL CREW HOURS (6X10 WORK SCHEDULE)	CIVIL EQUIPMENT WORKING HOURS (6X10 WORK SCHEDULE)	TOTAL CIVIL EQUIPMENT WORKING DAYS	DAYS PER COUNTY	
AVG HOURS/DAY	AVG HOURS/DAY	TOTAL	KINGS	FRESNO
10	8	320	213	107
10	8	320	213	107
10	8	320	213	107
	10	400	266	133
	10	400	266	133
	6	480	320	160

FOUNDATION CREWS (QTY 2)			
CLASS	QTY	EQUIPMENT	QTY
GF	1	LO DRILL/TRACK DRILL	1
FM	2	WATERTRUCK	2
OP	4	FORKLIFT	2
GM	2	CONCRETE TRUCK	5
		CONCRETE PUMP TRUCK	1
		SLURRY TANK	1
		33T CRANE	1
		GENERATOR	2
		AIR COMPRESSOR	2
		PICKUPS	3
		CREW TRUCK	1
workers/day		TRACTOR TRAILER	1

FOUNDATION CREW HOURS (6X10 WORK SCHEDULE)	FOUNDATION EQUIPMENT WORKING HOURS (6X10 WORK SCHEDULE)	FOUNDATION EQUIPMENT WORKING DAYS	DAYS PER COUNTY	
AVG HOURS/DAY	AVG HOURS/DAY	TOTAL	KINGS	FRESNO
10	9	180	120	60
10	10	400	266	133
10	5	200	133	67
10	4	400	266	133
	4	80	53	27
	6	120	80	40
	6	120	80	40
	6	240	160	80
	6	240	160	80
	8	480	320	160
	8	160	107	53
	8	160	107	53

TSP FRAME/ERECTION CREWS (QTY 2)			
CLASS	QTY	EQUIPMENT	QTY
GF	1	33T CRANE	1
FM	2	105' BUCKET TRUCK	2
JL	4	FORKLIFT	2
OP	2	PICKUPS	2
GM	2	CREW TRUCK	2
workers/day		TRACTOR TRAILER	1

FRAME CREW HOURS (6X10 WORK SCHEDULE)	FRAME EQUIPMENT WORKING HOURS (6X10 WORK SCHEDULE)	FRAME EQUIPMENT WORKING DAYS	DAYS PER COUNTY	
AVG HOURS/DAY	AVG HOURS/DAY	TOTAL	KINGS	FRESNO
10	10	200	133	67
10	10	400	266	133
10	10	400	266	133
10	10	400	266	133
10	10	400	266	133
	8	160	107	53

WIRE CREWS (QTY 5)			
CLASS	QTY	EQUIPMENT	QTY
GF	2	33T CRANE	5
FM	5	TENSIONER	1
JL	15	3/4 HARDLINE PULLER	2
OP	5	3 DRUM MACHINES	2
GM	5	D8 SAG CATS	2
		WIRE BOAT (NON-MOTORIZED)	6
		REEL STAND (NON-MOTORIZED)	2
		CREW TRUCK	10
		WINCH TRUCK	5
		PICKUPS	4
		MID-SPAN SLEEVING RIG	1
		10K FORKLIFT	2
		BACKHOE	1
		105' BUCKET TRUCK	2
		55' BUCKET TRUCK	2
		30/60 DIGGER DERRICK	2
		TOOL TRAILER (NON-MOTORIZED)	2
		MATERIAL TRAILER (NON-MOTORIZED)	2
		HELICOPTER	1
		HELICOPTER SUPPORT TRAILER (NON-MOTORIZED)	1
		HELICOPTER FUEL TRUCK	1
workers/day		WATER TRUCK	2
	32	TRACTOR TRAILER	1

WIRE CREW HOURS (6X10 WORK SCHEDULE)	WIRE EQUIPMENT WORKING HOURS (6X10 WORK SCHEDULE)	WIRE EQUIPMENT WORKING DAYS	DAYS PER COUNTY	
AVG HOURS/DAY	AVG HOURS/DAY	TOTAL	KINGS	FRESNO
10	8	800	533	266
10	5	100	67	33
10	5	200	133	67
10	5	200	133	67
10	5	200	133	67
	NA			
	NA			
	10	2000	1332	666
	5	500	333	167
	8	640	426	213
	3	60	40	20
	5	200	133	67
	3	60	40	20
	5	200	133	67
	5	200	133	67
	5	200	133	67
	NA			
	NA			
	5	100	67	33
	NA			
	10	200	133	67
	10	400	266	133
	8	160	107	53

Total 59 workers
 Worker average VMT = 85 miles per day

Attachment 2: CalEEMod Output

Aquamarine Solar Project and Gen Tie

Source	Year	Uncontrolled Emissions in tons/year (metric tons for CO2)					GHG
		ROG/HC	NOx	CO	PM10	PM2.5	
Construction							
Aquamarine Solar Site	2019	1.37	11.64	8.93	4.27	1.82	2909
Gen Tie Kings County	2019	0.94	9.21	6.19	15.43	2.31	1181.00
Gen Tie Fresno County	2019	0.47	4.63	3.03	7.60	1.15	596.00
Gen Tie Helicopter Use	2019	1.54	0.59	1.95	0.02	0.02	345
2019 Total	2019	4.32	26.07	20.10	27.32	5.30	5031.00
Aquamarine Solar Site	2020	1.40	11.80	10.07	3.00	0.97	4635
Aquamarine Solar Site	2021	0.04	0.29	0.29	0.09	0.03	108
Operation							
Aquamarine Solar Site	2022	0.12	1.24	1.11	16.28	1.66	292

Aquamarine Solar Project and Gen Tie

Source	Year	Controlled Emissions in tons/year (metric tons for CO2)					GHG
		ROG/HC	NOx	CO	PM10	PM2.5	
Construction							
Aquamarine Solar Site	2019	0.89	7.95	9.41	1.77	0.72	2909
Gen Tie Kings County	2019	0.36	5.38	7.13	5.39	0.65	1181.00
Gen Tie Fresno County	2019	0.18	2.70	3.50	2.66	0.32	596.00
Gen Tie Helicopter Use	2019	1.54	0.59	1.95	0.02	0.02	345
2019 Total	2019	2.97	16.62	21.99	9.84	1.71	5031.00
Aquamarine Solar Site	2020	1.16	10.62	10.05	1.76	0.61	4635
Aquamarine Solar Site	2021	0.03	0.25	0.30	0.06	0.02	108
Operation							
Aquamarine Solar Site	2022	0.12	1.24	1.11	8.64	0.90	292
Mitigation Measures:	Tier 3 diesel engines Dust control plan with watering or use of pallatives on unpaved roadways Dust control on unpaved roadways						

Aquamarine Solar Project, Kings Co - Kings County, Annual

Aquamarine Solar Project, Kings Co Kings County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	1,825.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	37
Climate Zone	3			Operational Year	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	641.35	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Acreage from PD

Construction Phase - Phases and durations from applicant, 2 year construction period

Off-road Equipment - applicant provided equipment and hours

Off-road Equipment - Applicant provided equipment and hours

Off-road Equipment - Applicant provided equipment and hours crawler tract = compactor

Trips and VMT - Applicant provided trips

Grading -

Vehicle Trips - 25.06 trips per avg day and 26.01 mi/trip for both on- and off-site travel

Road Dust - Assume all on-site travel on dirt. Off site on highways

Construction Off-road Equipment Mitigation - Tier 3 and BMPs

Operational Off-Road Equipment - assume ATVs negligible (operate 0.1 hrs per day)

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	50
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	8.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	7.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	10.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	155,000.00	300.00
tblConstructionPhase	NumDays	155,000.00	160.00

tblConstructionPhase	NumDays	6,000.00	210.00
tblLandUse	LotAcreage	0.00	1,825.00
tblOffRoadEquipment	HorsePower	212.00	8.00
tblOffRoadEquipment	HorsePower	203.00	97.00
tblOffRoadEquipment	LoadFactor	0.36	0.37
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	7.00	1.20
tblOffRoadEquipment	UsageHours	8.00	5.10
tblOffRoadEquipment	UsageHours	8.00	3.50
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	7.00	5.70
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	2.20
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	1.30
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	1.80
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	5.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblRoadDust	MaterialMoistureContent	0.5	12
tblRoadDust	MeanVehicleSpeed	40	15
tblRoadDust	RoadPercentPave	100	67

tblRoadDust	RoadSiltLoading	0.1	0
tblTripsAndVMT	HaulingTripLength	20.00	30.50
tblTripsAndVMT	HaulingTripLength	20.00	176.90
tblTripsAndVMT	HaulingTripLength	20.00	53.90
tblTripsAndVMT	HaulingTripNumber	0.00	9,106.00
tblTripsAndVMT	HaulingTripNumber	0.00	12,248.00
tblTripsAndVMT	HaulingTripNumber	0.00	1,838.00
tblTripsAndVMT	VendorTripLength	6.60	0.00
tblTripsAndVMT	VendorTripLength	6.60	0.00
tblTripsAndVMT	VendorTripLength	6.60	0.00
tblTripsAndVMT	WorkerTripLength	16.80	34.00
tblTripsAndVMT	WorkerTripLength	16.80	34.00
tblTripsAndVMT	WorkerTripLength	16.80	34.00
tblTripsAndVMT	WorkerTripNumber	40.00	280.00
tblTripsAndVMT	WorkerTripNumber	0.00	580.00
tblTripsAndVMT	WorkerTripNumber	0.00	80.00
tblVehicleTrips	CC_TL	6.60	26.01
tblVehicleTrips	CNW_TL	6.60	26.01
tblVehicleTrips	CW_TL	14.70	26.01
tblVehicleTrips	CW_TTP	0.00	100.00
tblVehicleTrips	HO_TL	0.00	26.01
tblVehicleTrips	HS_TL	0.00	26.01
tblVehicleTrips	HW_TL	0.00	26.01
tblVehicleTrips	PR_TP	0.00	100.00
tblVehicleTrips	ST_TR	0.00	25.06
tblVehicleTrips	SU_TR	0.00	25.06
tblVehicleTrips	WD_TR	0.00	25.06

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	1.3692	11.6375	8.9341	0.0315	3.8901	0.3784	4.2685	1.4755	0.3489	1.8244	0.0000	2,902.6183	2,902.6183	0.2616	0.0000	2,909.1574
2020	1.3956	11.7979	10.0737	0.0498	2.7438	0.2570	3.0008	0.7324	0.2379	0.9703	0.0000	4,630.1434	4,630.1434	0.1842	0.0000	4,634.7490
2021	0.0379	0.2861	0.2944	1.1700e-003	0.0869	8.0400e-003	0.0949	0.0228	7.4200e-003	0.0302	0.0000	108.1175	108.1175	7.5700e-003	0.0000	108.3067
Maximum	1.3956	11.7979	10.0737	0.0498	3.8901	0.3784	4.2685	1.4755	0.3489	1.8244	0.0000	4,630.1434	4,630.1434	0.2616	0.0000	4,634.7490

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.8907	7.9525	9.4139	0.0315	1.5737	0.1913	1.7650	0.5299	0.1898	0.7197	0.0000	2,902.6177	2,902.6177	0.2616	0.0000	2,909.1567
2020	1.1598	10.6176	10.0468	0.0498	1.5878	0.1672	1.7550	0.4486	0.1646	0.6132	0.0000	4,630.1431	4,630.1431	0.1842	0.0000	4,634.7487
2021	0.0300	0.2541	0.3008	1.1700e-003	0.0486	6.4900e-003	0.0551	0.0134	6.4300e-003	0.0198	0.0000	108.1174	108.1174	7.5700e-003	0.0000	108.3067
Maximum	1.1598	10.6176	10.0468	0.0498	1.5878	0.1913	1.7650	0.5299	0.1898	0.7197	0.0000	4,630.1431	4,630.1431	0.2616	0.0000	4,634.7487

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	25.77	20.65	-2.38	0.00	52.24	43.28	51.45	55.53	39.28	52.11	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	3-1-2019	5-31-2019	2.8790	1.7060

2	6-1-2019	8-31-2019	2.8637	1.6907
3	9-1-2019	11-30-2019	5.4292	3.9950
4	12-1-2019	2-29-2020	4.2342	3.6138
5	3-1-2020	5-31-2020	3.4542	3.0879
6	6-1-2020	8-31-2020	3.5470	3.1579
7	9-1-2020	11-30-2020	3.6611	3.2600
8	12-1-2020	2-28-2021	0.4305	0.3747
9	3-1-2021	5-31-2021	0.0555	0.0487
		Highest	5.4292	3.9950

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0187	0.2517	0.2469	1.4500e-003	9.4520	1.2900e-003	9.4532	0.9373	1.2200e-003	0.9385	0.0000	135.2610	135.2610	6.6500e-003	0.0000	135.4273
Offroad	0.1006	0.9875	0.8666	1.8000e-003		0.0452	0.0452		0.0439	0.0439	0.0000	155.7753	155.7753	0.0213	0.0000	156.3072
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.1193	1.2391	1.1136	3.2500e-003	9.4520	0.0465	9.4984	0.9373	0.0451	0.9824	0.0000	291.0363	291.0363	0.0279	0.0000	291.7345

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0187	0.2517	0.2469	1.4500e-003	9.4520	1.2900e-003	9.4532	0.9373	1.2200e-003	0.9385	0.0000	135.2610	135.2610	6.6500e-003	0.0000	135.4273
Offroad	0.1006	0.9875	0.8666	1.8000e-003		0.0452	0.0452		0.0439	0.0439	0.0000	155.7753	155.7753	0.0213	0.0000	156.3072
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.1193	1.2391	1.1136	3.2500e-003	9.4520	0.0465	9.4984	0.9373	0.0451	0.9824	0.0000	291.0363	291.0363	0.0279	0.0000	291.7345

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	3/1/2019	12/19/2019	5	210	
2	Installation of Solar Arrays	Building Construction	10/1/2019	11/23/2020	5	300	
3	Installation of Inverters, Transformers, Substation	Building Construction	8/1/2020	3/12/2021	5	160	

Acres of Grading (Site Preparation Phase): 254.63

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Crawler Tractors	1	1.40	8	0.43
Site Preparation	Graders	5	3.60	187	0.41
Site Preparation	Pavers	1	0.50	130	0.42
Site Preparation	Rubber Tired Dozers	3	7.00	247	0.40
Site Preparation	Rubber Tired Loaders	1	2.80	97	0.37
Site Preparation	Skid Steer Loaders	1	6.30	65	0.37
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Installation of Solar Arrays	Cranes	0	7.00	231	0.29
Installation of Solar Arrays	Forklifts	6	5.10	89	0.20
Installation of Solar Arrays	Generator Sets	0	8.00	84	0.74
Installation of Solar Arrays	Tractors/Loaders/Backhoes	2	5.70	97	0.37
Installation of Solar Arrays	Trenchers	9	3.30	78	0.50
Installation of Solar Arrays	Welders	0	8.00	46	0.45
Installation of Inverters, Transformers, Substation Interconnection	Aerial Lifts	1	3.50	63	0.31
Installation of Inverters, Transformers, Substation Interconnection	Cranes	1	1.20	231	0.29
Installation of Inverters, Transformers, Substation Interconnection	Forklifts	2	3.50	89	0.20
Installation of Inverters, Transformers, Substation Interconnection	Generator Sets	0	8.00	84	0.74
Installation of Inverters, Transformers, Substation Interconnection	Pavers	0	8.00	130	0.42
Installation of Inverters, Transformers, Substation Interconnection	Paving Equipment	0	8.00	132	0.36
Installation of Inverters, Transformers, Substation Interconnection	Rollers	0	8.00	80	0.38
Installation of Inverters, Transformers, Substation Interconnection	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Installation of Inverters, Transformers, Substation Interconnection	Trenchers	1	3.60	78	0.50
Installation of Inverters, Transformers, Substation Interconnection	Welders	0	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	16	280.00	0.00	9,106.00	34.00	0.00	30.50	LD_Mix	HDT_Mix	HHDT

Installation of Solar Arrays	17	580.00	0.00	12,248.00	34.00	0.00	176.90	LD_Mix	HDT_Mix	HHDT
Installation of Inverters	6	80.00	0.00	1,838.00	34.00	0.00	53.90	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Site Preparation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.7949	0.0000	1.7949	0.9270	0.0000	0.9270	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.5482	6.0942	2.8087	5.5400e-003		0.2923	0.2923		0.2689	0.2689	0.0000	497.6786	497.6786	0.1575	0.0000	501.6151
Total	0.5482	6.0942	2.8087	5.5400e-003	1.7949	0.2923	2.0872	0.9270	0.2689	1.1959	0.0000	497.6786	497.6786	0.1575	0.0000	501.6151

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	0.0551	1.8128	0.2569	5.3000e-003	0.1194	7.7900e-003	0.1272	0.0328	7.4600e-003	0.0403	0.0000	503.8727	503.8727	0.0291	0.0000	504.5995
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.3646	0.3330	2.9747	7.0600e-003	0.7430	4.7800e-003	0.7477	0.1973	4.4100e-003	0.2017	0.0000	637.6411	637.6411	0.0249	0.0000	638.2641
Total	0.4197	2.1458	3.2316	0.0124	0.8623	0.0126	0.8749	0.2301	0.0119	0.2420	0.0000	1,141.5138	1,141.5138	0.0540	0.0000	1,142.8636

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.4038	0.0000	0.4038	0.2086	0.0000	0.2086	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1356	2.7584	3.3022	5.5400e-003		0.1333	0.1333		0.1333	0.1333	0.0000	497.6780	497.6780	0.1575	0.0000	501.6145
Total	0.1356	2.7584	3.3022	5.5400e-003	0.4038	0.1333	0.5372	0.2086	0.1333	0.3419	0.0000	497.6780	497.6780	0.1575	0.0000	501.6145

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0551	1.8128	0.2569	5.3000e-003	0.0747	7.7900e-003	0.0825	0.0218	7.4600e-003	0.0293	0.0000	503.8727	503.8727	0.0291	0.0000	504.5995
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.3646	0.3330	2.9747	7.0600e-003	0.4209	4.7800e-003	0.4257	0.1183	4.4100e-003	0.1227	0.0000	637.6411	637.6411	0.0249	0.0000	638.2641
Total	0.4197	2.1458	3.2316	0.0124	0.4956	0.0126	0.5082	0.1401	0.0119	0.1520	0.0000	1,141.5138	1,141.5138	0.0540	0.0000	1,142.8636

3.3 Installation of Solar Arrays - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0844	0.7701	0.5823	7.5000e-004		0.0576	0.0576		0.0530	0.0530	0.0000	67.5524	67.5524	0.0214	0.0000	68.0868
Total	0.0844	0.7701	0.5823	7.5000e-004		0.0576	0.0576		0.0530	0.0530	0.0000	67.5524	67.5524	0.0214	0.0000	68.0868

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0796	2.4106	0.3749	8.2100e-003	0.7492	0.0128	0.7620	0.1899	0.0123	0.2022	0.0000	780.7562	780.7562	0.0125	0.0000	781.0690
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2374	0.2168	1.9366	4.6000e-003	0.4837	3.1100e-003	0.4868	0.1285	2.8700e-003	0.1313	0.0000	415.1174	415.1174	0.0162	0.0000	415.5230
Total	0.3169	2.6273	2.3115	0.0128	1.2329	0.0159	1.2488	0.3184	0.0151	0.3335	0.0000	1,195.8735	1,195.8735	0.0287	0.0000	1,196.5920

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0184	0.4210	0.5686	7.5000e-004		0.0295	0.0295		0.0295	0.0295	0.0000	67.5524	67.5524	0.0214	0.0000	68.0867
Total	0.0184	0.4210	0.5686	7.5000e-004		0.0295	0.0295		0.0295	0.0295	0.0000	67.5524	67.5524	0.0214	0.0000	68.0867

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0796	2.4106	0.3749	8.2100e-003	0.4002	0.0128	0.4130	0.1042	0.0123	0.1165	0.0000	780.7562	780.7562	0.0125	0.0000	781.0690
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2374	0.2168	1.9366	4.6000e-003	0.2740	3.1100e-003	0.2772	0.0770	2.8700e-003	0.0799	0.0000	415.1174	415.1174	0.0162	0.0000	415.5230
Total	0.3169	2.6273	2.3115	0.0128	0.6742	0.0159	0.6902	0.1812	0.0151	0.1964	0.0000	1,195.8735	1,195.8735	0.0287	0.0000	1,196.5920

3.3 Installation of Solar Arrays - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2817	2.5807	2.0534	2.6600e-003		0.1889	0.1889		0.1738	0.1738	0.0000	234.3694	234.3694	0.0758	0.0000	236.2644

Total	0.2817	2.5807	2.0534	2.6600e-003		0.1889	0.1889		0.1738	0.1738	0.0000	234.3694	234.3694	0.0758	0.0000	236.2644
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Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.2622	7.8678	1.2752	0.0288	0.8796	0.0378	0.9174	0.2372	0.0362	0.2734	0.0000	2,734.6686	2,734.6686	0.0422	0.0000	2,735.7229
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.7637	0.6746	6.0734	0.0158	1.7149	0.0107	1.7255	0.4554	9.8200e-003	0.4653	0.0000	1,425.9110	1,425.9110	0.0497	0.0000	1,427.1523
Total	1.0259	8.5424	7.3487	0.0445	2.5945	0.0485	2.6429	0.6927	0.0460	0.7387	0.0000	4,160.5796	4,160.5796	0.0918	0.0000	4,162.8751

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0654	1.4928	2.0158	2.6600e-003		0.1046	0.1046		0.1046	0.1046	0.0000	234.3691	234.3691	0.0758	0.0000	236.2641
Total	0.0654	1.4928	2.0158	2.6600e-003		0.1046	0.1046		0.1046	0.1046	0.0000	234.3691	234.3691	0.0758	0.0000	236.2641

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.2622	7.8678	1.2752	0.0288	0.5306	0.0378	0.5684	0.1516	0.0362	0.1877	0.0000	2,734.6686	2,734.6686	0.0422	0.0000	2,735.7229
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.7637	0.6746	6.0734	0.0158	0.9716	0.0107	0.9822	0.2730	9.8200e-003	0.2828	0.0000	1,425.9110	1,425.9110	0.0497	0.0000	1,427.1523
Total	1.0259	8.5424	7.3487	0.0445	1.5022	0.0485	1.5507	0.4245	0.0460	0.4706	0.0000	4,160.5796	4,160.5796	0.0918	0.0000	4,162.8751

3.4 Installation of Inverters, Transformers, Substation, Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0275	0.2718	0.2265	3.3000e-004		0.0174	0.0174		0.0160	0.0160	0.0000	28.7721	28.7721	9.3100e-003	0.0000	29.0047
Total	0.0275	0.2718	0.2265	3.3000e-004		0.0174	0.0174		0.0160	0.0160	0.0000	28.7721	28.7721	9.3100e-003	0.0000	29.0047

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	0.0114	0.3597	0.0550	1.2100e-003	0.0392	1.5400e-003	0.0407	0.0105	1.4700e-003	0.0119	0.0000	114.8077	114.8077	4.1100e-003	0.0000	114.9103
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0491	0.0433	0.3902	1.0100e-003	0.1102	6.9000e-004	0.1109	0.0293	6.3000e-004	0.0299	0.0000	91.6147	91.6147	3.1900e-003	0.0000	91.6944
Total	0.0605	0.4030	0.4452	2.2200e-003	0.1494	2.2300e-003	0.1516	0.0397	2.1000e-003	0.0418	0.0000	206.4223	206.4223	7.3000e-003	0.0000	206.6048

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.0400e-003	0.1794	0.2371	3.3000e-004		0.0119	0.0119		0.0119	0.0119	0.0000	28.7721	28.7721	9.3100e-003	0.0000	29.0047
Total	8.0400e-003	0.1794	0.2371	3.3000e-004		0.0119	0.0119		0.0119	0.0119	0.0000	28.7721	28.7721	9.3100e-003	0.0000	29.0047

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0114	0.3597	0.0550	1.2100e-003	0.0232	1.5400e-003	0.0248	6.5500e-003	1.4700e-003	8.0200e-003	0.0000	114.8077	114.8077	4.1100e-003	0.0000	114.9103
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0491	0.0433	0.3902	1.0100e-003	0.0624	6.9000e-004	0.0631	0.0175	6.3000e-004	0.0182	0.0000	91.6147	91.6147	3.1900e-003	0.0000	91.6944
Total	0.0605	0.4030	0.4452	2.2200e-003	0.0856	2.2300e-003	0.0879	0.0241	2.1000e-003	0.0262	0.0000	206.4223	206.4223	7.3000e-003	0.0000	206.6048

3.4 Installation of Inverters, Transformers, Substation, Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0117	0.1160	0.1046	1.5000e-004		7.1000e-003	7.1000e-003		6.5300e-003	6.5300e-003	0.0000	13.4647	13.4647	4.3500e-003	0.0000	13.5735
Total	0.0117	0.1160	0.1046	1.5000e-004		7.1000e-003	7.1000e-003		6.5300e-003	6.5300e-003	0.0000	13.4647	13.4647	4.3500e-003	0.0000	13.5735

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.0000e-003	0.1521	0.0248	5.6000e-004	0.0353	6.3000e-004	0.0359	9.0700e-003	6.0000e-004	9.6700e-003	0.0000	53.0717	53.0717	1.8900e-003	0.0000	53.1189
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0212	0.0180	0.1651	4.6000e-004	0.0516	3.1000e-004	0.0519	0.0137	2.9000e-004	0.0140	0.0000	41.5811	41.5811	1.3300e-003	0.0000	41.6143
Total	0.0262	0.1701	0.1898	1.0200e-003	0.0869	9.4000e-004	0.0878	0.0228	8.9000e-004	0.0237	0.0000	94.6528	94.6528	3.2200e-003	0.0000	94.7331

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.7600e-003	0.0840	0.1110	1.5000e-004		5.5500e-003	5.5500e-003		5.5500e-003	5.5500e-003	0.0000	13.4647	13.4647	4.3500e-003	0.0000	13.5735
Total	3.7600e-003	0.0840	0.1110	1.5000e-004		5.5500e-003	5.5500e-003		5.5500e-003	5.5500e-003	0.0000	13.4647	13.4647	4.3500e-003	0.0000	13.5735

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.0000e-003	0.1521	0.0248	5.6000e-004	0.0194	6.3000e-004	0.0200	5.1500e-003	6.0000e-004	5.7500e-003	0.0000	53.0717	53.0717	1.8900e-003	0.0000	53.1189
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0212	0.0180	0.1651	4.6000e-004	0.0292	3.1000e-004	0.0295	8.2100e-003	2.9000e-004	8.4900e-003	0.0000	41.5811	41.5811	1.3300e-003	0.0000	41.6143
Total	0.0262	0.1701	0.1898	1.0200e-003	0.0486	9.4000e-004	0.0495	0.0134	8.9000e-004	0.0142	0.0000	94.6528	94.6528	3.2200e-003	0.0000	94.7331

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000

Total		0.0000	0.0000	0.0000	0.0000
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Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined	0 / 0	0.0000	0.0000	0.0000	0.0000
Industrial					
Total		0.0000	0.0000	0.0000	0.0000

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Crawler Tractors	2	2.20	260	212	0.43	Diesel
Generator Sets	2	1.30	260	84	0.74	Diesel
Pumps	5	1.80	260	84	0.74	Diesel

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	tons/yr										MT/yr					
Crawler Tractors	0.0352	0.4296	0.1655	5.6000e-004		0.0162	0.0162		0.0149	0.0149	0.0000	49.2337	49.2337	0.0159	0.0000	49.6317
Generator Sets	0.0139	0.1237	0.1553	2.8000e-004		6.2100e-003	6.2100e-003		6.2100e-003	6.2100e-003	0.0000	23.8800	23.8800	1.1300e-003	0.0000	23.9084
Pumps	0.0515	0.4342	0.5458	9.6000e-004		0.0228	0.0228		0.0228	0.0228	0.0000	82.6616	82.6616	4.2200e-003	0.0000	82.7670
Total	0.1006	0.9875	0.8666	1.8000e-003		0.0452	0.0452		0.0439	0.0439	0.0000	155.7753	155.7753	0.0213	0.0000	156.3072

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type
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Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type
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User Defined Equipment

Equipment Type	Number
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11.0 Vegetation

Gen-Tie, Kings Co - Kings County, Annual

Gen-Tie, Kings Co
Kings County, Annual

1.0 Project Characteristics**1.1 Land Usage**

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	57.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	37
Climate Zone	3			Operational Year	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	641.35	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Applicant provided acreage = 1ac/tower * 57 towers

Construction Phase - 133-day construction schedule

Off-road Equipment - Based on best approximation of list. Vehicles excluded

Off-road Equipment - Based on list - excluding vehicles

Off-road Equipment - Based on equipment list

Off-road Equipment - Other = tensioners and pullers. Best estimate from list, excluding vehicles

Trips and VMT - 85mi VMT/worker Used default vendor trip length since vendor trips only at site

On-road Fugitive Dust - Assume half vendor trips on dirt roads

Grading -

Vehicle Trips -

Construction Off-road Equipment Mitigation - Tier 3 equipment and BMPs

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	12
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	7.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3

tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	1,110.00	133.00
tblConstructionPhase	NumDays	1,110.00	133.00
tblConstructionPhase	NumDays	110.00	133.00
tblConstructionPhase	NumDays	40.00	133.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblLandUse	LotAcreage	0.00	57.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	5.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	7.00	10.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	5.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	3.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOnRoadDust	VendorPercentPave	100.00	50.00
tblOnRoadDust	VendorPercentPave	100.00	50.00
tblOnRoadDust	VendorPercentPave	100.00	50.00
tblOnRoadDust	VendorPercentPave	100.00	50.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	12.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	26.00
tblTripsAndVMT	WorkerTripLength	16.80	85.00
tblTripsAndVMT	WorkerTripLength	16.80	85.00

tblTripsAndVMT	WorkerTripLength	16.80	85.00
tblTripsAndVMT	WorkerTripLength	16.80	85.00
tblTripsAndVMT	WorkerTripNumber	20.00	7.00
tblTripsAndVMT	WorkerTripNumber	25.00	9.00
tblTripsAndVMT	WorkerTripNumber	0.00	11.00
tblTripsAndVMT	WorkerTripNumber	0.00	32.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.9376	9.2055	6.1875	0.0131	14.9918	0.4416	15.4335	1.9001	0.4114	2.3115	0.0000	1,174.6372	1,174.6372	0.2608	0.0000	1,181.1574
Maximum	0.9376	9.2055	6.1875	0.0131	14.9918	0.4416	15.4335	1.9001	0.4114	2.3115	0.0000	1,174.6372	1,174.6372	0.2608	0.0000	1,181.1574

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.3638	5.3753	7.1311	0.0131	5.1357	0.2579	5.3936	0.3930	0.2577	0.6507	0.0000	1,174.6361	1,174.6361	0.2608	0.0000	1,181.1563
Maximum	0.3638	5.3753	7.1311	0.0131	5.1357	0.2579	5.3936	0.3930	0.2577	0.6507	0.0000	1,174.6361	1,174.6361	0.2608	0.0000	1,181.1563

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	61.20	41.61	-15.25	0.00	65.74	41.60	65.05	79.32	37.37	71.85	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	5-14-2019	8-13-2019	1.4367	0.8123
		Highest	1.4367	0.8123

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation/Civil	Site Preparation	1/1/2019	6/4/2019	6	133	
2	Grading/Foundation	Grading	1/1/2019	6/4/2019	6	133	
3	Building Construction/Frame	Building Construction	1/1/2019	6/4/2019	6	133	
4	Wires	Building Construction	1/1/2019	6/4/2019	6	133	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation/Civil	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation/Civil	Skid Steer Loaders	2	8.00	65	0.37
Site Preparation/Civil	Skid Steer Loaders	2	10.00	65	0.37
Site Preparation/Civil	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Grading/Foundation	Air Compressors	2	6.00	78	0.48
Grading/Foundation	Bore/Drill Rigs	1	9.00	221	0.50
Grading/Foundation	Cranes	1	6.00	231	0.29
Grading/Foundation	Excavators	0	8.00	158	0.38
Grading/Foundation	Forklifts	2	5.00	89	0.20
Grading/Foundation	Generator Sets	2	6.00	84	0.74
Grading/Foundation	Graders	0	8.00	187	0.41
Grading/Foundation	Pumps	1	4.00	84	0.74
Grading/Foundation	Rubber Tired Dozers	0	8.00	247	0.40
Grading/Foundation	Scrapers	0	8.00	367	0.48
Grading/Foundation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Building Construction/Frame	Cranes	1	10.00	231	0.29
Building Construction/Frame	Forklifts	2	10.00	89	0.20
Building Construction/Frame	Generator Sets	0	8.00	84	0.74
Building Construction/Frame	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Building Construction/Frame	Welders	0	8.00	46	0.45
Wires	Cranes	5	8.00	231	0.29
Wires	Crawler Tractors	2	5.00	212	0.43
Wires	Forklifts	2	5.00	89	0.20
Wires	Generator Sets	1	8.00	84	0.74
Wires	Other Construction Equipment	3	5.00	172	0.42
Wires	Tractors/Loaders/Backhoes	1	3.00	97	0.37
Wires	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Wires	Welders	0	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation/Civil	8	7.00	6.00	0.00	85.00	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading/Foundation	10	9.00	12.00	0.00	85.00	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction/Frame	4	11.00	4.00	0.00	85.00	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Wires	15	32.00	26.00	0.00	85.00	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

- Use Cleaner Engines for Construction Equipment
- Use Soil Stabilizer
- Replace Ground Cover
- Water Exposed Area
- Water Unpaved Roads
- Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation/Civil - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.8009	0.0000	0.8009	0.4403	0.0000	0.4403	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2072	2.2539	1.2920	2.1700e-003		0.1145	0.1145		0.1053	0.1053	0.0000	194.6595	194.6595	0.0616	0.0000	196.1992
Total	0.2072	2.2539	1.2920	2.1700e-003	0.8009	0.1145	0.9154	0.4403	0.1053	0.5456	0.0000	194.6595	194.6595	0.0616	0.0000	196.1992

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.8600e-003	0.0504	0.0107	1.1000e-004	1.7429	3.3000e-004	1.7432	0.1743	3.2000e-004	0.1746	0.0000	10.1848	10.1848	1.2600e-003	0.0000	10.2163
Worker	0.0135	0.0128	0.1130	2.8000e-004	0.0294	1.8000e-004	0.0296	7.8100e-003	1.7000e-004	7.9800e-003	0.0000	25.0947	25.0947	9.6000e-004	0.0000	25.1188
Total	0.0153	0.0632	0.1237	3.9000e-004	1.7723	5.1000e-004	1.7728	0.1821	4.9000e-004	0.1826	0.0000	35.2795	35.2795	2.2200e-003	0.0000	35.3351

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3604	0.0000	0.3604	0.0991	0.0000	0.0991	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0532	1.1162	1.3837	2.1700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	194.6593	194.6593	0.0616	0.0000	196.1990
Total	0.0532	1.1162	1.3837	2.1700e-003	0.3604	0.0609	0.4214	0.0991	0.0609	0.1600	0.0000	194.6593	194.6593	0.0616	0.0000	196.1990

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.8600e-003	0.0504	0.0107	1.1000e-004	0.5659	3.3000e-004	0.5663	0.0285	3.2000e-004	0.0288	0.0000	10.1848	10.1848	1.2600e-003	0.0000	10.2163
Worker	0.0135	0.0128	0.1130	2.8000e-004	0.0294	1.8000e-004	0.0296	7.8100e-003	1.7000e-004	7.9800e-003	0.0000	25.0947	25.0947	9.6000e-004	0.0000	25.1188
Total	0.0153	0.0632	0.1237	3.9000e-004	0.5953	5.1000e-004	0.5959	0.0363	4.9000e-004	0.0368	0.0000	35.2795	35.2795	2.2200e-003	0.0000	35.3351

3.3 Grading/Foundation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1702	1.5984	1.2634	2.5900e-003		0.0877	0.0877		0.0845	0.0845	0.0000	227.8721	227.8721	0.0453	0.0000	229.0037
Total	0.1702	1.5984	1.2634	2.5900e-003	0.0000	0.0877	0.0877	0.0000	0.0845	0.0845	0.0000	227.8721	227.8721	0.0453	0.0000	229.0037

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.7200e-003	0.1008	0.0214	2.1000e-004	3.4858	6.7000e-004	3.4864	0.3485	6.4000e-004	0.3491	0.0000	20.3696	20.3696	2.5200e-003	0.0000	20.4327
Worker	0.0173	0.0165	0.1453	3.6000e-004	0.0378	2.4000e-004	0.0380	0.0100	2.2000e-004	0.0103	0.0000	32.2647	32.2647	1.2400e-003	0.0000	32.2956
Total	0.0210	0.1173	0.1667	5.7000e-004	3.5236	9.1000e-004	3.5245	0.3585	8.6000e-004	0.3594	0.0000	52.6342	52.6342	3.7600e-003	0.0000	52.7283

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0582	1.2418	1.5678	2.5900e-003		0.0718	0.0718		0.0718	0.0718	0.0000	227.8718	227.8718	0.0453	0.0000	229.0035
Total	0.0582	1.2418	1.5678	2.5900e-003	0.0000	0.0718	0.0718	0.0000	0.0718	0.0718	0.0000	227.8718	227.8718	0.0453	0.0000	229.0035

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.7200e-003	0.1008	0.0214	2.1000e-004	1.1319	6.7000e-004	1.1325	0.0570	6.4000e-004	0.0577	0.0000	20.3696	20.3696	2.5200e-003	0.0000	20.4327
Worker	0.0173	0.0165	0.1453	3.6000e-004	0.0378	2.4000e-004	0.0380	0.0100	2.2000e-004	0.0103	0.0000	32.2647	32.2647	1.2400e-003	0.0000	32.2956
Total	0.0210	0.1173	0.1667	5.7000e-004	1.1697	9.1000e-004	1.1706	0.0671	8.6000e-004	0.0679	0.0000	52.6342	52.6342	3.7600e-003	0.0000	52.7283

3.4 Building Construction/Frame - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0840	0.8922	0.5423	9.4000e-004		0.0499	0.0499		0.0459	0.0459	0.0000	84.4502	84.4502	0.0267	0.0000	85.1182
Total	0.0840	0.8922	0.5423	9.4000e-004		0.0499	0.0499		0.0459	0.0459	0.0000	84.4502	84.4502	0.0267	0.0000	85.1182

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2400e-003	0.0336	7.1300e-003	7.0000e-005	1.1619	2.2000e-004	1.1622	0.1162	2.1000e-004	0.1164	0.0000	6.7899	6.7899	8.4000e-004	0.0000	6.8109
Worker	0.0212	0.0202	0.1776	4.4000e-004	0.0462	2.9000e-004	0.0465	0.0123	2.7000e-004	0.0125	0.0000	39.4346	39.4346	1.5100e-003	0.0000	39.4724
Total	0.0224	0.0538	0.1848	5.1000e-004	1.2081	5.1000e-004	1.2086	0.1284	4.8000e-004	0.1289	0.0000	46.2244	46.2244	2.3500e-003	0.0000	46.2833

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0231	0.4862	0.6042	9.4000e-004		0.0268	0.0268		0.0268	0.0268	0.0000	84.4501	84.4501	0.0267	0.0000	85.1181
Total	0.0231	0.4862	0.6042	9.4000e-004		0.0268	0.0268		0.0268	0.0268	0.0000	84.4501	84.4501	0.0267	0.0000	85.1181

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2400e-003	0.0336	7.1300e-003	7.0000e-005	0.3773	2.2000e-004	0.3775	0.0190	2.1000e-004	0.0192	0.0000	6.7899	6.7899	8.4000e-004	0.0000	6.8109
Worker	0.0212	0.0202	0.1776	4.4000e-004	0.0462	2.9000e-004	0.0465	0.0123	2.7000e-004	0.0125	0.0000	39.4346	39.4346	1.5100e-003	0.0000	39.4724
Total	0.0224	0.0538	0.1848	5.1000e-004	0.4235	5.1000e-004	0.4240	0.0313	4.8000e-004	0.0318	0.0000	46.2244	46.2244	2.3500e-003	0.0000	46.2833

3.5 Wires - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3479	3.9498	2.0516	4.1900e-003		0.1853	0.1853		0.1717	0.1717	0.0000	374.6643	374.6643	0.1090	0.0000	377.3900
Total	0.3479	3.9498	2.0516	4.1900e-003		0.1853	0.1853		0.1717	0.1717	0.0000	374.6643	374.6643	0.1090	0.0000	377.3900

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	8.0600e-003	0.2184	0.0464	4.7000e-004	7.5525	1.4500e-003	7.5539	0.7551	1.3900e-003	0.7565	0.0000	44.1341	44.1341	5.4700e-003	0.0000	44.2707
Worker	0.0616	0.0586	0.5167	1.2700e-003	0.1344	8.4000e-004	0.1353	0.0357	7.8000e-004	0.0365	0.0000	114.7188	114.7188	4.4000e-003	0.0000	114.8288
Total	0.0696	0.2770	0.5631	1.7400e-003	7.6869	2.2900e-003	7.6892	0.7908	2.1700e-003	0.7929	0.0000	158.8528	158.8528	9.8700e-003	0.0000	159.0995

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1011	2.0199	2.5371	4.1900e-003		0.0943	0.0943		0.0943	0.0943	0.0000	374.6639	374.6639	0.1090	0.0000	377.3896
Total	0.1011	2.0199	2.5371	4.1900e-003		0.0943	0.0943		0.0943	0.0943	0.0000	374.6639	374.6639	0.1090	0.0000	377.3896

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	8.0600e-003	0.2184	0.0464	4.7000e-004	2.4524	1.4500e-003	2.4538	0.1236	1.3900e-003	0.1250	0.0000	44.1341	44.1341	5.4700e-003	0.0000	44.2707
Worker	0.0616	0.0586	0.5167	1.2700e-003	0.1344	8.4000e-004	0.1353	0.0357	7.8000e-004	0.0365	0.0000	114.7188	114.7188	4.4000e-003	0.0000	114.8288
Total	0.0696	0.2770	0.5631	1.7400e-003	2.5868	2.2900e-003	2.5891	0.1593	2.1700e-003	0.1614	0.0000	158.8528	158.8528	9.8700e-003	0.0000	159.0995

Gen-Tie, Fresno Co - Fresno County, Annual

Gen-Tie, Fresno Co
Fresno County, Annual

1.0 Project Characteristics**1.1 Land Usage**

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	57.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	45
Climate Zone	3			Operational Year	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	641.35	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Applicant provided acreage = 1ac/tower * 57 towers

Construction Phase - 67-day construction schedule

Off-road Equipment - Based on best approximation of list. Vehicles excluded

Off-road Equipment - Based on list - excluding vehicles

Off-road Equipment - Based on equipment list

Off-road Equipment - Other = tensioners and pullers. Best estimate from list, excluding vehicles

Trips and VMT - 85mi VMT/worker Used default vendor trip length since vendor trips only at site

On-road Fugitive Dust - Assume half vendor trips on dirt roads

Grading -

Vehicle Trips -

Construction Off-road Equipment Mitigation - Tier 3 equipment and BMPs

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0.5	12
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	7.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3

tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	1,110.00	67.00
tblConstructionPhase	NumDays	1,110.00	67.00
tblConstructionPhase	NumDays	110.00	67.00
tblConstructionPhase	NumDays	40.00	67.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblLandUse	LotAcreage	0.00	57.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	5.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	7.00	10.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	5.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	3.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOnRoadDust	VendorPercentPave	100.00	50.00
tblOnRoadDust	VendorPercentPave	100.00	50.00
tblOnRoadDust	VendorPercentPave	100.00	50.00
tblOnRoadDust	VendorPercentPave	100.00	50.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	12.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	26.00
tblTripsAndVMT	WorkerTripLength	16.80	85.00
tblTripsAndVMT	WorkerTripLength	16.80	85.00

tblTripsAndVMT	WorkerTripLength	16.80	85.00
tblTripsAndVMT	WorkerTripLength	16.80	85.00
tblTripsAndVMT	WorkerTripNumber	20.00	7.00
tblTripsAndVMT	WorkerTripNumber	25.00	9.00
tblTripsAndVMT	WorkerTripNumber	0.00	11.00
tblTripsAndVMT	WorkerTripNumber	0.00	32.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.4687	4.6301	3.0276	6.6000e-003	7.3805	0.2225	7.6030	0.9399	0.2073	1.1472	0.0000	592.9103	592.9103	0.1306	0.0000	596.1760
Maximum	0.4687	4.6301	3.0276	6.6000e-003	7.3805	0.2225	7.6030	0.9399	0.2073	1.1472	0.0000	592.9103	592.9103	0.1306	0.0000	596.1760

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.1796	2.7006	3.5029	6.6000e-003	2.5310	0.1300	2.6610	0.1951	0.1298	0.3249	0.0000	592.9097	592.9097	0.1306	0.0000	596.1754
Maximum	0.1796	2.7006	3.5029	6.6000e-003	2.5310	0.1300	2.6610	0.1951	0.1298	0.3249	0.0000	592.9097	592.9097	0.1306	0.0000	596.1754

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	61.67	41.67	-15.70	0.00	65.71	41.59	65.00	79.25	37.36	71.68	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation/Civil	Site Preparation	1/1/2019	3/19/2019	6	67	
2	Grading/Foundation	Grading	1/1/2019	3/19/2019	6	67	
3	Building Construction/Frame	Building Construction	1/1/2019	3/19/2019	6	67	
4	Wires	Building Construction	1/1/2019	3/19/2019	6	67	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation/Civil	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation/Civil	Skid Steer Loaders	2	8.00	65	0.37
Site Preparation/Civil	Skid Steer Loaders	2	10.00	65	0.37
Site Preparation/Civil	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Grading/Foundation	Air Compressors	2	6.00	78	0.48
Grading/Foundation	Bore/Drill Rigs	1	9.00	221	0.50
Grading/Foundation	Cranes	1	6.00	231	0.29
Grading/Foundation	Excavators	0	8.00	158	0.38
Grading/Foundation	Forklifts	2	5.00	89	0.20
Grading/Foundation	Generator Sets	2	6.00	84	0.74
Grading/Foundation	Graders	0	8.00	187	0.41
Grading/Foundation	Pumps	1	4.00	84	0.74
Grading/Foundation	Rubber Tired Dozers	0	8.00	247	0.40
Grading/Foundation	Scrapers	0	8.00	367	0.48
Grading/Foundation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Building Construction/Frame	Cranes	1	10.00	231	0.29
Building Construction/Frame	Forklifts	2	10.00	89	0.20
Building Construction/Frame	Generator Sets	0	8.00	84	0.74
Building Construction/Frame	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Building Construction/Frame	Welders	0	8.00	46	0.45
Wires	Cranes	5	8.00	231	0.29
Wires	Crawler Tractors	2	5.00	212	0.43
Wires	Forklifts	2	5.00	89	0.20
Wires	Generator Sets	1	8.00	84	0.74
Wires	Other Construction Equipment	3	5.00	172	0.42
Wires	Tractors/Loaders/Backhoes	1	3.00	97	0.37
Wires	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Wires	Welders	0	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation/Civil	8	7.00	6.00	0.00	85.00	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading/Foundation	10	9.00	12.00	0.00	85.00	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction/Frame	4	11.00	4.00	0.00	85.00	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Wires	15	32.00	26.00	0.00	85.00	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

- Use Cleaner Engines for Construction Equipment
- Use Soil Stabilizer
- Replace Ground Cover
- Water Exposed Area
- Water Unpaved Roads
- Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation/Civil - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.4035	0.0000	0.4035	0.2218	0.0000	0.2218	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1044	1.1354	0.6509	1.0900e-003		0.0577	0.0577		0.0531	0.0531	0.0000	98.0616	98.0616	0.0310	0.0000	98.8372
Total	0.1044	1.1354	0.6509	1.0900e-003	0.4035	0.0577	0.4612	0.2218	0.0531	0.2749	0.0000	98.0616	98.0616	0.0310	0.0000	98.8372

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	8.7000e-004	0.0260	4.4000e-003	5.0000e-005	0.8566	1.8000e-004	0.8568	0.0856	1.7000e-004	0.0858	0.0000	5.0682	5.0682	6.9000e-004	0.0000	5.0854
Worker	6.4100e-003	5.0400e-003	0.0473	1.4000e-004	0.0147	9.0000e-005	0.0148	3.9200e-003	8.0000e-005	4.0000e-003	0.0000	12.8405	12.8405	3.4000e-004	0.0000	12.8491
Total	7.2800e-003	0.0310	0.0517	1.9000e-004	0.8713	2.7000e-004	0.8716	0.0896	2.5000e-004	0.0898	0.0000	17.9087	17.9087	1.0300e-003	0.0000	17.9345

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1816	0.0000	0.1816	0.0499	0.0000	0.0499	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0268	0.5623	0.6971	1.0900e-003		0.0307	0.0307		0.0307	0.0307	0.0000	98.0615	98.0615	0.0310	0.0000	98.8371
Total	0.0268	0.5623	0.6971	1.0900e-003	0.1816	0.0307	0.2123	0.0499	0.0307	0.0806	0.0000	98.0615	98.0615	0.0310	0.0000	98.8371

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	8.7000e-004	0.0260	4.4000e-003	5.0000e-005	0.2782	1.8000e-004	0.2783	0.0140	1.7000e-004	0.0142	0.0000	5.0682	5.0682	6.9000e-004	0.0000	5.0854
Worker	6.4100e-003	5.0400e-003	0.0473	1.4000e-004	0.0147	9.0000e-005	0.0148	3.9200e-003	8.0000e-005	4.0000e-003	0.0000	12.8405	12.8405	3.4000e-004	0.0000	12.8491
Total	7.2800e-003	0.0310	0.0517	1.9000e-004	0.2929	2.7000e-004	0.2932	0.0179	2.5000e-004	0.0182	0.0000	17.9087	17.9087	1.0300e-003	0.0000	17.9345

3.3 Grading/Foundation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0857	0.8052	0.6365	1.3100e-003		0.0442	0.0442		0.0426	0.0426	0.0000	114.7927	114.7927	0.0228	0.0000	115.3628
Total	0.0857	0.8052	0.6365	1.3100e-003	0.0000	0.0442	0.0442	0.0000	0.0426	0.0426	0.0000	114.7927	114.7927	0.0228	0.0000	115.3628

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.7300e-003	0.0520	8.8100e-003	1.1000e-004	1.7132	3.6000e-004	1.7136	0.1713	3.4000e-004	0.1716	0.0000	10.1363	10.1363	1.3800e-003	0.0000	10.1709
Worker	8.2500e-003	6.4700e-003	0.0608	1.8000e-004	0.0190	1.1000e-004	0.0191	5.0300e-003	1.0000e-004	5.1400e-003	0.0000	16.5093	16.5093	4.4000e-004	0.0000	16.5203
Total	9.9800e-003	0.0584	0.0696	2.9000e-004	1.7321	4.7000e-004	1.7326	0.1763	4.4000e-004	0.1768	0.0000	26.6456	26.6456	1.8200e-003	0.0000	26.6912

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0293	0.6256	0.7898	1.3100e-003		0.0362	0.0362		0.0362	0.0362	0.0000	114.7926	114.7926	0.0228	0.0000	115.3626
Total	0.0293	0.6256	0.7898	1.3100e-003	0.0000	0.0362	0.0362	0.0000	0.0362	0.0362	0.0000	114.7926	114.7926	0.0228	0.0000	115.3626

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.7300e-003	0.0520	8.8100e-003	1.1000e-004	0.5563	3.6000e-004	0.5567	0.0280	3.4000e-004	0.0284	0.0000	10.1363	10.1363	1.3800e-003	0.0000	10.1709
Worker	8.2500e-003	6.4700e-003	0.0608	1.8000e-004	0.0190	1.1000e-004	0.0191	5.0300e-003	1.0000e-004	5.1400e-003	0.0000	16.5093	16.5093	4.4000e-004	0.0000	16.5203
Total	9.9800e-003	0.0584	0.0696	2.9000e-004	0.5753	4.7000e-004	0.5757	0.0331	4.4000e-004	0.0335	0.0000	26.6456	26.6456	1.8200e-003	0.0000	26.6912

3.4 Building Construction/Frame - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0423	0.4495	0.2732	4.7000e-004		0.0252	0.0252		0.0231	0.0231	0.0000	42.5426	42.5426	0.0135	0.0000	42.8791
Total	0.0423	0.4495	0.2732	4.7000e-004		0.0252	0.0252		0.0231	0.0231	0.0000	42.5426	42.5426	0.0135	0.0000	42.8791

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.8000e-004	0.0173	2.9400e-003	4.0000e-005	0.5711	1.2000e-004	0.5712	0.0571	1.1000e-004	0.0572	0.0000	3.3788	3.3788	4.6000e-004	0.0000	3.3903
Worker	0.0101	7.9100e-003	0.0743	2.2000e-004	0.0232	1.4000e-004	0.0233	6.1500e-003	1.3000e-004	6.2800e-003	0.0000	20.1780	20.1780	5.4000e-004	0.0000	20.1915
Total	0.0107	0.0252	0.0772	2.6000e-004	0.5942	2.6000e-004	0.5945	0.0633	2.4000e-004	0.0635	0.0000	23.5568	23.5568	1.0000e-003	0.0000	23.5818

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0116	0.2449	0.3044	4.7000e-004		0.0135	0.0135		0.0135	0.0135	0.0000	42.5425	42.5425	0.0135	0.0000	42.8790
Total	0.0116	0.2449	0.3044	4.7000e-004		0.0135	0.0135		0.0135	0.0135	0.0000	42.5425	42.5425	0.0135	0.0000	42.8790

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.8000e-004	0.0173	2.9400e-003	4.0000e-005	0.1854	1.2000e-004	0.1856	9.3500e-003	1.1000e-004	9.4600e-003	0.0000	3.3788	3.3788	4.6000e-004	0.0000	3.3903
Worker	0.0101	7.9100e-003	0.0743	2.2000e-004	0.0232	1.4000e-004	0.0233	6.1500e-003	1.3000e-004	6.2800e-003	0.0000	20.1780	20.1780	5.4000e-004	0.0000	20.1915
Total	0.0107	0.0252	0.0772	2.6000e-004	0.2086	2.6000e-004	0.2089	0.0155	2.4000e-004	0.0157	0.0000	23.5568	23.5568	1.0000e-003	0.0000	23.5818

3.5 Wires - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1753	1.9897	1.0335	2.1100e-003		0.0933	0.0933		0.0865	0.0865	0.0000	188.7407	188.7407	0.0549	0.0000	190.1138
Total	0.1753	1.9897	1.0335	2.1100e-003		0.0933	0.0933		0.0865	0.0865	0.0000	188.7407	188.7407	0.0549	0.0000	190.1138

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.7600e-003	0.1126	0.0191	2.3000e-004	3.7119	7.8000e-004	3.7127	0.3711	7.4000e-004	0.3719	0.0000	21.9620	21.9620	2.9900e-003	0.0000	22.0369
Worker	0.0293	0.0230	0.2161	6.5000e-004	0.0674	4.0000e-004	0.0678	0.0179	3.6000e-004	0.0183	0.0000	58.6996	58.6996	1.5700e-003	0.0000	58.7388
Total	0.0331	0.1356	0.2352	8.8000e-004	3.7793	1.1800e-003	3.7805	0.3890	1.1000e-003	0.3901	0.0000	80.6617	80.6617	4.5600e-003	0.0000	80.7757

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0509	1.0175	1.2781	2.1100e-003		0.0475	0.0475		0.0475	0.0475	0.0000	188.7405	188.7405	0.0549	0.0000	190.1136
Total	0.0509	1.0175	1.2781	2.1100e-003		0.0475	0.0475		0.0475	0.0475	0.0000	188.7405	188.7405	0.0549	0.0000	190.1136

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.7600e-003	0.1126	0.0191	2.3000e-004	1.2053	7.8000e-004	1.2061	0.0608	7.4000e-004	0.0615	0.0000	21.9620	21.9620	2.9900e-003	0.0000	22.0369
Worker	0.0293	0.0230	0.2161	6.5000e-004	0.0674	4.0000e-004	0.0678	0.0179	3.6000e-004	0.0183	0.0000	58.6996	58.6996	1.5700e-003	0.0000	58.7388
Total	0.0331	0.1356	0.2352	8.8000e-004	1.2727	1.1800e-003	1.2739	0.0787	1.1000e-003	0.0798	0.0000	80.6617	80.6617	4.5600e-003	0.0000	80.7757

Attachment 3: Helicopter Emission Computations

Helicopter Emissions

Helicopter type:

Hughes MD500E

Emissions Source:

Guidance on the Determination of Helicopter Emissions

Swiss Federation, Volume 2, December 2015

	Quantity	Units	Fuel (kg)	NOx (g)	HC (g)	CO (g)	PM (g)	CO2
LTO Emissions	5	LTO per day	16.40	59.50	438.20	571.20	2.30	
Hourly	5	hrs/day	98.80	480.00	960.00	1200.00	16.00	
	Daily	kg or g/day	576.00	2697.50	6991.00	8856.00	91.50	
			Daily Emissions					
		gallons or lbs/day	180.45	5.94	15.40	19.51	0.20	3808
Aviation Fuel:	6.8	lbs/gallon						
	0.0038	m**3/gallon						
	840	kg/m**3						
	21.1	lbsCO2/gallon		lbs. per period				
Kings County	133	days		790.24	2048.02	2594.38	26.81	506400
Fresno County	67	days		398.09	1031.71	1306.94	13.50	255104
Total				NOx	HC	CO	PM	CO2
				tons and metric tons	tons	tons		
				0.59	1.54	1.95	0.02	345.46

https://www.eia.gov/environment/emissions/co2_vol_mass.php