

Draft Environmental Impact Report

SCH# 2022060193

Volume 4

Appendices K through N

JASMINE SOLAR PROJECT by SF Jasmine, LLC (*PP22401*)

Conditional Use Permit No. 3, Map No. 160
Williamson Act Land Use Cancellation 22-01



Kern County
Planning and Natural Resources Department
Bakersfield, California

October 2023

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Bakersfield, California

Technical Assistance by:
Kimley-Horn

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Appendices – Volume 4

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To assist you in reviewing this electronic document, “bookmarks” and/or “links” have been provided for easier navigation between sections. When available, bookmarks are located in the panel to the left. Links are highlighted in **BLUE** in the Table of Contents. Clicking on either the bookmarks or links will take you to the selected item. This document may consist of multiple linked PDF files. If saving this document to your computer, you must save all corresponding files to a directory on your hard drive to maintain the manner in which these PDF documents are linked.

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Appendix K
Hydrology Report



Hydrology Report

Jasmine Solar Project

SF Jasmine, LLC

September 2021
Revised December 2021

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1 Purpose and Project Overview

The purpose of this Hydrology Summary Report is to describe existing conditions in the vicinity of the Jasmine Solar Project (Project), as proposed by SF Jasmine, LLC. The Project proposes to include up to a 70-megawatt (MW) solar module with on-site energy storage, connecting to PG&E's Lakeview Substation via a ½-mile generation tie-in line. See Map Figures 1-3 provided in Appendix A.

The Project Site is located in southern Kern County, covers approximately 493 acres of irrigated farmland, and is 4 miles west of Interstate 5 on Copus Road. The nearest major road intersection to the site is Copus Road and Old River Road, which is located near the southeast corner of the site.

It is estimated the proposed Project will use approximately 0.5 acre-feet of groundwater annually, pumped from existing on-site wells, which is significantly (several orders of magnitude) less water than used for any agriculture historically at the Site. This water will be used to wash dust from the surfaces of the PV panels. This estimate assumes one annual wash. There is currently no septic system or connections to a wastewater treatment system on the site, nor are any proposed. For stormwater, the Project includes a proposed on-site stormwater basin.

Impervious surfaces will be minimal and will consist of foundations for inverter skids, substation, etc. The total impervious surface will total around 5000 sf (~0.1 acres). The site's internal maintenance and access roads will be compacted dirt or gravel. Approximately 10.5 acres of stormwater retention basin(s) with a 50 acre-foot volume would be constructed to collect and passively treat stormwater on site.

2 Environmental Setting

The Project Site is located within the Central Valley Hydrologic Units, in the Kern County Subbasin (Groundwater Basin Number: 5-022.14) which is located at the southern end of the San Joaquin Valley and contains the City of Bakersfield (See Figure 1). It is bounded on the west, southwest, and east by the bedrock formations of the coast range, San Emigdio Mountains, and Sierra Nevada, respectively. It is separated from the White Wolf Subbasin to the southeast by the White Wolf Fault. The northern boundary is generally coincident with the County line (CDWR 2016).

The Project Site is located in the Tulare Lake Hydrologic Region, and specifically within Kern County Subbasin (CDWR 2013, 2015). The Tulare Lake Hydrologic Region is approximately 16,800 square miles in size. Major rivers draining into the Tulare Lake region include the Kings, Kaweah, Tule, and Kern, which extend from the Sierra Nevada headwaters in eastern Fresno and Tulare counties, to their termination at the former Tulare Lake and Buena Vista Lake beds.

The Project Site sits at a mean sea elevation (msl) ranging from approximately 385 feet in the southernmost boundary to 335 feet in the northernmost boundary and is approximately 490 acres (approximately 0.77 square miles) within the area locally called the Maricopa Flats. The Project Site is privately-owned, irrigated farmland principally comprised of center-pivot sprinkler systems. There are no structures or impervious surfaces. The site does contain ancillary farming improvements such as compacted dirt roads, open irrigation ditches, a centrally located 1-acre irrigation pond, and a 3-acre existing drilling operation adjacent to Copus Road.

2.1 Regional Climate

The San Joaquin Valley has a hot, dry climate that is influenced by the surrounding Diablo and Tehachapi Mountain ranges. Approximately 90 percent of the annual precipitation normally falls between November and May. A large percentage of the precipitation typically falls in association with a small number of large winter storms. The winter season is known for producing fog in the valley, which can last for weeks and can reduce visibility to less than $\frac{1}{4}$ of a mile. During the spring, weak weather fronts often generate high winds and gusty conditions that create dust storms (NOAA 2008).

The Project area is typical of a desert climate. Table 1 provides monthly precipitation and average air temperatures. The absolute high average temperature is 97 degrees Fahrenheit (°F) and occurs in July. The lowest average temperature is 38 degrees Fahrenheit (°F) and occurs in December (NOAA 2008).

Climate Data

Month	Total Precipitation (in)	Average Max Air Temp (°F)	Average Min Air Temp (°F)
January	1.18	56	39
February	1.21	64	43
March	1.41	68	46
April	0.45	76	50
May	0.24	84	57
June	0.12	92	64
July	0.0	97	69
August	0.08	95	68
September	0.15	89	64
October	0.30	80	55
November	0.59	65	44
December	0.76	56	38

Source: NOAA 2008

2.2 Soils

Soils in the Project Site consist of Califlax Loam (Natural Resources Conservation Service 2018). The hydrologic soil group was developed by the U.S. Department of Agriculture to describe if rainwater is likely to runoff the soil or infiltrate, with soils likely to infiltrate at a higher rate having a classification of A, and soils that are most likely to experience little infiltration having a rating of D. Califlax Loam soil have a Hydrologic Soil Group rating of C indicating that the soils will not infiltrate most of the received moisture, especially in above average rain events (NRCS 2021).

2.3 Surface Water and Site Drainage

The Project Site is located approximately 1.8 miles southwest of an irrigation canal known as the New Rim Ditch and 1.9 miles northeast of the California Aqueduct. It is located within Subwatershed HUC 12-180300031202, which contains the remnants of Pleitito Creek. Pleitito Creek is mapped south of the California Aqueduct, though aerial imagery does not indicate any above-ground creek visibility (See Figure 3). Tulucay creek, which is not located within the same subwatershed as the Project Site, is partially daylight and terminates approximately five miles east of the Project Site (CDWR 2021).

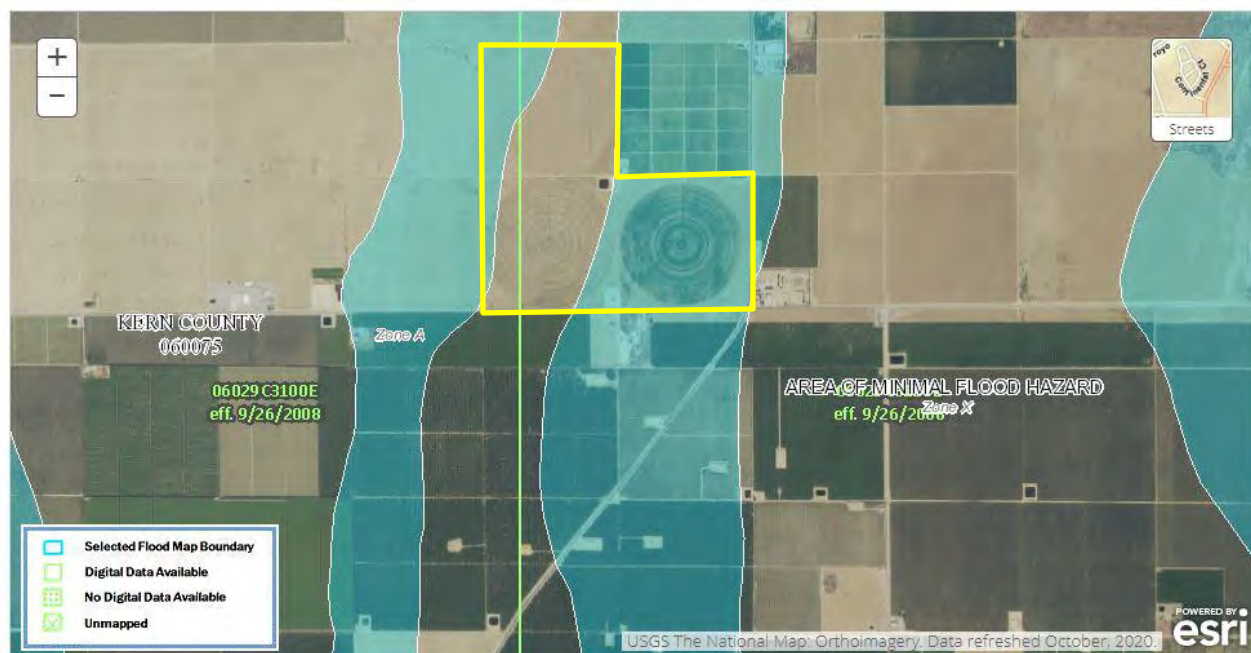
The area in the immediate vicinity has a gentle northeasterly topographic gradient which results in any runoff flowing to the north into or towards the former (dry) Kern Lakebed (See Figure 3). In a relatively larger to above average rain event, the Project Site flows to open drainage ditches along the edges of each existing field and along the road frontages of Copus Drive and Old River Road.

2.4 Flooding

Flooding is a temporary condition in which land that is normally dry is partially or completely inundated. Flooding occurs when water bodies, such as streams, rivers, lakes, or reservoirs, are abnormally high and overflow into adjacent low-lying areas. These areas are known as floodplains, defined by their exposure to risk of recurring floods.

The Federal Emergency Management Agency (FEMA) has designated the northwestern portion and the eastern half of the Site as Zone A (See Figure 3, Appendix A, and Image 1 below). Zone A according to FEMA are “Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.” All other portions of the Project Site and off-site improvement areas are located in an area designated by the FEMA as Zone X, which is an area of minimal flood hazard (FEMA 2008).

Image 1 – FEMA designations for the Project Site and Surrounding areas



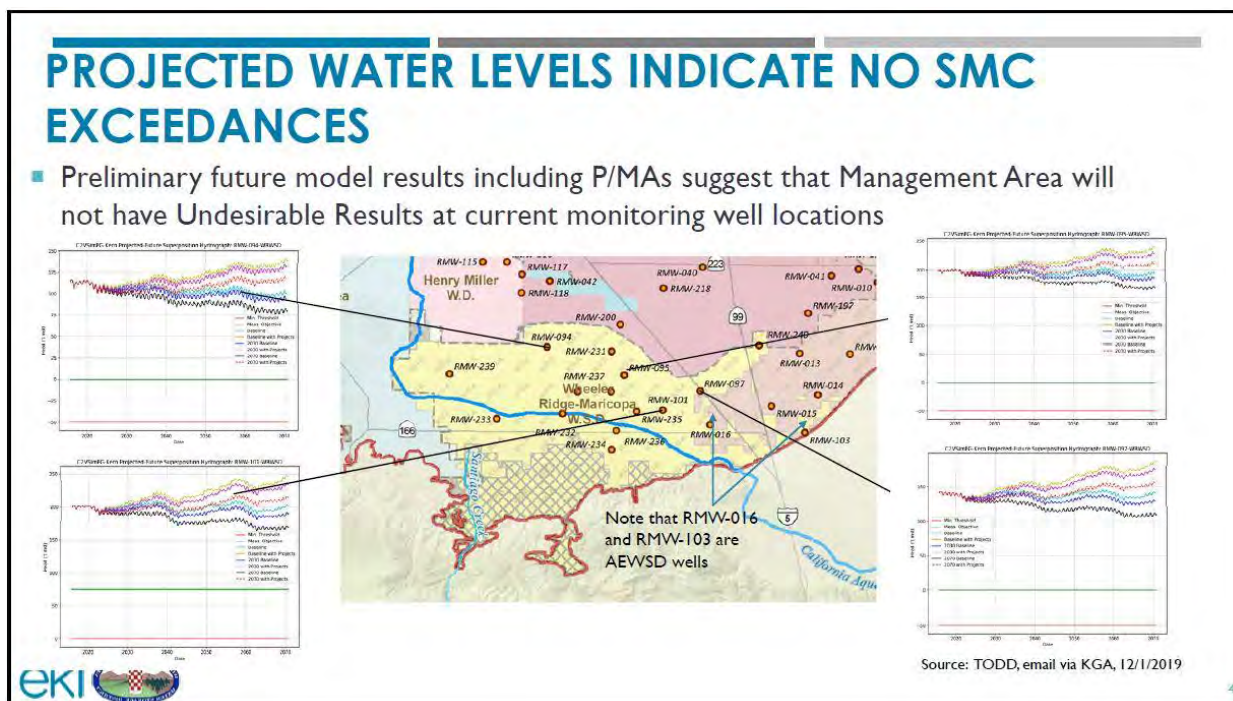
2.5 Regional Groundwater

The Project Site is located within the San Joaquin Valley Groundwater Basin and the Kern County Subbasin (Groundwater Basin Number: 5-022.14) is located at the southern end of the San Joaquin Valley. The Project Site is located in the Tulare Lake Hydrologic Region. The Kern County Subbasin groundwater is subject to the Kern Groundwater Authority (KGA) as a groundwater sustainability plan area that is broken up into many agencies and water districts. The Wheeler Ridge – Maricopa Water Storage District (WRMWSD) is responsible for the Project Site and near vicinity groundwater (KGA website <http://www.kerngwa.com/gsp.html>). The WRMWSD was formed to engage with stakeholders and assist in general compliance with specific elements of the California Sustainable Management Act (SGMA), and any basin specific groundwater budget goals. A Groundwater Sustainability Plan (GSP) has been submitted to the Department of Water Resources in 2020, and is under review.

The WRMWSD also has stakeholder engagement and coordination meetings with regards to groundwater sustainability indicators and the water resource programs: Integrated Regional Water Management Plan, Irrigated Lands Regulatory Program, Agricultural Water

Management Plans, and SB 1938 Plans. In a 2019 WRMWSD presentation, it was indicated that preliminary model runs of the wells monitored in the groundwater management area of the Project Site were not expected to have undesirable results (See Image 2, below).

Image 2 – WRMWSD 2019 Presentation to Stakeholders Regarding Modeled 2040 Groundwater Conditions



2.5.1.1 Concepts of Groundwater Hydrology

Water is present in two highly generalized zones beneath the ground surface. The upper zone is the zone of aeration (or vadose zone) where pore spaces in the geologic material are partly filled with air and partly filled with water. Wells do not produce groundwater from the vadose zone because the molecules of water adhere tightly to the various geologic materials. Water stored in this zone of aeration is called soil moisture or vadose water. Soil moisture is drawn into the rootlets of growing plants. As the plants use the water, it is transpired as vapor to the atmosphere. Isolated zones of saturated soil can occur in the zone of aeration. These zones of perched groundwater can occur above low permeability layers and are separated from the main groundwater body by an underlying unsaturated zone.

The lower zone is the zone of saturation where all of the interconnected pore spaces in the geologic material are filled with groundwater, and only dissolved gaseous air is present. Groundwater in the saturated zone is either confined or unconfined. An aquifer containing unconfined groundwater is one that is not overlain by a confining bed of relatively low permeability geologic material. The upper surface of an unconfined body of groundwater is called the water table. It is represented by the level of water in a well penetrating the saturated zone. In an unconfined aquifer the water table is assumed to be connected, and affected by atmospheric pressures.

A confined aquifer is overlain by relatively impermeable material and is isolated from overlying aquifers. Groundwater contained in confined aquifers is under pressure, and the level to which the water will rise in a non-pumping well is the potentiometric surface of the groundwater. The potentiometric surface is the theoretical groundwater surface that represents the upward pressure exerted by the confined groundwater on the materials overlying it, or observed in a well penetrating only the confined aquifer.

Water recharges an aquifer through precipitation, stream flow, irrigation, or other sources by entering the ground and moving downward through the zone of aeration and into the zone of saturation. Groundwater under pressure moves toward areas of lower pressure, such as pumping depressions. In unconfined shallower aquifer cases where the pressure relief area is along a stream channel, springs form and provide stream flow even during periods of low precipitation.

The general groundwater movement pattern of a basin can be interpreted from groundwater contour maps which show lines of equal elevation of the groundwater surface. Groundwater movement is perpendicular to the contour lines and from the higher elevation contours to the lower. The relative spacing between the contour lines indicates the hydraulic gradient of the groundwater, which can be an index of: the resistance encountered as the water moves through the aquifer, the overall groundwater basin geometry, and aquifer materials composition.

3 Regulatory Setting

3.1 Federal

3.1.1.1 *Clean Water Act*

The federal Clean Water Act (CWA), enacted by Congress in 1972 and amended several times since, is the primary federal law regulating water quality in the United States and forms the basis for several State and local laws throughout the country. The Act established the basic structure for regulating discharges of pollutants into the waters of the United States. The Clean Water Act gave the U.S. EPA the authority to implement federal pollution control programs, such as setting water quality standards for contaminants in surface water, establishing wastewater and effluent discharge limits for various industry categories, and imposing requirements for controlling nonpoint source pollution. At the federal level, the Clean Water Act is administered by the U.S. EPA and U.S. Army Corps of Engineers (USACE). At the state and regional levels in California, the act is administered and enforced by the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs). The Project site is within the Central Valley Regional Water Quality Control Board.

The Project Site and immediate area does not contain Federal Waters of the Nation (United States) and is not subject to the federal CWA and associated provisions and, therefore; not technically subject to the federal NPDES program. However, Kern County requires compliance with its NPDES program to ensure maintenance of water quality in the County. The Kern County NPDES program is applicable to projects disturbing 1 acre or more during construction; therefore, the Project is subject to the Kern County NPDES program.

3.2 State

3.2.1.1 *Porter Cologne Water Quality Control Act*

The Porter Cologne Water Quality Control Act is the primary statute covering the quality of waters in California. Under the Act, the SWRCB has the ultimate authority over State water rights and water quality policy. The nine RWQCBs regulate water quality under this Act through the regulatory standards and objectives set forth in Water Quality Control Plans (also referred to as Basin Plans) prepared for each region. The five-member SWRCB allocates water rights, adjudicates water right disputes, develops state-wide water protection plans, establishes water quality standards, and guides the nine RWQCBs located in the major watersheds of the state. The joint authority of water allocation and water quality protection enables the SWRCB to provide comprehensive protection for California's waters. The SWRCB is responsible for implementing the Clean Water Act, issues National Pollutant Discharge Elimination System (NPDES) permits to cities and counties through RWQCBs, and implements and enforces the NPDES General Permits.

3.2.1.2 *NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities*

The General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit) (Order No. 2009-0009, as amended by Order No. 2010-0014 and 2012-006) took effect on July 1, 2010 and was amended on February 14, 2011. The Order applies to construction sites that include one or more acres

of soil disturbance. To obtain coverage under the Construction General Permit, dischargers must electronically file permit registration documents, which include a Notice of Intent, Storm Water Pollution Prevention Plan (SWPPP), and other compliance related documents required by the General Permit. The SWPPP must include best management practices to identify, reduce or eliminate sediment and other pollutants in storm water and non-storm water discharges during construction.

3.2.1.3 Department of Water Resources

The California Department of Water Resources is responsible for managing water resources in California in cooperation with other local, county, and state agencies. One of the major responsibilities of the Department of Water Resources is preparing and updating the California Water Plan to guide development and management of the state's water resources. The California Water Plan provides a status update of the major water resource trends in California but does not mandate actions or authorize spending for actions or projects.

3.2.1.4 Central Valley Regional Water Quality Control Board

RWQCBs adopt and implement water quality control plans (Basin Plans) which recognize the unique characteristics of each region with regard to natural water quality, actual and potential beneficial uses, and water quality problems. The current 2018 Water Quality Control Plan for the Sacramento and San Joaquin River Basins Plan prepared by the CVRWQCB provides a definitive program of actions designed to preserve and enhance water quality and to protect beneficial uses of water in the Central Valley. The CVRWQCB also oversees and regulates groundwater investigations, clean-up, and abatement activities at sites with identified pollution problems.

3.3 Local

3.3.1.1 Kern County NPDES Storm Water Program Permit

Kern County requires the project to submit an NPDES Storm Water Program Permit for projects that disturb more than 1 acre for the Kern County Public Works Department to verify the applicant's stormwater plans, even if the project is not subject to the federal NPDES program. The applicant applies for the permit under one of the four following conditions:

- All stormwater is retained onsite and no stormwater runoff, sediment, or pollutants from onsite construction activity can discharge directly or indirectly offsite or to a river, lake, stream, municipal storm drain, or offsite drainage facilities.
- All stormwater runoff is not retained on site but does not discharge to a Water of the United States (i.e., drain to a terminal drainage facility). Therefore, a SWPPP has been developed and Best Management Practices (BMPs) must be implemented.
- All stormwater runoff is not retained on site, and the discharge is to a Water of the United States. Therefore, a Notice of Intent must be filed with the SWRCB prior to issuance of the building permit. Also, a SWPPP has been developed and BMPs must be implemented.
- Construction activity is between 1 and 5 acres and an Erosivity Waiver was granted by the SWRCB. BMPs must be implemented.

3.3.1.2 Kern County Grading Code

Kern County has implemented a Grading Code under Title 17 of the Ordinance Code of Kern County that covers stormwater management, erosion control, and water quality provisions during construction. Additionally, Division 4 of the Kern County Development Standards apply, and is copied and/or described below for reference.

Applicable provisions of Section 17.28.070, Grading Permit Requirements, require the following:

- C. Grading Designation. Grading in excess of 2,000 cubic yards shall be performed in accordance with the approved grading plan prepared by a civil engineer or architect, and shall be designated as “engineered grading.”

Note that this requires a soils and/or engineering geology report.

Applicable provisions of Section 17.28.100, Cuts, require the following:

- B. Slope. The slope of cut surfaces shall be no steeper than is safe for the intended use and shall be no steeper than two (2) units horizontal to one (1) unit vertical unless the applicant furnishes a soils engineering or an engineering geology report, or both, stating that the site has been investigated and giving an option that a cut at the steeper slope will be stable and not create a hazard to public or private property.

Applicable provisions of Section 17.28.110, Fills, require the following:

- A. General. Unless otherwise recommended in the approved soils engineering report, fills shall conform to the provisions of this section. In the absence of an approved soils engineering report, these provisions may be waived for minor fills not intended to support structures.
- B. Fill Location. Fill slopes shall not be constructed on natural slopes steeper than two (2) horizontal units to one (1) vertical unit.
- C. Preparation of Ground. The ground surface shall be prepared to receive fill by removing vegetation, noncomplying fill, topsoil and other unsuitable materials scarifying to provide a bond with new fill and, where slopes are steeper than five (5) horizontal units to one (1) vertical unit and the height is greater than five (5) feet, by benching into sound bedrock or other competent material as determined by the soils engineer. The bench under the toe of fill on a slope steeper than five (5) horizontal units to one (1) vertical unit shall be at least ten (10) feet wide. The area beyond the toe of fill shall be sloped for sheet overflow or a paved drain shall be provided. When fill is to be placed over a cut, the bench under the toe of the fill shall be at least ten (10) feet wide, but the cut shall be made before placing the fill and the cut shall be qualified by the soils engineer or engineering geologist or both as a suitable foundation for fill.
- D. Fill Material. Detrimental amounts of organic material shall not be permitted in fills. Except as permitted by the building official, no rock or similar irreducible material with a maximum dimension greater than (twelve) 12 inches shall be buried or placed in fills.”
- E. Compaction. All fills shall be compacted to a minimum of ninety (90) percent of maximum density.

Applicable provisions of Section 17.28.130, Drainage and Terracing, require the following:

- A. General. Unless otherwise indicated on the approved grading plan, drainage facilities and terracing shall conform to the provisions of this section for cut or fill slopes steeper than three (3) units horizontal to (1) unit vertical.
- B. Terrace. Terraces at least six (6) feet in width shall be established at not more than thirty (30) foot vertical intervals on all cut or fill slopes to control surface drainage and debris except that where only one (1) terrace is required, it shall be at mid-height. For cut or fill slopes greater than sixty (60) feet and up to one hundred twenty (120) feet in vertical height, one (1) terrace at approximately mid-height shall be twelve (12) feet in width. Terrace widths and spacing for cut and fill slopes greater than one hundred twenty (120) feet in height shall be designed by a civil engineer and approved by the building official. Suitable access shall be provided to permit proper cleaning and maintenance.

Swales or ditches on terraces shall have a minimum gradient of five (5) percent and must be paved with reinforced concrete not less than three (3) inches in thickness or an approved equal paving. They shall have a minimum depth at the deepest point of one (1) foot and a minimum paved width of five (5) feet.

A single run of swale or ditch shall not collect runoff from a tributary area exceeding thirteen thousand five hundred (13,500) square feet (projected) without discharging into a down drain.

- C. Subsurface Drainage. Cut and fill slopes shall be provided with subsurface drainage as necessary for stability.
- D. Disposal. All drainage facilities shall be designed to carry waters to the nearest practicable drainage way approved by the building official and/or other appropriate jurisdiction as a safe place to deposit such waters. Erosion of ground in the area of discharge shall be prevented by installation of non-erosive downdrains or other devices.

Building pads shall have a drainage gradient of two (2) percent toward approved drainage facilities, unless waived by the building official.

- E. Interceptor Drains. Paved interceptor drains shall be installed along the top of all cut slopes where the tributary drainage area above slopes toward the cut and has a drainage path greater than forty (40) feet measured horizontally. Interceptor drains shall be paved with a minimum of three (3) inches of concrete or gunite and reinforced. They shall have a minimum depth of twelve (12) inches and a minimum paved width of thirty (30) inches measured horizontally across the drain. The slope of drain shall be approved by the building official.

Applicable provisions of Section 17.28.140, Erosion Control, require the following:

- A. Slopes. The faces of cut-and-fill slopes shall be prepared and maintained to control erosion. This control may consist of effective planting. Protection for the slopes shall be installed as soon as practicable and prior to calling for final approval. Where cut slopes are not subject to erosion due to the erosion-resistant character of the materials, such protection may be omitted.

- B. Other Devices. Where necessary, check dams, cribbing, riprap, or other devices or methods shall be employed to control erosion and provide safety.
- C. Temporary Devices. Temporary drainage and erosion control shall be provided as needed at the end of each workday during grading operations, such that existing drainage channels would not be blocked. Dust control shall be applied to all graded areas and materials and shall consist of applying water or another approved dust palliative for the alleviation or prevention of dust nuisance. Deposition of rocks, earth materials or debris onto adjacent property, public roads or drainage channels shall not be allowed.

Applicable provisions of Section 17.28.150, Drainage Retention Facilities, require the following:

General. All drainage retention/detention facilities and their associated conveyance facilities shall be designed in accordance with the Kern County Development Standards or latest revision thereof.

Note that under Kern County Development Standards, Division 4, retention basins are defined as structures without an outlet/spillway and detention basins contain an outlet or spillway.

3.3.1.3 Kern County Development Standards, Division Four, Drainage

The development standards are intended to protect life and property and maintain necessary access to property or passage of the traveling public on the public highways, including but not limited to minimizing impacts due to flood waters and general drainage needs. These standards are adopted by the County of Kern but are not included within the County code. The standard includes the following:

III. Drainage Plans. The Project Site is not included in a Special District so the general drainage plan provisions apply.

IV. Alluvial Fan Development. The Project Site is located on an alluvial fan and designated as Zone A on the FEMA FIRM for that reason. This section requires analysis and “mitigation [to] ensure that the one-percent risk flow will be received into the development site, without causing more than one foot of water surface rise resulting from encroachment at the development site, and discharge the one percent risk flow in a manner, as close as possible, to the flow pattern existing prior to development of the site.”

VI. Culverts, Bridges & At-Grade-Crossings. Kern County requires publicly maintained crossings of natural channels to be culverted or bridged. Private roadways can use at-grade crossings; however, they cannot encroach on a floodway.

VIII. Retention Basin Design. This chapter contains the following applicable sections:

Sec. 408-1 Design Volume. The design volume of stormwater retention basins shall be based upon the runoff from the ISDD five-day storm event and a volume of nuisance water determined by the engineer. No runoff generated on site from the design storm or from nuisance flows will be allowed to leave the site unless downstream drainage disposal facilities exist to handle the flow. [Note that there are not downstream drainage disposal facilities available at the Project Site at this time.] The retention of upstream off-site flows shall not be considered to

reduce the size of the required on-site retention facilities or mitigate the runoff from the proposed development. An evaluation of the runoff volumes associated with the site in its existing condition shall not reduce the size of the required drainage facilities.

Sec. 408-2 Hydraulic Design. In the absence of a hydrologic volume routing analysis, the storm drain hydraulic grade line calculations shall assume that 50% of the design storm volume and 100% of the nuisance volume is in the basin when the peak flow rates occur.

Sec. 408-3 Freeboard. Freeboard shall be required for all retention basins having a design water depth exceeding 18 inches. Six (6) inches of freeboard will be required when the design ponding depth within the basin is four (4) feet or less. For basins with a design ponding depth greater than four (4) feet the amount of freeboard required shall be one (1) foot. Freeboard shall be measured from the lowest gutter inlet or top of bank, whichever is lower.

In addition, this standard requires fencing, rodent and nuisance control, and access, and it provides construction requirements.

IX. Detention Basin Design. This chapter has similar design requirements as Chapter VII, Retention Basin Design, with additional requirements for outlets, spillways, and (when required) pump stations

3.3.1.4 Kern County Review Authority

The County of Kern, Department of Planning & Natural Resources and Development Services, will review all grading and drainage improvements, including hydrology and hydraulic calculations. In accordance with the Uniform Building Code and Grading Guidelines for Kern County, a Grading Permit will be required.

4 California Environmental Quality Act

The California Environmental Quality Act (CEQA) Appendix G Checklist questions related to hydrology, water quality, and groundwater are analyzed in relation to construction and operation of the proposed Project. In defining the proposed Project, the draft project description information provided by Rincon Consultants on August 9th, 2021, was utilized.

4.1 Approach to Analysis

Potential impacts to surface water quality are evaluated for both construction and operational activities. Construction impacts are evaluated for their potential to violate water quality standards and waste discharge requirements. The evaluation also considers additional runoff from new impervious areas, and whether the stormwater treatment techniques proposed as part of the Project would provide adequate capacity and treatment.

Flood hazard impacts are evaluated by assessing the Project's location within a FEMA flood hazard area or other potential hazard area and the extent to which additional impervious areas could result in flooding. The Project would not alter the course of a stream or river, therefore this portion of the "standard" evaluation criteria was not discussed further in the impact analysis for the Project.

4.1.1.1 Stormwater Flow Analysis

The Magnitude and Frequency Method, as outlined by USGS, will be used for the preliminary analysis of stormwater flows for 10- and 100-year storm events for the Project Site (National Oceanic and Atmospheric Administration 2018; U.S. Geological Survey 2006). This method is outlined in Water Resources Investigations Bulletin No. 77-21, titled Magnitude and Frequency of Floods in California, and includes stormwater runoff equations derived from precipitation and runoff data from 778 stream gauge locations in California for the 2-, 5-, 10-, 25- and 100-year recurrence intervals. This model is limited to tributary areas greater than 100 acres and has not been validated for smaller watersheds.

Impervious areas can contribute to changes in flow and should be considered for any project. For the proposed Project, changes in impervious area would be limited to PV panel columns, a meteorological station, a substation, battery storage containers and facility (foundation), O&M facility, and communication tower pads. PV panels do not measurably increase impervious area because they are mounted on small columns and allow percolation of runoff from each panel to occur in pervious areas effectively the same size as the panel. Any runoff produced follows its natural flow once in the pervious area. The meteorological station, substation, and communication tower pads would increase impervious area and could affect runoff. The sizes of these facilities are unknown; however, runoff from these pads is anticipated to percolate to the surrounding pervious areas and follow its natural flow. The permanent O&M facility will be sited at one of the three construction laydown areas and is the proposed development most likely to impact local hydrology through increased impervious surface. GHD assumes here the construction of one or more retention basins to manage stormwater due to new impervious surface in areas with compacted soil such as roads, solar array areas, and O&M buildings.

Drainage channels have not been formally proposed across the proposed development; however, to meet current Kern County site development requirements, GHD anticipates the Project will be developing one or more retention basins (discussed below) due to new

impervious surface in areas with compacted soil such as roads, solar array areas, and O&M buildings.

GHD assumes the proposed Project only includes conversion to impermeable surfaces of approximately less than 1 percent of the total project area.

4.1.1.2 Access Roads

Generally, stormwater in defined natural channels would be conveyed across project roads via improved at-grade crossings. Water moves through the Project Site via sheet flow at a low flow rate. An effective option will be to design private access roads to solar array sites to allow sheet flow to pass over and across the roadway, without impeding or adding to the natural flow, by designing the road surface essentially flush with the existing and surrounding ground. In these cases, it will be desirable that sheet flows remain in an unconfined and low-velocity state. By designing this way, these unpaved roads will not change the existing drainage or affect flow within the Project Site.

4.1.1.3 Retention Basin

Per the Grading Code under Title 17 of the Ordinance Code of Kern County and Division 4 of the Kern County Development Standards, as described above, GHD anticipates that Kern County will require the development of a retention basin or basins. The Kern County Development Standard differentiates a retention basin from a detention basin in that an outlet/spillway is included with the detention basin. Both basin types can allow for infiltration to groundwater. Based on other solar projects in the area, the areas of the proposed Project with compacted soils such as roads, solar array areas, and the O&M building are likely to require retention basins to manage onsite stormwater generated due to increased impervious surface. The size and location of the retention basin(s) will depend on a number of site conditions including consolidation of facilities to warrant a detention basin, the amount of new impervious surface, and where there could be reduced pervious surface area.

4.2 Impacts and Mitigation Measures

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?			✓	
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?			✓	
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition				

	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
of impervious surfaces, in a manner which would:				
i. Result in substantial erosion or siltation on- or off-site?			✓	
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?			✓	
iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?			✓	
iv. Impede or redirect flood flows?			✓	
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?			✓	
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?				✓

a) Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Construction

Construction of the Project does not involve discharge to a jurisdictional water feature nor discharges related to dewatering.

Construction activities would disturb greater than one acre of soil and would include clearing, grading, excavation, soil compaction, utility trenching, and similar activities. If not properly managed, construction activities could result in erosion and sedimentation, as well as the discharge of chemicals and materials, such as concrete, mortar, asphalt, fuels, and lubricants to storm drains and waterways. Applicable water quality standards and waste discharge requirements could be violated, and polluted runoff could substantially degrade water quality. However, the Project would be required, per existing State regulations, to obtain coverage under State Water Resources Control Board Order No. 2009-0009-DWQ, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities, as amended by Order No. 2012-0006. Prior to the start of construction, the Applicant would submit permit registration documents (notice of intent, risk assessment, site maps, Storm Water Pollution Prevention Plan [SWPPP], annual fee, and certifications) to the State Water Resources Control Board. The SWPPP shall address pollutant sources, non-storm water discharges, best management practices, and other requirements specified in the above-mentioned Order. The SWPPP also includes

dust control practices to prevent wind erosion, sediment tracking, dust generation by construction equipment, management of concrete slurry, asphalt, pavement cutting, and other street and road activities to avoid discharge to storm drains from such work. A Qualified Storm Water Pollution Prevention Plan Practitioner is required to oversee implementation of the Plan, including visual inspections, sampling and analysis, and ensuring overall compliance. In addition to the State regulations, Kern County also requires a project to submit an NPDES Storm Water Program Permit for projects that disturb more than 1 acre for the Kern County Public Works Department to verify the applicant's stormwater plans.

With the Project's compliance under the existing State and County regulations, construction impacts related to the violation of a water quality standard or waste discharge requirement, would be less than significant.

Operation

The Project would be subject to review by Kern County and be required to comply with the adopted Development Design Standards which regulate, among other things, stormwater management, erosion control, and water quality. As part of the Project, approximately 10.5 acres of stormwater retention basin(s) with a 50 acre-foot volume would be constructed. At the time of this analysis, the location of the basin(s) was not known. However, the Applicant would be required to submit Drainage Plans to the County for review and to determine compliance with the Development Design Standards. Division 4 of the standards specifically regulate the design volume and hydraulic design requirements for individual project sites.

With the Project's compliance with the adopted Development Design Standards, operational impacts related to the violation of a water quality standard or waste discharge requirement, would be less than significant.

b) Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Construction

During construction, groundwater from the existing on-site irrigation wells, or purchased from a local provider, would be used for dust suppression, soil compaction, concrete hydration, and other miscellaneous activities requiring non-potable water during construction. Up to approximately 150 acre-feet of water per construction year would be needed. This is substantially less than used for irrigation of crops under existing conditions.

Given the limited amount of groundwater use during construction and that it would be less than existing conditions, the Project is not anticipated to substantially decrease groundwater supplies or interfere with groundwater recharge during construction such that the Project would impede sustainable groundwater management of the basin.

The construction-related impact to groundwater supplies would be less than significant.

Operation

It is estimated the Project would use approximately 0.5 acre-feet of groundwater annually, pumped from the existing on-site irrigation wells. This water would be used to wash dust from the surfaces of the PV panels. This volume would be significantly (several orders of magnitude) less water than used historically for agriculture irrigation at the site.

Although exact quantities were unknown at the time of this analysis, post-construction impervious surfaces are expected to be minimal, and include the panel support posts and small ancillary structures (control house building and O&M building) representing less than 1 percent of the 520-acre site. The new areas of impervious surfaces would not have a measurable effect on groundwater recharge. The onsite retention basin(s) for stormwater management would capture stormwater and allow for infiltration to the groundwater.

The operational-related impact to groundwater supplies would be less than significant.

c.i) Would the project substantially alter the existing drainage pattern of the site or area, including through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on- or off-site?

Construction

As described above, under impact a), construction activities would disturb greater than one acre of soil and would include clearing, grading, excavation, soil compaction, utility trenching, and similar activities. If not properly managed, construction activities could result in off-site erosion and sedimentation.

However, the Project would be required, per existing State regulations, to obtain coverage under State Water Resources Control Board Order No. 2009-0009-DWQ, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities, as amended by Order No. 2012-0006. Prior to the start of construction, the Applicant would submit permit registration documents (notice of intent, risk assessment, site maps, SWPPP, annual fee, and certifications) to the State Water Resources Control Board. The SWPPP would address pollutant sources, non-storm water discharges, best management practices, and other requirements specified in the above-mentioned Order. BMPs include, among other requirements, installation of silt fencing around the construction site, protection of storm-drain inlets, and covering of exposed soil stockpiles. In addition to the State regulations, Kern County would require the Project to submit an NPDES Storm Water Program Permit to the Kern County Public Works Department to verify the Applicant's stormwater plans.

With the Project's compliance under the existing State and County regulations, construction impacts related to the alteration of existing drainage pattern, would be less than significant.

Operation

The Project site is relatively flat and would remain so post-construction. The rough grade would provide site drainage to the stormwater retention basin(s). The onsite retention basin(s) for stormwater management would capture stormwater, allow for infiltration to the groundwater, and minimize risk from offsite flows. In addition, construction of the Project would comply with applicable drainage standards found in the Kern County Grading Code and Development Standards.

Operational-related impacts from erosion or siltation would be less than significant.

c.ii) Would the project substantially alter the existing drainage pattern of the site or area, including through the addition of impervious surfaces, in a manner which would substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

The Federal Emergency Management Agency (FEMA) has designated the northwestern portion and the eastern half of the Site as Zone A. Zone A comprises “Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies.” All other portions of the Project Site and off-site improvement areas are located in an area designated by the FEMA as Zone X, which is an area of minimal flood hazard (FEMA 2008). At the time of this analysis, it was not known whether the operation and maintenance building would be located in Zone A or Zone X. However, if in Zone A, the building would need to comply with the Kern County requirements for development within a 100-year floodplain. Drainage plans would be submitted and reviewed by Kern County to verify that potential flood waters would not increase the water surface elevations more than 1 foot or in accordance with the Kern County Floodplain Ordinance.

As described above, under impact c.i), the Project site is relatively flat and would remain so post-construction. The Project includes drainage to an on-site stormwater retention basin(s) that would retain certain rain events on-site, thus minimizing the potential for increased flooding from implementation of the Project.

Impacts related to the potential for a substantial increase in on- or off-site flooding would be less than significant.

c.iii) Would the project substantially alter the existing drainage pattern of the site or area, including through the addition of impervious surfaces, in a manner which would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Construction

As described above, under impact a), compliance with State Water Resources Control Board Order No. 2009-0009-DWQ, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities, would minimize the risk of substantial polluted runoff during construction.

With the Project's compliance under existing State regulations, construction impacts related to polluted runoff would be less than significant.

Operation

The Project would be subject to review by Kern County and be required to comply with the adopted Development Design Standards which regulate, among other things, stormwater management, erosion control, and water quality. As noted under impact a), the Project includes construction of a stormwater retention basin(s). The Applicant would be required to submit Drainage Plans to the County for review and to determine compliance with the Development Design Standards. Division 4 of the standards specifically regulate the design volume and hydraulic design requirements for individual project sites. In addition, less than 1 percent of the site would become impervious, with much of the stormwater transmitted to the retention basin. Little to no additional flow would be directed to the existing off-site stormwater drainage system as a result of the proposed improvements.

Operational impacts to the capacity of the off-site drainage systems would be less than significant.

c.iv) Would the project substantially alter the existing drainage pattern of the site or area, including through the addition of impervious surfaces, in a manner which would impede or redirect flood flows?

As described above, under impact c.ii), portions of the Site are designated as Zone A, which are areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. The majority of the improvements (solar panels) would be placed on support posts above the flood elevation thus allowing floodwater to continue to move across the Project site. Structures that could impede or redirect flow would be limited, and potentially include the control house building and O&M building. However, structures located within Zone A would be subject to review by Kern County to verify that potential flood waters would not increase the water surface elevations more than 1 foot or in accordance with the Kern County Floodplain Ordinance.

The impact of the Project to impede or redirect flood flows would be less than significant.

d) In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

The Project site is not located with a tsunami or seiche zone (Kern County General Plan 2009).

As described under impact c.ii), a portion of the Project site is located within a flood hazard zone. Small quantities of pollutant materials, such as oils and grease for mechanical device maintenance, would be stored on site. However, storage would be located outside of or raised above the flood elevation.

The impact to risk of pollutant release due to a flood hazard would be less than significant.

e) Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

There are no state waters on, or adjacent to, the Project site for which a Basin Plan would apply. Therefore, the Project would not obstruct the implementation of a water quality control plan.

There is currently no adopted sustainable groundwater management plan that includes the Project site. The Project Site is located within the San Joaquin Valley Groundwater Basin, Kern County Subbasin (Groundwater Basin Number: 5-022.14), and Tulare Lake Hydrologic Region. The Kern County Subbasin groundwater is subject to the Kern Groundwater Authority (KGA) as a groundwater sustainability plan area that is broken up into many agencies and water districts. The Wheeler Ridge – Maricopa Water Storage District (WRMWSD) is responsible for the Project Site and near-vicinity groundwater (KGA website <http://www.kerngwa.com/gsp.html>). The WRMWSD was formed to engage with stakeholders and assist in general compliance with specific elements of the California Sustainable Management Act (SGMA), and any basin specific groundwater budget goals.

In a 2019 WRMWSD presentation, it was indicated that preliminary model runs of the wells monitored in the groundwater management area of the Project Site were not expected to have undesirable results. Given that the Project would use substantially less groundwater than under existing farm irrigation conditions, implementation of the Project would not be expected to change the results.

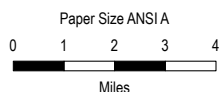
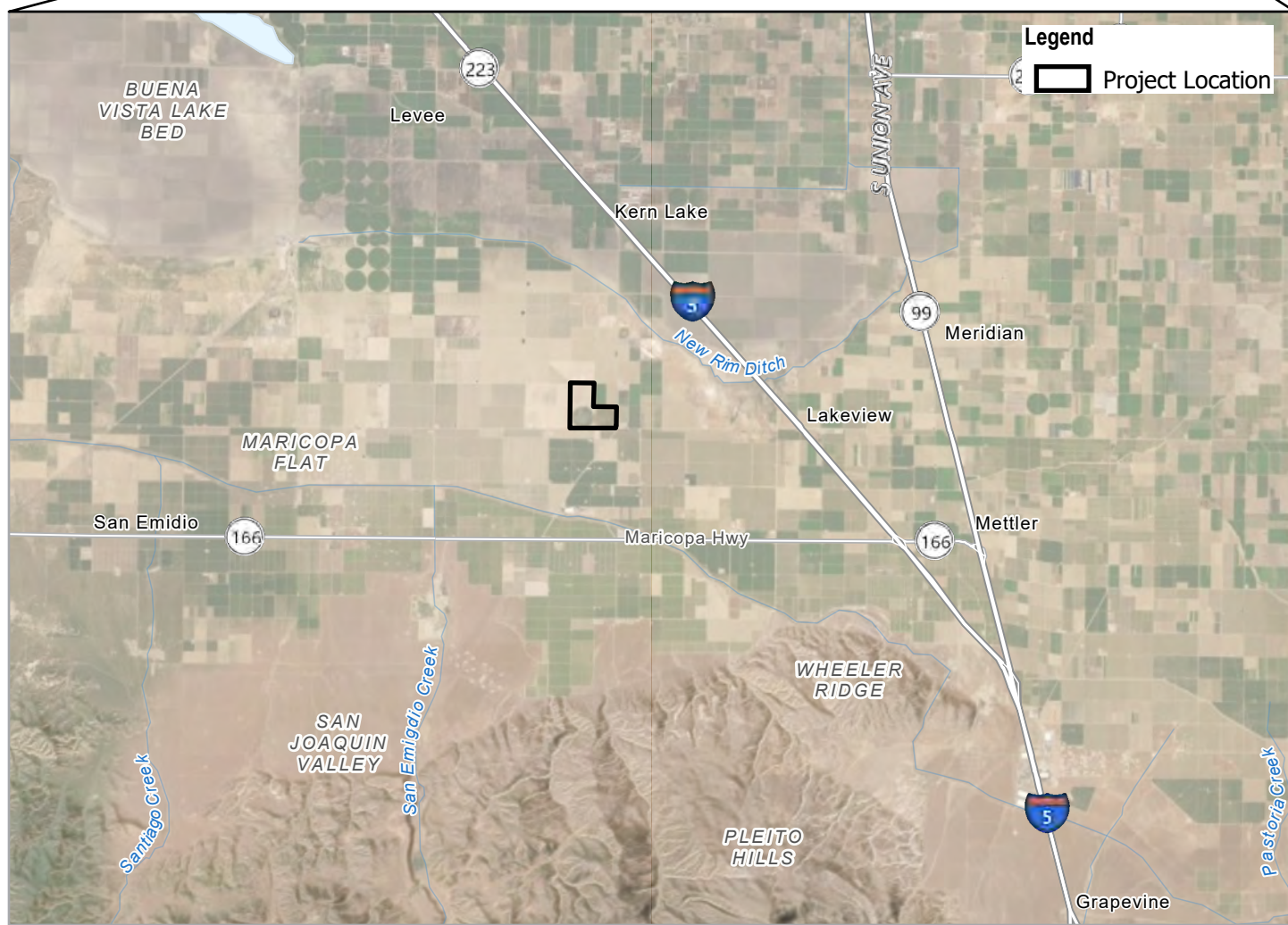
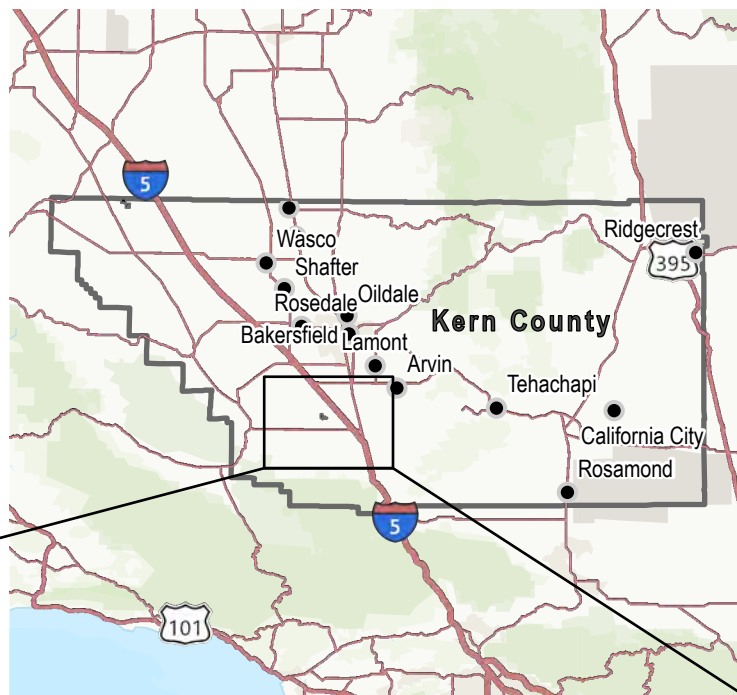
Because there is no applicable Basin Plan or Sustainable Groundwater Management Plan applicable to the site, the Project could not conflict with either of these types of plans.

5 References

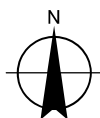
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Appendix A

Maps



Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

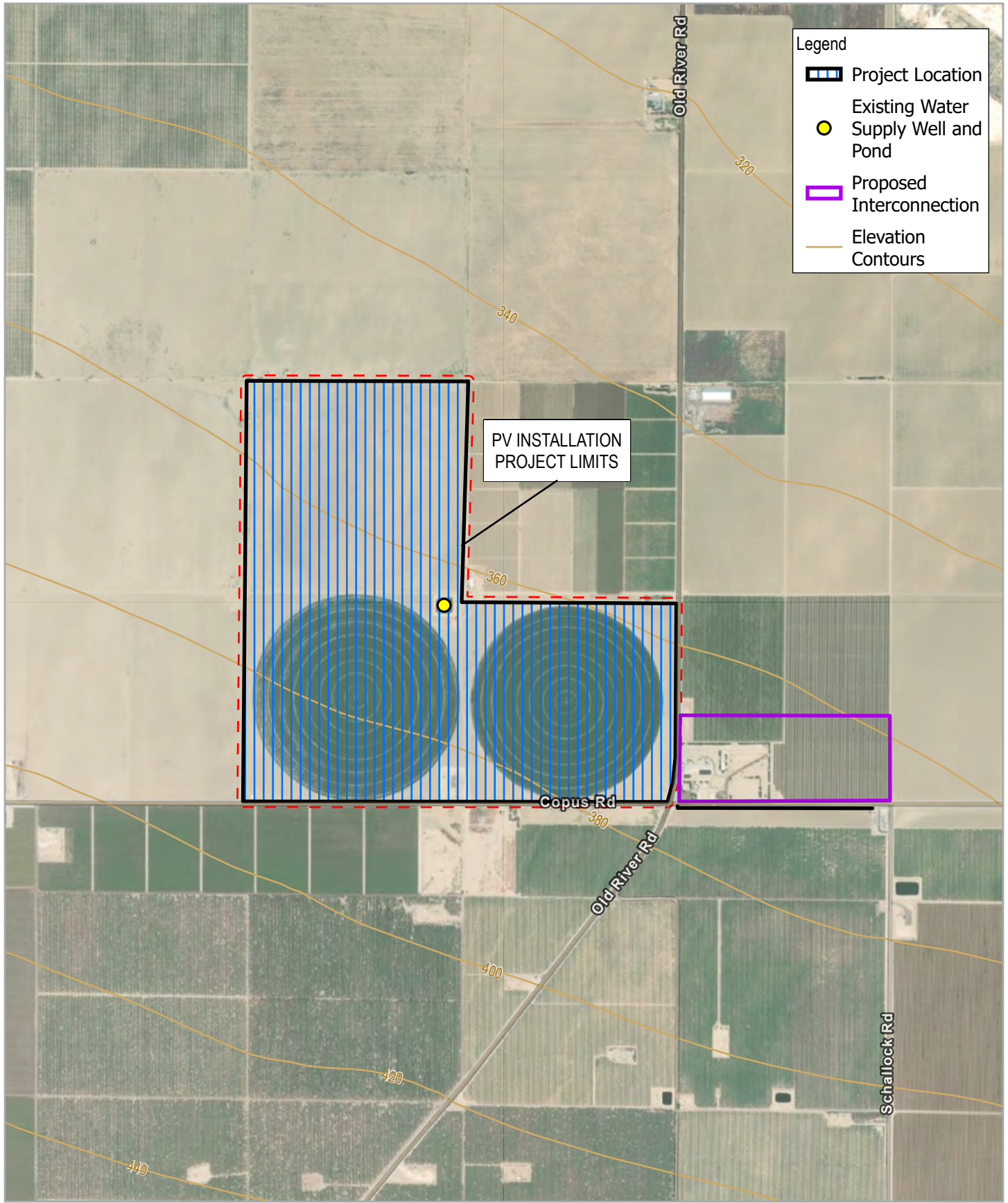


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Revision No. -
Date 3/29/2021

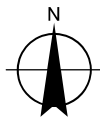
Vicinity Map

FIGURE 1



Paper Size ANSI A
0 400 800 1,200 1,600
Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

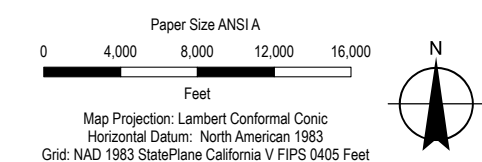
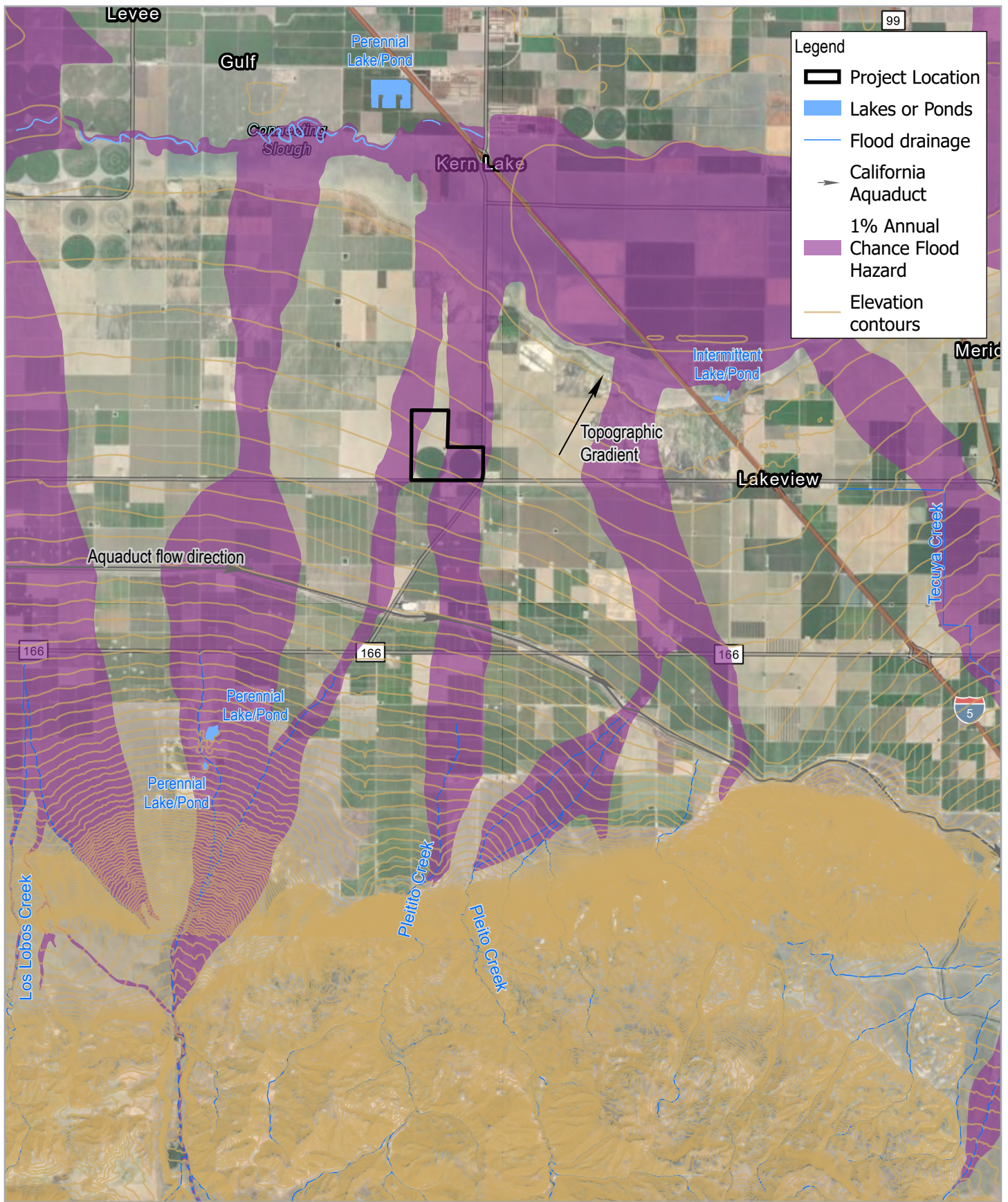


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Date 3/30/2021

Site Map

FIGURE 2



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Date 3/30/2021

Hydrology Map

FIGURE 3

Appendix L
Water Supply Assessment



Jasmine Solar Project

Water Supply Assessment

prepared for

SF Jasmine, LLC

50 California Street, Suite 820
San Francisco, California 94111

prepared by

Rincon Consultants, Inc.

180 North Ashwood Avenue
Ventura, California 93003

September 2021

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Appendices

Appendix A DWR Guidebook for Implementation of Senate Bill 610

1 Project Description

1.1 Introduction

In 2001, California adopted Senate Bill (SB) 610 and SB 221, amending California Water Code to require that certain types of development projects be analyzed in a Water Supply Assessment (WSA) which provides detailed assessments of water supply availability and reliability to city and county decision-makers prior to project approval. A WSA must identify the source(s) of water supply to be used to meet the water demands of a proposed project over a 20-year planning horizon, and with consideration to varying climactic (drought) conditions. The primary purpose of these requirements is to promote collaborative planning between local water supply and land use decisions.

SB 610 was not originally clear on whether renewable energy developments are subject to SB 610 and require the preparation of a WSA. SB 267 was signed into law on October 8, 2011, amending California's Water Law to revise the definition of "project" specified in SB 610. Under SB 267, wind and photovoltaic projects that consumed less than 75 acre-feet per year (AFY) of water were not considered to be a "project" under SB 610; subsequently, a WSA would not be required for this type of project. The renewable energy exclusions provided by SB 267 expired in January 2017. Since the language of SB 610 remains unclear on whether renewable energy projects meet the definition of a "project," this WSA takes a conservative approach and considers renewable energy projects to be subject to the requirements of SB 610.

The Jasmine Solar Facility ("proposed project") is a proposed solar energy generation facility that would consist of photovoltaic (PV) modules and associated facilities, detailed below in Section 1.3, *Project Description*. The proposed project would require a short-term water supply during construction and a long-term water supply during operation and maintenance, as well as an assumed short-term water supply during decommissioning or repowering upon the completion of the project's operational lifespan. As assessed in this WSA, it is assumed the project would source its water supply from the local groundwater basin and/or from a local water purveyor.

This WSA for the proposed project has been prepared in accordance with California Water Code, as amended by SB 610, which requires a WSA to examine the availability of water supply source(s) that would be used to meet the proposed project's water demands, including with consideration to normal-year (no drought), single-dry-year (limited drought), and multiple-dry-year (extended drought) conditions, over a 20-year planning horizon. The WSA must account for the projected water demand of the project in addition to other existing and planned future uses of the identified water supply, to the extent information is available. A common lack of data for groundwater usage and replenishment rates often makes it difficult to estimate baseline conditions regarding water supply availability; therefore, where data is not available to make quantitative estimates of water supply, reasonable assumptions are made based on available information and data.

The steps followed to ensure compliance of this WSA with California Water Code are described in Attachment A (California Department of Water Resources [DWR] Guidebook for Implementation of SB 610 and SB 221).

1.2 Project Location

The project site is located in San Joaquin Valley in southwestern unincorporated Kern County at the intersection of Old River Road and Copus Road. The site is approximately four miles west of Interstate 5 and approximately three miles north of State Route 166. The nearest community is Maricopa, which is approximately 15 miles east of the site. The surrounding area consists of actively farmed agricultural land. Unpaved roads bound the project site to the north and west. Old River Road is along the eastern boundary of the site, while Copus Road is adjacent to the project site's southern boundary.

The project would be located on five parcels, two of which would be split under the project; as such, there are currently three parcels and identified by respective Assessor Parcel Numbers (APNs), and two of these three existing parcels would be split under the proposed project, resulting in five distinct parcels and associated APNs. The existing parcels are identified by the following APNs: APN 295-130-78; APN 295-130-36 (parcel split pending); and APN 295-130-80 (parcel split pending). The total area of the project site is 520 acres, within which the project would be developed on 492 acres across the planned five parcels, or approximately 95 percent of the 520-acre site. The existing Pacific Gas and Electric (PG&E) Lakeview Substation is located approximately 0.5 mile east of the site, comprising approximately 1.5 acres adjacent to the generation tie line ("gen-tie") corridor.

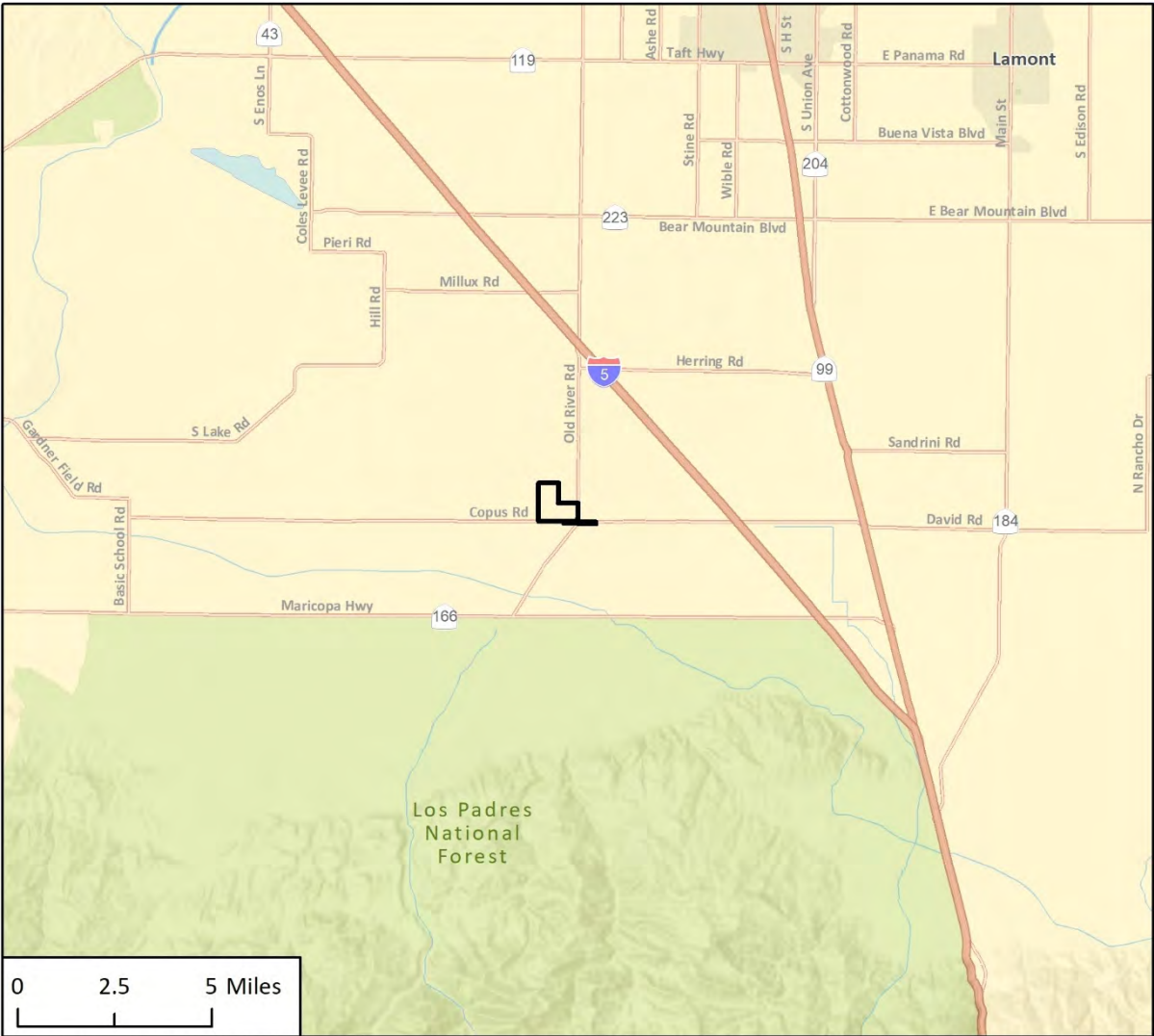
The proposed project site currently consists of previously developed agricultural land, and is characterized by a history of farming, ranching, and oil exploration. The project site is currently in contract under the Williamson Act with the California Department of Conservation (DOC). The proposed project site and gen-tie route are also classified in the DOC's most recent update to the Important Farmland Map as "Farmland of Statewide Importance" and "Grazing Land." These designations indicate that the land has been identified for agricultural uses under State law; under the proposed project, land uses on the project site would be converted from agriculture and grazing to solar energy generation.

Please see Figure 1 for an overview of the project site's regional location, and Figure 2 for an aerial view of the project site and its surrounding area.

1.2.1 Groundwater Resources

The proposed project site is located within the Kern County Subbasin ("Kern Subbasin") of the San Joaquin Valley Groundwater Basin. The Kern Subbasin is identified by DWR as groundwater basin number 5-002.14, and is bounded to the north by the boundary between Kern County, where the project is located, and Tulare County. Two other subbasins of the San Joaquin Valley Groundwater Basin share the Kern County-Tulare County boundary with the Kern Subbasin and are located adjacent to the north of the Kern Subbasin, within Tulare County. These subbasins include the Tulare Lake Subbasin (DWR basin no. 5-022.12) to the northwest and the Tule Subbasin (DWR basin no. 5-022-13) to the northeast. The Kern Subbasin is bounded to the east and southeast by granitic bedrock of the Sierra Nevada foothills and Tehachapi Mountains, and to the southwest and west by the marine sediments of the San Emigdio Mountains and Coast Ranges (DWR 2006). In addition, the White Wolf Subbasin (DWR basin no. 5-022.18) is adjacent to the south of the Kern Subbasin.

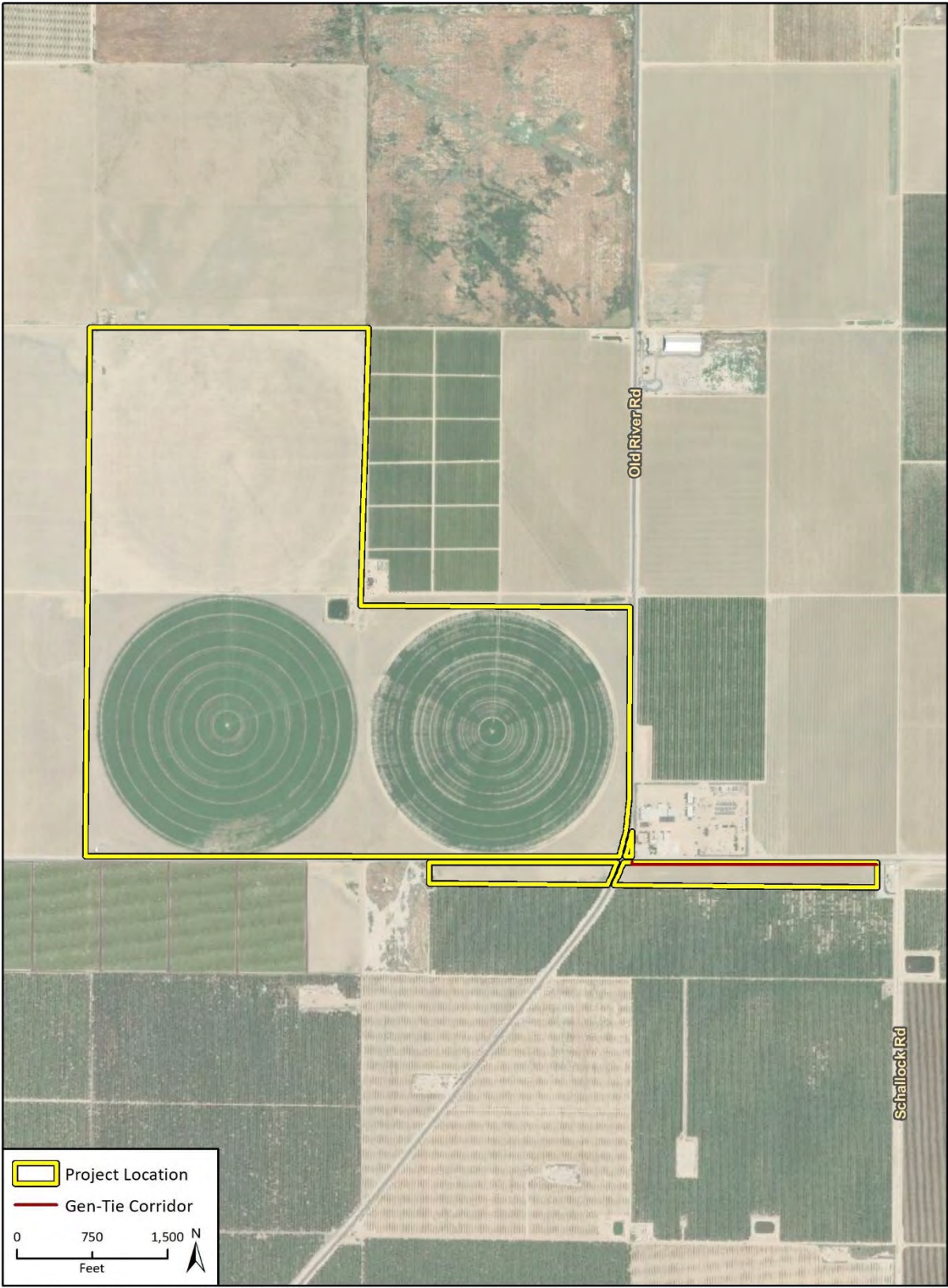
Figure 1 Regional Project Area



Project Area



Figure 2 Project Site Location



Sediments that comprise the shallow to intermediate depth water-bearing deposits in the Kern Subbasin are primarily continental deposits of Tertiary and Quaternary age. From oldest to youngest the deposits include the Olcese and Santa Margarita Formations; the Tulare Formation (western subbasin) and its eastern subbasin equivalent, the Kern River Formation; older alluvium/stream deposits; and younger alluvium and coeval flood basin deposits (DWR 2006). Recharge to the Kern Subbasin occurs via natural recharge from stream seepage along the Kern River and the eastern portion of the subbasin. Recharge also occurs via the infiltration of applied irrigation water, which is a factor of historic and ongoing agricultural land uses throughout the project area, and is now the largest contributor to groundwater recharge in the Kern Subbasin. Also tied to agricultural land uses, the Kern Subbasin has been historically over-pumped, and prior to 1970 this over-use resulted in approximately nine feet of land subsidence in the south-central portion of the subbasin (DWR 2006).

Groundwater banking activities in the Kern Subbasin initiated in the 1970s, with the City of Bakersfield's 2800 Acres Spreading Area (KCWA 2021). In the 1990s, groundwater banking programs were expanded through construction of the Kern Water Bank, which encompasses 20,000 acres of recharge areas, as well as the Kern County Water Agency's 2,233-acre Thomas N. Clark Recharge and Banking Project, formerly known as the Pioneer Banking Project (KCWA 2021). Nearly all groundwater districts have banking projects within their district's boundaries, and those districts that don't overlie the defined groundwater basin participate in local programs (KCWA 2021). Groundwater banking programs now provide critical reliability of water supply availability to the project area; this is discussed further in Section 2.1, *Overview of Water Supply*, and Section 2.2, *Water Supply Availability Conclusions*.

Figure 3 provides an overview of the extent of the groundwater resources in the project area, and specifically the Kern Subbasin within the San Joaquin Valley Groundwater Basin; as shown, the project site is in the southern-most portion of the Kern Subbasin which, in turn, is in the southern-most portion of the San Joaquin Valley Groundwater Basin.

1.2.2 Surface Water Features

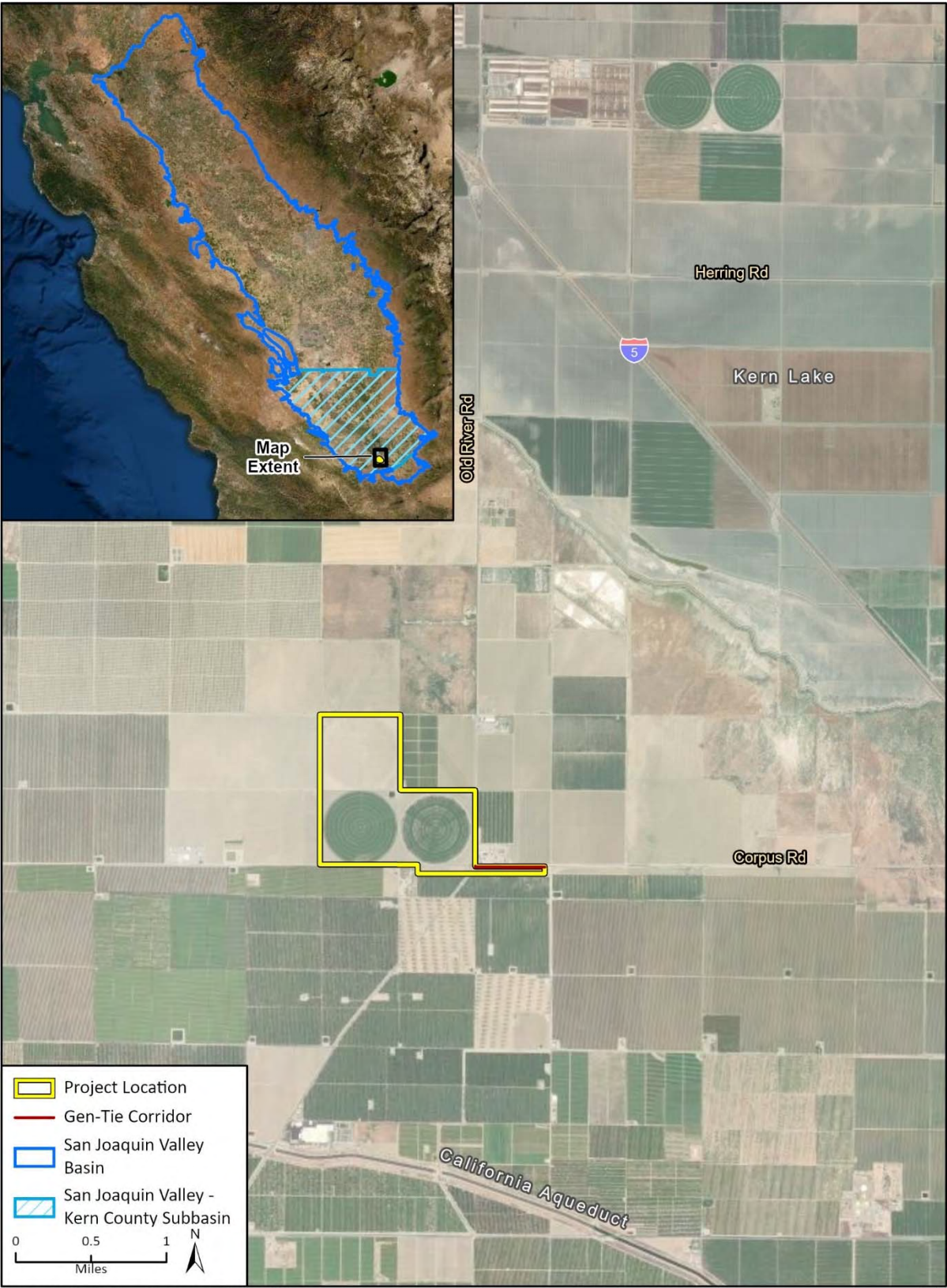
The project site is located within the Tulare Lake Hydrologic Region ("Tulare Lake Region"), in the southwestern portion of the San Joaquin Valley of California. The Tulare Lake Region covers approximately 10.9 million acres (17,050 square miles), and covers most of Kern County, as well as most of Fresno County and all of Kings and Tulare counties. This is the largest agricultural region in California, with irrigated acreage declining only slightly between 2005 and 2010, during which time a significant drought also occurred between 2007 and 2009 (DWR 2013). Surface water features in the Tulare Lake Region include alluvial fans from the Sierra Nevada foothills to the east of the project site, as well as the Kings, Kaweah, and Tule rivers and their tributaries. Surface waters in the Tulare Lake Region are generally characterized by southwest- to south-flowing rivers, creeks, and irrigation canal systems that convey surface water originating from the Sierra Nevada (DWR 2013).

Water supply conveyance facilities in the Tulare Lake Region include the California Aqueduct, which runs in a west-east alignment south of the project site, and conveys State Water Project (SWP) water through the project area. The Kern River, which is the prominent natural surface water feature in the Kern Subbasin, runs in a southwest-northeast alignment north of the project site. The Kern River originates in the Sierra Nevada to the northeast of Kern Subbasin.

1.2.3 Water Purveyors

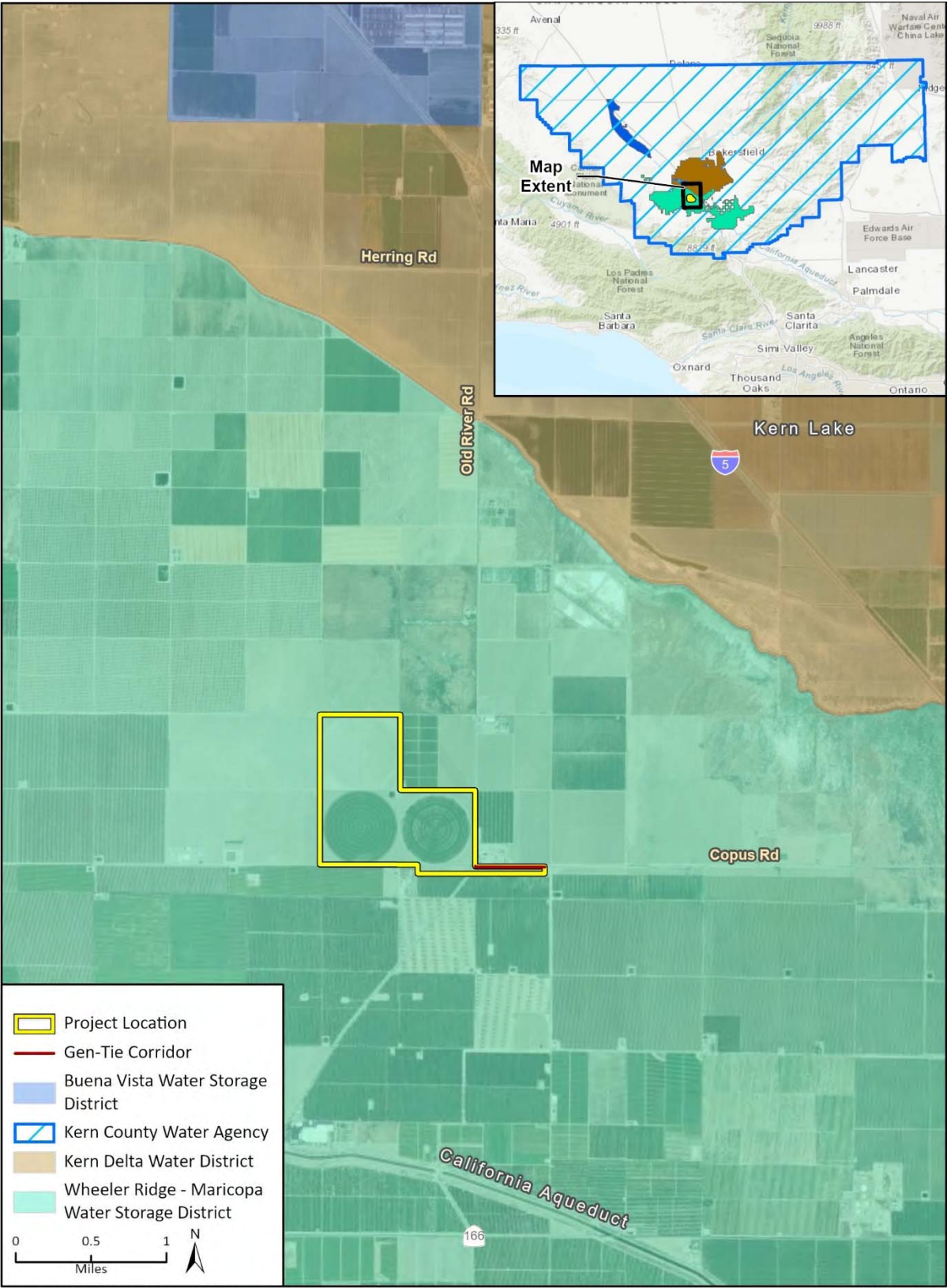
There are numerous water purveyors in Kern County; please see Figure 4, which identifies the water purveyors underlying and adjacent to the project site. The Kern County Water Agency (KCWA), which

Figure 3 Groundwater Resources



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Figure 4 Water Purveyors



was created in 1961 by a special act of the California State Legislature, serves as the local contracting entity with the California Department of Water Resources (DWR) for State Water Project (SWP) water. The KCWA is the second largest agency contracting SWP water from the DWR. In turn, KCWA holds long-term contracts for SWP water deliveries to 13 local water districts, referred to as Member Units, as well as Improvement District No. 4 (ID4), which was formed by KCWA in 1971 to provide a supplemental drinking water supply to portions of Metropolitan Bakersfield.

The proposed project site is located within the Wheeler Ridge-Maricopa Water Storage District (WSD), which is a KCWA Member Unit and receives SWP deliveries through the KCWA. The Wheeler Ridge-Maricopa WSD also manages the portion of the Kern Subbasin that underlies its jurisdiction, and serves as the Groundwater Sustainability Agency (GSA) for this portion of the Kern Subbasin, referred to as the Wheeler Ridge-Maricopa Management Area (of the Kern County Subbasin). In addition, the KCWA and the Wheeler Ridge-Maricopa WSD are both member agencies of the Kern Groundwater Authority (KGA), which was formed by a Joint Powers Agreement between 16 member agencies to function as the GSA for the overall Kern Subbasin. KGA's jurisdictional boundary is entirely within the Kern Subbasin, as defined in DWR Bulletin 118, *South of the Tulare Lake Hydrologic Region of the San Joaquin Valley Groundwater Basin*.

As the GSA for the overall Kern Subbasin, the KGA developed an "umbrella" GSP for the Kern Subbasin, referred to as the "KGA Umbrella GSP" (KGA 2020). The KGA Umbrella GSP provides SGMA coverage for all Kern Subbasin lands that are included in the management areas of member agencies to the KGA (KGA 2020). Each KGA member agency has developed a Management Area Plan for its respective management area, all of which are attached to the KGA Umbrella GSP (KGA 2020). The Wheeler Ridge-Maricopa Management Area includes 91,430 acres and consists of the portion of the Kern Subbasin located within the Wheeler Ridge-Maricopa WSD service area, excluding an area of approximately 2,809 acres that is also within the West Kern Water District service area (Wheeler Ridge-Maricopa WSD 2019). The purpose of the Wheeler Ridge-Maricopa Management Area Plan is to, in conjunction with the KGA GSA and other GSAs in the Kern Subbasin, meet the regulatory requirements of SGMA by providing management of all portions of the Kern Subbasin under a GSP implemented by a designated GSA, in accordance with the timeline set forth by SGMA.

Table 1 below provides a summary overview of the water purveyors discussed above, as relevant to the proposed project site.

Table 1 Summary of Project Area Water Purveyors

Agency	Jurisdiction	Role
Kern County Water Agency (KCWA)	Kern County (all)	State Water Project (SWP) local contractor; holds long term contracts with 13 Member Units (local water districts) for SWP water deliveries; member agency of the KGA
Kern Groundwater Authority (KGA)	Kern Subbasin (all)	Joint Powers Authority of 16 member agencies, including KCWA and Wheeler Ridge-Maricopa WSD, and umbrella GSA for the Kern Subbasin
Wheeler Ridge-Maricopa Water Supply District (WSD)	Wheeler Ridge-Maricopa Management Area (within Kern Subbasin)	GSA for the Wheeler Ridge-Maricopa Management Area of Kern Subbasin; Member Unit of the KCWA SWP contract; member agency of the KGA

The water purveyors and management plans introduced above are further detailed in this WSA as relevant to water supply and reliability for the proposed project; please see Section 2.2, *Water Supply Availability Conclusions*.

1.3 Project Description

The project would involve the construction and operation of a 70-megawatt (MW) utility-scale solar facility on approximately 492 acres, or approximately 95 percent, of the 520-acre site. The solar facility would consist of Photovoltaic (PV) modules and trackers, inverters and medium voltage transformers, Direct Current (DC) collection, onsite substation, battery storage, telecommunications, meteorological data collection, lighting signage, access roads, and gen-tie. The project will interconnect at the existing PG&E Lakeview Substation via a 0.5-mile generation-tie ("gen-tie") line that will enter through the northwest corner of the substation property. Under the proposed project, PV panels or modules would be installed on mounting frameworks across the five planned parcels that comprise the project site, to convert sunlight directly into electricity.

The solar array fields would be arranged in groups called "blocks," with an inverter station generally located centrally within each block. The project would also include an operations and maintenance (O&M) building, substations, energy storage systems (ESSs), and/or transmission facilities, as necessary. In addition to the five planned parcels within the project site, the project would establish a gen-tie corridor to deliver power from one or more on-site substations or switchyards at the project site to the existing electrical transmission grid. This corridor would route to the existing Pacific Gas and Electric (PG&E) Lakeview Substation via up to 230-kV overhead and/or underground electrical transmission lines. Alternatively, the project may transmit power to Kramer Substation located in San Bernardino via a transmission line in an Edwards Air Force Base utility corridor.

PV Module Configuration

The proposed Facility would utilize PV modules and trackers. Trackers optimize power production by ensuring proper panel orientation to the sun both daily and seasonally. The tracking systems are supported by metal posts (piles) that are driven into the ground with a pile driving machine. Affixed to the top of each pile is a pile cap and bearing assembly that supports and allows proper movement of the torque tube assembly. Tracking systems would be mounted on a single axis, which requires a drive system that provides directional force to the torque tube. This can be accomplished with a mechanical drive arm and tube assembly that “pushes and pulls” the torque arm through its range of motion or by a geared assembly that redirects rotational force to the tubes. Both approaches require a small-gear motor mounted on a pile support or pad.

The panels would be comprised of blue or black glass, with a plastic binding material and frame to provide structural rigidity. The PV panels would be self-contained, and designed to withstand exposure to the elements for a period of 35 years or longer; although a WSA is required to assess a 20-year projection of water supply availability, for the purposes of this WSA, and to address the full operational lifetime of the project, a 35-year projection of water supply availability is provided (please see Section 2.2, *Water Supply Availability Conclusions*). The final panel selection would be determined at the detailed project-engineering phase and will depend upon market availability. For the purposes of this WSA, it is assumed that regardless of final panel selection, they will require panel washing to remove dust and debris accumulated from the surfaces of the panels to maintain power generation efficiency (please see Section 1.4.2, *Operation and Maintenance*).

Multiple trackers would be deployed in proximity to power conditioning stations (PCS), where the DC produced by the panels would be converted to alternating current (AC) and transferred to the on-site substation for eventual delivery to the electrical grid. The number of trackers connected to each of the PCS' would vary with panel output relative to inverter size and desired output from the PCS.

The proposed project panels would be organized in rows in a uniform grid pattern, with each row separated by 10 to 20 feet between foundation posts. The proposed project's tracker system would include a wire management system to support and contain the DC wires used to collect the output of the panels and move output to the PCS'. The panel and tracker features allow for a natural light regime between and under the panels, supporting the co-management of solar energy generation with passive agriculture (such as grazing) and wildlife movement through the site.

Inverters and Medium Voltage Transformers

The proposed project would include an estimated 40 PCS' across the five planned parcels within the 492-acre development area, depending on final design details. Each PCS for the proposed project would be comprised of inverters, transformers, and other electrical equipment, which would be mounted on a concrete pad or piles, with a footprint of approximately 12 feet by 30 feet (360 square feet). The inverter at each PCS would convert the DC electricity to AC electricity, which then flows to a transformer where it is stepped up to the appropriate collection level voltage (34.5-kV).

Electrical Collection and Distribution System

The DC output of multiple rows of PV modules connected in series would be collected through one or more combiner boxes and associated electrical wiring located throughout the proposed project site. The power would be delivered via an underground cable network to the inverters in the electrical equipment enclosures at the respective PCS, as described above. Multiple transformers electrically connected in series would deliver AC power to the Project Substation.

Project Substation

The proposed project would include installation of an on-site substation referred to as the Project Substation, in the southeast corner of APN 295-130-78. The Project Substation would include transformers, breakers, switches, meters, and related equipment. Interconnection equipment, including the control house, would be installed aboveground and underground within the footprint of the substation. The overall footprint of the Project Substation is anticipated to be approximately 200 feet by 200 feet (40,000 square feet, or 0.92 acre) and approximately 100 feet in height at its apex. The Project Substation would include an emergency generator for use in the event that the regional transmission system fails; this emergency generator would provide emergency power until the regional transmission system restores operations. The Project Substation would also contain a control house building approximately 15 by 40 feet (600 square feet) with a maximum height of less than 20 feet. The Project Substation would be surrounded by a seven-foot barbed wire chain-link fence.

The Project Substation must have access to communication systems in the area, for compliance with monitoring and control requirements of the Federal Energy Regulatory Commission (FERC) and California Independent System Operator (CAISO). Compliance may be accomplished by underground lines, aboveground lines, or wireless communication.

In addition to the Project Substation, which would be installed within the proposed project site, PG&E's existing Lakeview Substation would also require modifications to accommodate the proposed project gen-tie connection. Additional electrical equipment, including Direct Transfer Trip equipment, Supervisory Control Data Acquisition and telemetry equipment, and breaker and control switching equipment, would be placed within the existing fenced area at the Lakeview Substation.

Telecommunications

The proposed project would require redundant telecommunication connections. The primary telecommunication line would consist of fiber optic cable and/or copper telecommunication line, installed above and/or below ground, attached to either existing utility lines located outside of the project site, or the new gen-tie that would be installed as part of the project. The telecommunication route would use a combination of existing poles, new poles, and/or below ground installations between the point of connection to existing telecommunications infrastructure and PG&E's existing Lakeview Substation. Lines would be placed within utility franchise easements to the extent feasible. The point of interconnection to the existing telecommunication facilities would be within a small shelter.

The interconnection utility service would consist of fiber stranded cables (Dielectric Self Supporting and Optical Ground Wire) coming into the proposed Project Substation and the existing Lakeview Substation as part of the standard substation design criteria. Below-ground installations are usually installed 24 to 48 inches below grade. Above-ground lines are typically placed below existing distribution lines or on new, adjacent wooden poles. Telecommunication lines may also be attached to the new gen-tie line. A secondary (backup) internet connection would be provided using a similar method for redundant paths. The project site would also have internal telecommunications expected to be provided by the local provider in the area.

Meteorological Data Collection System

The proposed project would require up to four meteorological data collection systems. The systems, which would be mounted at various locations throughout the project site, would include a variety of instruments to collect meteorological data. Meteorological data would be collected at the maximum height of the solar panels or approximately 15 feet above the ground.

Battery Storage Component

The proposed project may include the installation of a Battery Energy Storage System (BESS) component. Storage components are desirable for renewable energy projects because they allow energy to be reliably fed to the grid from an otherwise intermittent energy production source. The BESS would consist of commercially available lithium ion batteries housed in enclosures, each with a footprint of approximately eight feet wide by 40 feet long (320 square feet) and a height of approximately 9.5 feet. The BESS component would have a footprint of approximately one acre and would be immediately adjacent to the Project Substation. Site preparation required for the BESS enclosures requires leveling the area for a flat concrete foundation.

The proposed lithium-ion batteries would principally comply with the UL 9450 standard for outdoor energy storage enclosures. The project will be subject to compliance with existing federal, state, and local regulations for health and safety, including the 2016 California Fire Code. The selected BESS provider(s) would comply with the application-specific codes, standards, and regulations for the siting, construction, and operation of lithium-ion stationary BESS. The proposed project would include current best practices for fire safety. The BESS would contain a safety system as required by NFPA 855 and tested under the UL 9540A *Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems*. The enclosure wall is designed to contain the fire and prevent propagation.

Lighting and Signage

The proposed project would include installation of on-site lighting to allow for ongoing maintenance and security. Low-level lighting may be installed at the entry gates, Project Substation, inverter pads, and O&M Building. Any lighting situated outside of the Project Substation would be downward facing, shielded or otherwise modified to minimize emission of light or glare beyond the property line, or upward into the sky.

The proposed project would include installation of signage on the fence in the vicinity of the main entry gates. This signage would identify the Project owner, operator, and emergency contacts, and would include safety and security information for the project site. In addition, small-scale signage would be posted at the main entry gates and intermittently along the perimeter fencing on exterior parcel boundaries, to indicate “No Trespassing” and “Private Property” for security and safety purposes.

Generation-Tie Line

The 70 kV gen-tie would extend to the west from the Project Substation, and continue for approximately 0.60 mile, to interconnect the Project Substation to the existing PG&E Lakeview Substation. The gen-tie right-of way would have a width of 25 to 75 feet, within which approximately 25 new poles would be installed to accommodate the gen-tie. The new poles would be constructed of either steel or wood at a maximum of 125 feet tall.

Access Roads

Access to the proposed project site would occur via Copus Rd and Old River Rd, which are adjacent to the project site and the gen-tie corridor. Interior access within the solar array development area would occur via maintenance and perimeter roads with width of up to 20 feet. The access points and interior driveways would be constructed in accordance with Kern County and California Department of Forestry and Fire Protection (CalFire) requirements and maintained to facilitate on-site circulation for emergency vehicles during all weather conditions.

1.4 Water Demands

The proposed project would require a temporary water supply during each of the assumed 12-month primary construction and decommissioning phases, and a long-term water supply during the 35-year operational period. Water demands of the proposed project are summarized in Table 2 below.

Table 2 Project Water Demands

Project Phase (Duration of Phase)	Annual Demand (acre-feet/year)	Total Demand (acre-feet)
Construction (1 year)¹		
Dust Suppression	150	150
Total Construction	150	150
Operation and Maintenance (35 years)²		
Panel Washing ³	3.5	122.5
Water Treatment Brine ⁴	3.5	122.5
Fire Suppression ⁵	2.95	103.25
O&M Building ⁶	0.11	3.85
Total O&M	10.01	350.35
Decommissioning (1 year)⁷		
Dust Suppression	150	150
Total Decommissioning	150	150
Total Demand	-	650.35
Amortized Demand⁸	17.58	

¹ The construction period is assumed to be 12 months, during which time the project's full construction water demand of 150 acre-feet would occur; the total construction-period water demand is assumed to be 150 acre-feet regardless of the duration of construction, such that a longer construction period would result in a lower monthly construction demand. Water demand during the additional four months necessary to finish upgrades to the substation is assumed to be negligible and, if needed, is assumed to be available from the estimated operational supply.

² The O&M period is assumed to be 35 years, which is 15 years longer than the 20-year projection required by California Water Code (as amended by SB 610) to be considered in a WSA. However, for the purposes of full disclosure and to provide a conservative analysis, this table presents all anticipated water demands of the project over the entirety of its anticipated operational lifespan of 35 years. During the O&M period, the activities requiring water supply would include washing the solar panels (including accounting for the water in the brine waste stream produced from water treatment), for emergency fire suppression water, and for uses in the O&M building.

³ This analysis assumes that solar PV panel washing requires approximately 0.05 AFY of water per MW of the project (SNL 2013). The project is designed to produce up to 70 MW; therefore, water demands for solar panel washing would be approximately 3.5 AFY. Please see Section 1.4.2.

⁴ Water treatment brine consists of the waste product from the project's assumed water treatment system. This analysis conservatively assumes the recovery rate of the water treatment system will be approximately 50 percent, meaning that for every gallon of clean water produced, one gallon of waste product (concentrated brine) would be produced, such that two gallons of raw water are required to produce one gallon of treated water (and one gallon of water treatment brine). This is likely an over-estimation; please see Section 1.4.2.

⁵ This analysis assumes that approximately 2.95 acre-feet of water would be stored on-site and designated for emergency fire suppression use only. In addition, this analysis conservatively assumes that the fire suppression water would be entirely replenished each year; this is likely an over-estimation, as emergency fire suppression activities are unlikely to occur on an annual basis.

⁶ This analysis assumes the project would include one O&M building encompassing approximately 2,000 square feet, and further assumes that an adjusted water demand factor for commercial land uses of approximately 2,000 gallons per day per acre, or 0.046 gallons per day per square foot (Hesperia 2008) is appropriate for the project's O&M building. Please see Section 1.4.2.

⁷ Decommissioning activities for the proposed project are not specifically known at this time; therefore, in order to provide a conservative analysis that accounts for all project phases, this analysis assumes that the project's decommissioning period would be the same as the project's primary construction period, in terms of duration (12 months, not counting substation upgrades) and water demand for dust suppression (150 acre-feet).

⁸ The amortized demand of 17.58 AFY is the project's total estimated water demand (650.35 acre-feet) averaged over the cumulative duration of all project phases (37 years, accounting for one year each of construction and decommissioning, and 35 years of operation and maintenance).

AFY = acre-feet per year

The water demand estimates summarized above and detailed in the following sections are used to analyze the availability and reliability of water supply for the proposed project over the WSA's required

20-year projection, as well as the project's anticipated operational lifespan of 35 years. Please see Section 2.2, *Water Supply Availability Conclusions*, for detailed discussion of the project's total water demands compared to the anticipated water supply availability and reliability.

1.4.1 Construction

Construction of the proposed project is anticipated to occur over approximately 16 months, initiating in 2023 with the facility placed into service by end of 2023 and final close out items completed in 2024. Construction activities would include site preparation and grading; installation of tracker foundations and underground cabling; installation of the Project Substation, project facilities, and electrical components; and implementation of upgrades at the PG&E Lakeview Substation. Primary construction activities would take place during the first 12 months of construction; upgrades to the PG&E Substation would overlap with the other phases and are expected to take up to 16 months. Water requirements during construction would primarily be associated with dust suppression and soil compaction during ground-disturbing activities which would only occur during the initial 12-month period of construction. Active construction areas would be watered at a frequency to be determined by the type of activity, site-specific soil conditions, and wind conditions. Stockpiled soils would also be watered or stabilized with other approved substances. Non-potable water may also be required to establish vegetation or earth-binding materials to disturbed areas upon completion of the construction period. Potable water for drinking and similar needs during construction would be trucked in from off-site (e.g., bottled water).

The project applicant has identified construction water demands of up to 150 AFY, which equates to 12.5 acre-feet per month over the project's anticipated active 12-month construction period. The final 4 months of upgrades to the PG&E Substation would have a negligible water demand which is assumed to be available from the operational water demand. The water supply during construction would be obtained from existing groundwater well(s) on the project site, or it would be purchased for a local water purveyor and trucked to the project site, where it would be stored on-site for use as needed. As described in Section 1.2, *Project Location*, the proposed project site is located within the Kern Subbasin of the San Joaquin Valley Groundwater Basin; this area is within the service area of the Wheeler Ridge-Maricopa WSD, which is also a Member Unit of the KCWA for delivery of imported SWP water, as well as a member agency of the KGA, for participation in the KGA Umbrella GSP for the Kern Subbasin. As such, the water supply provided by Wheeler Ridge-Maricopa WSD consists of both imported SWP water and locally produced groundwater resources.

1.4.2 Operation and Maintenance

The operational lifetime of the proposed project is anticipated to be 35 years. Therefore, although a WSA is required to assess a 20-year projection, for the purposes of this WSA, a 35-year projection is assessed, to account for the anticipated operational lifespan of the project.

The project would operate continuously, seven days a week, until the anticipated repowering or decommissioning of the project. Operation of the proposed project would include cleaning the PV panels with water, monitoring electricity generation, providing site security, and replacing or repairing facilities and components as needed to support operations. Other O&M activities include erosion control maintenance, restoration of vegetative cover, and vegetation maintenance such as mowing, grazing, and weed control with herbicide spraying or mechanical removal.

The project applicant has estimated that operational water demands of the project would be approximately 0.5 AFY. The water demands of a given project are dependent upon the specific components, activities, and requirements of each project, and vary from project to project. In order to provide a conservative analysis for the purposes of this WSA, operational water demands for the proposed project have been estimated in excess of the applicant's estimated 0.5 AFY, as detailed below. The assumptions developed for the proposed project are based upon experience assessing other utility-scale solar developments, and all assumptions used to inform these estimates are also detailed below. As mentioned, the purpose of expanding the estimation of operational water demands is to provide a conservative analysis of water supply availability and reliability to the project.

Panel Washing

Water demands during operation would primarily be associated with panel washing activities, as the PV panels would need to be washed with water to remove dust and maintain efficiency. The frequency of panel washing activities would depend upon site-specific conditions, particularly wind and rain. The solar PV panel washing analysis relies on an assumed water demand rate of 0.05 acre-feet of water per year per MW, based on other utility-scale solar PV projects in California deserts (Sandia National Laboratories 2013). The proposed project is designed to generate 70 MW of power, which corresponds to a water demand of 3.5 AFY for panel washing ($70 \text{ MW} \times 0.05 \text{ AFY/MW} = 3.5 \text{ AFY}$).

In addition, it is important that water used for panel washing is low in concentration of total dissolved solids (TDS), because water with high TDS concentrations, when applied to solar PV panels, may result in the TDS constituents clinging to the surfaces of the panels and impeding operational efficiency. It is common for groundwater in areas where agricultural land uses are present to be high in TDS concentrations, due to nutrients in the soils infiltrating to the underlying groundwater resources with the application of irrigation water. The proposed project area has historically been used for agricultural purposes, which continue to occur across the project site. Therefore, it is assumed that locally produced groundwater would require water quality treatment prior to use for washing the project solar panels.

Water Quality Treatment

For the purposes of this analysis, it is assumed that the project will use a combined reverse osmosis (RO) and deionization (DI) system to treat water for panel washing, and that the RO/DI system would be installed within the project's 492-acre development area. Water quality treatment to reduce TDS produces concentrated brine that will need to be disposed of; therefore, total O&M water requirements for the project account for brine / wastewater that would be produced during water treatment. Industrial RO systems typically run between 50 and 85 percent recovery, depending on the feed water characteristics and other design considerations (PureTec Industrial Water 2019). Recovery is the amount of water permeated per unit time, typically measured in gallons per minute (gpm) and expressed as a percentage of the source water flow rate. In other words, an 85 percent recovery rate means that 85 percent of the amount of water fed into a system is produced as treated water, and 15 percent is produced as concentrate for disposal. Source water that has higher concentrations of water quality constituents results in lower recovery rates from a RO/DI system.

In addition, based on the conservatively assumed 50 percent recovery rate for the project's water quality treatment system, an additional 3.5 AFY would be required to account for the brine stream produced as a byproduct of the RO/DI water quality treatment system. As such, the project's combined water demand for panel washing and water quality treatment to lower TDS concentrations in the wash water would be approximately seven AFY. The wastewater / brine would be collected and disposed of off-site, at an approved waste disposal site.

Fire Suppression

Combustible vegetation or agricultural products on and around the proposed project site would be actively managed during all project phases to minimize fire risk. Combustible products would be either limited in height or removed primarily through a combination of dirt or gravel firebreaks, grazing, and mowing. In addition, a Vegetation Management Plan would be implemented during operations to guide the use of tools such as grazing and mowing to help manage accumulation of potential fire fuels around project infrastructure. The proposed project would also include fire breaks around the site boundary in the form of compacted dirt or gravel breaks and access driveways subject to Kern County standards. In addition, it is anticipated that water for emergency fire suppression would be stored on-site during all project phases, for use as needed.

Kern County Development Standards, Division 2, *Water Systems*, Chapter V, *Fire Protection Requirements*, states that fire flow requirements shall be determined by the Fire Chief and computed on the basis of a minimum 20 pounds per square in gauge (PSIG) residual operating pressure at the point of lowest pressure of the street main from which the flow is measured. Chapter V, Section 205-3.01, *Water Supplies for Fire Protection*, further specifies in Table No. 1-W, *Fire Flow Requirements*, that minimum fire flow for an industrial site is 1,500 gallons per minute (gpm) for a minimum of four hours. This equates to 90,000 gallons per hour, for 360,000 gallons over four hours, which totals approximately 2.95 acre-feet.

For the purposes of this WSA, and to provide a conservative analysis of proposed project water demands, it is assumed that fire suppression water would be stored in on-site tanks, rather than connecting to an in-street water main. It is also assumed that the project's entire storage of fire suppression water (2.95 acre-feet) would be replaced annually; this is likely an over-estimation, but it provides a conservative analysis for the characterization of the proposed project water demands.

O&M Building

For the purposes of this WSA, it is assumed that the proposed project would include an operations and maintenance (O&M) building, which is assumed to include an office space, repair and storage area, control room, and restroom facilities. Roads, driveways, and parking lot entrances would be constructed in accordance with County standards and California Accessibility Regulations. Based on the size of similar buildings at other utility-scale solar installations, the O&M building is estimated to cover approximately 2,000 square feet and require approximately 0.11 AFY.

1.4.3 Decommissioning or Repowering

The operational lifetime of the proposed project is anticipated to be 35 years. Therefore, although a WSA is required to assess water supply availability for a 20-year projection, this WSA addresses a 37-year projection, which includes one year of construction, 35 years of O&M, and one year of decommissioning or repowering. Due to this length of time, it is highly speculative to assume what the water demands at the time of decommissioning or repowering will be. In order to address this issue, it is assumed that water demands for decommissioning or repowering will be the same in duration (12 months) and intensity (150 acre-feet) as the active construction period; the additional 4 months for substation upgrades and completion of project close out items in the initial construction time estimate is not assumed to have a corresponding time or water demand during decommissioning or repowering.

2 Background

This section provides an assessment of water supply availability and reliability for the proposed project, as required by SB 610, which amended California Water Code to require detailed analysis of water supply availability for certain types of development projects. The primary purpose of SB 610 is to improve the linkage between water and land use planning by ensuring greater communication between water providers and local planning agencies, and guaranteeing land use decisions for certain large development projects are fully informed as to whether sufficient water supplies are available to meet project demands. SB 610 requires the preparation of a WSA for a project that is subject to CEQA and meets certain requirements, each of which is discussed below.

California Water Code, as amended by SB 610, requires a WSA address the following questions:

- Is there a public water system that will service the proposed project?
- Is there a current Urban Water Management Plan (UWMP) that accounts for the project demand?
- Is groundwater a component of the supplies for the project?
- Are there sufficient supplies to serve the project over the next twenty years?

The following discussions address the SB 610 WSA questions as they relate to the project.

The primary question to be answered in a WSA, informed by responses to the questions below, is:

Will the total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection meet the projected water demand of the proposed project, in addition to existing and planned future uses of the identified water supplies, including agricultural and manufacturing uses?

Is the proposed project subject to CEQA?

California Water Code Section 10910(a) states any city or county that determines a project, as defined in Section 10912, is subject to CEQA must prepare a WSA. Projects requiring an issuance of a discretionary permit by a public agency, projects undertaken by a public agency, and projects funded by a public agency are subject to CEQA. The project requires issuance of discretionary permits from Kern County and is therefore subject to CEQA.

Is the Proposed Project a “Project” Under SB 610?

California Water Code, as amended by SB 610, states any proposed action that meets the definition of “project” under SB 610 is required to prepare a WSA to demonstrate whether sufficient water supplies are available to meet requirements of the project under normal and drought conditions. Water Code Section 10912 defines a “project” as any one of six different development types with certain water use requirements. Each development type and associated water requirements is addressed below.

RESIDENTIAL DEVELOPMENT

A proposed residential development of more than 500 dwelling units is defined as a “project” under SB 610. The project is not a residential development.

SHOPPING CENTER OR BUSINESS ESTABLISHMENT

A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space is defined as a “project” under SB 610. The project is not a shopping center or business establishment.

COMMERCIAL OFFICE BUILDING

A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space is defined as a “project” under SB 610. The project is not a commercial office building.

HOTEL OR MOTEL

A proposed hotel or motel, or both, having more than 500 rooms is defined as a “project” under SB 610. The project is not a hotel or motel.

INDUSTRIAL, MANUFACTURING, OR PROCESSING PLANT OR INDUSTRIAL PARK

A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area is defined as a “project” under SB 610.

The project is not a manufacturing plant, processing plant, or industrial park. However, it is an industrial facility occupying more than 40 acres and therefore this analysis conservatively determined the project to be considered a “project” under Water Code Section 10912. Therefore, this WSA has been prepared to satisfy the requirements of SB 610.

Is There a Public Water System that Will Serve the Proposed Project?

California Water Code Section 10912 defines a “public water system” as a system that has 3,000 or more service connections and provides piped water to the public for human consumption. The project would source water from an on- or off-site groundwater well in the Kern Subbasin of the San Joaquin Valley Groundwater Basin, or through a purchase from the Wheeler Ridge-Maricopa WSD, which would also provide groundwater from the Kern Subbasin, either directly as raw groundwater, or indirectly as water available in a banking or exchange program. The Wheeler Ridge-Maricopa WSD is not a public water system; this WSA assumes the project would not be served by a public water system.

Is There a Current UWMP that Accounts for the Project Demand?

California’s urban water suppliers prepare UWMPs to support long-term resource planning and ensure adequate water supplies. Every urban water supplier that either delivers more than 3,000 AFY of water annually or serves more than 3,000 connections is required to assess the reliability of its water sources over a 20-year period under normal-, single-dry, and multiple-dry year scenarios. These are the same requirements of a WSA, as specified by SB 610. UWMPs must be updated and submitted to DWR every five years for review and approval (DWR 2020). There is not currently an UWMP that accounts for the proposed project. However, there are numerous water supply management plans in place, as discussed throughout this WSA, and particularly in Section 2.1.1, *Groundwater Management*.

Is Groundwater a Component of the Supplies for the Project?

The project’s water demands may be met in part or in full by groundwater produced from the underlying Kern Subbasin of the San Joaquin Valley Groundwater Basin. The local groundwater

resources are introduced above in Section 1.2.1, *Groundwater Resources*, and management of local groundwater resources is discussed in Section 2.1.1, *Groundwater Management*.

Are There Sufficient Supplies to Serve the Project Over the Next Twenty Years?

The sufficiency of water supplies identified as potential sources to serve the project is assessed in the following sections. Groundwater resources in the project area are described in Section 1.2.1, *Groundwater Resources*, surface water resources are described in Section 1.2.2, *Surface Water Features*, and Section 1.2.3, *Water Purveyors*. Water supply reliability is discussed in Section 2.1.1, *Groundwater Management*, and in Section 2.1.2, *Water Supply Reliability*.

The information and analysis provided in this WSA support the conclusion that there are sufficient water supplies available in the project area to meet the needs of the project over the next 20 years (the assessment period required per SB 610 for a WSA). Conclusions associated with the sufficiency of available water supplies are discussed in Section 2.2, *Water Supply Availability Conclusions*.

2.1 Overview of Water Supply

The information and analysis provided herein constitutes a WSA consistent with the requirements of California Water Code as amended by SB 610. It is assumed that water supply for the proposed project would be produced from an on- or off-site groundwater well in the Kern Subbasin, and/or it would be purchased from the Wheeler Ridge-Mariposa WSD. Therefore, the following sections describe the management of groundwater within the Kern Subbasin in order to characterize the reliability of local groundwater as a potential supply source for the proposed project.

2.1.1 Groundwater Management

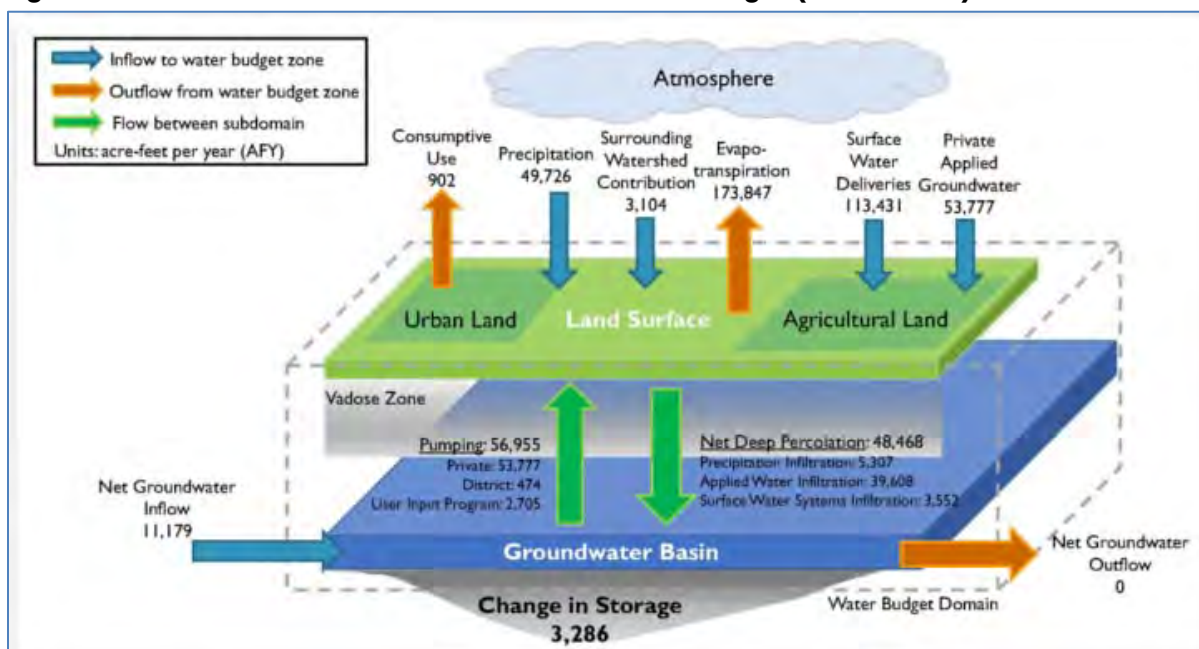
To facilitate the implementation of the KGA Umbrella GSP, KGA's jurisdictional area is divided into management areas formed by the portion of the Subbasin that underlies the boundaries of each member agency and any associated non-districted lands (KGA 2020). Each member agency of KGA has developed its own management area plan to support the development of the KGA Umbrella GSP. The proposed project site is within the Wheeler Ridge-Maricopa WSD Management Area.

For the Kern Subbasin as a whole, the GSAs have coordinated on two basin-wide water budget approaches which are described in the KGA Umbrella GSP (KGA 2020) and include:

- 1) Development of a numerical model based on the California Central Valley Groundwater / Surface Water Simulation Model (C2VSim) to estimate the basin-wide water budget; and
- 2) Development of a "checkbook" water accounting approach that estimates the supply, demand, and shortages within the Kern Subbasin using certain management assumptions.

In addition to the above approaches, local agencies including the Wheeler Ridge-Maricopa WSD prepared water budgets on a local management area-basis, using a third, spreadsheet-based model that was calibrated by data from the respective management areas, to reflect observed water level and storage changes (Wheeler Ridge-Maricopa WSD 2019). The water budget developed for the Wheeler Ridge-Maricopa WSD Management Area is illustrated below, in Figure 5. As shown, the historical change in groundwater stored in this management area was calculated to be an increase of 3,286 acre-feet over the historic period from 1995 through 2014, which equates to an additional 173 acre-feet of groundwater added to this management area each year.

Figure 5 Kern Subbasin Illustrated Historical Water Budget (1995 – 2014)



Source: Wheeler Ridge-Maricopa GSA 2019

In addition to the historic water budget, which determined a gain in the storage of 3,286 acre-feet between 1995 and 2014, future water budget conditions were also developed using the locally calibrated model, and informed by DWR-provided inputs for climate variables and water supply assumptions including changes to imported SWP water supply deliveries (Wheeler Ridge-Maricopa GSA 2019). The future water budget projections addressed the 50 years between 2021 and 2070, and included consideration to the effects of climate change, as well as the effects of implementation of groundwater supply management projects and programs, referred to as “Projects and Management Actions” (P/MAs). Table 3, below, provides an overview of P/MA efforts that have been developed for groundwater supply management in the Kern Subbasin. These P/MAs were developed to address two specific indicators of basin health, as defined by SGMA, including Chronic Lowering of Groundwater, and Reduction of Groundwater Storage Sustainability. Within these categories, the P/MAs are further classified into five types of activity, according to the mechanism by which the primary benefit of the respective P/MA would be achieved.

Table 3 Wheeler Ridge-Maricopa WSD – Kern Subbasin Management Area P/MAs

Project Title	Implementation Status	Description	Anticipated Benefits
Projects to Enhance Recharge / Banking			
On-Farm Recharge	Not yet initiated; to be implemented upon adoption of WRMWSD GSP Chapter (2020)	Study and implement on-farm recharge where viable	~2,000 AFY (10,000 acre-feet every five years)
In-District Banking Facilities	Not yet initiated; to be implemented upon adoption of WRMWSD GSP Chapter (2020)	Program to promote private and/or District-owned banking facilities within the District.	~2,000 AFY (10,000 acre-feet every five years); ~2.5 AFY per acre of land converted to basins

Project Title	Implementation Status	Description	Anticipated Benefits
Increase Out-of-District Banking Operations	Not yet initiated; to be implemented upon adoption of WRMWSD GSP Chapter (2020)	Increase size/participation in out-of-District banking facilities (i.e., Kern Water Bank and Pioneer Project). Increased banking of wet year supplies outside the District would support deliveries of imported water into the District in normal/dry years	TBD; depends on recharge basin area
Projects to Increase Water Management Flexibility			
Expand District Distribution System	Not yet initiated; TBD	Project to expand District distribution system into area currently using only private groundwater	~2,000 AFY
Projects to Develop New Supplies			
Purchase Additional Supplies	Ongoing	Continue purchase of additional supplies, as available, for banking outside of the District or direct delivery within the District	5,000 AFY
Desalination Facilities	Not yet initiated; TBD	Desalination facilities to allow for use of additional poor-quality groundwater for agricultural use, easing demand on principal aquifer	No net supply augmentation, but minimizes local groundwater pumping impacts
“Thru Delta” Facility	State-led effort underway	Participation of some sort of “Thru Delta” Facility to increase access to contracted (SWP) supplies	Up to 25,000 AFY
Management Actions / Policies to Reduce Overall Water Demand			
Acreage Assessment	Not yet initiated; to be implemented upon adoption of WRMWSD GSP Chapter (2020)	Set policy to implement an acreage assessment to fund purchase of additional supplies, purchase of land for fallowing, and other investments to support SGMA compliance	
Management Actions / Policies to Reduce Groundwater Pumping			
Groundwater Allocation and Market	Not yet initiated; to be implemented upon adoption of WRMWSD GSP Chapter (2020)	Develop a groundwater pumping allocation methodology, including a market system for trading and/or transferring of allocations	
Voluntary Pumping Limitations	Not yet initiated; to be implemented upon adoption of WRMWSD GSP Chapter (2020)	Set non-binding pumping limitations in conjunction with a fee for pumping above limits	Up to 21,000 AFY
Mandatory Pumping Limitations	Not yet initiated; anticipated initiation in 2030	Set binding pumping limitations in conjunction with a fee for pumping above limits	Up to 21,000 AFY
Land Retirement	Not yet initiated; anticipated initiation in 2035	Purchase and permanently fallow previously irrigated acreage within District to reduce overall water demand and groundwater extractions	Up to 21,000 AFY
Source: Wheeler Ridge-Maricopa WSD 2019 (Table PMA [Projects and Management Areas]-1)			

The P/MAs developed for Kern Subbasin, as presented above, largely incorporate conjunctive use management, which is the combined management of surface water and groundwater resources. Conjunctive use programs have been developed to capture and transport surface water during wet years for use in recharging the local groundwater and offset use of groundwater pumping. Projects such as interties, pipelines, and recharge basins have been developed and implemented throughout the Kern Subbasin to deliver, bank, and return surface water, as well as replenish aquifers to better prepare for and manage during times of dry periods when beneficial users are more reliant on groundwater (KGA 2020). The timing and design of P/MAs will be determined by the Wheeler Ridge-Maricopa WSD, based upon observed conditions of groundwater storage in comparison to the projected conditions; the type and timing of P/MA implementation will be adjusted in response to observed conditions, as needed to facilitate the achievement of sustainability goals within the management area.

The Wheeler Ridge-Maricopa WSD's sustainability goal for its management area of the Kern Subbasin is to eliminate the supply deficit currently projected to occur in 2070, which is shown below in Table 4, by 2040. The WSD intends to achieve this sustainability goal through the implementation of P/MAs identified above in Table 3. As shown in Table 3, the current status of most P/MAs is "not yet initiated"; this is because the P/MAs being implemented at any given time are subject to change depending upon observed conditions within the management area, and are adjusted as needed in response to observed conditions, to best facilitate achievement of the WSD's sustainability goal of eliminating the projected 2070 supply deficit by 2040. This projected supply deficit was identified through the Wheeler Ridge-Maricopa WSD's development of a series of water budget scenarios, using the same locally calibrated model that was used to create the historic water budget illustrated in Figure 5.

The modeled water budget scenarios included current and future "baseline" conditions, or conditions without any P/MA implementation, as well as scenarios that included consideration to the effects of climate change, and the supply benefits associated with implementation of the P/MAs. The model results are shown below in Table 4, which presents the locally calibrated model data in the center column. As mentioned, the locally calibrated model is considered the most accurate for assessment of supply within the WSD management area, because it is informed by locally observed conditions; the other modelling approaches shown in the first and last columns were undertaken by KGA to assess the Kern Subbasin as a whole.

Table 4 Comparison of Change in Storage Estimates (AFY) from Three Water Budget Estimation Methods

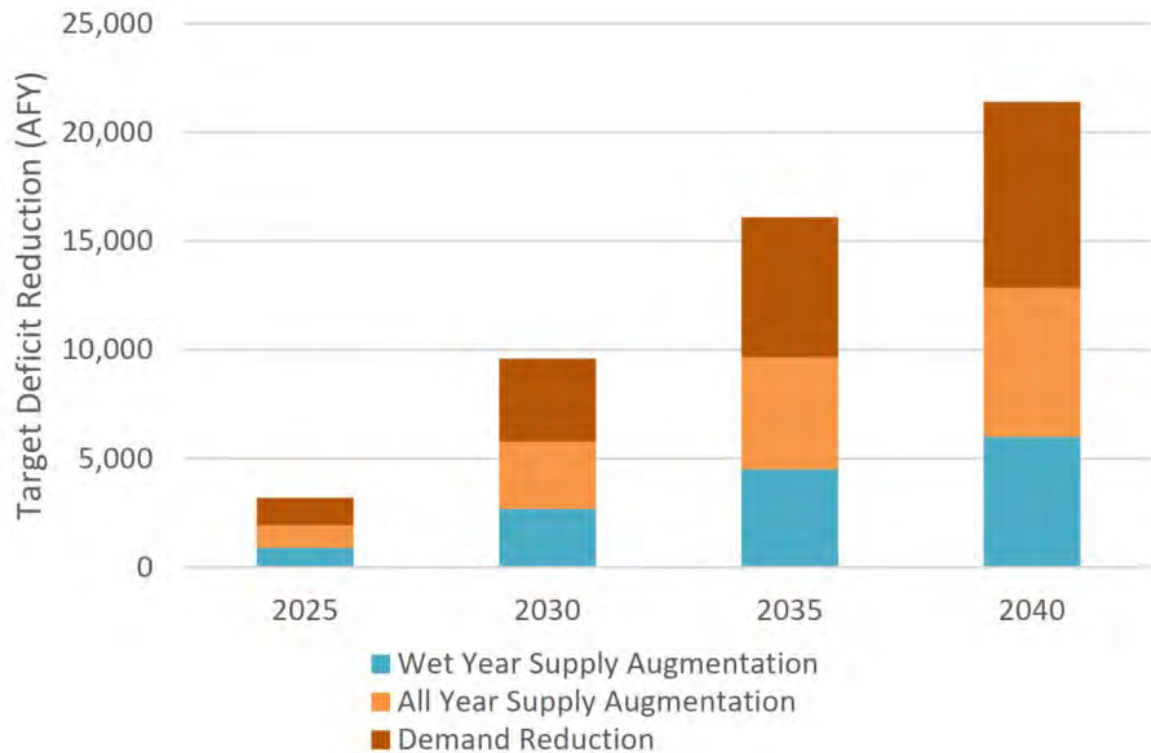
Period / Scenario	Basin-wide Numerical Model	Local Analytical Spreadsheet Model	Basin-wide "Checkbook" Water Accounting Approach
Historical Period (WY 1995 – 2014)	-8,654	3,286	Not Applicable
Current Period (WY 2015)	-45,191	-42,898	Not Applicable
Projected Period (50 years; 2021 – 2070) Baseline with no Projects	-5,423	-14,665	-14,665
Projected Period (50 years; 2021 – 2070) 2030 Climate Change <u>with no Projects</u>	-9,712	-21,429	Not Applicable
Projected Period (50 years; 2021 – 2070) 2030 Climate Change <u>with Projects</u>	9,780	53	Not Applicable
Projected Period (50 years; 2021 – 2070) 2070 Climate Change <u>with no Projects</u>	-17,952	-33,326	Not Applicable
Projected Period (50 years; 2021 – 2070) 2070 Climate Change <u>with Projects</u>	1,571	47	Not Applicable

Source: Wheeler Ridge-Maricopa WSD 2019

As shown in Table 4, under current (baseline) conditions with no P/MAs implemented, the Wheeler Ridge-Maricopa WSD Management Area will experience a supply deficit of 14,665 acre-feet by 2070, which increases to 21,429 acre-feet when accounting for the adverse effects of climate change on groundwater supply. This is the aforementioned 2070 supply deficit that will be addressed by the WSD's sustainability goal of eliminating the projected deficit by 2040 through the implementation of P/MAs. Table 4 also indicates that the implementation of P/MAs in this management area would result in a positive water balance of 53 acre-feet in 2030, and 47 acre-feet in 2070 (Wheeler Ridge-Maricopa WSD 2019).

As mentioned, the specific P/MAs to be implemented during any given year are referred to as the "glide path", and are adjusted as needed depending on local observed conditions. Through implementation of P/MAs over the glide path timeline, the projected supply deficit would be eliminated by 2040; as such, the glide path spells out the general schedule for when expected benefits from P/MAs will accrue between 2020 and 2040. Figure 6, below, illustrates the anticipated composition of the glide path P/MAs through 2040, when the sustainability goal of eliminating the 2070 supply gap will be achieved.

Figure 6 Project & Management Action Implementation Glide Path



Source: Wheeler Ridge-Mariposa WSD 2019

The P/MA glide path groups shown in Figure 6 are comprised of specific P/MAs from Table 3, as follows:

- “Wet Year Supply Augmentation” includes:
 - On-Farm Recharge (~2,000 AFY)
 - In-District Banking Facilities (~2,000 AFY)
- “All Year Supply Augmentation” includes:
 - Purchase Additional Supplies (5,000 AFY)
 - Desalination Facilities (n/a)
 - Thru Delta Facility (up to 25,000 AFY)
 - Expand District Distribution System (~2,000 AFY)
 - Acreage Assessment (n/a)
 - In-District Banking Facilities (~2.5 AFY per acre of land converted to basins)
- “Demand Reduction” includes:
 - Voluntary Pumping Limitations (up to 21,000 AFY)
 - Mandatory Pumping Limitations (up to 21,000 AFY)
 - Land Retirement (up to 21,000 AFY)
 - Groundwater Allocation and Market (n/a)

Based upon the P/MA glide path timeline shown in Figure 6, the Wheeler Ridge-Maricopa WSD Management Area will be in sustainable conditions by 2040, as indicated by elimination of the projected 2070 supply deficit through implementation of P/MAs.

2.1.2 Water Supply Reliability

The reliability of water supply within the Wheeler Ridge-Maricopa WSD Management Area is dependent upon the successful implementation of P/MAs, which may include any combination of the P/MAs identified in Table 3, and will be selected by the Wheeler Ridge-Maricopa WSD based upon observed conditions within the management area, toward the sustainability goal of eliminating the projected 2070 supply deficit by 2040. Several of the P/MAs identified in Table 3 rely on water supplies from outside the Wheeler Ridge-Maricopa WSD Management Area and rely on the availability of water during wet years to conduct managed recharge, banking inside and outside the WSD Management Area, and offset groundwater pumping. In addition, the volume of SWP supplies delivered to the WSD is anticipated to decrease under the 2030 Climate Change Scenario relative to the historical water budget shown in Figure 5 and the Baseline Scenario (Wheeler Ridge-Maricopa WSD 2019). The declining volume of SWP deliveries to the management area is the primary driver behind the projected 2070 supply deficit; this explains why the historic budget is positive while the current and future projected budgets trend towards overdraft, prior to the implementation of P/MAs to address reductions in imported SWP deliveries.

As discussed above in Section 2.1.1, *Groundwater Management*, through the implementation of P/MAs on the glide path shown in Figure 6, the WSD will achieve its sustainability goal despite the effects of climate change and decreasing SWP water deliveries. In addition, the WSD is an active participant in the various surface water transfer, exchange, and purchase markets in the Central Valley, and will continue working towards securing additional supply through those sources. The WSD is also participating in efforts to develop new surface water supplies that would provide more consistent and reliable sources to the management area, including the through support of the Sites Reservoir Project, and the Water Fix and Eco Restore Project (formerly the “Bay Delta Conservation Plan”; referred to in Table 3 as the “Thru Delta” Facility). (Wheeler Ridge-Maricopa WSD 2019)

Based upon the anticipated benefits of conjunctive use management and implementation of P/MAs selected based upon locally observed conditions, the Wheeler Ridge-Maricopa WSD Management Area of the Kern Subbasin is anticipated to be in a state of sustainable supply conditions by 2040. It is also anticipated that P/MAs will continue to be implemented within the management area after sustainable conditions are achieved, such that the management area will continue to be characterized by sustainable supply conditions. Therefore, this management area of the Kern Subbasin is anticipated to have reliability of the available supply, including with consideration to the effects of climate change, as well as reduced quantities of SWP water deliveries.

In addition, implementation of the proposed project would convert the existing land uses on the project site from agricultural to solar energy development, which is generally less water intensive; this land use conversion would support water supply reliability for the project, as the water supply and demand estimates reflected in the KGA Umbrella GSP as well as the Wheeler Ridge-Maricopa WSD Management Area Plan assume the project site is used for agriculture. According to the Water Association of Kern County (WAKC)’s agricultural mapping tool, the proposed project site is currently farmed for corn (WAKC 2021). Based on aerial imagery of the site and WAKC records (WAKC 2021), approximately one third of the site is not currently in production, while approximately two thirds of the site are actively used for corn crops; therefore, approximately 325 of the project’s 492 acres are currently irrigated for corn.

The water demands to irrigate corn depend on site-specific soil characteristics and design of the irrigation system. In general, growers typically use a seven- to 10-day irrigation schedule, during which time about four to six inches of water is applied to the surface (UC DANR [University of California Division of Agriculture and Natural Resources] 2021). For the purposes of this WSA, it is assumed that an average of approximately five inches (0.42 foot) of water is applied to the irrigated portions of the project site. Assuming that 325 acres of the site are currently irrigated, this equates to approximately 136.5 AFY of water ($325 \text{ acres} \times 0.42 \text{ foot/acre} = 136.5 \text{ acre-feet}$). This is a broad estimation, which assumes water would be consistently applied to the irrigated portions of the site throughout the year. In addition, corn crops typically mature within approximately 120 days, or three months; as such, if only one crop of corn is irrigated on the site each year, the associated water demand would be approximately one third of 136.5 acre-feet, or approximately 45.5 AFY. For comparison, the proposed project's operational water demands are conservatively estimated to be approximately 10 AFY, which increase to 17.58 AFY when amortized to include the 150-AFY construction and decommissioning water demands, respectively, as detailed in Table 2. Therefore, implementation of the proposed project could accelerate achievement of sustainable conditions in the basin, further improving water supply reliability for the project.

2.2 Water Supply Availability Conclusions

In accordance with California Water Code, as amended by SB 610, this WSA identifies and characterizes all known and potential water demands of the project, in comparison to the water supplies available to the project over a 20-year projection, with consideration to varying drought conditions and ongoing long-term supply management activities. The water supply considered for the purposes of this WSA is groundwater pumped from the Kern Subbasin of the San Joaquin Valley Groundwater Basin, and specifically the portion of the Kern Subbasin located within the management area of the Wheeler Ridge-Maricopa WSD. It is assumed that water for the project would be pumped from on- or off-site groundwater well(s) in the Kern Subbasin, or it would be purchased from the Wheeler Ridge-Maricopa WSD and transported to the project site. For the purposes of this WSA, it is also assumed that should the project's water supply be purchased from the WSD, it would be sourced by the WSD from the local Kern Subbasin, either directly through pumping the water, or indirectly through a banking or exchange program. However, considering that the project site is currently irrigated for agricultural uses, it is likely that a groundwater well is already present on-site and available for use under the project.

As discussed in Section 1.4, *Water Demands*, and detailed in Table 2, the proposed project's amortized annual water demand is 17.58 AFY; this is the project's total maximum water demand averaged over all phases of the project, accounting for 37 years to capture one year each for construction and decommissioning or repowering, and 35 years for operation and maintenance. During a normal O&M year for the project, water demands are conservatively estimated to be approximately 10 AFY, although the project applicant estimates that operational demands may be as low as 0.5 AFY. Operational water demands consist of water required for washing the solar panels, water for the treatment system which is assumed to be required to reduce TDS concentrations in the raw groundwater, water for emergency fire suppression that would be stored on-site for use as needed, and water for sanitary uses at the O&M building.

Long-term water supply availability projections provided in the KGA Umbrella GSP and the Wheeler Ridge-Maricopa WSD Management Area Plan were reviewed and assessed in comparison to the anticipated water demands of the project. As discussed in Section 2.1.1, *Groundwater Management*, and Section 2.1.2, *Water Supply Reliability*, the Kern Subbasin is currently projected to be affected by overdraft conditions due to decreasing SWP water deliveries, and the anticipated effects of climate

change. The P/MAs identified in Table 3 are designed to improve groundwater sustainability by increasing the amount of groundwater in storage and expanding existing conjunctive use programs. With implementation of P/MAs on the glide path timeline, including adjusting the specific timing and type of P/MAs selected based upon observed local conditions, the projected 2070 supply deficit will be eliminated by 2040. As discussed above, the supply availability projections that were used to identify this timeline for achieving sustainability assumed the project site is used for irrigated agriculture, which is the current use of the site. Because the proposed project would convert the site to solar energy development, it would also reduce the amount of water currently applied to the project site, thereby facilitating achievement of sustainable groundwater conditions.

In addition, the proposed project itself is consistent with some of the P/MAs identified to manage the basin towards a sustainable balance. For instance, the *Acreage Assessment* P/MA will set policy to implement an acreage assessment to fund purchase of land for fallowing, among other investments to support SGMA compliance; the proposed project, by nature of converting the project site from agriculture to solar development, would fallow the site of irrigated uses, which is the intent of this P/MA. Similarly, the *Land Retirement* P/MA would facilitate the purchase and permanent fallowing of previously irrigated acreage to reduce overall water demand and groundwater extractions; this would also be achieved under the proposed project, by removing existing irrigated agriculture from the site.

Based on the information and analysis provided herein, although the proposed project would occur while overdraft conditions are present in the Kern Subbasin, the project would not impede existing management efforts towards reaching a sustainable balance in the basin and would actually facilitate achievement of the WSD's sustainability goal by providing some of the same effects on groundwater supply as would be achieved through implementation of P/MAs. In addition, once the 2070 supply deficit is eliminated, which is anticipated to occur by 2040, the Kern Subbasin would be maintained in sustainable conditions through the continued implementation of P/MAs. Historic water budgets modeled for the Kern Subbasin indicate that there has previously been a net positive gain in supply of approximately 173 AFY (see Figure 5), which suggests that once the basin is in balance, it may experience an increasingly positive balance. Therefore, this WSA concludes that sufficient water supply is available to meet the project's maximum potential water demands over a 35-year operational lifespan, and that water supply is reliable under normal-year, single-dry-year, and multiple-dry-year conditions, which are reflected in the WSD's projections of the effects of climate change. Although regional water shortages may occur during the project's lifetime, such conditions are projected to occur regardless of the proposed project and are accounted for in the KGA Umbrella GSP as well as the Wheeler Ridge-Maricopa WSD Management Area Plan.

2.3 Regulatory Setting

Federal

Clean Water Act

The federal Clean Water Act (CWA) is the primary surface water protection legislation throughout the country. The CWA seeks to restore and maintain the chemical, physical, and biological integrity of surface waters, and to support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water." Point-source pollutant discharges and polluted runoff (nonpoint-sources) into Waters of the United States (WOTUS) are addressed. The CWA establishes water quality standards and creates a framework for issuing permits, monitoring discharges, and managing polluted runoff.

The Project Site is located approximately 1.8 miles southwest of New Rim Ditch, an irrigation canal, and located within Subwatershed HUC 12-180300031202, which contains Pleitito Creek, and approximately 5 miles from the termination of Tulucay Creek. It is unlikely the project would require CWA Section 401 and 404 permits for construction, operation, or decommissioning activities (as discussed under the relevant sections below), but if needed such permits would be issued by the Lahontan RWQCB and/or the USACE.

CLEAN WATER ACT SECTION 303(d)

Under Section 303(d) of the CWA, States are required to develop and update a list of water bodies under their jurisdiction which fail to meet water quality standards even after point sources of pollution have utilized the minimum levels of pollution control. These are referred to as '303(d) impaired' bodies. Jurisdictions must establish priority rankings for 303(d) impaired water bodies and develop action plans to improve water quality to minimum standards. The plans include the setting of Total Maximum Daily Loads (TMDLs) for the pollutants which are impairing the water bodies; these limits are stricter than the normal minimum standards in order to bring the impaired bodies into compliance over time.

There are no 303(d) listed bodies in the vicinity of the Project Site.

CLEAN WATER ACT SECTION 401

Under Section 401 of the CWA, the RWQCBs have regulatory authority over actions in WOTUS and/or the State of California through the issuance of water quality certifications, which are issued in conjunction with any federal permit (e.g., permits issued by the USACE under Section 404 of the CWA, described below). Section 401 of the CWA provides the SWRCB and the RWQCBs with the regulatory authority to waive, certify, or deny any proposed activity that could result in a discharge to surface waters of the State. To waive or certify an activity, these agencies must find that the proposed discharge would comply with State water quality standards, including those protecting beneficial uses and water quality. If these agencies deny the proposed activity, the federal permit cannot be issued. This water quality certification is generally required for projects requiring Section 404 authorization involving the discharge of dredged or fill material to wetlands or other WOTUS but may be required for other projects. While unlikely, any such request for certification (or waiver thereof) would need to be submitted to the Lahontan RWQCB.

CLEAN WATER ACT SECTION 402

Section 402 of the CWA regulates point-source discharges to surface waters and requires that all construction sites on an acre or greater of land, as well as municipal, industrial, and commercial facilities discharging wastewater or stormwater directly from a point source (e.g., pipe, ditch, or channel) into a surface water of the United States must obtain permission under the National Pollutant Discharge Elimination System (NPDES). All NPDES permits are written to ensure that the surface water receiving discharges will achieve specified water quality standards.

The SWRCB is the permitting authority in California and adopted an NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit) (Order 2009-0009, as amended by Orders 2010-0014-DWQ and 2012-006-DWQ). Containment and spill cleanup are encompassed in the Storm Water Pollution Prevention Plan (SWPPP) which is required to be developed as a condition of permit issuance. Requirements for post-construction control of stormwater runoff are included under Provision C.3, which allows permitting authorities to use the permit process to enforce appropriate source control and treatment measures in new development to address operational stormwater and wastewater discharges.

CLEAN WATER ACT SECTION 404

Under Section 404 of the Clean Water Act, proposed discharges of dredged or fill material into WOTUS require USACE authorization. WOTUS generally include tidal waters, lakes, ponds, rivers, streams (including intermittent streams), and wetlands (with the exception of isolated wetlands). Federal regulations regarding the definition of WOTUS change with some regularity under different administrations. The Clean Water Rule was promulgated in 2015, expanding the definition of WOTUS and increasing the waters under USACE jurisdiction. In 2020 the Navigable Waters Protection Rule was issued and reversed the Clean Water Rule, removing almost 60% of previously regulated waters from federal jurisdiction. In June 2021 USEPA and USACE announced a new rulemaking process to revise or reverse the Navigable Waters Protection Rule. The USACE identifies wetlands using a multi-parameter approach, which requires positive wetland indicators in three distinct environmental categories: hydrology, soils, and vegetation. According to the *Corps of Engineers Wetlands Delineation Manual* (1987), except in certain situations, all three parameters must be satisfied for an area to be considered a jurisdictional wetland.

National Flood Insurance Program

The FEMA National Flood Insurance Program (NFIP) includes a flood hazard mapping program which identifies and ranks flood hazard areas. Under this program, FEMA produces Flood Insurance Rate Maps, which delineate flood risk areas and risk levels. Special Flood Hazard Areas are defined as areas within a 100-year floodplain, which corresponds to a 1% annual chance of flooding. It also delineates areas that are in moderate flood hazard areas, defined as areas between a 0.2% and 1.0% chance of flooding annually. Special Flood Hazard Areas are further divided into Zones, which provide information on the degree of flooding within the risk area, including average depth of flooding. Kern County is a participating jurisdiction in the NFIP, and all new development must comply with the minimum requirements of the NFIP.

State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1967 requires the SWRCB and the nine RWQCBs to adopt water quality criteria to protect State waters and designates SWRCB as the state water pollution control agency under the CWA. These criteria include the identification of beneficial uses, narrative and numerical water quality standards, and implementation procedures. The Water Quality Control Plan, or Basin Plan, protects designated beneficial uses of State waters through the issuance of Waste Discharge Requirements (WDRs), designation of water quality objectives and through the development of TMDLs under CWA Section 303(d). The Basin Plans are updated every 3 years. Anyone proposing to discharge waste that could affect the quality of the waters of the State must make a report of the waste discharge to the RWQCB or SWRCB as appropriate, in compliance with the Porter-Cologne Act.

The Water Quality Control Plan for the Lahontan Region is the Basin Plan that covers Kern County, including the project site, and is discussed under *Local* regulations, below.

Sustainable Groundwater Management Act

In September 2014, Governor Brown signed legislation requiring that California's critical groundwater resources be sustainably managed by local agencies. The Sustainable Groundwater Management Act (SGMA) gives local agencies the power to sustainably manage groundwater, provides for the creation of regional Groundwater Sustainability Agencies (GSA) and requires Groundwater Sustainability Plans

(GSP) to be developed for medium- and high-priority groundwater basins. These basins or subbasins must adopt groundwater management plans by 2020 or 2022, depending upon whether the basin is in critical overdraft. GSAs will have until 2040 or 2042 to achieve groundwater sustainability.

The Kern Subbasin is designated a High Priority Basin by DWR due to historic levels of overdraft from agricultural use, resulting in subsidence and, in some cases, complete disconnection between groundwater and overlying surface water systems. As discussed under Section 1.2.1, *Groundwater Resources*, and Section 1.2.3, *Water Purveyors* above, the Wheeler-Ridge-Maricopa WSD is the GSA for this portion of the Kern Subbasin and is a member agency of the KGA, which functions as the GSA for the overall Kern Subbasin. Wheeler Ridge-Maricopa WSD has developed a Management Area Plan under the KGA Umbrella GSP to meet the regulatory requirements of SGMA.

Urban Water Management Planning Act

In 1983, the California Legislature enacted the Urban Water Management Planning Act (Water Code, Section 10610 et seq.), which requires urban water suppliers to develop Urban Water Management Plans (UWMP) to actively pursue the efficient use of available supplies as well as conduct drought assessments and planning. This Act also requires the provision of water service to be affordable to lower income households (Section 10631.1). Similarly, Government Code Section 65589.7 (Senate Bill [SB] 1087) requires water service providers to reserve water allocations for low-income housing. Every five years, water suppliers are required to update their UWMPs to identify short-term and long-term water demand management measures to meet growing water demands. As discussed under 2.1.1 *Groundwater Management*, above, there is no UWMP which accounts for the proposed project, but there are numerous water supply management plans in place for the Kern Subbasin, including the KGA Umbrella GSP.

Local

Kern County General Plan

The Kern County General Plan has a set of policies and implementation measures related to groundwater supply that would apply to the proposed project, including:

Policy 1.3.1: Kern County will ensure that new developments will not be sited on land that is physically or environmentally constrained (Map Code 2.1 [Seismic Hazard], Map Code 2.2 [Landslide], Map Code 2.3 [Shallow Groundwater], Map Code 2.5 [Flood Hazard], Map Codes from 2.6–2.9, Map Code 2.10 [Nearby Waste Facility], and Map Code 2.11 [Burn Dump Hazard]) to support such development unless appropriate studies establish that such development will not result in unmitigated significant impact.

Policy 1.3.2: In order to minimize risk to Kern County residents and their property, new development will not be permitted in hazard areas in the absence of implementing ordinance and programs. The ordinances will establish conditions, criteria and standards for the approval of development in hazard areas.

Implementation Measure 1.3 C: Cooperate with the Kern County Water Agency to classify lands in the County overlying groundwater according to groundwater quantity and quality limitations.

Policy 1.10.35: Ensure that adequate water storage, treatment, and transmission facilities are constructed concurrently with planned growth.

Policy 1.10.39: Encourage the development of the County's groundwater supply to sustain and ensure water quality and quantity for existing users, planned growth, and maintenance of the natural environment.

Policy 1.10.41: Review development proposals to ensure adequate water is available to accommodate projected growth.

Implementation Measure 1.10 X: Encourage effective groundwater resource management for the long-term benefit of the County through the following:

- i. Promote groundwater recharge activities in various zone districts
- ii. Support for the development of Urban Water Management Plans and promote Department of Water Resources grant funding for all water providers
- iii. Support the development of Groundwater Management Plans
- iv. Support the development of future sources of additional surface water and groundwater, including conjunctive use, recycled water, conservation, additional storage of surface water, and groundwater and desalination

Implementation Measure 1.10 Y: Promote efficient water use by utilizing measures such as:

- i. Requiring water-conserving design and equipment in new construction
- ii. Encouraging water-conserving landscaping and irrigation methods
- iii. Encouraging the retrofitting of existing development with water conserving devices

Kern County Water Quality Control Plan

The Basin Plan for the Lahontan RWQCB includes Chapter 4.6, Groundwater Protection And Management, which outlines policies and regulations for groundwater basin water quality and management within the RWQCB jurisdiction, and Chapter 4.9, Resources Management and Restoration, which includes additional actions and policies related to groundwater management. These Chapters outline the levels of regulatory control over groundwater supply and recharge from the RWQCB, other State agencies including SWRCB and DWR, and the USEPA, Federal Energy Regulatory Commission, and Bureau of Land Management.

Under the Basin Plan, the Kern County Engineering and Survey Services Department requires the completion of an NPDES applicability form for all projects that disturb one or more acres within Kern County, even though many of the waters within Kern County are not technically subject to federal regulations as they are closed systems that never contact oceans or other WOTUS bodies. The Basin Plan also requires that projects not otherwise subject to SB 610/SB 221 are still required to provide a water supply assessment similar to that required by SB 610/SB 221.

Kern County Water Well Permitting

The Kern County Public Health Services Department requires the submittal of an application to construct, reconstruct/modify, deepen, or destroy any water wells within the County's jurisdiction. The application requires the disclosure of details including but not limited to the well's location, depth, diameter, sealing material, as well as the depth to groundwater at that location. A water sample must also be taken at the proposed well location. No work related to water well construction may occur prior to approval from the Department, and approval of water quality and

final construction features is required before the water well is put to use.

3 Impact Analysis

3.1 CEQA Checklist

The following analysis is provided to support environmental documentation pursuant to CEQA. The conclusions of the CEQA analysis provided in this section are summarized in Table 5.

Table 5 Summary of Impacts

Impact Statement	Proposed Project's Level of Significance	Applicable Mitigation Measures
Hydrology and Water Quality		
Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	Less than significant impact	none
Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	Less than significant impact	none

3.2 Methodology

This section analyzes impacts on groundwater supplies and recharge and applicable groundwater management plans from implementation of the proposed project. Analysis is informed by Appendix G of the CEQA Guidelines and is based on review of available information on local and regional water supply and management, groundwater management plans and projections, and projected future supply and demand scenarios as determined by the applicable agencies and as described throughout this water supply assessment. Supply calculations used in this analysis encompassed all phases of project lifespan, including construction, operation, and projected decommission and were based upon available information about the project requirements and industry-standard assumptions regarding water use for similar projects. Potential significant impacts were evaluated based on review of this data and consideration of changes that may result from implementation of the project in comparison to existing and projected conditions.

3.3 Significance Thresholds

According to Appendix G of the CEQA Guidelines, a water supply-related impact would be considered potentially significant if the project would result in one of the following conditions:

- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan

The significance thresholds listed above are two of the five thresholds identified in Section IX, *Hydrology and Water Quality*, of Appendix G to the CEQA Guidelines. The three significance thresholds from Section IX that are not addressed herein are applicable to hydrology and water quality, and are therefore addressed separately in the Hydrology Technical Report.

3.4 Water Supply Impact Analysis

Threshold 1: Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
--

IMPACT WS-1: THE PROJECT WOULD INTRODUCE A NEW WATER DEMAND THAT WOULD BE MET USING LOCAL GROUNDWATER RESOURCES; HOWEVER, THE PROJECT WOULD ALSO DECREASE EXISTING WATER DEMANDS ON THE PROJECT SITE BY CONVERTING THE LAND USE FROM IRRIGATED AGRICULTURE TO SOLAR ENERGY PRODUCTION. THE PROJECT WOULD ALSO INTRODUCE IMPERVIOUS SURFACES IN THE FORM OF THE SOLAR PANELS AND SUPPORT FACILITIES; HOWEVER, NATURAL GROUND COVER WOULD BE MAINTAINED AS MUCH AS POSSIBLE, AND THE PROJECT WOULD NOT INTERFERE SUBSTANTIALLY WITH GROUNDWATER RECHARGE. THEREFORE, THE PROJECT WOULD NOT IMPEDE SUSTAINABLE GROUNDWATER MANAGEMENT OF THE BASIN. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

As detailed under Section 2.1 and 2.2 above, the current use of the project site is agricultural and utilizes local groundwater for its water needs. Implementation of the proposed project would convert use of the project site from water-intensive agriculture to solar energy production with an estimated amortized demand of 17.58 AFY. The net use of local groundwater resources at the project site would be reduced from implementation of the project.

Recharge to the Kern Subbasin occurs primarily via infiltration through the surface including through use of imported recharge water and is highly managed by local and regional agencies including the Wheeler Ridge-Maricopa WSD and the KCWA. Implementation of the proposed project would increase the amount of impermeable surface area in the form of solar panels positioned over the ground surface. However, precipitation would runoff the solar panels to the ground surface, and runoff from the project site overall would be managed through use of on-site stormwater retention basins that allow for the captured stormwater to infiltrate to the groundwater and net decrease of infiltration would be minimal.

Therefore, because the proposed project would reduce existing water demands on the site, and because potential impacts associated with changes to impermeable surfaces would be mitigated to avoid adverse impacts to infiltration and recharge, potential impacts to groundwater supply would be less than significant.

Mitigation Measures

No mitigation is required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 2: Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?
--

The topic of water quality is addressed in the Hydrology Technical Report; the impact analysis provided below therefore does not include analysis of water quality, including as related to water quality control plans in the project area.

IMPACT WS-2: THE PROJECT WOULD CONVERT LAND USES ON THE SITE FROM ACTIVE AGRICULTURE CONSISTING OF IRRIGATED CROPS TO SOLAR ENERGY PRODUCTION, WHICH IS CONSISTENT WITH THE MANAGEMENT DIRECTION OF THE KERN GROUNDWATER AUTHORITY'S UMBRELLA GROUNDWATER SUSTAINABILITY PLAN FOR THE KERN SUBBASIN OF THE SAN JOAQUIN VALLEY GROUNDWATER BASIN, WHERE THE PROJECT IS LOCATED. THEREFORE, THE PROJECT WOULD NOT CONFLICT WITH OR OBSTRUCT IMPLEMENTATION OF A SUSTAINABLE GROUNDWATER MANAGEMENT PLAN. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

As detailed in Section 2.2, *Water Supply Availability Conclusions* above, the KGA's Umbrella GSP is the sustainable groundwater management plan that covers the Kern Subbasin. Water for the proposed project would most likely be pumped onsite given the current agricultural use of the project site, but it is possible water would be purchased from the Wheeler Ridge-Maricopa WSD and imported to the site. Either source would rely on Kern Subbasin groundwater, which is managed through the Umbrella GSP, and thus utilization of local groundwater resources would be required to comply with the Umbrella GSP and would not conflict with it.

The Kern Subbasin is currently projected to reach overdraft conditions by 2070 due to decreased SWP deliveries and the effects of climate change. Implementation of the P/MAs described in Section 2.2 are expected to reduce or eliminate the overdraft conditions. Supply projections used to arrive at the 2070 projected overdraft date included use of the project site as agriculture. Implementation of the proposed project would be consistent with P/MAs identified to manage the basin sustainably. The proposed project would facilitate implementation of the sustainable groundwater management plan and would not obstruct or conflict with the plan. Potential impacts associated with conflicting with a local groundwater management plan would be less than significant.

Mitigation Measures

No mitigation is required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

4 Conclusions and Mitigation Measures

The project would not: substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin; or conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. No mitigation measures are recommended.

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Appendix A

DWR Guidebook for Implementation of Senate Bill 610

The Water Supply Assessment (WSA) for the proposed Jasmine Solar Project (“project”) was prepared using guidance contained in the California Department of Water Resources’ (DWR) Guidebook for Implementation of Senate Bill (SB) 610 and SB 221 of 2001 (DWR Guidebook). The California DWR prepared the Guidebook to assist water suppliers in preparation of the water assessments and the written verification of water supply availability required by SB 610 and SB 221; the DWR has no regulatory or permitting approval authority concerning water assessments or verifications of sufficient water supply, and provides the Guidebook purely as an assistance tool. The following table provides a detailed description of how the DWR Guidebook was used in preparing the project’s WSA.

Table A-1 Jasmine Solar Project WSA - Consistency with DWR Guidelines

Guidelines Section Number and Title (DWR, 2003)	Guidelines Direction	Relevant WSA Section and Response
Section 1 (page 2). Does SB 610 or SB 221 apply to the proposed development?	Is the Project subject to SB 610?	WSA Section 3.1
	Is the Project subject to CEQA (Water Code §10910(a))? If yes, continue.	Yes, the project subject to CEQA.
	Is it a “project” as defined by Water Code §10912(a) or (b)? If yes, to comply with SB 610 go to Section 2, page 4.	WSA Section 0 Yes, the project is considered to meet the definition of “project” per Water Code §10912(a) or (b).
	Is the project subject to SB 221? Does the tentative map include a “subdivision” as defined by Government Code §66473.7(a)(1)? If no, stop.	No, the project does not include a “subdivision;” SB 221 does not apply to the project, and no further action relevant to SB 221 is required.
Section 2 (page 4). Who will prepare the SB 610 analysis?	Is there a public water system (“water supplier”) for the project (Water Code § 10910(b))? If no, go to Section 3, page 6.	WSA Section 0 No, there is no public water system for the project.
Section 3 (page 6). Has an assessment already been prepared that includes this project?	Has this project already been the subject of an assessment (Water Code §10910(h))? If no, go to Section 4, page 8.	No, the project has not been the subject of an assessment.
Section 4 (page 8). Is there a current Urban Water Management Plan?	Is there an adopted urban water management plan (UWMP) (Water Code §10910(c))? If yes, continue. If yes, information from the UWMP related to the proposed water demand for the project may also be used for carrying out Section 5, Steps 1 and 2, and Section 7; proceed to Section 5, page 10 of the Guidelines.	WSA Section 0 There is not an UWMP that accounts for the proposed project. However, there are multiple groundwater management plans that were assessed for this WSA, including the Kern Groundwater Authority (KGA)’s Umbrella Groundwater Sustainability Plan (GSP) for the Kern Subbasin, and Wheeler Ridge-Maricopa WSD’s Management Area Plan, which addresses groundwater management in the portion of the Kern Subbasin within the Wheeler Ridge-Maricopa WSD’s service area.

Guidelines Section Number and Title (DWR, 2003)	Guidelines Direction	Relevant WSA Section and Response
Section 5 (page 10). What information should be included in an assessment?	Step One (page 13). Documenting wholesale water supplies.	Kern County Water Agency (KCWA) is the local SWP water wholesaler that distributes imported SWP water to the project area.
	Step Two (page 17). Documenting Supply if Groundwater is a Source*.	The project's water demands may be met with groundwater supplies from the Kern Subbasin of the San Joaquin Valley Groundwater Basin.
	Specify if a groundwater management plan or any other specific authorization for groundwater management for the basin has been adopted and how it affects the water supplier's use of the basin.	WSA Sections 2.1.1 and 3.4 There is an Integrated Regional Water Management Plan (IRWMP) and a Groundwater Management Plan (GWMP) for the project area that assessed conditions in the Kern Subbasin and were used to inform the WSA.
	The description of the groundwater basin may be excerpted from the groundwater management plan, from DWR Bulletin 118, California's Ground Water, or from some other document that has been published and that discusses the basin boundaries, type of rock that constitutes the aquifer, variability of the aquifer material, and total groundwater in storage (average specific yield times the volume of the aquifer).	WSA Sections 1.2.1 and 2.1.1 provide descriptions of the groundwater basin characteristics using available resources, including DWR Bulletin 118.
	In an adjudicated basin the amount of water the urban supplier has the legal right to pump should be enumerated in the court decision.	The project is not located in an adjudicated groundwater basin.
	The Department of Water Resources has projected estimates of overdraft, or "water shortage," based on projected amounts of water supply and demand (basin management), at the hydrologic region level in Bulletin 160, California Water Plan Update. Estimates at the basin or subbasin level will be projected for some basins in Bulletin 118. If the basin has not been evaluated by DWR, data that indicate groundwater level trends over a period of time should be collected and evaluated.	WSA Section 4.1 discusses groundwater level trends.
	If the evaluation indicates an overdraft due to existing groundwater extraction, or projected increases in groundwater extraction, describe actions and/or program designed to eliminate the long-term overdraft condition.	Management agencies in the Kern Subbasin, including the Wheeler Ridge-Maricopa WSD, project a water supply deficit in the Kern Subbasin in 2070, which is largely associated with decreasing deliveries of imported SWP water, as well as the effects of climate change. Projects and

Guidelines Section Number and Title (DWR, 2003)	Guidelines Direction	Relevant WSA Section and Response
		management actions (P/MAs) to address and eliminate this projected deficit have been developed and are being implemented, towards the sustainability goal of eliminating the projected 2070 deficit by 2040. These conditions would occur regardless of the project. In addition, the project would reduce existing water demands on the project site, thereby facilitating attainment of the sustainability goal (eliminate the projected 2070 deficit by 2040).
	If water supplier wells are plotted on a map, or are available from a geographic information system, the amount of water extracted by the water supplier for the past five years can be obtained from the Department of Health Services, Office of Drinking Water and Environmental Management.	Water pumping for the project would not initiate until the onset of construction activities.
	Description and analysis of the amount and location of groundwater pumped by the water supplier for the past five years. Include information on proposed pumping locations and quantities. The description and analysis is to be based on information that is reasonably available, including, but not limited to, historic use records from DWR.	WSA Section 2.1.1 addresses available historical groundwater pumping data.
	Analysis of the location, amount, and sufficiency of groundwater that is projected to be pumped by the water supplier.	WSA Sections 2.1.1 and 3.2 discuss location, amount, and sufficiency of groundwater supplies from the Kern Subbasin.
	Step 3 (page 21). Documenting project demand (Project Demand Analysis).	WSA Section 1.4 Construction of the project would require up to approximately 150 acre-feet of water. Operational water demands, which include water used for fire suppression, solar PV panel washing and concentrate, and operation of the proposed O&M building, would total approximately 10.1 AFY.
	Step 4 (page 26). Documenting dry year(s) supply.	WSA Section 2.1.2 discusses water supply reliability including during dry year scenarios.
	Step 5 (page 31). Documenting dry year(s) demand.	WSA Section 4.2 discusses water supply reliability including during dry year scenarios.
Section 6 (page 33). Is the projected water supply sufficient or insufficient		WSA Section 2.1.2 summarizes why the identified water supply/supplies

Guidelines Section Number and Title (DWR, 2003)	Guidelines Direction	Relevant WSA Section and Response
for the proposed project?		are considered sufficient for the project.
Section 7 (page 35). If the projected supply is determined to be insufficient.	Does the assessment conclude that supply is “sufficient”? If no, continue.	WSA Section 4 It is reasonably anticipated that sufficient water supplies are available for the project.
Section 8 (page 38). Final SB 610 assessment actions by lead agencies.	The lead agency shall review the WSA and must decide whether additional water supply information is needed for its consideration of the proposed project. The lead agency “shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses.”	The WSA for the project will be included as part of the Draft EIR for the project. Per SB 610, the lead agency will approve or disapprove a project based on a number of factors, including but not limited to the water supply assessment.

Appendix M

Noise Study



Jasmine Solar Project

Noise Study

prepared for

SF Jasmine, LLC

50 California Street, Suite 820
San Francisco, California 94111

prepared by

Rincon Consultants, Inc.

180 North Ashwood Avenue
Ventura, California 93003

September 2021



RINCON CONSULTANTS, INC.

Environmental Scientists | Planners | Engineers

rinconconsultants.com

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Appendix B Roadway Construction Noise Model (RCNM) Results

Appendix C Traffic Noise Model (FHWA RD 77-108) Results

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1 Project Description

1.1 Introduction

This study analyzes the potential noise impacts of the proposed Jasmine Solar Project (Project) located in unincorporated Kern County. Rincon Consultants, Inc. (Rincon) prepared this study under contract to SF Jasmine, LLC, Inc. for use in support of the environmental documentation being prepared by Kern County pursuant to the requirements of the California Environmental Quality Act (CEQA). The study evaluates the short- and long-term impacts of the Project to noise-sensitive receivers.

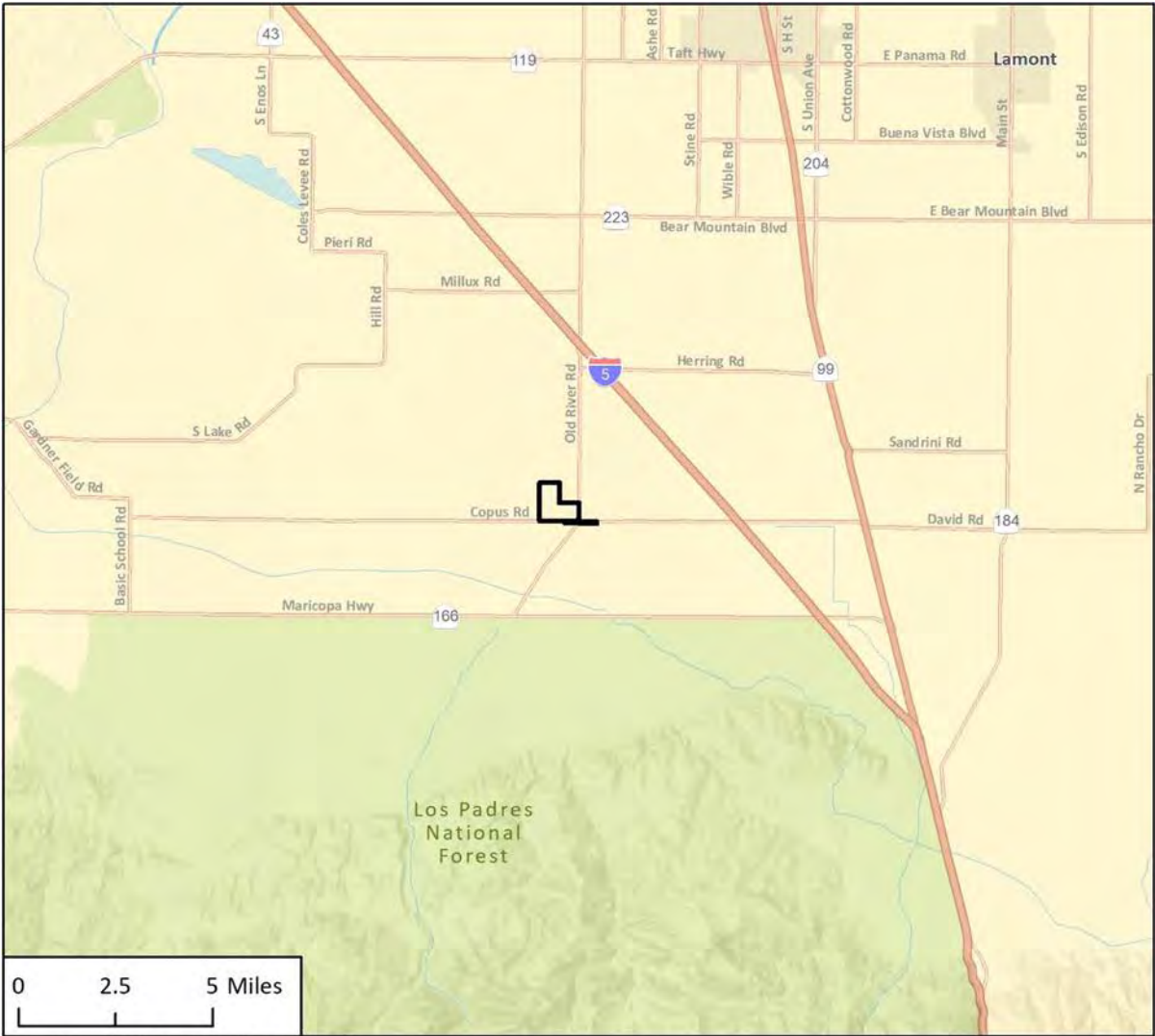
1.2 Project Location

The Project site is located in San Joaquin Valley in southwestern unincorporated Kern County at the intersection of Old River Road and Copus Road. The site is approximately four miles west of Interstate 5 and approximately three miles north of State Route 166. The Project site is approximately 15 miles east of Maricopa. The surrounding area consists of actively farmed agricultural land. Unpaved roads bound the Project site to the north and west. Old River Road is along the eastern boundary of the site, while Copus Road is adjacent to the Project site's southern boundary. The Project site would be located on properties identified by five Assessor's Parcel Numbers (APNs), two of which are pending a parcel split: APN 295-130-78; APN 295-130-36 (parcel split pending); and APN 295-130-80 (parcel split pending). The total area of the site is approximately 520 acres. Approximately 492 acres of the Project site would be developed and occupied by the proposed 70 MW solar facility. The existing Pacific Gas and Electric (PG&E) Lakeview Substation is located approximately 0.5 mile east of the main facility site and adjacent to the generation tie line (gen-tie) corridor. Figure 1 and Figure 2 show the regional location and immediate vicinity of the Project area, respectively.

1.3 Project Description

The Project would involve the construction of a 70-megawatt (MW) utility-scale solar facility on approximately 492 acres of the 520-acre site. The solar facility would consist of Photovoltaic (PV) modules and trackers, inverters and medium voltage transformers, Direct Current (DC) collection, on-site substation, battery storage, telecommunications, meteorological data collection, lighting signage, access roads, and gen-tie. The Project will interconnect at PG&E's Lakeview Substation via a 0.6-mile gen-tie line that will enter through the northwest corner of the substation property. The permanent disturbance acreage associated with development of the solar facility and associated infrastructure (i.e., Project site) would be less than the gross acreage of the Project area. Access to the site would be off of Copus Road and Old River Road. There would be approximately 14-acres of access and maintenance roads constructed on-site. Additional details about elements of the solar facility are provided in more detail below.

Figure 1 Regional Location

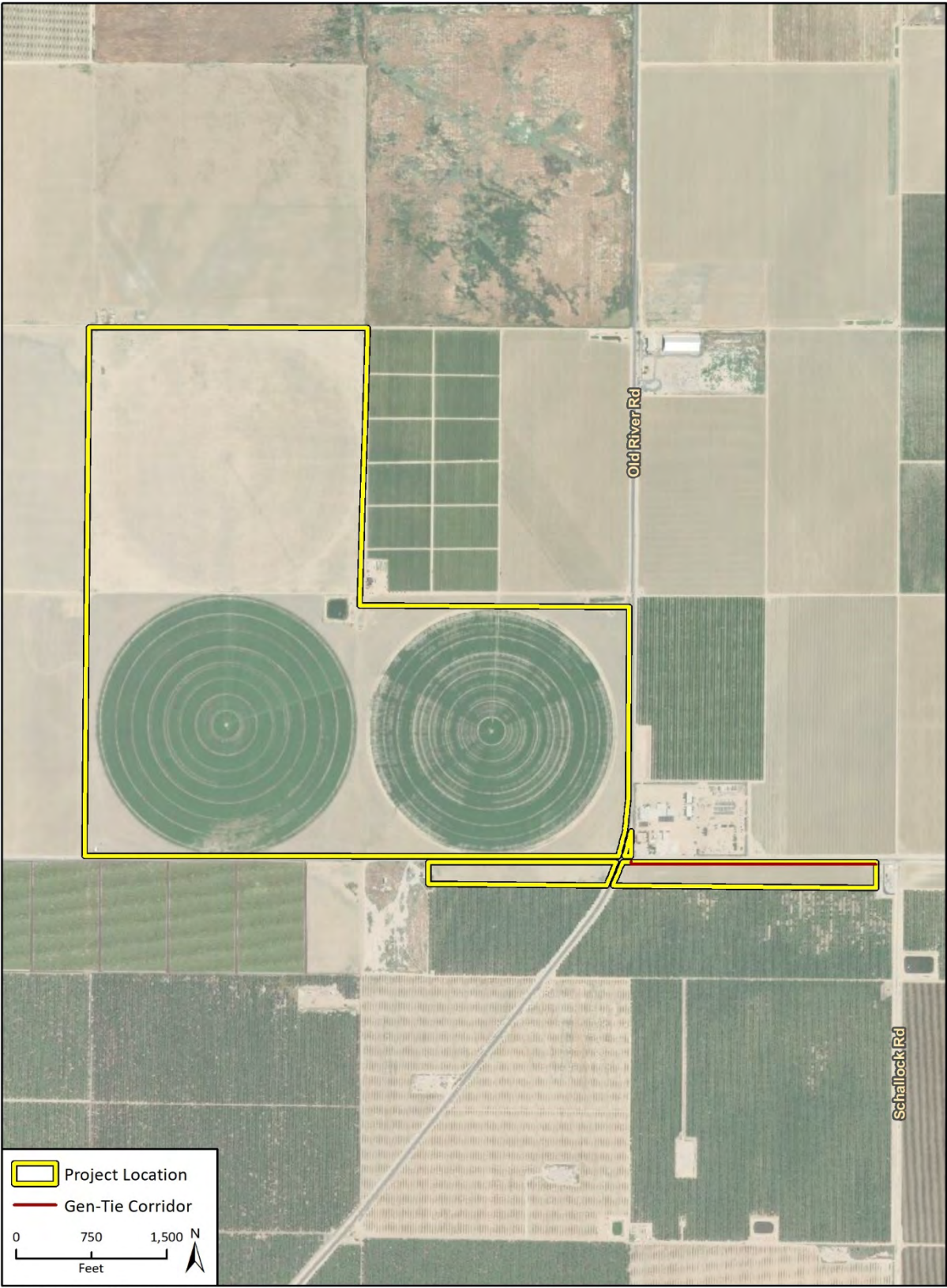


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Project Area



Figure 2 Project Location



PV Module Configuration

The solar facility would utilize PV modules and trackers. Trackers optimize power production by ensuring proper panel orientation to the sun both daily and seasonally. The panels are typically. The PV panels would be self-contained durably constructed units designed to withstand exposure to the elements for a period of 35 years or longer. The solar modules would be certified to comply with industry standard quality testing. Panels would be electrically connected. The Project would be designed in accordance with local and state codes and regulations.

Multiple trackers would be deployed in proximity to the power conditioning stations (PCS) where the DC produced by the panels is converted to alternating current (AC) and transferred to the on-site Substation and eventual delivery to the electrical grid. The number of trackers connected to each of the PCS would vary with panel output relative to inverter size and desired output from the PCS. The panels would be organized in rows in a uniform grid pattern, with each row separated by between 10 to 20 feet (from post to post).

Inverters and Medium Voltage Transformers

Each PCS would be comprised of inverters, transformers, and other electrical equipment comprise. The footprint of each PCS, which is generally mounted on a concrete pad or piles, would be approximately 12 feet by 30 feet. The proposed Project would require approximately 40 PCS, depending on final design details. The inverter converts the DC electricity to AC electricity, which then flows to a transformer where it is stepped up to the appropriate collection level voltage (34.5-kV). The Project would use Power Electronic HEM Central inverters or equivalent and one medium voltage transformers per inverter. Each inverter and transformer would be installed as per manufacturer's requirements.

Electrical Collection and Distribution System

The DC output of multiple rows of PV modules connected in series would be collected through one or more combiner boxes and associated electrical wiring located throughout the Project site. The power would be delivered via an underground cable network to the inverters in the electrical equipment enclosures at the PCS, described above. Multiple transformers electrically connected in series would deliver AC power to the substation located on-site.

Project Substation

The substation is proposed to be in the southeast corner of APN 295-130-78. The substation would include transformers, breakers, switches, meters, and related equipment. Interconnection equipment, including the control house, would be installed aboveground and underground within the footprint of the substation. The overall footprint of the substation is anticipated to be approximately 200 by 200 feet and approximately 100 feet in height at its apex. The substation would include an emergency generator for use in the event that the regional transmission system fails; this emergency generator would provide emergency power until the regional transmission system restores operations. The substation would also contain a control house building approximately 15 by 40 feet with an overall height of less than 20 feet. The substation would be surrounded by a seven-foot barbed wire chain-link fence and would comply with electrical codes.

The substation would be required to have access to communication systems in the area to comply with Federal Energy Regulatory Commission/California Independent System Operator/Utility

monitoring and control requirements. Compliance may be accomplished by underground lines, aboveground lines, or wireless communication.

Lakeview Substation

The existing Lakeview Substation, operated by PG&E, would require modifications to accommodate a new 70 kV bus terminal. The new bus terminal will connect the proposed customer-owned photovoltaic solar Project to the existing transmission system via new generation tie-line. Additional electrical equipment, including Direct Transfer Trip equipment, Supervisory Control Data Acquisition and telemetry equipment, and breaker and control switching equipment, would be placed within the existing fenced area at the Lakeview Substation

Telecommunications

The Project would require redundant telecommunication connections. The primary telecommunication line would consist of fiber optic cable and/or copper telecommunication line, installed above and/or below ground, attached to either existing utility lines located outside of the Project or the new gen-tie. The Project's telecommunication route would use a combination of existing poles, new poles, and/or below ground installations between the point of connection to existing telecommunications infrastructure and the Lakeview Substation. Lines would be placed within utility franchise easements to the extent feasible. The point of interconnection to the existing telecommunication facilities would be within a small telecommunications shelter. The interconnection utility service would consist of fiber stranded cables (Dielectric Self Supporting and Optical Ground Wire) coming into the substations as part of the standard substation design criteria. Telecommunication lines may also be attached to the new gen-tie line. A secondary (backup) internet connection would be provided using a similar method for redundant paths. The site will also have internal telecommunications expected to be provided by the local provider in the area.

Meteorological Data Collection System

The Project would require up to four meteorological data collection systems. The systems, which would be mounted at various locations throughout the proposed solar facility, would include a variety of instruments to collect meteorological data. Meteorological data would be collected at approximately 15 feet above the ground (the maximum height of the solar panels).

Battery Storage Component

The proposed Project may include the installation of a battery storage component. The battery system would consist of commercially available lithium ion batteries housed in enclosures. The enclosures would be approximately 8 feet wide by 40 feet long by 9.5 feet high (2.4 meters wide by 12 meters long by 2.9 meters high). The battery storage component would have a footprint of approximately 1 acre and would be immediately adjacent to the Project's Substation. Site preparation required for the battery storage enclosures requires leveling the area for a flat concrete foundation.

Lighting and Signage

Low-level lighting may be installed at the entry gates, on-site substation, inverter pads, and operation and maintenance (O&M) Building for ongoing maintenance and security. Lighting outside of the substation would be downward facing, shielded or otherwise modified to minimize emission of light or glare beyond the property line, or upward into the sky.

Signage installed on the fence in the vicinity of the main entry gates would identify the Project owner, operator, and emergency contacts and provide safety and security information. Small-scale signage would be posted at the main entry gates and intermittently along the perimeter fencing on exterior parcel boundaries, to indicate “No Trespassing” and “Private Property” for security and safety purposes. All signage would conform to Kern County signage requirements.

Generation-Tie Line

The 70 kV gen-tie would interconnect the Project’s substation to the existing PG&E Lakeview Substation. The gen-tie is proposed to extend to the west from the Project Substation for approximately 0.60 miles. The gen-tie right-of way would be from 25- to 75-feet-wide. Approximately 25 new poles would be installed to accommodate the gen-tie. The new poles would be constructed of either steel or wood at a maximum of 125 feet tall.

Access Roads

The proposed Facility would be primarily accessed off Copus Rd and Old River Rd adjacent to the Project site and gen-tie corridor. Interior access within the solar array area would be approximately 20-foot-wide access and maintenance roads and perimeter roads. The access points and interior driveways would be constructed in accordance with Kern County and California Department of Forestry and Fire Protection requirements and maintained to facilitate on-site circulation for emergency vehicles during all weather conditions.

1.4 Construction Activities

Construction of all Project components would occur over approximately 16 months. Construction would begin in January 2023 at the earliest with all construction completing in 2024. Construction of the Project would include the following types of activities:¹

- Site preparation & Grading
- Tracker Foundations (Piles)
- Underground Cabling
- Mechanical Installation
- Electrical Installation
- PG&E Substation Upgrades

There would be six total phases with Phases 1 through 5 occurring over 12 months and Phase 6 taking approximately 16 months. The construction phases would overlap and occur simultaneously, such that the total length of construction would be 16 months. Table 1 shows the assumed construction schedule, number of workdays, and overlapping phases that were used in the following analysis.

¹ The anticipated construction schedule and types of construction activities are subject to changing. However, for the purpose of this analysis, these phases are assumed to occur and overlap.

Table 1 Overall Project Construction Schedule

Scenario	Workdays	Months															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Phase 1: Site Preparation & Grading	60																
Phase 2: Tracker Foundations (Piles)	103																
Phase 3: Underground Cabling	86																
Phase 4: Mechanical Installation	103																
Phase 5: Electrical Installation	129																
Phase 6: PG&E Substation Upgrades	336																

Note: Majority of the construction would occur in a 12-month period (i.e., Phases 1 through 5). The 16-month schedule accommodates the PG&E substation modification and power line construction.

Construction traffic would access the Project site locally from Copus and Old River Road. It is estimated that the peak construction workforce would be 550 workers. On-road traffic would consist of employee and vendor vehicle trips. The number of vehicle trips would vary by month depending on the construction activities. The construction workforce would typically work five days per week at eight hour per day. Some Saturday, Sunday, evening, and night work may also be required due to the scheduling of system outages and construction schedules. Earthmoving activities are expected to be limited to the construction of access roads, O&M building, substation, energy storage systems, and control rooms.

Truck Deliveries

Materials and supplies would be delivered to the Project site by truck. Truck deliveries would normally occur during daylight hours. However, there could be offloading and/or transporting of materials to the Project site on weekends and during evening hours.

Water

The proposed Project would obtain water for construction from either existing wells or purchase water from a local provider. The water would be trucked and stored on-site to be primarily used for dust suppression, soil compaction, concrete hydration and other miscellaneous activities requiring non-potable water during construction. The Project will require an estimated 150 acre-feet of water for construction activities and 0.5 acre-feet of water per year during operations. Potable water for drinking and similar needs during construction would be trucked in from off-site (e.g., bottled water).

Dust Control

The Project would implement standard fugitive dust control measures and incorporate those measures into their construction contracts for all Projects. Those dust control measures include:

- Watering active construction sites with the frequency of watering based on the type of operation, soil, and wind exposure.
- Stabilizing dust emissions at disturbed areas, including storage piles that are not actively utilized for construction purposes, using water or other approved substances.
- Prohibiting grading activities during periods of high wind (over 20 miles per hour).
- Limiting vehicle speed on-site to minimize dust emissions on unpaved driveways (15 miles per hour).
- Covering trucks hauling dirt, sand, or loose materials.
- Posting a publicly visible sign with the telephone number and person to contact regarding dust complaints. The contact would respond and take corrective actions within 48 hours. The phone number of the San Joaquin Valley Air Pollution Control District must also be visible to ensure compliance with rules regarding nuisance and fugitive dust emissions.

Diesel-Powered Equipment

In addition to standard dust control features, the Project would implement standard measures to reduce tailpipe emissions from diesel-powered construction equipment. This requirement would be incorporated into the construction contracts for the proposed solar facility.

1.5 Operational Activities

Once completed, the Project would generally be limited to the following maintenance activities:

- Cleaning PV panels
- Monitoring electricity generation
- Providing site security
- Maintaining the facility: replacing or repairing inverters, wiring, and PV modules
- Erosion control maintenance
- Restoration of vegetative cover and vegetation maintenance

The Project would operate continuously, seven days a week, until the anticipated repowering or decommissioning in 35 years. One employee would be assigned for operational maintenance and oversight. Personnel would largely work in the O&M building monitoring the system's performance and performing system production forecasting. Personnel would access on-site equipment for operational adjustments or minor repairs. Regular access throughout the day and night is expected. Personnel would use light to medium duty trucks and all-terrain vehicles for traversing the site along fire access roads, including drainage crossings. Security monitoring would occur on-site 24 hours a day. The facility would generate electricity during normal daylight hours when the solar energy is available. Maintenance activities may occur seven days a week, 24 hours a day to ensure PV panel output when solar energy is available. The Project would require an estimated 150 acre-feet of water for construction activities and 0.5 acre-feet of water per year during operations.

1.6 Decommissioning Activities

The Project would be decommissioned after 35 years and the site would be reverted to undeveloped land. The decommissioning and restoration process would involve removing aboveground and belowground structures, restoring topsoil, revegetation, and seeding. Temporary erosion and sedimentation control Best Management Practices (BMPs) would be used during the decommissioning phase. Solar panels would be removed and placed in secure transport crates or container boxes for storage, and transported to another solar facility for reuse, material recycling, or disposal. Electrical equipment would be de-energized prior to removal, salvaged (where possible), placed in appropriate shipping containers, and secured in a truck transport trailer for shipment off-site. Electrical equipment, transformers, and switching gear on the inverter and interconnection transformer pads and all above ground electrical wiring would be removed and recycled or disposed. All other aboveground site infrastructure—including fences, awnings, and the concrete pads that supported the inverters, and related equipment—would be removed. The fence and gate would be removed per a fencing plan and may include the replacement of some perimeter array fencing with fencing to facilitate livestock management. Removed materials would be recycled to the greatest extent possible. All debris would be removed from the area.

2 Background

2.1 Overview of Sound Measurement

Noise

Sound is a vibratory disturbance created by a moving or vibrating source, which is capable of being detected by the hearing organs. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment (California Department of Transportation [Caltrans] 2013).

Human Perception of Sound

Noise levels are commonly measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels so that they are consistent with the human hearing response. Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used to measure earthquake magnitudes. A doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; dividing the energy in half would result in a 3 dB decrease (Caltrans 2013).

Human perception of noise has no simple correlation with sound energy: the perception of sound is not linear in terms of dBA or in terms of sound energy. Two sources do not “sound twice as loud” as one source. It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA, increase or decrease (i.e., twice the sound energy); that a change of 5 dBA is readily perceptible (8 times the sound energy); and that an increase (or decrease) of 10 dBA sounds twice (half) as loud (10.5 times the sound energy) (Caltrans 2013).

Sound Propagation and Shielding

Sound changes in both level and frequency spectrum as it travels from the source to the receiver. The most obvious change is the decrease in the noise level as the distance from the source increases. The manner by which noise reduces with distance depends on factors such as the type of sources (e.g., point or line), the path the sound will travel, site conditions, and obstructions.

Sound levels are described as either a “sound power level” or a “sound pressure level,” which are two distinct characteristics of sound. Both share the same unit of measurement, the dB. However, sound power (expressed as L_{pw}) is the energy converted into sound by the source. As sound energy travels through the air, it creates a sound wave that exerts pressure on receivers, such as an eardrum or microphone, which is the sound pressure level. Sound measurement instruments only measure sound pressure, and noise level limits are typically expressed as sound pressure levels.

Noise levels from a point source (e.g., construction, industrial machinery, air conditioning units) typically attenuate, or drop off, at a rate of 6 dBA per doubling of distance. Noise from a line source (e.g., roadway, pipeline, railroad) typically attenuates at about 3 dBA per doubling of distance (Caltrans 2013). Noise levels may also be reduced by intervening structures; the amount of attenuation provided by this “shielding” depends on the size of the object and the frequencies of the noise levels. Natural terrain features, such as hills and dense woods, and man-made features, such as

buildings and walls, can significantly alter noise levels. Generally, any large structure blocking the line of sight will provide at least a 5-dBA reduction in source noise levels at the receiver (Federal Highway Administration [FHWA] 2011). Structures can substantially reduce exposure to noise as well. The FHWA's guidance indicates that modern building construction generally provides an exterior-to-interior noise level reduction of 10 dBA with open windows and an exterior-to-interior noise level reduction of 20 to 35 dBA with closed windows (FHWA 2011).

Descriptors

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important factors of Project noise impact. Most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors have been developed. The noise descriptors used for this study are the equivalent noise level (L_{eq}), Day-Night Average Level (DNL; may also be symbolized as L_{dn}), and the community noise equivalent level (CNEL; may also be symbolized as L_{den}).

L_{eq} is one of the most frequently used noise metrics; it considers both duration and sound power level. The L_{eq} is defined as the single steady-state A weighted sound level equal to the average sound energy over a time period. When no time period is specified, a 1-hour period is assumed. The L_{max} is the highest noise level within the sampling period, and the L_{min} is the lowest noise level within the measuring period. Normal conversational levels are in the 60 to 65 dBA L_{eq} range; ambient noise levels greater than 65 dBA L_{eq} can interrupt conversations (Federal Transit Administration [FTA] 2018).

Noise that occurs at night tends to be more disturbing than that occurring during the day. Community noise is usually measured using Day-Night Average Level (DNL or LDN), which is the 24-hour average noise level with a +10 dBA penalty for noise occurring during nighttime hours (10:00 p.m. to 7:00 a.m.). Community noise can also be measured using Community Noise Equivalent Level (CNEL or LDEN), which is the 24-hour average noise level with a +5 dBA penalty for noise occurring from 7:00 p.m. to 10:00 p.m. and a +10 dBA penalty for noise occurring from 10:00 p.m. to 7:00 a.m. (Caltrans 2013). The relationship between the peak-hour L_{eq} value and the LDN/CNEL depends on the distribution of noise during the day, evening, and night; however, noise levels described by LDN and CNEL usually differ by 1 dBA or less. Quiet suburban areas typically have CNEL noise levels in the range of 40 to 50 CNEL, while areas near arterial streets are in the 50 to 60+ CNEL range (FTA 2018).

Groundborne Vibration

Groundborne vibration of concern in environmental analysis consists of the oscillatory waves that move from a source through the ground to adjacent buildings or structures and vibration energy may propagate through the buildings or structures. Vibration may be felt, may manifest as an audible low-frequency rumbling noise (referred to as groundborne noise), and may cause windows, items on shelves, and pictures on walls to rattle. Although groundborne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors. The primary concern from vibration is that it can be intrusive and annoying to building occupants at vibration-sensitive land uses and may cause structural damage.

Typically, ground-borne vibration generated by manmade activities attenuates rapidly as distance from the source of the vibration increases. Vibration amplitudes are usually expressed in peak particle velocity (PPV) or root mean squared (RMS) vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the maximum instantaneous

positive or negative peak of a vibration signal. PPV is often used as it corresponds to the stresses that are experienced by buildings (Caltrans 2020).

High levels of groundborne vibration may cause damage to nearby building or structures; at lower levels, groundborne vibration may cause minor cosmetic (i.e., non-structural damage) such as cracks. These vibration levels are nearly exclusively associated with high impact activities such as blasting, pile-driving, vibratory compaction, demolition, drilling, or excavation. The American Association of State Highway and Transportation Officials (AASHTO) has determined vibration levels with potential to damage nearby buildings and structures; these levels are identified in Table 2.

Table 2 AASHTO Maximum Vibration Levels for Preventing Damage

Type of Situation	Limiting Velocity (in/sec)
Historic sites or other critical locations	0.1
Residential buildings, plastered walls	0.2–0.3
Residential buildings in good repair with gypsum board walls	0.4–0.5
Engineered structures, without plaster	1.0–1.5

Source: Caltrans 2020

2.2 Project Noise Setting

Sensitive Receivers

Kern County considers residential areas, schools, convalescent and acute care hospitals, parks and recreational areas, and churches as noise sensitive. The Project site is in a rural agricultural environment surrounded by mostly agricultural uses. A small cluster of single-family residences and commercial uses are in the community of Mettler, approximately 8.5 miles to the east along State Route 99. The nearest sensitive use is an agriculturally zoned residence at 14017 Copus Road, approximately 175 feet to the south of the nearest Project boundary line and more than 2,000 feet to the proposed gen-tie route. Other sensitive receivers include residences located more than 4,000 feet to the north, south, and west of the Project.

Noise Measurements

The primary sources of noise on-site and in the surrounding area include motor vehicles, wind, and agricultural activities (e.g., farming equipment). The greatest vehicle noise occurs from vehicles on the main thoroughfares (Copus Road and Old River Road). To evaluate existing noise levels in the area, four 15-minute noise measurements (ST1 through ST4) were taken on and near the Project site on July 23, 2021, using an Extech, Model 407780A, ANSI Type II integrating sound level meter. Figure 3 shows the locations of the noise measurements. The noise measurement locations were chosen to provide a representative range of ambient noise levels across the Project site and in the nearby area, especially near existing noise-sensitive residences and roadways. The short-term noise measurement results are shown in Table 3. Table 4 reports traffic counts taken concurrently with sound level measurements. Detailed noise meter outputs are included in Appendix A.

Table 3 Noise Monitoring Results in the Project Site Vicinity

Measurement Location		Sample Times	Approximate Distance to Primary Noise Source	L _{eq} (dBA)	L _{min} (dBA)	L _{max} (dBA)
NM1	North of Copus Road and west of Old River Road, north of residence	1:20 – 1:35 p.m.	Approximately 30 feet from Copus Road centerline	67	41	86
NM2	West of Old River Road and north of Copus Road	1:48 – 2:03 p.m.	Approximately 35 feet from Old River Road centerline	64	34	77
NM3	North of Copus Road and west of Project site adjacent to residence	2:12 – 2:27 p.m.	Approximately 25 feet from Copus Road centerline	68	34	89
NM4	South of Copus Road and east of Project site adjacent to residence	11:03 – 11:18 a.m.	Approximately 25 feet from Copus Road centerline	71	29	88

L_{eq} = average noise level equivalent; dBA = A-weighted decibel (for these measurements, the L_{eq} was over a 15-minute period); L_{min} = minimum instantaneous noise level; L_{max} = maximum instantaneous noise level

See Figure 3 for noise measurement locations.

Source: Rincon Consultants, field measurements conducted on July 23, 2021, using ANSI Type II Integrating sound level meter. See Appendix A.

Table 4 Traffic Counts During Sound Level Monitoring

Measurement	Roadway	Traffic	Autos	Medium Trucks	Heavy Trucks
NM1	Copus Road – at Old River Road	15-minute count	32	2	3
		One-hour Equivalent	128	8	12
		Percent	86.5%	5.4%	8.1%
NM2	Old River Road – at Copus Road	15-minute count	80	1	19
		One-hour Equivalent	320	4	76
		Percent	80%	1%	19%
NM3	Copus Road – east of Project site	15-minute count	40	2	4
		One-hour Equivalent	120	8	12
		Percent	85.7%	5.7%	8.6%
NM4	Copus Road - west of Project site	15-minute count	65	2	3
		One-hour Equivalent	260	8	12
		Percent	92.8%	2.9%	4.3%

Detailed traffic count data is included in Appendix A.

Figure 3 Noise Measurement Locations



2.3 Regulatory Setting

Kern County General Plan

Chapter 3 of the Kern County General Plan provides a framework to protect County residents and visitors from the harmful effects of excessive noise, minimize annoyance caused by noise, and identify noise sensitive land uses (Kern County 2009). The County considers residential areas, schools, convalescent and acute care hospitals, parks and recreational areas, and churches as noise sensitive. The plan contains the following policies related to noise in Kern County that would be relevant to the Project:

Goals

- 1) Ensure that residents of Kern County are protected from excessive noise and that moderate levels of noise are maintained.
- 2) Protect the economic base of Kern County by preventing the encroachment of incompatible land uses near known noise producing roadways, industries, railroads, airports, oil and gas extraction, and other sources.

Policies

- 1) Review discretionary industrial, commercial, or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses.
- 3) Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise.
- 4) Utilize good land use planning principles to reduce conflicts related to noise emissions.
- 7) Utilize good land use planning principles to reduce conflicts related to noise emissions.

Implementation Measures

- A. Utilize zoning regulations to assist in achieving noise-compatible land use patterns.
- C. Review discretionary development plans, programs and proposals, including those initiated by both the public and private sectors, to ascertain and ensure their conformance to the policies outlined in this element.
- F. Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB L_{dn} and interior noise levels in excess of 45 dB L_{dn}.
- G. At the time of any discretionary approval, such as a request for a General Plan Amendment, zone change or subdivision, the developer may be required to submit an acoustical report indicating the means by which the developer proposes to comply with the noise standards. The acoustical report shall:
 1. Be the responsibility of the applicant.
 2. Be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.
 3. Be subject to the review and approval of the Kern County Planning Department and the Environmental Health Services Department. All recommendations therein shall be complied with prior to final approval of the project.

- J. Develop implementation procedures to ensure that requirements imposed pursuant to the findings of an acoustical analysis are conducted as part of the project permitting process.

Chapter 5, Energy Element, Policy 10 of the General Plan also requires an acoustical analysis for energy project proposals that might impact sensitive and highly sensitive uses in accordance with the Noise Element of the General Plan

Kern County Code of Ordinances

The Kern County Code of Ordinances, Chapter 8.36 (Noise Control), defines acceptable hours of construction, and limitations on construction related noise impacts on adjacent sensitive receptors.

Section 8.36.020 – Prohibited Sounds

It is unlawful for any person to do, or cause to be done, any of the following acts within the unincorporated areas of the county:

- H. Create noise from construction, between the hours of nine (9:00) p.m. and six (6:00) a.m. on weekdays and nine (9:00) p.m. and eight (8:00) a.m. on weekends, which is audible to a person with average hearing faculties or capacity at a distance of one hundred fifty (150) feet from the construction site, if the construction site is within one thousand (1,000) feet of an occupied residential dwelling except as provided below:
 - 1. The development services agency director or a designated representative may for good cause exempt some construction work for a limited time.
 - 2. Emergency work is exempt from this section.

3 Impact Analysis

3.1 CEQA Checklist

The following analysis is provided to support environmental documentation pursuant to CEQA. The conclusions of the study are summarized in

Table 5 Summary of Noise and Vibration Impacts

Issue	Proposed Project's Level of Significance	Applicable Recommendations
Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Less than significant impact (Construction)	None)
	Less than significant impact (Operation)	None
Would the project result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	Less than significant impact (Construction)	None)
	Less than significant impact (Operation)	None
For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	No Impact	None

3.2 Methodology

To assess the potential for temporary construction and long-term operational noise impacts, noise-sensitive receivers closest to the Project site were identified. The Project parcels are generally located in a rural, agricultural area, with nearby noise-sensitive receivers being located to the south, west, and north of the Project site. Figure 3 shows locations of noise-sensitive receivers.

The nearest single-family residence is located to the south of the Project across Copus Road approximately 175 feet from the nearest Project boundary line. There are other residential uses to the south, west, and north of the site and each of these receivers are more than 4,000 feet from the nearest Project boundary.

Construction and Decommissioning Noise

The FHWA Roadway Construction Noise Model (RCNM) was used to estimate construction noise at nearby sensitive receptors. Construction noise modeling results are provided in Appendix B. The types of construction equipment that would be used on-site were provided by SF Jasmine, LLC. RCNM provides reference noise levels at the standard distance of 50 feet and estimates noise levels at nearby sensitive receivers based on a standard noise attenuation rate of 6 dB per doubling of distance (line-of-sight method of sound attenuation for point sources of noise such as construction equipment). Although construction equipment may operate near the Project's property lines, construction equipment would be mobile throughout the day and would average a further distance from the nearest residential property line over a typical construction day. This analysis conservatively

assumes that in addition to the distance from the property line to each noise-sensitive receiver, the equipment would average at least 50 feet from the property lines (internal to the Project site) from each noise-sensitive receiver. For this analysis, it is assumed that Project construction would occur within 225 feet of a noise-sensitive receiver.

Project construction equipment assumptions were provided by the Project applicant with construction equipment for each activity (e.g., gen-tie and solar array construction) that would be operating simultaneously. For gen-tie construction, a crane and an excavator operating simultaneously has been modeled. For Project parcel construction, an excavator, auger drill rig, loader, pneumatic tools, and a pickup truck operating simultaneously has been modeled.

As discussed in Section 2.3, *Regulatory Setting*, Kern County does not specify quantitative construction noise limits. This analysis uses the FTA Transit Noise and Vibration Impact Assessment (FTA 2018) criteria. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction. For residential uses, the daytime noise threshold is 80 dBA L_{eq} for an 8-hour period.

As stated in Section 1.6, *Decommissioning*, at the end of the Project's useful life (anticipated to be 35 years), the proposed solar facility and associated infrastructure would be decommissioned in accordance with then-current decommissioning practices. At this time, it is not possible to quantitatively evaluate potential noise that would result from Project decommissioning, due to technology or construction practices that would be available at that time. Therefore, based on current decommissioning practices and as a reasonable worst-case scenario, this analysis assumes that noise impacts generated during future decommissioning would be similar to noise impacts generated during the construction phase of the Project.

Construction Traffic Noise

Noise levels from existing traffic and with-construction traffic along Copus Road, Old River Road, and SR 166 were estimated in terms of average daily traffic L_{dn} using the FHWA Highway Traffic Noise Prediction Model (FHWA RD 77-108). The model calculations are based on traffic volumes from the supplemental traffic analysis prepared by GHD for this Project (GHD 2021). Vehicle trips generated by Project construction activities are estimated at 194 workers during peak construction periods totaling 512 daily trips, which would occur during the overlap of concrete foundations, structural steel work, and electrical/instrumentation work. A vehicle trip is defined as a one-direction vehicle movement. The total number of trips generated by the Project includes both inbound and outbound trips. The roadways were modeled conservatively using a straight-line analysis (i.e., assuming no attenuation from topography and a straight roadway).

Table 6 shows the estimated number of existing and construction-generated vehicle trips at the modeled roadway segments (GHD 2021). The table also includes the estimated speeds for each roadway used in the model. The modal split of construction trips was assumed to be 95 percent passenger cars and 5 percent heavy trucks for construction on Project parcels. The modal split of existing trips was based on traffic counts conducted during noise monitoring, shown in Table 4. The modal split applied to Copus Road traffic volumes east of Old River Road is 87 percent passenger cars, 5 percent medium trucks, and 8 percent heavy trucks. The modal split applied to Copus Road traffic volumes west of Old River Road is 93 percent passenger cars, 3 percent medium trucks, and 4 percent heavy trucks. The modal split applied to Old River Road is 80 percent passenger cars, 1 percent medium trucks, and 19 percent heavy trucks. Construction trips would be split from I-5 on to Copus Road or from Old River Road to Copus Road (GHD 2021). Model results are included in Appendix C.

Table 6 Existing and Construction Vehicle Trips

Roadway Segment	Speed Limit (mph)	Existing Daily Vehicle Trips	Construction Daily Vehicle Trips	Existing + Construction Daily Vehicle Trips
Copus Road - East of Old River Road	45 ¹	2,600	230	2,830
Copus Road – West of Old River Road	45 ¹	2,080	26	2,106
Old River Road – North of Copus Road	45 ¹	3,560	205	3,765
Old River Road – South of Copus Road	45 ¹	4,280	51	4,331

¹ No posted speed limit in the immediate area; speeds estimated by traffic observed during a site visit.

Source: GHD 2021

For traffic-related noise, impacts are considered potentially significant if Project-generated traffic would result in exposure of sensitive receivers to an unacceptable increase in noise levels during construction and/or operational activities. Recommendations in the FTA's *Transit Noise and Vibration Impact Assessment Manual* were used to determine whether increases in traffic noise would be unacceptable (FTA 2018). Under these FTA criteria, as existing ambient noise increases, the "allowable" increase in noise exposure due to a Project is reduced. Table 7 shows the FTA criteria considered when evaluating traffic noise generated by this Project. If sensitive receivers would be exposed to traffic noise increases exceeding these criteria, impacts may be considered significant.

Table 7 Significance of Changes in Roadway Noise Exposure

Existing Noise Exposure (dBA L _{dn} or L _{eq})	Allowable Noise Exposure Increase (dBA L _{dn} or L _{eq})
40-45	10
45-50	7
50-55	5
55-60	3
60-65	2
65-74	1
75+	0

Source: FTA 2018

On-Site Operational Noise

On-site operational noise sources were modeled with SoundPLAN. Propagation of modeled stationary noise sources was based on ISO Standard 9613-2, "Attenuation of Sound during Propagation Outdoors, Part 2: General Method of Calculation." The assessment methodology assumes that all receivers would be downwind of stationary sources. This is a worst-case assumption for total noise impacts, since, in reality, only some receivers would be downwind at any one time.

Operational noise sources from the Project include collector lines, PV solar arrays with associated electrical equipment (such as transformers and inverters), energy storage systems, substations, and the operations and maintenance facility. The Project would operate continuously, seven days a week, until the anticipated repowering or decommissioning of the Project in 35 years. Stationary noise sources during operation would include PV solar arrays with associated electrical equipment (such as transformers and inverters), energy storage systems, substations, collector lines, and the operations and maintenance facility. Electrical equipment produces a discrete low-frequency humming noise. The noise from transformers is produced by alternating current flux in the core, which causes it to vibrate.

Transformers (MV Skid)

Transformers would be co-located with the inverters on power conditioning stations throughout the site on MV skids. MV Skids are compact and resistant platforms, supplied as a turnkey unit suitable for all integrated medium-voltage equipment. It comes with a medium-voltage outdoor transformer, protection and disconnection cells, oil reserve and filter. The Project applicant proposes to use Power Electronic HEM Central inverters or equivalent MV skids. Manufacturer's specifications indicate that these units generate a noise level of 79 dBA at 1 meter (see Appendix D for specification sheets)

Battery Energy Storage System (BESS)

BESS enclosures would be approximately 8 feet wide by 40 feet long by 9.5 feet high (2.4 meters wide by 12 meters long by 2.9 meters high). The battery storage component would have a footprint of approximately 1 acre and would be immediately adjacent to the Project's Substation. BESS units would be BYD energy storage units or similar design. Manufacturer's specifications indicate that these units generate a noise level of 75 dBA at 1 meter (see Appendix D for specification sheets).

70 kV Step-Up Transformer

Noise from the proposed substation step-up transformer was modeled using a reference noise level of 80 dBA L_{eq} at 6 feet, consistent with manufacturer specifications for an ABB step-up transformer (see Appendix D for specification sheets).

Table 8 lists representative noise levels of stationary noise sources of on-site equipment used for similar solar projects that are assumed to be used on the Project site.

Table 8 Estimated Noise Rating for Equipment Utilized During Project Operations

Equipment Type	Reference Noise Level (dBA L_{eq})	Distance from Source (feet)
Gen-Tie ¹	20	50
PV Panel Motors	44	50
Transformer (MV Skid)	79	3.3
BESS Unit	75	3.3
Substation	80	6

¹ Only applicable to the gen-tie transmission line.

Sources: U.S. Department of Energy 2011; Power Electronics 2021; ABB Performance Specifications 2019

As shown in Table 8, it is expected that the loudest noise generated by on-site solar operations would come from substation equipment at 80 dBA L_{eq} , from transformer equipment at 79 dBA L_{eq} , and from BESS units at 75 dBA L_{eq} . The combined noise level from the substation, transformers, and BESS units, which would be anticipated to operate simultaneously, are analyzed below in the impact analysis for on-site operational noise, see Table 15, at the closest sensitive receivers through SoundPLAN modeling. Noise levels from the gen-tie transmission line, and PV panel motors are discussed separately, as these noise sources would be minor in comparison to the HVAC systems and transformers and were not modeled.

Operational noise was assessed using Kern County's exterior noise standard of 65 dBA L_{dn} at the boundary of areas planned and zoned for residential or other noise-sensitive land uses.

Operational Traffic Noise

Vehicle trips generated by Project operational activities would be eight trips, including one full time employee (GHD 2021). The existing traffic volumes used in this analysis are shown in Table 6. These traffic volumes were compared with the expected increase in traffic volumes after construction of the Project. The significance of the Project's increase in traffic noise was determined using the FTA criteria shown in Table 7.

Vibration

Vibration associated with construction of the Project has the potential to be an annoyance to nearby land uses. Kern County does not have adopted limits for determining significance of vibration impacts on structures or persons. Caltrans has developed limits for the assessment of vibrations from transportation and construction sources. The Caltrans vibration limits are reflective of standard practice for analyzing vibration impacts on structures from continuous and intermittent sources. The Caltrans *Transportation and Construction Vibration Guidance Manual* (Caltrans 2020) identifies two impact criteria for buildings and humans: Table 9 presents the impact criteria for buildings, and Table 10 presents the impact criteria for humans. These criteria are used for this vibration analysis.

Table 9 Caltrans Vibration Damage Potential

Human Response	Maximum PPV (in./sec.)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

PPV = peak particle velocity; in./sec. = inches per second

Source: Caltrans 2020

Table 10 Caltrans Vibration Annoyance Potential

Human Response	Maximum PPV (in./sec.)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Severe	0.04	0.01
Strongly perceptible	0.25	0.04
Distinctly perceptible	0.9	0.10
Barely perceptible	2.0	0.4

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

PPV = peak particle velocity; in./sec. = inches per second

Source: Caltrans 2020

3.3 Significance Thresholds

Based on the CEQA Guidelines, a noise-related impact would be considered significant if the Project would result in one or more of the following conditions:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
- Generation of excessive groundborne vibration or groundborne noise levels
- For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels

3.4 Impact Analysis

Threshold 1: Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? **Less Than Significant**

Impact N-1 CONSTRUCTION AND DEMOLITION ACTIVITIES ASSOCIATED WITH IMPLEMENTATION OF THE PROPOSED PROJECT WOULD INTERMITTENTLY GENERATE CONSTRUCTION AND DECOMMISSIONING NOISE WITHIN AND ADJACENT TO THE PROJECT SITE, HOWEVER, NOISE LEVELS WOULD NOT BE IN EXCESS OF ESTABLISHED STANDARDS. THIS IMPACT IS LESS THAN SIGNIFICANT.

Construction and Decommissioning Noise

Construction and decommissioning of the Project would involve the use of noise-generating equipment during various phases, including transport of personnel and materials to the site, heavy machinery used in grading and clearing the site, pneumatic post drivers to install foundation supports for solar array modules, as well as equipment used during construction of the proposed solar arrays, infrastructure improvements, and related structures. Emergency diesel generators may be used

during construction activities. Project components at all Project parcels and the gen-tie would be constructed over a 16-month period.

Table 11 shows the noise levels associated with heavy construction equipment at a reference distance of 50 feet from the source. As shown in this table, noise levels at this distance can range from about 74 to 85 dBA, depending upon the types of equipment in operation at any given time and phase of construction (FHWA 2006).

Table 11 Typical Construction Equipment Noise Levels

Equipment	Acoustical Usage Factor (%) ¹	Measured L _{eq} (dBA at 50 feet)
Augur Drill Rig	20	84
Backhoe	40	78
Compactor (ground)	20	83
Concrete Mixer Truck	40	85
Crane	16	85
Dozer	40	82
Dump Truck	40	76
Excavator	40	81
Flat Bed Truck	40	74
Front End Loader	40	79
Generator	50	81
Grader	40	83
Pickup Truck	40	75
Pneumatic Tools	50	85
Roller	20	80
Scraper	40	84
Warning Horn	5	83
Welder/Torch	40	74

¹ The average fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.

Source: FHWA 2006

Construction activities would be subject to Kern County policies and regulations. Heavy construction activities would normally occur on-site between the hours of 7:00 a.m. and 6:00 p.m., which is between the acceptable hours for construction listed in the Kern County Code of Ordinances (6:00 a.m. to 9:00 p.m., on weekdays) except for the 8:00 a.m. to 9:00 p.m. on weekends. Additional hours may also be necessary to make up schedule deficiencies or to complete critical construction activities. As a result, some construction activities may be required to continue 24 hours per day, seven days per week. Activities that generate relatively low amounts of noise, such as refueling equipment, staging material for the following day's construction activities, quality assurance/control, and commissioning, may potentially occur between the hours of 9:00 p.m. and 6:00 a.m. on weekdays and the hours of 9:00 p.m. and 8:00 a.m. on weekends. Per Section 8.36.020 of the Kern County Code, these activities would require approval from the development services agency director or his or her designated representative if audible to a person with average hearing ability at a distance of 150 feet from a construction site, if the site is within 1,000 feet of an occupied residential dwelling.

Noise-sensitive receivers near Project construction include single-family residences in the Project area, the nearest of which is located south of the Project site across Copus Road, approximately 225 feet from construction activities. These land uses would experience a temporary increase in noise during construction of the Project. The following subsections detail the impacts to noise-sensitive receivers in proximity to the Project parcels and the gen-tie corridor.

Project Site Construction

Table 12 shows the estimated average noise level from construction at the Project parcels at the nearest noise-sensitive land uses using RCNM.

Table 12 Noise Levels at Various Distances from Construction at the Project Parcels

Receiver	Distance from Construction (feet) ¹	Noise Level at Receptor (dBA L _{eq})
Reference Distance	50	85
Single-family residence on Copus Road	225	72
Single-family residence on Old River Road	4,135	47
Single-family residence on Copus Road	4,115	47

See Appendix B for model outputs.

¹ Distances include the distance from the Project parcel boundary to the receivers, plus 50 feet to account for construction equipment that be mobile throughout the day and would average a further distance (of approximately 50 feet) from the property line over a typical construction day.

As shown in Table 12, although construction noise levels from simultaneous heavy equipment operation would reach 85 dBA L_{eq} at the reference distance of 50 feet, due to the further distance between construction at the Project parcels and the nearest noise-sensitive receivers, construction noise levels under the conservative scenario analyzed would only reach as high as 72 dBA L_{eq}. This would be below FTA's threshold of 80 dBA L_{eq} for residential uses exposed to daytime construction noise. Most construction activities would occur in the body of each parcel, farther from nearby noise-sensitive receivers than analyzed, and would therefore result in lower noise levels, especially in later construction phases when equipment with the loudest equipment, such as pneumatic tools and graders, would no longer be used.

Heavy construction activity involving pneumatic tools and graders also would not occur during nighttime hours. However, per Section 8.36.020 of the Kern County Code, construction activities outside of acceptable hours would require approval from the development services agency director or designated representative if audible to a person with average hearing ability at a distance of 150 feet from a construction site, if the site is within 1,000 feet of an occupied residential dwelling. Because a sensitive receiver is closer than 1,000 feet away from construction, County approval and implementation of a noise control plan would be required unless nighttime construction noise is inaudible at nearby residences. Therefore, daytime construction noise impacts would be less than significant.

Construction of Gen-Tie

The gen-tie corridor may be routed along Copus Road, approximately 0.5 mile east of the Project site, connecting to the existing Lakeview Substation. For the purposes of this analysis, at the closest point of construction, the gen-tie routes would be located approximately 2,000 feet from the nearest

single-family residence. As modeled, the loudest anticipated construction noise from gen-tie construction would potentially involve the simultaneous use of an excavator and a crane.

Table 13 shows construction noise levels at the nearest noise-sensitive receiver.

Table 13 Typical Construction Noise Levels at Various Distances from Gen-Tie Construction

Receiver	Distance from Construction (feet)	Noise Level at Receptor (dBA L_{eq})
Reference Distance	50	78
Single-family residence on Copus Road	2,000	46
See Appendix B for model outputs.		

As shown in Table 13, simultaneous heavy equipment use during gen-tie construction would generate a noise level of up to 78 dBA L_{eq} at 50 feet and a noise level of up to the nearest residential use of up to 46 dBA L_{eq} at 2,000 feet. This would be below FTA's construction noise threshold of 80 dBA L_{eq} (8-hour). Heavy construction would not occur during nighttime hours pursuant to County Code Section 8.36.020 that limits heavy duty construction activities from 6:00 a.m. to 9:00 p.m. on weekdays and from 8:00 a.m. to 9:00 p.m. on weekdays. Therefore, impacts would be less than significant.

Decommissioning

At the end of the Project's useful life (anticipated to be 35 years), the solar facility and associated infrastructure may be decommissioned in accordance with then-current decommissioning practices. Given the Project's operating life cycle and distant timeframe for decommissioning activities, it is too speculative to quantify the potential noise impacts that could occur during decommissioning activities. On a rough basis, decommissioning would be similar to Project construction and be completed in 12 months. Assuming that the facility would be torn down and the materials present recycled or disposed, temporary noise associated with such actions are assumed to be generally similar to the noise levels that would result from Project construction. Similar to the noise generated during construction of the Project, decommissioning activities would be conducted in accordance with all applicable requirements in effect at the time of Project termination. Potential future environmental effects associated with Project decommissioning would be addressed at the time decommissioning is proposed consistent with regulations in effect at that time. A final decommissioning plan, based on then-current technology, site conditions, and regulations, would be prepared prior to actual decommissioning.

Construction Traffic Noise

Construction of the Project would increase traffic noise offsite from commuting construction workers and from haul trucks bringing materials to and from the Project site. Project components would be constructed simultaneously over a 16-month period. This could expose nearby residences to traffic noise increases associated with construction traffic. This analysis of cumulative effects focuses on the effects of concurrent construction traffic for the worst-case scenario (i.e., traffic generated by the peak construction period). Table 6 in Section 3.1, *Methodology and Significance Thresholds*, compares existing daily traffic volumes on nearby road segments to anticipated traffic generated by

Project construction. Based on these traffic volumes, Table 14 shows modeled traffic noise levels at the nearest receivers under existing traffic conditions and with construction traffic.

Table 14 Construction Traffic Noise

Roadway	Nearest Sensitive Receiver	Distance from Roadway Centerline to Nearest Sensitive Receiver (feet)	Existing Traffic Noise (dBA L _{dn})	With-Construction Traffic Noise (dBA L _{dn})	Change in Traffic Noise (dBA L _{dn})	FTA Allowable Noise Exposure Increase (dBA L _{dn})
Copus Road - East of Old River Road	Single-family residence	100	58	58	<1	3
Copus Road – West of Old River Road	Single-family residence	85	56	57	1	3
Old River Road – North of Copus Road	Single-family residence	150	58	59	1	3
Old River Road – South of Copus Road	Single-family residence	400	53	53	<1	5
See Appendix C for model inputs and results Source: GHD 2021						

As shown in Table 14, construction traffic would increase noise levels by up to 1 dBA L_{dn} at the nearest sensitive receivers when accounting for Project construction traffic of 512 trips distributed over Copus Road and Old River Road (see Appendix C). Project traffic noise increases would not exceed the applicable FTA criteria. Therefore, the short-term increase in traffic noise from Project construction would be less than significant.

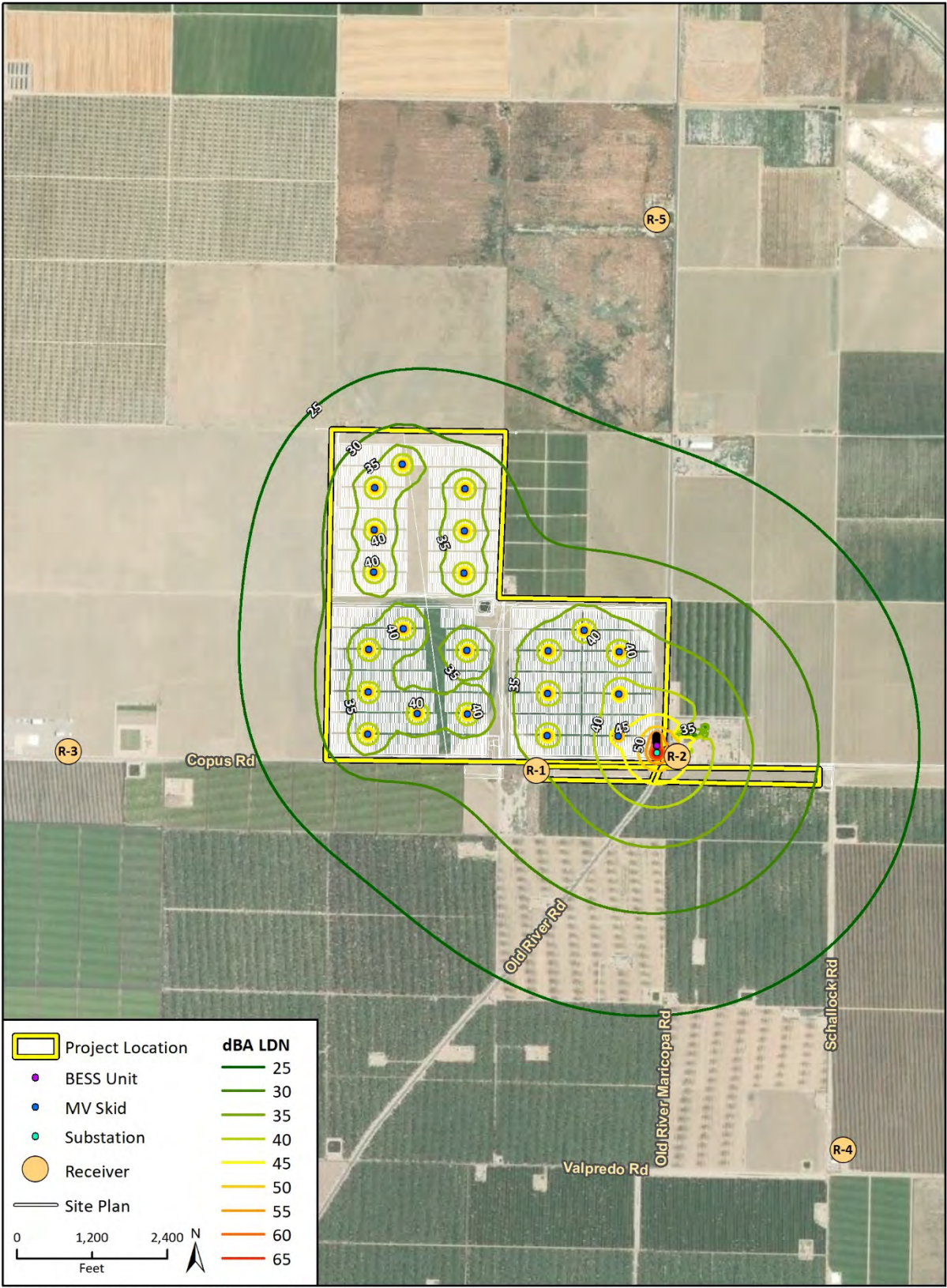
IMPACT N-2 OPERATIONAL ACTIVITIES ASSOCIATED WITH THE PROPOSED PROJECT WOULD GENERATE NOISE THAT MAY PERIODICALLY BE AUDIBLE TO NOISE-SENSITIVE RECEIVERS NEAR THE PROJECT SITE. NOISE SOURCES WOULD INCLUDE STATIONARY SOURCES (STATIONARY EQUIPMENT) AND MOBILE SOURCES (TRAFFIC). HOWEVER, OPERATIONAL NOISE WOULD NOT EXCEED COUNTY NOISE STANDARDS AT NEARBY NOISE-SENSITIVE RECEIVERS. THEREFORE, OPERATIONAL NOISE IMPACTS WOULD BE LESS THAN SIGNIFICANT.

On-Site Operational Noise

Solar Array Noise

Sensitive receivers nearby the Project parcels include the single-family residence across Copus Road to the south of the Project site and single-family residences located further away to the north, south, and west. Noise levels from the Project's solar array operations (i.e., transformers and inverters within a MV Skid, substation, BESS units) are shown in Table 15, and noise level contours and receiver locations are shown in Figure 4.

Figure 4 Receiver Locations and Operational Noise Contours



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Fig. 4 Noise Contours

Table 15 Operational Noise Levels at Nearest Sensitive Receivers

Receiver	Receiver Description	Noise Level at Receiver		Exceed Threshold?
		dBA L _{eq}	dBA L _{dn}	
R1	Residence adjacent to Project site across Copus Rd.	28	35	No
R2	Commercial adjacent to Project site across Old River Rd.	45	52	—
R3	Residence west of the Project site along Copus Rd.	15	21	No
R4	Residence to the south of the Project site along Valpredo Ave.	13	19	No
R5	Residence to the north of the Project site along Old River Rd.	14	20	No

“—” indicates that Kern County standards does not apply because this use is not noise-sensitive.
Note: Calculations completed in SoundPLAN; See Figure 4 for receiver locations.

As shown in Table 15, operational noise levels from the Project site would reach up to 35 dBA L_{dn} at noise-sensitive land uses. These noise levels would be well below Kern County’s standard of 65 dBA L_{dn} and would not be audible over the existing ambient noise levels of the area at noise-sensitive land uses. Therefore, operational noise impacts from the Project would be less than significant.

Gen-Tie

The gen-tie transmission line would generate noise from the corona affect, which is a phenomenon associated with the electrical ionization of the air that occurs near the surface of the energized conductor and suspension hardware due to very high electric field strength. This is audible power line noise that is generated from electric corona discharge, which is usually experienced as a random crackling or hissing sound. The corona effect on the gen-tie transmission line would generate a noise level of approximately 20 dBA at a distance of 50 feet (*California Valley Solar Project Final EIR*, San Luis Obispo County 2011). The distance to the nearest residence is more than 2,000 feet from the gen-tie route. As observed during a site visit to existing solar farms, noise levels from these transmission lines were not detected over the existing ambient noise sources in the area (wind and vehicles) just outside of the solar farm properties (Rincon 2020). Therefore, per site observations and the general low noise of transmissions lines, gen-tie noise would not exceed County’s standard of 65 dBA L_{dn} at the nearest residences, and impacts would be less than significant.

Solar Array Tracking Motors

PV panel noise would come from the tracking motors. These systems involve the panels being driven by motors to make brief, incremental adjustments to track the arc of the sun to maximize the solar effect. While these motors may generate noise of up to 44 dBA at 50 feet, these motors would operate briefly throughout an hour (e.g., several minutes per hour) as the sun moves west across the sky, and then would reset at night to face the eastern sky (Dudek 2018). By operating only several minutes per hour, the hourly noise level would be negligible at the nearest sensitive receivers. In addition, as observed during a site visit to the area and viewing of existing solar farms in the area, noise levels from PV panel tracking were not detected over the existing ambient noise sources in the area (wind, vehicles, planes, and trains) just outside of the solar farm properties (Rincon 2020). Therefore, noise levels from the PV panels would be less than significant.

Operational Traffic Noise

Once the Project is complete, vehicle trips to the Project site would be associated with operations and maintenance of the solar facility. In addition, the Project would require occasional nighttime activities, including deliveries, repairs, maintenance, office and administrative activities, security personnel, and emergency response.

As shown in Table 14, existing roadways generate noise levels of 53 to 58 dBA L_{eq} at the nearest single-family residences. Pursuant to the FTA criteria described in Table 7, a significant noise impact would occur if roadway noise would increase by more than 3 dBA for Copus Road and Old River Road north of Copus Road and 5 dBA for Old River Road south of Copus Road traffic. With the relatively minor increase in traffic volumes from Project operation (8 trips), Project operation would increase noise by less than 1 dBA on each roadway (GHD 2021). This increase would be imperceptible to the nearest residents and would not exceed applicable FTA criteria. Therefore, the Project's noise increases from operational traffic would have a less than significant impact.

Threshold 2: Would the project result in generation of excessive ground-borne vibration or ground-borne noise levels? Less Than Significant

IMPACT N-3 CONSTRUCTION ACTIVITIES ASSOCIATED WITH IMPLEMENTATION OF THE PROPOSED PROJECT WOULD INTERMITTENTLY GENERATE GROUNDBORNE VIBRATION WITHIN AND ADJACENT TO THE PROJECT SITE. HOWEVER, VIBRATION WOULD NOT EXCEED STANDARDS. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.

Vibration

Construction at Project Parcels

Construction at the Project parcels may require post driving and has the potential to result in temporary vibration impacts on structures and humans. Based on the potential site locations, post driving activities could occur within 190 feet of the nearest off-site residential structure. It was conservatively assumed that an impact pile driver, as discussed in Caltrans' *Transportation and Construction Vibration Guidance Manual* (Caltrans 2020), would be used for the Project. It should be noted that an impact pile driver as considered by Caltrans is larger than the type of equipment that would be used to drill in posts for the solar panels (e.g., an impact pile driver on the scale analyzed by Caltrans would typically be used for large bridge concrete footings). Other construction activities are less intensive than pile driving and would have lower PPV than pile driving. Therefore, vibration levels from pile driving are considered a conservative scenario for construction at the Project parcels.

Using the referenced formula and an assumed 2,400 ft-lb rated energy for the post driver, the PPV at the nearest residential structure would be 0.069 in./sec. PPV at 190 feet, which would be below the Caltrans continuous/frequent intermittent sources threshold for damage potential to older residential structures of 0.3 in./sec. PPV and the strongly perceptible human annoyance threshold of 0.10 in./sec. PPV (see Appendix E). Therefore, vibration impacts associated with construction of the proposed Project would be less than significant.

Gen-tie Construction

Gen-tie construction may require the use of an auger drill rig that has the potential to result in temporary vibration impacts on structures and humans. Based on the potential site locations, auger drilling activities could occur within 2,000 feet of the nearest off-site residential structure. Other than

use of an auger drill rig, other construction activities at the gen-tie corridors are less intensive than auger drill rig and would have lower PPV than the auger drill rig. Therefore, vibration levels from the auger drill rig are considered worst case for the gen-tie construction.

Caltrans vibration guidelines do not provide vibration levels specifically for an auger drill rig; however, the guidelines do provide vibration levels for caisson drilling of 0.089 in./sec. PPV at 25 feet. A caisson drill would typically drill a much larger hole than the type of bore performed for a solar foundation post (e.g., a caisson drill would be used to drill a bridge pier). Although a caisson drill is a more intensive activity that would result in greater vibration than an auger drill, it was used as a conservative reference for this analysis. Using the referenced formula, the PPV at the residential structure would be 0.0001 in./sec. PPV at 2,000 feet, which would be below the Caltrans continuous/frequent intermittent sources threshold for damage potential to older residential structures of 0.3 in./sec. PPV and the strongly perceptible human annoyance threshold of 0.10 in./sec. PPV. In addition, heavy construction activity involving drilling would not occur during nighttime hours. Therefore, vibration impacts associated with construction of the proposed Project would be less than significant.

Operation

Once constructed, the proposed PV facility would not have any components that would generate vibration levels. Thus, operation of the proposed Project would not result in any vibration and impacts would be less than significant.

Threshold 3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels? **No Impact**

IMPACT N-4 THE PROJECT SITE IS LOCATED OUTSIDE OF NOISE CONTOURS ASSOCIATED WITH AIRPORTS. THEREFORE, THE PROPOSED PROJECT WOULD NOT BE EXPOSED TO EXCESSIVE NOISE LEVELS FROM AIRCRAFT OPERATIONS AND NO IMPACT WOULD OCCUR.

The airport nearest to the Project, Bakersfield Municipal Airport, is located approximately 16.15 miles to the northeast. The project would not be located within the 65 dBA CNEL noise contour of the airport, as shown on the airport noise contour graphic Figure 4-4 of the Bakersfield Municipal Airport Land Use Compatibility Plan (Kern County 2012). Therefore, no substantial noise exposure from airport noise would occur to construction workers, or users of the Project. No impacts would occur.

4 Conclusions

As discussed in Section 3, *Impact Analysis*, the Project would not generate daytime construction activities, construction traffic noise, construction vibration, on-site operational noise, or operational traffic noise exceeding applicable standards. Therefore, impacts to nearby sensitive receivers would be less than significant.

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Appendix A

On-Site Noise Measurement Data

NM1

Freq weight : A
 Time weight : SLOW
 Level Range : 40-100
 Max dB : 86.0 - 2021/07/23 13:27:00
 Level Range : 40-100
 SEL : 96.7
 Leq : 67.2

No.s	Date Time	(dB)
1	2021/07/23 13:20:02	57.2
2	2021/07/23 13:20:05	52.5
3	2021/07/23 13:20:08	59.5
4	2021/07/23 13:20:11	70.7
5	2021/07/23 13:20:14	60.4
6	2021/07/23 13:20:17	52.1
7	2021/07/23 13:20:20	45.7
8	2021/07/23 13:20:23	46.8
9	2021/07/23 13:20:26	64.7
10	2021/07/23 13:20:29	66.8
11	2021/07/23 13:20:32	72.1
12	2021/07/23 13:20:35	61.9
13	2021/07/23 13:20:38	51.9
14	2021/07/23 13:20:41	44.5
15	2021/07/23 13:20:44	42.9
16	2021/07/23 13:20:47	41.7
17	2021/07/23 13:20:50	41.9
18	2021/07/23 13:20:53	42.7
19	2021/07/23 13:20:56	42.1
20	2021/07/23 13:20:59	41.1
21	2021/07/23 13:21:02	41.2
22	2021/07/23 13:21:05	40.8
23	2021/07/23 13:21:08	42.1
24	2021/07/23 13:21:11	42.3
25	2021/07/23 13:21:14	43.7
26	2021/07/23 13:21:17	43.9
27	2021/07/23 13:21:20	42.4
28	2021/07/23 13:21:23	41.0
29	2021/07/23 13:21:26	41.7
30	2021/07/23 13:21:29	42.6
31	2021/07/23 13:21:32	42.4
32	2021/07/23 13:21:35	43.8
33	2021/07/23 13:21:38	47.5
34	2021/07/23 13:21:41	57.2
35	2021/07/23 13:21:44	75.6
36	2021/07/23 13:21:47	64.5
37	2021/07/23 13:21:50	55.1
38	2021/07/23 13:21:53	47.6
39	2021/07/23 13:21:56	45.8
40	2021/07/23 13:21:59	45.2
41	2021/07/23 13:22:02	44.4
42	2021/07/23 13:22:05	43.1
43	2021/07/23 13:22:08	42.2
44	2021/07/23 13:22:11	43.0
45	2021/07/23 13:22:14	42.6
46	2021/07/23 13:22:17	42.4
47	2021/07/23 13:22:20	41.8
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49	2021/07/23 13:22:26	42.6
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52	2021/07/23 13:22:35	45.9
53	2021/07/23 13:22:38	54.5
54	2021/07/23 13:22:41	69.5
55	2021/07/23 13:22:44	59.0
56	2021/07/23 13:22:47	50.2
57	2021/07/23 13:22:50	46.0
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59	2021/07/23 13:22:56	44.6
60	2021/07/23 13:22:59	44.0
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63	2021/07/23 13:23:08	45.8
64	2021/07/23 13:23:11	42.8
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66	2021/07/23 13:23:17	58.7
67	2021/07/23 13:23:20	71.4
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69	2021/07/23 13:23:26	54.9
70	2021/07/23 13:23:29	59.0
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77	2021/07/23 13:23:50	42.0
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79	2021/07/23 13:23:56	41.7
80	2021/07/23 13:23:59	43.6
81	2021/07/23 13:24:02	55.9
82	2021/07/23 13:24:05	75.6
83	2021/07/23 13:24:08	64.6
84	2021/07/23 13:24:11	55.5
85	2021/07/23 13:24:14	47.6
86	2021/07/23 13:24:17	43.5
87	2021/07/23 13:24:20	43.6
88	2021/07/23 13:24:23	43.2
89	2021/07/23 13:24:26	45.5
90	2021/07/23 13:24:29	45.1

91	2021/07/23	13:24:32	46.2
92	2021/07/23	13:24:35	47.7
93	2021/07/23	13:24:38	52.7
94	2021/07/23	13:24:41	67.0
95	2021/07/23	13:24:44	80.8
96	2021/07/23	13:24:47	73.2
97	2021/07/23	13:24:50	64.2
98	2021/07/23	13:24:53	52.8
99	2021/07/23	13:24:56	45.7
100	2021/07/23	13:24:59	42.9
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102	2021/07/23	13:25:05	43.9
103	2021/07/23	13:25:08	41.8
104	2021/07/23	13:25:11	42.3
105	2021/07/23	13:25:14	41.0
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107	2021/07/23	13:25:20	40.8
108	2021/07/23	13:25:23	41.7
109	2021/07/23	13:25:26	46.0
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111	2021/07/23	13:25:32	42.9
112	2021/07/23	13:25:35	41.9
113	2021/07/23	13:25:38	43.3
114	2021/07/23	13:25:41	44.8
115	2021/07/23	13:25:44	46.8
116	2021/07/23	13:25:47	48.0
117	2021/07/23	13:25:50	60.5
118	2021/07/23	13:25:53	74.8
119	2021/07/23	13:25:56	64.2
120	2021/07/23	13:25:59	58.0
121	2021/07/23	13:26:02	53.3
122	2021/07/23	13:26:05	48.9
123	2021/07/23	13:26:08	51.4
124	2021/07/23	13:26:11	58.6
125	2021/07/23	13:26:14	80.2
126	2021/07/23	13:26:17	73.7
127	2021/07/23	13:26:20	65.5
128	2021/07/23	13:26:23	70.8
129	2021/07/23	13:26:26	63.0
130	2021/07/23	13:26:29	52.2
131	2021/07/23	13:26:32	47.0
132	2021/07/23	13:26:35	44.8
133	2021/07/23	13:26:38	43.9
134	2021/07/23	13:26:41	42.3
135	2021/07/23	13:26:44	42.5
136	2021/07/23	13:26:47	48.3
137	2021/07/23	13:26:50	51.7
138	2021/07/23	13:26:53	57.0
139	2021/07/23	13:26:56	76.2
140	2021/07/23	13:26:59	84.5
141	2021/07/23	13:27:02	78.7
142	2021/07/23	13:27:05	73.7
143	2021/07/23	13:27:08	63.0
144	2021/07/23	13:27:11	54.3
145	2021/07/23	13:27:14	47.6
146	2021/07/23	13:27:17	44.6
147	2021/07/23	13:27:20	42.9
148	2021/07/23	13:27:23	43.6
149	2021/07/23	13:27:26	42.9
150	2021/07/23	13:27:29	42.5
151	2021/07/23	13:27:32	42.6
152	2021/07/23	13:27:35	42.0
153	2021/07/23	13:27:38	40.8
154	2021/07/23	13:27:41	45.7
155	2021/07/23	13:27:44	45.5
156	2021/07/23	13:27:47	46.2
157	2021/07/23	13:27:50	43.0
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159	2021/07/23	13:27:56	45.8
160	2021/07/23	13:27:59	45.5
161	2021/07/23	13:28:02	45.6
162	2021/07/23	13:28:05	43.9
163	2021/07/23	13:28:08	46.4
164	2021/07/23	13:28:11	45.6
165	2021/07/23	13:28:14	51.9
166	2021/07/23	13:28:17	75.9
167	2021/07/23	13:28:20	67.0
168	2021/07/23	13:28:23	75.4
169	2021/07/23	13:28:26	73.2
170	2021/07/23	13:28:29	61.2
171	2021/07/23	13:28:32	50.7
172	2021/07/23	13:28:35	46.2
173	2021/07/23	13:28:38	44.6
174	2021/07/23	13:28:41	43.9
175	2021/07/23	13:28:44	42.8
176	2021/07/23	13:28:47	45.2
177	2021/07/23	13:28:50	43.2
178	2021/07/23	13:28:53	45.3
179	2021/07/23	13:28:56	46.1
180	2021/07/23	13:28:59	46.5
181	2021/07/23	13:29:02	48.5
182	2021/07/23	13:29:05	50.7
183	2021/07/23	13:29:08	49.8
184	2021/07/23	13:29:11	48.0
185	2021/07/23	13:29:14	48.9
186	2021/07/23	13:29:17	48.3
187	2021/07/23	13:29:20	51.6
188	2021/07/23	13:29:23	49.5
189	2021/07/23	13:29:26	44.8
190	2021/07/23	13:29:29	46.1
191	2021/07/23	13:29:32	48.7
192	2021/07/23	13:29:35	44.6
193	2021/07/23	13:29:38	46.4
194	2021/07/23	13:29:41	45.5

195	2021/07/23	13:29:44	43.3
196	2021/07/23	13:29:47	46.0
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198	2021/07/23	13:29:53	45.0
199	2021/07/23	13:29:56	48.6
200	2021/07/23	13:29:59	47.7
201	2021/07/23	13:30:02	44.9
202	2021/07/23	13:30:05	43.5
203	2021/07/23	13:30:08	41.4
204	2021/07/23	13:30:11	41.2
205	2021/07/23	13:30:14	43.4
206	2021/07/23	13:30:17	43.2
207	2021/07/23	13:30:20	43.0
208	2021/07/23	13:30:23	44.1
209	2021/07/23	13:30:26	45.3
210	2021/07/23	13:30:29	44.5
211	2021/07/23	13:30:32	46.4
212	2021/07/23	13:30:35	44.5
213	2021/07/23	13:30:38	45.9
214	2021/07/23	13:30:41	45.9
215	2021/07/23	13:30:44	48.6
216	2021/07/23	13:30:47	72.3
217	2021/07/23	13:30:50	59.9
218	2021/07/23	13:30:53	48.8
219	2021/07/23	13:30:56	44.1
220	2021/07/23	13:30:59	44.6
221	2021/07/23	13:31:02	42.6
222	2021/07/23	13:31:05	43.7
223	2021/07/23	13:31:08	40.9
224	2021/07/23	13:31:11	40.6
225	2021/07/23	13:31:14	42.7
226	2021/07/23	13:31:17	64.5
227	2021/07/23	13:31:20	66.5
228	2021/07/23	13:31:23	72.8
229	2021/07/23	13:31:26	70.5
230	2021/07/23	13:31:29	60.3
231	2021/07/23	13:31:32	52.6
232	2021/07/23	13:31:35	47.7
233	2021/07/23	13:31:38	50.0
234	2021/07/23	13:31:41	49.7
235	2021/07/23	13:31:44	75.0
236	2021/07/23	13:31:47	70.5
237	2021/07/23	13:31:50	61.0
238	2021/07/23	13:31:53	54.2
239	2021/07/23	13:31:56	48.4
240	2021/07/23	13:31:59	44.7
241	2021/07/23	13:32:02	42.6
242	2021/07/23	13:32:05	41.9
243	2021/07/23	13:32:08	40.9
244	2021/07/23	13:32:11	41.5
245	2021/07/23	13:32:14	41.1
246	2021/07/23	13:32:17	46.0
247	2021/07/23	13:32:20	43.1
248	2021/07/23	13:32:23	43.3
249	2021/07/23	13:32:26	44.7
250	2021/07/23	13:32:29	42.5
251	2021/07/23	13:32:32	42.9
252	2021/07/23	13:32:35	46.7
253	2021/07/23	13:32:38	74.9
254	2021/07/23	13:32:41	63.6
255	2021/07/23	13:32:44	52.5
256	2021/07/23	13:32:47	47.1
257	2021/07/23	13:32:50	45.1
258	2021/07/23	13:32:53	43.3
259	2021/07/23	13:32:56	41.7
260	2021/07/23	13:32:59	42.2
261	2021/07/23	13:33:02	44.3
262	2021/07/23	13:33:05	44.1
263	2021/07/23	13:33:08	43.6
264	2021/07/23	13:33:11	41.3
265	2021/07/23	13:33:14	42.1
266	2021/07/23	13:33:17	40.9
267	2021/07/23	13:33:20	44.2
268	2021/07/23	13:33:23	46.4
269	2021/07/23	13:33:26	42.6
270	2021/07/23	13:33:29	44.8
271	2021/07/23	13:33:32	48.6
272	2021/07/23	13:33:35	67.8
273	2021/07/23	13:33:38	76.2
274	2021/07/23	13:33:41	65.0
275	2021/07/23	13:33:44	55.9
276	2021/07/23	13:33:47	52.3
277	2021/07/23	13:33:50	56.8
278	2021/07/23	13:33:53	71.3
279	2021/07/23	13:33:56	59.6
280	2021/07/23	13:33:59	51.3
281	2021/07/23	13:34:02	46.7
282	2021/07/23	13:34:05	59.3
283	2021/07/23	13:34:08	51.1
284	2021/07/23	13:34:11	44.9
285	2021/07/23	13:34:14	44.5
286	2021/07/23	13:34:17	45.4
287	2021/07/23	13:34:20	44.1
288	2021/07/23	13:34:23	44.3
289	2021/07/23	13:34:26	49.5
290	2021/07/23	13:34:29	72.9
291	2021/07/23	13:34:32	69.8
292	2021/07/23	13:34:35	66.2
293	2021/07/23	13:34:38	74.7
294	2021/07/23	13:34:41	67.6
295	2021/07/23	13:34:44	73.4
296	2021/07/23	13:34:47	64.4
297	2021/07/23	13:34:50	53.0
298	2021/07/23	13:34:53	46.1

299	2021/07/23	13:34:56	48.8
300	2021/07/23	13:34:59	45.3

NM2

Freq weight : A
 Time weight : SLOW
 Level Range : 40-100
 Max dB : 77.5 - 2021/07/23 13:51:19
 Level Range : 40-100
 SEL : 93.9
 Leq : 64.4

No.s	Date Time	(dB)
1	2021/07/23 13:48:19	49.7
2	2021/07/23 13:48:22	63.7
3	2021/07/23 13:48:25	59.6
4	2021/07/23 13:48:28	57.3
5	2021/07/23 13:48:31	66.1
6	2021/07/23 13:48:34	55.7
7	2021/07/23 13:48:37	70.1
8	2021/07/23 13:48:40	61.9
9	2021/07/23 13:48:43	66.1
10	2021/07/23 13:48:46	57.1
11	2021/07/23 13:48:49	47.7
12	2021/07/23 13:48:52	43.8
13	2021/07/23 13:48:55	43.8
14	2021/07/23 13:48:58	45.5
15	2021/07/23 13:49:01	64.2
16	2021/07/23 13:49:04	66.5
17	2021/07/23 13:49:07	56.0
18	2021/07/23 13:49:10	69.4
19	2021/07/23 13:49:13	63.5
20	2021/07/23 13:49:16	52.4
21	2021/07/23 13:49:19	47.4
22	2021/07/23 13:49:22	48.6
23	2021/07/23 13:49:25	55.4
24	2021/07/23 13:49:28	66.1
25	2021/07/23 13:49:31	72.9
26	2021/07/23 13:49:34	67.2
27	2021/07/23 13:49:37	57.8
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29	2021/07/23 13:49:43	44.1
30	2021/07/23 13:49:46	43.1
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32	2021/07/23 13:49:52	66.6
33	2021/07/23 13:49:55	54.4
34	2021/07/23 13:49:58	43.6
35	2021/07/23 13:50:01	38.6
36	2021/07/23 13:50:04	39.0
37	2021/07/23 13:50:07	43.5
38	2021/07/23 13:50:10	64.6
39	2021/07/23 13:50:13	67.0
40	2021/07/23 13:50:16	63.9
41	2021/07/23 13:50:19	68.9
42	2021/07/23 13:50:22	75.9
43	2021/07/23 13:50:25	69.1
44	2021/07/23 13:50:28	63.9
45	2021/07/23 13:50:31	68.9
46	2021/07/23 13:50:34	60.3
47	2021/07/23 13:50:37	52.1
48	2021/07/23 13:50:40	43.3
49	2021/07/23 13:50:43	43.2
50	2021/07/23 13:50:46	63.8
51	2021/07/23 13:50:49	64.8
52	2021/07/23 13:50:52	55.6
53	2021/07/23 13:50:55	65.3
54	2021/07/23 13:50:58	58.0
55	2021/07/23 13:51:01	67.6
56	2021/07/23 13:51:04	75.5
57	2021/07/23 13:51:07	70.9
58	2021/07/23 13:51:10	68.4
59	2021/07/23 13:51:13	63.4
60	2021/07/23 13:51:16	74.7
61	2021/07/23 13:51:19	71.5
62	2021/07/23 13:51:22	59.9
63	2021/07/23 13:51:25	49.5
64	2021/07/23 13:51:28	43.9
65	2021/07/23 13:51:31	41.2
66	2021/07/23 13:51:34	42.9
67	2021/07/23 13:51:37	40.8
68	2021/07/23 13:51:40	41.4
69	2021/07/23 13:51:43	44.3
70	2021/07/23 13:51:46	45.4
71	2021/07/23 13:51:49	64.3
72	2021/07/23 13:51:52	60.2
73	2021/07/23 13:51:55	51.0
74	2021/07/23 13:51:58	51.8
75	2021/07/23 13:52:01	59.8
76	2021/07/23 13:52:04	68.6
77	2021/07/23 13:52:07	69.9
78	2021/07/23 13:52:10	67.9
79	2021/07/23 13:52:13	62.7
80	2021/07/23 13:52:16	65.4
81	2021/07/23 13:52:19	68.1
82	2021/07/23 13:52:22	61.0
83	2021/07/23 13:52:25	53.7
84	2021/07/23 13:52:28	48.7
85	2021/07/23 13:52:31	44.8
86	2021/07/23 13:52:34	47.6
87	2021/07/23 13:52:37	50.4
88	2021/07/23 13:52:40	42.5
89	2021/07/23 13:52:43	43.3
90	2021/07/23 13:52:46	45.4

91	2021/07/23	13:52:49	43.4
92	2021/07/23	13:52:52	45.3
93	2021/07/23	13:52:55	43.1
94	2021/07/23	13:52:58	43.0
95	2021/07/23	13:53:01	43.1
96	2021/07/23	13:53:04	44.9
97	2021/07/23	13:53:07	42.3
98	2021/07/23	13:53:10	44.8
99	2021/07/23	13:53:13	48.4
100	2021/07/23	13:53:16	68.9
101	2021/07/23	13:53:19	62.9
102	2021/07/23	13:53:22	68.6
103	2021/07/23	13:53:25	69.9
104	2021/07/23	13:53:28	69.4
105	2021/07/23	13:53:31	68.4
106	2021/07/23	13:53:34	63.3
107	2021/07/23	13:53:37	53.4
108	2021/07/23	13:53:40	48.9
109	2021/07/23	13:53:43	53.3
110	2021/07/23	13:53:46	64.6
111	2021/07/23	13:53:49	72.6
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114	2021/07/23	13:53:58	67.2
115	2021/07/23	13:54:01	60.4
116	2021/07/23	13:54:04	68.4
117	2021/07/23	13:54:07	75.7
118	2021/07/23	13:54:10	69.9
119	2021/07/23	13:54:13	60.2
120	2021/07/23	13:54:16	63.9
121	2021/07/23	13:54:19	67.0
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130	2021/07/23	13:54:46	48.6
131	2021/07/23	13:54:49	52.9
132	2021/07/23	13:54:52	68.6
133	2021/07/23	13:54:55	61.0
134	2021/07/23	13:54:58	51.2
135	2021/07/23	13:55:01	45.2
136	2021/07/23	13:55:04	42.6
137	2021/07/23	13:55:07	43.9
138	2021/07/23	13:55:10	46.5
139	2021/07/23	13:55:13	43.9
140	2021/07/23	13:55:16	42.5
141	2021/07/23	13:55:19	44.2
142	2021/07/23	13:55:22	63.4
143	2021/07/23	13:55:25	61.9
144	2021/07/23	13:55:28	57.5
145	2021/07/23	13:55:31	67.2
146	2021/07/23	13:55:34	70.0
147	2021/07/23	13:55:37	58.8
148	2021/07/23	13:55:40	48.2
149	2021/07/23	13:55:43	43.6
150	2021/07/23	13:55:46	42.7
151	2021/07/23	13:55:49	41.1
152	2021/07/23	13:55:52	40.4
153	2021/07/23	13:55:55	39.7
154	2021/07/23	13:55:58	38.9
155	2021/07/23	13:56:01	36.7
156	2021/07/23	13:56:04	36.8
157	2021/07/23	13:56:07	45.7
158	2021/07/23	13:56:10	52.6
159	2021/07/23	13:56:13	56.7
160	2021/07/23	13:56:16	47.3
161	2021/07/23	13:56:19	47.2
162	2021/07/23	13:56:22	48.1
163	2021/07/23	13:56:25	57.9
164	2021/07/23	13:56:28	67.2
165	2021/07/23	13:56:31	74.0
166	2021/07/23	13:56:34	65.5
167	2021/07/23	13:56:37	74.1
168	2021/07/23	13:56:40	67.9
169	2021/07/23	13:56:43	58.0
170	2021/07/23	13:56:46	47.9
171	2021/07/23	13:56:49	46.5
172	2021/07/23	13:56:52	39.8
173	2021/07/23	13:56:55	37.9
174	2021/07/23	13:56:58	38.2
175	2021/07/23	13:57:01	38.2
176	2021/07/23	13:57:04	39.1
177	2021/07/23	13:57:07	37.8
178	2021/07/23	13:57:10	37.5
179	2021/07/23	13:57:13	37.1
180	2021/07/23	13:57:16	34.7
181	2021/07/23	13:57:19	34.3
182	2021/07/23	13:57:22	34.5
183	2021/07/23	13:57:25	34.8
184	2021/07/23	13:57:28	40.6
185	2021/07/23	13:57:31	53.6
186	2021/07/23	13:57:34	64.4
187	2021/07/23	13:57:37	55.5
188	2021/07/23	13:57:40	45.8
189	2021/07/23	13:57:43	40.2
190	2021/07/23	13:57:46	38.4
191	2021/07/23	13:57:49	39.8
192	2021/07/23	13:57:52	48.5
193	2021/07/23	13:57:55	66.3
194	2021/07/23	13:57:58	58.6

195	2021/07/23	13:58:01	47.7
196	2021/07/23	13:58:04	39.9
197	2021/07/23	13:58:07	42.4
198	2021/07/23	13:58:10	44.2
199	2021/07/23	13:58:13	40.5
200	2021/07/23	13:58:16	44.4
201	2021/07/23	13:58:19	42.6
202	2021/07/23	13:58:22	42.2
203	2021/07/23	13:58:25	47.5
204	2021/07/23	13:58:28	55.5
205	2021/07/23	13:58:31	71.7
206	2021/07/23	13:58:34	67.0
207	2021/07/23	13:58:37	57.3
208	2021/07/23	13:58:40	64.5
209	2021/07/23	13:58:43	56.6
210	2021/07/23	13:58:46	47.8
211	2021/07/23	13:58:49	43.7
212	2021/07/23	13:58:52	40.9
213	2021/07/23	13:58:55	37.7
214	2021/07/23	13:58:58	35.1
215	2021/07/23	13:59:01	36.4
216	2021/07/23	13:59:04	45.0
217	2021/07/23	13:59:07	67.6
218	2021/07/23	13:59:10	61.8
219	2021/07/23	13:59:13	55.5
220	2021/07/23	13:59:16	66.0
221	2021/07/23	13:59:19	55.0
222	2021/07/23	13:59:22	44.0
223	2021/07/23	13:59:25	42.6
224	2021/07/23	13:59:28	49.7
225	2021/07/23	13:59:31	65.5
226	2021/07/23	13:59:34	64.0
227	2021/07/23	13:59:37	70.8
228	2021/07/23	13:59:40	62.6
229	2021/07/23	13:59:43	66.7
230	2021/07/23	13:59:46	63.7
231	2021/07/23	13:59:49	71.5
232	2021/07/23	13:59:52	65.1
233	2021/07/23	13:59:55	59.2
234	2021/07/23	13:59:58	51.2
235	2021/07/23	14:00:01	56.7
236	2021/07/23	14:00:04	66.2
237	2021/07/23	14:00:07	72.7
238	2021/07/23	14:00:10	67.0
239	2021/07/23	14:00:13	66.2
240	2021/07/23	14:00:16	73.0
241	2021/07/23	14:00:19	66.6
242	2021/07/23	14:00:22	56.4
243	2021/07/23	14:00:25	48.7
244	2021/07/23	14:00:28	44.5
245	2021/07/23	14:00:31	41.6
246	2021/07/23	14:00:34	41.0
247	2021/07/23	14:00:37	40.6
248	2021/07/23	14:00:40	45.6
249	2021/07/23	14:00:43	63.9
250	2021/07/23	14:00:46	63.8
251	2021/07/23	14:00:49	70.1
252	2021/07/23	14:00:52	60.8
253	2021/07/23	14:00:55	67.4
254	2021/07/23	14:00:58	66.4
255	2021/07/23	14:01:01	58.9
256	2021/07/23	14:01:04	54.9
257	2021/07/23	14:01:07	67.2
258	2021/07/23	14:01:10	56.8
259	2021/07/23	14:01:13	47.8
260	2021/07/23	14:01:16	45.7
261	2021/07/23	14:01:19	45.3
262	2021/07/23	14:01:22	46.2
263	2021/07/23	14:01:25	48.3
264	2021/07/23	14:01:28	49.0
265	2021/07/23	14:01:31	55.3
266	2021/07/23	14:01:34	64.9
267	2021/07/23	14:01:37	68.5
268	2021/07/23	14:01:40	69.6
269	2021/07/23	14:01:43	65.5
270	2021/07/23	14:01:46	55.9
271	2021/07/23	14:01:49	47.5
272	2021/07/23	14:01:52	44.1
273	2021/07/23	14:01:55	51.0
274	2021/07/23	14:01:58	67.7
275	2021/07/23	14:02:01	71.7
276	2021/07/23	14:02:04	70.5
277	2021/07/23	14:02:07	65.1
278	2021/07/23	14:02:10	64.3
279	2021/07/23	14:02:13	64.3
280	2021/07/23	14:02:16	62.1
281	2021/07/23	14:02:19	58.7
282	2021/07/23	14:02:22	54.4
283	2021/07/23	14:02:25	47.7
284	2021/07/23	14:02:28	45.7
285	2021/07/23	14:02:31	60.9
286	2021/07/23	14:02:34	66.2
287	2021/07/23	14:02:37	68.2
288	2021/07/23	14:02:40	60.0
289	2021/07/23	14:02:43	53.8
290	2021/07/23	14:02:46	48.6
291	2021/07/23	14:02:49	47.5
292	2021/07/23	14:02:52	44.4
293	2021/07/23	14:02:55	49.4
294	2021/07/23	14:02:58	63.1
295	2021/07/23	14:03:01	55.8
296	2021/07/23	14:03:04	46.6
297	2021/07/23	14:03:07	44.6
298	2021/07/23	14:03:10	44.9

299	2021/07/23	14:03:13	48.2
300	2021/07/23	14:03:16	57.6

NM3

Freq weight : A
 Time Weight : SLOW
 Level Range : 40-100
 Max dB : 88.9 - 2021/07/23 14:13:37
 Level Range : 40-100
 SEL : 99.5
 Leq : 68.4

No.s	Date Time	(dB)
1	2021/07/23 14:12:36	56.1
2	2021/07/23 14:12:39	51.7
3	2021/07/23 14:12:42	48.8
4	2021/07/23 14:12:45	44.4
5	2021/07/23 14:12:48	41.1
6	2021/07/23 14:12:51	37.5
7	2021/07/23 14:12:54	37.1
8	2021/07/23 14:12:57	37.0
9	2021/07/23 14:13:00	36.5
10	2021/07/23 14:13:03	37.4
11	2021/07/23 14:13:06	37.8
12	2021/07/23 14:13:09	37.4
13	2021/07/23 14:13:12	41.3
14	2021/07/23 14:13:15	46.1
15	2021/07/23 14:13:18	61.5
16	2021/07/23 14:13:21	71.9
17	2021/07/23 14:13:24	60.2
18	2021/07/23 14:13:27	51.5
19	2021/07/23 14:13:30	53.5
20	2021/07/23 14:13:33	75.1
21	2021/07/23 14:13:36	83.3
22	2021/07/23 14:13:39	79.9
23	2021/07/23 14:13:42	71.1
24	2021/07/23 14:13:45	63.5
25	2021/07/23 14:13:48	59.2
26	2021/07/23 14:13:51	57.2
27	2021/07/23 14:13:54	55.2
28	2021/07/23 14:13:57	71.6
29	2021/07/23 14:14:00	71.7
30	2021/07/23 14:14:03	80.1
31	2021/07/23 14:14:06	77.4
32	2021/07/23 14:14:09	72.7
33	2021/07/23 14:14:12	65.5
34	2021/07/23 14:14:15	55.5
35	2021/07/23 14:14:18	47.0
36	2021/07/23 14:14:21	42.3
37	2021/07/23 14:14:24	41.9
38	2021/07/23 14:14:27	37.6
39	2021/07/23 14:14:30	35.8
40	2021/07/23 14:14:33	35.1
41	2021/07/23 14:14:36	38.2
42	2021/07/23 14:14:39	37.0
43	2021/07/23 14:14:42	36.4
44	2021/07/23 14:14:45	40.6
45	2021/07/23 14:14:48	35.6
46	2021/07/23 14:14:51	35.4
47	2021/07/23 14:14:54	36.1
48	2021/07/23 14:14:57	39.6
49	2021/07/23 14:15:00	53.7
50	2021/07/23 14:15:03	73.3
51	2021/07/23 14:15:06	61.0
52	2021/07/23 14:15:09	51.2
53	2021/07/23 14:15:12	60.1
54	2021/07/23 14:15:15	74.0
55	2021/07/23 14:15:18	62.2
56	2021/07/23 14:15:21	50.7
57	2021/07/23 14:15:24	41.4
58	2021/07/23 14:15:27	37.8
59	2021/07/23 14:15:30	37.1
60	2021/07/23 14:15:33	36.5
61	2021/07/23 14:15:36	37.4
62	2021/07/23 14:15:39	39.7
63	2021/07/23 14:15:42	43.4
64	2021/07/23 14:15:45	72.4
65	2021/07/23 14:15:48	74.4
66	2021/07/23 14:15:51	62.8
67	2021/07/23 14:15:54	52.9
68	2021/07/23 14:15:57	44.2
69	2021/07/23 14:16:00	40.9
70	2021/07/23 14:16:03	38.0
71	2021/07/23 14:16:06	37.1
72	2021/07/23 14:16:09	36.7
73	2021/07/23 14:16:12	36.1
74	2021/07/23 14:16:15	36.2
75	2021/07/23 14:16:18	35.4
76	2021/07/23 14:16:21	36.0
77	2021/07/23 14:16:24	36.5
78	2021/07/23 14:16:27	38.1
79	2021/07/23 14:16:30	38.8
80	2021/07/23 14:16:33	40.0
81	2021/07/23 14:16:36	48.7
82	2021/07/23 14:16:39	82.6
83	2021/07/23 14:16:42	73.3
84	2021/07/23 14:16:45	63.1
85	2021/07/23 14:16:48	79.7
86	2021/07/23 14:16:51	68.3
87	2021/07/23 14:16:54	57.7
88	2021/07/23 14:16:57	49.6
89	2021/07/23 14:17:00	56.1
90	2021/07/23 14:17:03	73.8

91	2021/07/23	14:17:06	63.1
92	2021/07/23	14:17:09	55.7
93	2021/07/23	14:17:12	54.6
94	2021/07/23	14:17:15	61.6
95	2021/07/23	14:17:18	70.8
96	2021/07/23	14:17:21	60.9
97	2021/07/23	14:17:24	53.7
98	2021/07/23	14:17:27	47.9
99	2021/07/23	14:17:30	43.0
100	2021/07/23	14:17:33	45.8
101	2021/07/23	14:17:36	44.5
102	2021/07/23	14:17:39	44.1
103	2021/07/23	14:17:42	45.5
104	2021/07/23	14:17:45	42.8
105	2021/07/23	14:17:48	40.6
106	2021/07/23	14:17:51	38.9
107	2021/07/23	14:17:54	39.1
108	2021/07/23	14:17:57	40.4
109	2021/07/23	14:18:00	50.7
110	2021/07/23	14:18:03	77.8
111	2021/07/23	14:18:06	66.8
112	2021/07/23	14:18:09	74.3
113	2021/07/23	14:18:12	67.0
114	2021/07/23	14:18:15	65.3
115	2021/07/23	14:18:18	71.5
116	2021/07/23	14:18:21	62.9
117	2021/07/23	14:18:24	84.0
118	2021/07/23	14:18:27	73.6
119	2021/07/23	14:18:30	72.7
120	2021/07/23	14:18:33	65.0
121	2021/07/23	14:18:36	59.8
122	2021/07/23	14:18:39	57.5
123	2021/07/23	14:18:42	56.1
124	2021/07/23	14:18:45	53.2
125	2021/07/23	14:18:48	51.0
126	2021/07/23	14:18:51	48.9
127	2021/07/23	14:18:54	47.0
128	2021/07/23	14:18:57	45.0
129	2021/07/23	14:19:00	44.4
130	2021/07/23	14:19:03	44.5
131	2021/07/23	14:19:06	43.6
132	2021/07/23	14:19:09	43.1
133	2021/07/23	14:19:12	43.0
134	2021/07/23	14:19:15	42.5
135	2021/07/23	14:19:18	41.5
136	2021/07/23	14:19:21	43.1
137	2021/07/23	14:19:24	41.4
138	2021/07/23	14:19:27	38.6
139	2021/07/23	14:19:30	36.4
140	2021/07/23	14:19:33	36.5
141	2021/07/23	14:19:36	35.7
142	2021/07/23	14:19:39	36.5
143	2021/07/23	14:19:42	37.0
144	2021/07/23	14:19:45	35.0
145	2021/07/23	14:19:48	34.6
146	2021/07/23	14:19:51	35.0
147	2021/07/23	14:19:54	35.8
148	2021/07/23	14:19:57	35.2
149	2021/07/23	14:20:00	35.3
150	2021/07/23	14:20:03	36.4
151	2021/07/23	14:20:06	36.1
152	2021/07/23	14:20:09	35.6
153	2021/07/23	14:20:12	36.0
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155	2021/07/23	14:20:18	37.7
156	2021/07/23	14:20:21	37.6
157	2021/07/23	14:20:24	35.7
158	2021/07/23	14:20:27	34.0
159	2021/07/23	14:20:30	34.5
160	2021/07/23	14:20:33	35.2
161	2021/07/23	14:20:36	35.5
162	2021/07/23	14:20:39	37.9
163	2021/07/23	14:20:42	56.7
164	2021/07/23	14:20:45	69.7
165	2021/07/23	14:20:48	72.4
166	2021/07/23	14:20:51	68.2
167	2021/07/23	14:20:54	58.2
168	2021/07/23	14:20:57	49.1
169	2021/07/23	14:21:00	40.7
170	2021/07/23	14:21:03	35.8
171	2021/07/23	14:21:06	36.1
172	2021/07/23	14:21:09	38.2
173	2021/07/23	14:21:12	48.2
174	2021/07/23	14:21:15	71.8
175	2021/07/23	14:21:18	72.5
176	2021/07/23	14:21:21	64.4
177	2021/07/23	14:21:24	53.6
178	2021/07/23	14:21:27	56.0
179	2021/07/23	14:21:30	70.0
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181	2021/07/23	14:21:36	50.0
182	2021/07/23	14:21:39	41.1
183	2021/07/23	14:21:42	36.7
184	2021/07/23	14:21:45	35.7
185	2021/07/23	14:21:48	36.4
186	2021/07/23	14:21:51	35.1
187	2021/07/23	14:21:54	34.3
188	2021/07/23	14:21:57	35.1
189	2021/07/23	14:22:00	36.1
190	2021/07/23	14:22:03	38.2
191	2021/07/23	14:22:06	37.1
192	2021/07/23	14:22:09	36.3
193	2021/07/23	14:22:12	35.7
194	2021/07/23	14:22:15	36.4

195	2021/07/23	14:22:18	37.5
196	2021/07/23	14:22:21	38.5
197	2021/07/23	14:22:24	40.4
198	2021/07/23	14:22:27	50.4
199	2021/07/23	14:22:30	70.7
200	2021/07/23	14:22:33	70.0
201	2021/07/23	14:22:36	61.7
202	2021/07/23	14:22:39	52.3
203	2021/07/23	14:22:42	44.8
204	2021/07/23	14:22:45	38.7
205	2021/07/23	14:22:48	36.8
206	2021/07/23	14:22:51	35.9
207	2021/07/23	14:22:54	35.6
208	2021/07/23	14:22:57	35.8
209	2021/07/23	14:23:00	35.9
210	2021/07/23	14:23:03	35.3
211	2021/07/23	14:23:06	34.4
212	2021/07/23	14:23:09	35.2
213	2021/07/23	14:23:12	36.0
214	2021/07/23	14:23:15	36.3
215	2021/07/23	14:23:18	36.3
216	2021/07/23	14:23:21	40.1
217	2021/07/23	14:23:24	47.8
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221	2021/07/23	14:23:36	61.5
222	2021/07/23	14:23:39	55.1
223	2021/07/23	14:23:42	53.6
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225	2021/07/23	14:23:48	66.2
226	2021/07/23	14:23:51	57.7
227	2021/07/23	14:23:54	53.5
228	2021/07/23	14:23:57	75.2
229	2021/07/23	14:24:00	80.5
230	2021/07/23	14:24:03	70.9
231	2021/07/23	14:24:06	61.1
232	2021/07/23	14:24:09	53.4
233	2021/07/23	14:24:12	49.8
234	2021/07/23	14:24:15	44.4
235	2021/07/23	14:24:18	43.3
236	2021/07/23	14:24:21	41.1
237	2021/07/23	14:24:24	41.1
238	2021/07/23	14:24:27	48.9
239	2021/07/23	14:24:30	72.5
240	2021/07/23	14:24:33	64.7
241	2021/07/23	14:24:36	53.8
242	2021/07/23	14:24:39	44.6
243	2021/07/23	14:24:42	39.8
244	2021/07/23	14:24:45	38.6
245	2021/07/23	14:24:48	39.6
246	2021/07/23	14:24:51	40.8
247	2021/07/23	14:24:54	44.1
248	2021/07/23	14:24:57	46.0
249	2021/07/23	14:25:00	46.5
250	2021/07/23	14:25:03	48.5
251	2021/07/23	14:25:06	49.8
252	2021/07/23	14:25:09	61.9
253	2021/07/23	14:25:12	73.8
254	2021/07/23	14:25:15	78.4
255	2021/07/23	14:25:18	67.3
256	2021/07/23	14:25:21	57.7
257	2021/07/23	14:25:24	70.7
258	2021/07/23	14:25:27	68.5
259	2021/07/23	14:25:30	61.2
260	2021/07/23	14:25:33	57.7
261	2021/07/23	14:25:36	54.0
262	2021/07/23	14:25:39	49.0
263	2021/07/23	14:25:42	52.0
264	2021/07/23	14:25:45	70.7
265	2021/07/23	14:25:48	74.6
266	2021/07/23	14:25:51	65.3
267	2021/07/23	14:25:54	59.7
268	2021/07/23	14:25:57	55.8
269	2021/07/23	14:26:00	52.1
270	2021/07/23	14:26:03	45.5
271	2021/07/23	14:26:06	39.6
272	2021/07/23	14:26:09	39.1
273	2021/07/23	14:26:12	36.5
274	2021/07/23	14:26:15	35.2
275	2021/07/23	14:26:18	35.2
276	2021/07/23	14:26:21	35.2
277	2021/07/23	14:26:24	34.5
278	2021/07/23	14:26:27	35.4
279	2021/07/23	14:26:30	35.5
280	2021/07/23	14:26:33	35.2
281	2021/07/23	14:26:36	34.4
282	2021/07/23	14:26:39	35.1
283	2021/07/23	14:26:42	35.8
284	2021/07/23	14:26:45	36.2
285	2021/07/23	14:26:48	36.1
286	2021/07/23	14:26:51	35.9
287	2021/07/23	14:26:54	41.6
288	2021/07/23	14:26:57	43.7
289	2021/07/23	14:27:00	41.8
290	2021/07/23	14:27:03	41.9
291	2021/07/23	14:27:06	42.2
292	2021/07/23	14:27:09	41.6
293	2021/07/23	14:27:12	41.4
294	2021/07/23	14:27:15	41.4
295	2021/07/23	14:27:18	41.9
296	2021/07/23	14:27:21	43.6
297	2021/07/23	14:27:24	43.1
298	2021/07/23	14:27:27	42.5

299	2021/07/23	14:27:30	42.8
300	2021/07/23	14:27:33	43.3

NM4

Freq weight : A
 Time weight : SLOW
 Level Range : 40-100
 Max dB : 88.3 - 2021/07/23 14:57:22
 Level Range : 40-100
 SEL : 99.5
 Leq : 71.1

No.s	Date Time	(dB)
1	2021/07/23 14:44:01	76.6
2	2021/07/23 14:44:04	69.0
3	2021/07/23 14:44:07	57.2
4	2021/07/23 14:44:10	45.8
5	2021/07/23 14:44:13	38.5
6	2021/07/23 14:44:16	41.1
7	2021/07/23 14:44:19	52.7
8	2021/07/23 14:44:22	81.8
9	2021/07/23 14:44:25	76.4
10	2021/07/23 14:44:28	71.4
11	2021/07/23 14:44:31	77.9
12	2021/07/23 14:44:34	71.4
13	2021/07/23 14:44:37	60.6
14	2021/07/23 14:44:40	48.8
15	2021/07/23 14:44:43	41.9
16	2021/07/23 14:44:46	54.7
17	2021/07/23 14:44:49	73.4
18	2021/07/23 14:44:52	65.2
19	2021/07/23 14:44:55	54.8
20	2021/07/23 14:44:58	77.9
21	2021/07/23 14:45:01	69.4
22	2021/07/23 14:45:04	68.2
23	2021/07/23 14:45:07	72.5
24	2021/07/23 14:45:10	62.4
25	2021/07/23 14:45:13	56.0
26	2021/07/23 14:45:16	50.1
27	2021/07/23 14:45:19	47.4
28	2021/07/23 14:45:22	61.9
29	2021/07/23 14:45:25	72.3
30	2021/07/23 14:45:28	63.2
31	2021/07/23 14:45:31	51.7
32	2021/07/23 14:45:34	44.5
33	2021/07/23 14:45:37	38.6
34	2021/07/23 14:45:40	34.5
35	2021/07/23 14:45:43	37.0
36	2021/07/23 14:45:46	43.9
37	2021/07/23 14:45:49	62.9
38	2021/07/23 14:45:52	75.8
39	2021/07/23 14:45:55	80.8
40	2021/07/23 14:45:58	75.1
41	2021/07/23 14:46:01	66.6
42	2021/07/23 14:46:04	58.6
43	2021/07/23 14:46:07	53.4
44	2021/07/23 14:46:10	51.6
45	2021/07/23 14:46:13	75.1
46	2021/07/23 14:46:16	66.9
47	2021/07/23 14:46:19	57.2
48	2021/07/23 14:46:22	56.3
49	2021/07/23 14:46:25	47.8
50	2021/07/23 14:46:28	53.8
51	2021/07/23 14:46:31	50.7
52	2021/07/23 14:46:34	48.2
53	2021/07/23 14:46:37	44.3
54	2021/07/23 14:46:40	40.9
55	2021/07/23 14:46:43	40.3
56	2021/07/23 14:46:46	49.0
57	2021/07/23 14:46:49	65.9
58	2021/07/23 14:46:52	80.2
59	2021/07/23 14:46:55	78.6
60	2021/07/23 14:46:58	68.3
61	2021/07/23 14:47:01	58.8
62	2021/07/23 14:47:04	58.9
63	2021/07/23 14:47:07	76.6
64	2021/07/23 14:47:10	69.4
65	2021/07/23 14:47:13	58.8
66	2021/07/23 14:47:16	47.6
67	2021/07/23 14:47:19	39.8
68	2021/07/23 14:47:22	42.0
69	2021/07/23 14:47:25	57.3
70	2021/07/23 14:47:28	73.4
71	2021/07/23 14:47:31	65.2
72	2021/07/23 14:47:34	54.4
73	2021/07/23 14:47:37	69.3
74	2021/07/23 14:47:40	75.4
75	2021/07/23 14:47:43	66.0
76	2021/07/23 14:47:46	60.5
77	2021/07/23 14:47:49	52.9
78	2021/07/23 14:47:52	43.9
79	2021/07/23 14:47:55	39.2
80	2021/07/23 14:47:58	37.3
81	2021/07/23 14:48:01	49.2
82	2021/07/23 14:48:04	78.2
83	2021/07/23 14:48:07	67.5
84	2021/07/23 14:48:10	56.3
85	2021/07/23 14:48:13	47.4
86	2021/07/23 14:48:16	44.0
87	2021/07/23 14:48:19	41.4
88	2021/07/23 14:48:22	59.0
89	2021/07/23 14:48:25	73.8
90	2021/07/23 14:48:28	63.5

91	2021/07/23	14:48:31	51.6
92	2021/07/23	14:48:34	40.7
93	2021/07/23	14:48:37	33.4
94	2021/07/23	14:48:40	31.3
95	2021/07/23	14:48:43	31.1
96	2021/07/23	14:48:46	29.7
97	2021/07/23	14:48:49	29.4
98	2021/07/23	14:48:52	30.7
99	2021/07/23	14:48:55	30.6
100	2021/07/23	14:48:58	31.0
101	2021/07/23	14:49:01	32.6
102	2021/07/23	14:49:04	35.2
103	2021/07/23	14:49:07	36.4
104	2021/07/23	14:49:10	39.4
105	2021/07/23	14:49:13	45.7
106	2021/07/23	14:49:16	60.9
107	2021/07/23	14:49:19	75.1
108	2021/07/23	14:49:22	73.8
109	2021/07/23	14:49:25	66.0
110	2021/07/23	14:49:28	66.7
111	2021/07/23	14:49:31	70.6
112	2021/07/23	14:49:34	61.1
113	2021/07/23	14:49:37	55.4
114	2021/07/23	14:49:40	65.4
115	2021/07/23	14:49:43	69.0
116	2021/07/23	14:49:46	60.8
117	2021/07/23	14:49:49	66.2
118	2021/07/23	14:49:52	70.1
119	2021/07/23	14:49:55	81.5
120	2021/07/23	14:49:58	75.9
121	2021/07/23	14:50:01	67.3
122	2021/07/23	14:50:04	58.9
123	2021/07/23	14:50:07	50.3
124	2021/07/23	14:50:10	41.9
125	2021/07/23	14:50:13	36.6
126	2021/07/23	14:50:16	34.1
127	2021/07/23	14:50:19	35.1
128	2021/07/23	14:50:22	31.5
129	2021/07/23	14:50:25	32.9
130	2021/07/23	14:50:28	34.4
131	2021/07/23	14:50:31	32.6
132	2021/07/23	14:50:34	33.4
133	2021/07/23	14:50:37	33.0
134	2021/07/23	14:50:40	33.6
135	2021/07/23	14:50:43	32.9
136	2021/07/23	14:50:46	32.0
137	2021/07/23	14:50:49	31.3
138	2021/07/23	14:50:52	30.7
139	2021/07/23	14:50:55	33.1
140	2021/07/23	14:50:58	37.4
141	2021/07/23	14:51:01	36.1
142	2021/07/23	14:51:04	38.3
143	2021/07/23	14:51:07	39.8
144	2021/07/23	14:51:10	49.3
145	2021/07/23	14:51:13	77.7
146	2021/07/23	14:51:16	67.6
147	2021/07/23	14:51:19	61.6
148	2021/07/23	14:51:22	52.6
149	2021/07/23	14:51:25	45.6
150	2021/07/23	14:51:28	41.7
151	2021/07/23	14:51:31	40.5
152	2021/07/23	14:51:34	41.3
153	2021/07/23	14:51:37	45.2
154	2021/07/23	14:51:40	56.8
155	2021/07/23	14:51:43	76.0
156	2021/07/23	14:51:46	68.3
157	2021/07/23	14:51:49	60.0
158	2021/07/23	14:51:52	49.4
159	2021/07/23	14:51:55	52.8
160	2021/07/23	14:51:58	75.2
161	2021/07/23	14:52:01	65.6
162	2021/07/23	14:52:04	60.0
163	2021/07/23	14:52:07	83.9
164	2021/07/23	14:52:10	72.0
165	2021/07/23	14:52:13	63.7
166	2021/07/23	14:52:16	59.5
167	2021/07/23	14:52:19	72.6
168	2021/07/23	14:52:22	63.5
169	2021/07/23	14:52:25	54.9
170	2021/07/23	14:52:28	47.9
171	2021/07/23	14:52:31	41.9
172	2021/07/23	14:52:34	41.3
173	2021/07/23	14:52:37	41.9
174	2021/07/23	14:52:40	58.4
175	2021/07/23	14:52:43	72.7
176	2021/07/23	14:52:46	62.3
177	2021/07/23	14:52:49	74.5
178	2021/07/23	14:52:52	64.4
179	2021/07/23	14:52:55	54.8
180	2021/07/23	14:52:58	55.8
181	2021/07/23	14:53:01	59.2
182	2021/07/23	14:53:04	75.5
183	2021/07/23	14:53:07	73.9
184	2021/07/23	14:53:10	63.4
185	2021/07/23	14:53:13	60.8
186	2021/07/23	14:53:16	52.5
187	2021/07/23	14:53:19	57.0
188	2021/07/23	14:53:22	74.9
189	2021/07/23	14:53:25	64.6
190	2021/07/23	14:53:28	58.3
191	2021/07/23	14:53:31	65.6
192	2021/07/23	14:53:34	71.8
193	2021/07/23	14:53:37	60.7
194	2021/07/23	14:53:40	49.1

195	2021/07/23	14:53:43	40.8
196	2021/07/23	14:53:46	47.4
197	2021/07/23	14:53:49	75.6
198	2021/07/23	14:53:52	66.1
199	2021/07/23	14:53:55	56.1
200	2021/07/23	14:53:58	44.8
201	2021/07/23	14:54:01	36.4
202	2021/07/23	14:54:04	33.9
203	2021/07/23	14:54:07	34.8
204	2021/07/23	14:54:10	39.3
205	2021/07/23	14:54:13	57.5
206	2021/07/23	14:54:16	68.0
207	2021/07/23	14:54:19	75.6
208	2021/07/23	14:54:22	68.4
209	2021/07/23	14:54:25	60.6
210	2021/07/23	14:54:28	52.7
211	2021/07/23	14:54:31	78.7
212	2021/07/23	14:54:34	69.7
213	2021/07/23	14:54:37	62.4
214	2021/07/23	14:54:40	75.8
215	2021/07/23	14:54:43	65.7
216	2021/07/23	14:54:46	67.0
217	2021/07/23	14:54:49	69.7
218	2021/07/23	14:54:52	60.0
219	2021/07/23	14:54:55	48.6
220	2021/07/23	14:54:58	39.6
221	2021/07/23	14:55:01	38.2
222	2021/07/23	14:55:04	42.1
223	2021/07/23	14:55:07	58.2
224	2021/07/23	14:55:10	83.9
225	2021/07/23	14:55:13	74.7
226	2021/07/23	14:55:16	62.9
227	2021/07/23	14:55:19	51.1
228	2021/07/23	14:55:22	44.9
229	2021/07/23	14:55:25	66.8
230	2021/07/23	14:55:28	71.4
231	2021/07/23	14:55:31	62.2
232	2021/07/23	14:55:34	50.6
233	2021/07/23	14:55:37	39.8
234	2021/07/23	14:55:40	33.3
235	2021/07/23	14:55:43	33.2
236	2021/07/23	14:55:46	41.1
237	2021/07/23	14:55:49	59.8
238	2021/07/23	14:55:52	71.2
239	2021/07/23	14:55:55	63.6
240	2021/07/23	14:55:58	51.9
241	2021/07/23	14:56:01	41.1
242	2021/07/23	14:56:04	36.4
243	2021/07/23	14:56:07	35.8
244	2021/07/23	14:56:10	37.3
245	2021/07/23	14:56:13	38.9
246	2021/07/23	14:56:16	39.0
247	2021/07/23	14:56:19	48.5
248	2021/07/23	14:56:22	42.7
249	2021/07/23	14:56:25	37.0
250	2021/07/23	14:56:28	34.3
251	2021/07/23	14:56:31	36.5
252	2021/07/23	14:56:34	44.4
253	2021/07/23	14:56:37	77.8
254	2021/07/23	14:56:40	69.9
255	2021/07/23	14:56:43	58.2
256	2021/07/23	14:56:46	48.1
257	2021/07/23	14:56:49	66.4
258	2021/07/23	14:56:52	81.0
259	2021/07/23	14:56:55	70.7
260	2021/07/23	14:56:58	63.0
261	2021/07/23	14:57:01	52.7
262	2021/07/23	14:57:04	43.8
263	2021/07/23	14:57:07	51.7
264	2021/07/23	14:57:10	78.0
265	2021/07/23	14:57:13	70.3
266	2021/07/23	14:57:16	58.8
267	2021/07/23	14:57:19	73.7
268	2021/07/23	14:57:22	88.3
269	2021/07/23	14:57:25	79.1
270	2021/07/23	14:57:28	67.7
271	2021/07/23	14:57:31	56.2
272	2021/07/23	14:57:34	44.7
273	2021/07/23	14:57:37	38.0
274	2021/07/23	14:57:40	42.3
275	2021/07/23	14:57:43	37.8
276	2021/07/23	14:57:46	34.8
277	2021/07/23	14:57:49	38.2
278	2021/07/23	14:57:52	45.7
279	2021/07/23	14:57:55	75.5
280	2021/07/23	14:57:58	64.6
281	2021/07/23	14:58:01	58.3
282	2021/07/23	14:58:04	49.1
283	2021/07/23	14:58:07	42.4
284	2021/07/23	14:58:10	47.4
285	2021/07/23	14:58:13	66.7
286	2021/07/23	14:58:16	66.6
287	2021/07/23	14:58:19	59.2
288	2021/07/23	14:58:22	49.7
289	2021/07/23	14:58:25	49.5
290	2021/07/23	14:58:28	71.2
291	2021/07/23	14:58:31	60.4
292	2021/07/23	14:58:34	50.0
293	2021/07/23	14:58:37	45.2
294	2021/07/23	14:58:40	38.9
295	2021/07/23	14:58:43	41.6
296	2021/07/23	14:58:46	49.7
297	2021/07/23	14:58:49	55.0
298	2021/07/23	14:58:52	80.9

299	2021/07/23	14:58:55	74.3
300	2021/07/23	14:58:58	67.0

Appendix B

Roadway Construction Noise Model (RCNM) Results

Report date: 08/10/2021
Case Description: Jasmine Solar - Parcel Construction

**** Receptor #1 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Reference Distacne	Residential	60.0	55.0	50.0

Equipment

	Impact	Usage	Spec	Actual	Receptor	Estimated
Description	Device	(%)	Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Pickup Truck	No	40		75.0	50.0	0.0
Pneumatic Tools	No	50		85.2	50.0	0.0

Results

[illegible]

**** Receptor #2 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Copus Road Residence	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	225.0	0.0
Excavator	No	40		80.7	225.0	0.0
Front End Loader	No	40		79.1	225.0	0.0
Pickup Truck	No	40		75.0	225.0	0.0
Pneumatic Tools	No	50		85.2	225.0	0.0

Results

[illegible]

**** Receptor #3 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Old River Road Residence	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	4135.0	0.0
Excavator	No	40		80.7	4135.0	0.0
Front End Loader	No	40		79.1	4135.0	0.0
Pickup Truck	No	40		75.0	4135.0	0.0
Pneumatic Tools	No	50		85.2	4135.0	0.0

Results

[illegible]

**** Receptor #4 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Copus Road Residence	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	4115.0	0.0
Excavator	No	40		80.7	4115.0	0.0
Front End Loader	No	40		79.1	4115.0	0.0
Pickup Truck	No	40		75.0	4115.0	0.0
Pneumatic Tools	No	50		85.2	4115.0	0.0

Results

[illegible]

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 08/04/2021
Case Description: Jasmine Solar - Gen-Tie

**** Receptor #1 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Reference Distance	Residential	60.0	55.0	50.0

			Equipment			
			Spec	Actual	Receptor	Estimated
Description	Impact	Usage	Lmax	Lmax	Distance	Shielding
-----	-----	-----	-----	-----	-----	-----
Crane	No	16		80.6	50.0	0.0
Excavator	No	40		80.7	50.0	0.0

Results

[illegible]

**** Receptor #2 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Copus Road Residence	Residential	60.0	55.0	50.0

Equipment						
Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	2000.0	0.0
Excavator	No	40		80.7	2000.0	0.0

Results														

Appendix C

Traffic Noise Model (FHWA RD-77-108) Results

Project Name	
Project Number	
Modeling Code	
Ground Type	
Metric (L_{eq})	

Project Name :	Jasmine Solar		
Project Number :	20-09824		
Modeling Condition :	Existing		
Ground Type :	Soft	Peak ratio to ADT:	
Metric (L_{eq} , L_{dn} , CNEL) :	Ldn	Traffic Desc. (Peak or ADT) :	ADT

rincon

Project Number :	Jasmine Solar
Modeling Condition :	20-09824
Ground Type :	Existing
Metric (Leq, Ldn, CNEL) :	Ldn

[illegible]

Rincon FHWA Traffic Noise Model



Model Input

Project Name :	Jasmine Solar		
Project Number :	20-09824		
Modeling Condition :	Existing Plus Project Construction Trips		
Ground Type :	Soft	Peak ratio to ADT:	
Metric (L_{eq} , L_{dn} , CNEL) :	Ldn	Traffic Desc. (Peak or ADT) :	ADT

[illegible]

Model Results

Project Number :	Jasmine Solar
Modeling Condition :	20-09824
Ground Type :	Existing Plus Project Construction Trips
Metric (Leq, Ldn, CNEL) :	Ldn

[illegible][illegible]

rincon

Project Name :	Jasmine Solar				
Project Number :	20-09824				
Modeling Condition :	Cumulative				
Ground Type :	Hard			Peak ratio to ADT:	
Metric (L_{eq} , L_{dn} , CNEL) :	Ldn			Traffic Desc. (Peak or ADT) :	ADT

rincon

Project Number :	Jasmine Solar
Modeling Condition :	20-09824
Ground Type :	Cumulative
Metric (Leq, Ldn, CNEL) :	Ldn

[illegible]

rincon

Project Name :	Jasmine Solar				
Project Number :	20-09824				
Modeling Condition :	Cumulative Plus Project				
Ground Type :	Hard			Peak ratio to ADT:	
Metric (L_{eq} , L_{dn} , CNEL) :	Ldn			Traffic Desc. (Peak or ADT) :	ADT

rincon

Project Number :	Jasmine Solar
Modeling Condition :	20-09824
Ground Type :	Cumulative Plus Project
Metric (Leq, Ldn, CNEL) :	Ldn

[illegible]

Appendix D

Specification Sheets

■ Introduction

In order to meet Energy storage market requirement, BYD developed 500kVA PCS (Power Conversion System) with years' experiences. This PCS is usually used for medium to large energy storage power station with high efficiency, reliable operation, high stability, and supplied for the following services: peak load shifting, adjustable reactive power etc.

■ PCS Topology

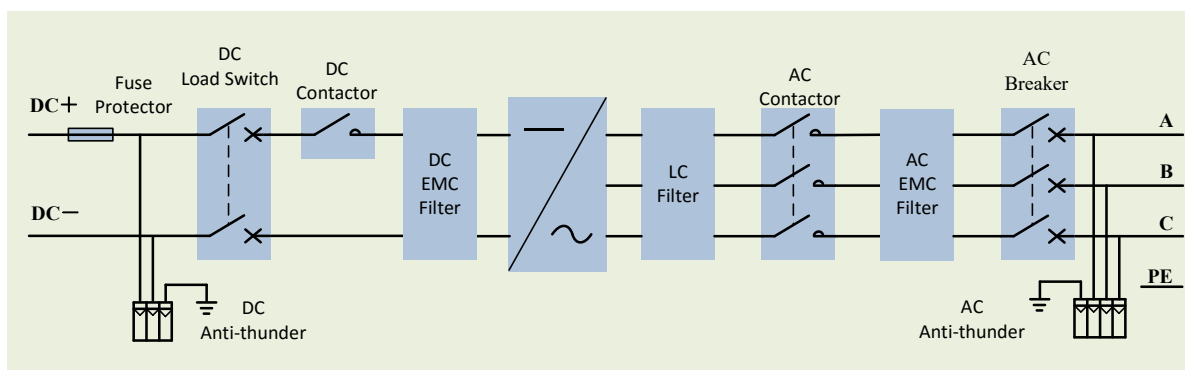


Figure 1: PCS Topology

■ System Parameters

No.	Item	Parameter	Remark
1	Type	BEG500KTL-U	
Parameters at DC side			
2	DC Voltage range	780~1000Vdc	
3	Max. DC current	700A	
Parameters at AC side			
4	Nominal AC voltage	480Vac	
5	Max.AC current	600A	
6	AC power	500kW	
7	Nominal Grid Frequency	60Hz	
8	Power Factor	0.95 (leading) ~0.95 (lagging)	
9	THD	<5%	at nominal power
System parameter			
10	Isolation Method	Transformer less	



BEG500KTL-U

Specification

11	Max. Efficiency	97.5%	
12	Nominal power	97%	
13	Enclosure Protection Grade	IP20 (indoor)	
14	Allowable Environment Temperature	-25~+55℃	Nominal output under 50℃
15	Allowable Relative Humidity	5~95% (no frozen)	
16	Allowable Max. Altitude	6000m	Power derating over 3000m
17	Noise	<75dB	
18	Cooling	Air cooling	
19	Fresh Air Consumption	10000m ³ /h	
20	Display	Touch screen	
21	Communication Interface	RS485/Ethernet	
保护功能			
22	Short-circuit Protection	√	
23	Over-load Protection	√	
24	DC Over-voltage and Under-voltage Protection	√	
25	Grid Monitoring	√	
26	Insulation Monitoring	√	
27	Over-temperature Protection	√	
28	DC Reverse Polarity Protection	√	
29	Islanding Protection	Active and Passive Detection	
Mechanical Parameter			
30	Dimension (W/L/D) (mm)	2000/600/2150	
31	Weight (kg)	1700	
Reference Standard			
32	Safety	UL 1741-2 nd Ed (January 28, 2010)	
33	On-grid	IEEE 1547 (2003) IEEE 1547.1(2005)	

■ Performance features

- Wide DC voltage input range, max. voltage is 1000V
- Output harmonic wave is small, max. efficiency is up to 97.5%
- Very short switch time of charging and discharging at full power
- Adjustable reactive power
- Active power derating
- Thin-film capacitor design improve the system service life

■ Topology

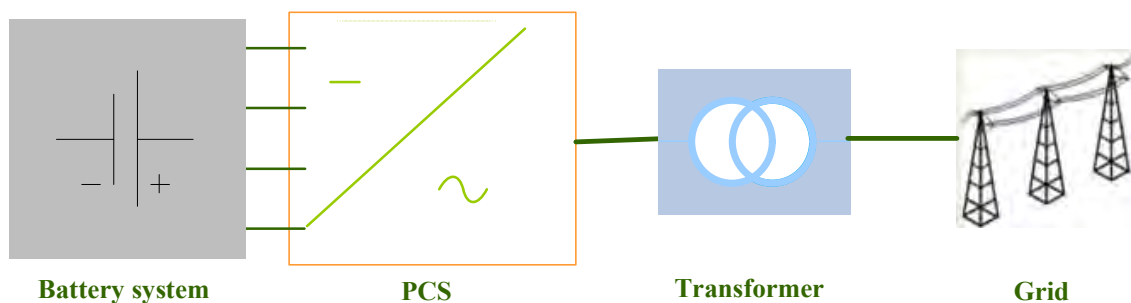
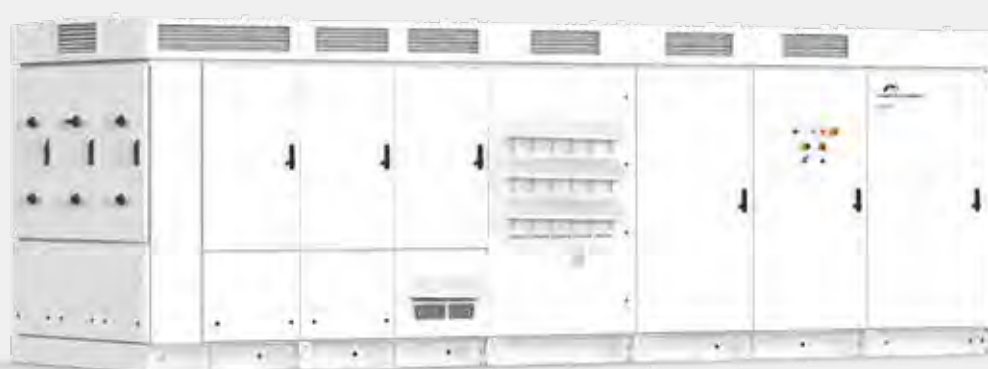


Figure 2: System Application



HEM

UTILITY SCALE MV CENTRAL STRING INVERTER



FIELD REPLACEABLE UNITS



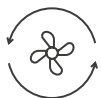
OUTDOOR DURABILITY



BUS PLUS SOLAR + STORAGE



NEMA 3R



ICOOL 3



ACTIVE HEATING



3 LEVEL TOPOLOGY



ECON MODE

THE INNOVATIVE MEDIUM VOLTAGE CENTRAL STRING INVERTER

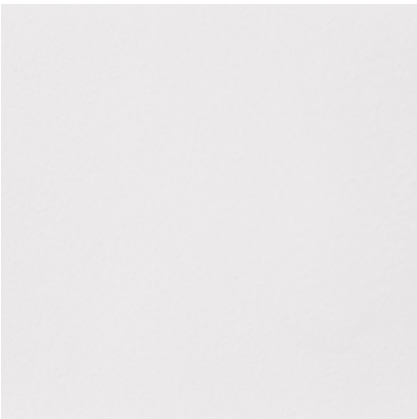
The Power Electronics HEM medium voltage inverter is designed for utility scale solar applications, that require the advantages of a central inverter solution but also the modularity of a string architecture. The HEM can reach up to a nominal power of 3.6 MVA, and offers a wide MPPT window. It also has the added advantage of having an integrated medium voltage transformer and switchgear.

The Bus Plus ready feature allows the connection of up to six Freemaq DC/DC converters. It is the most cost competitive solution for solar-plus-storage retrofits.

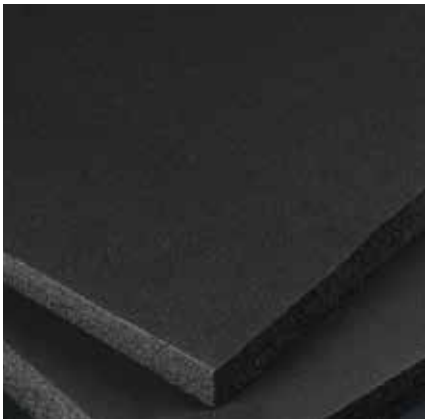
Its architecture, composed of six field replaceable units (FRU), is designed to provide the highest availability and optimize yield production. Its use in Utility Scale PV plants provides considerable savings in CAPEX, since having an integrated MV transformer and switchgear reduces the need of additional connections between the LV and MV sides.

Thanks to the Power Electronics iCOOL3 cooling system, the HEM is able to provide NEMA 3R degree of protection with an air cooling system, and as a result reducing OPEX costs. This product has been designed to be the lowest LCOE solution in the market for solar applications.

ROBUST DESIGN



Polymeric Painting



Closed-Cell Insulation



Galvanized Steel | Stainless Steel (Optional)

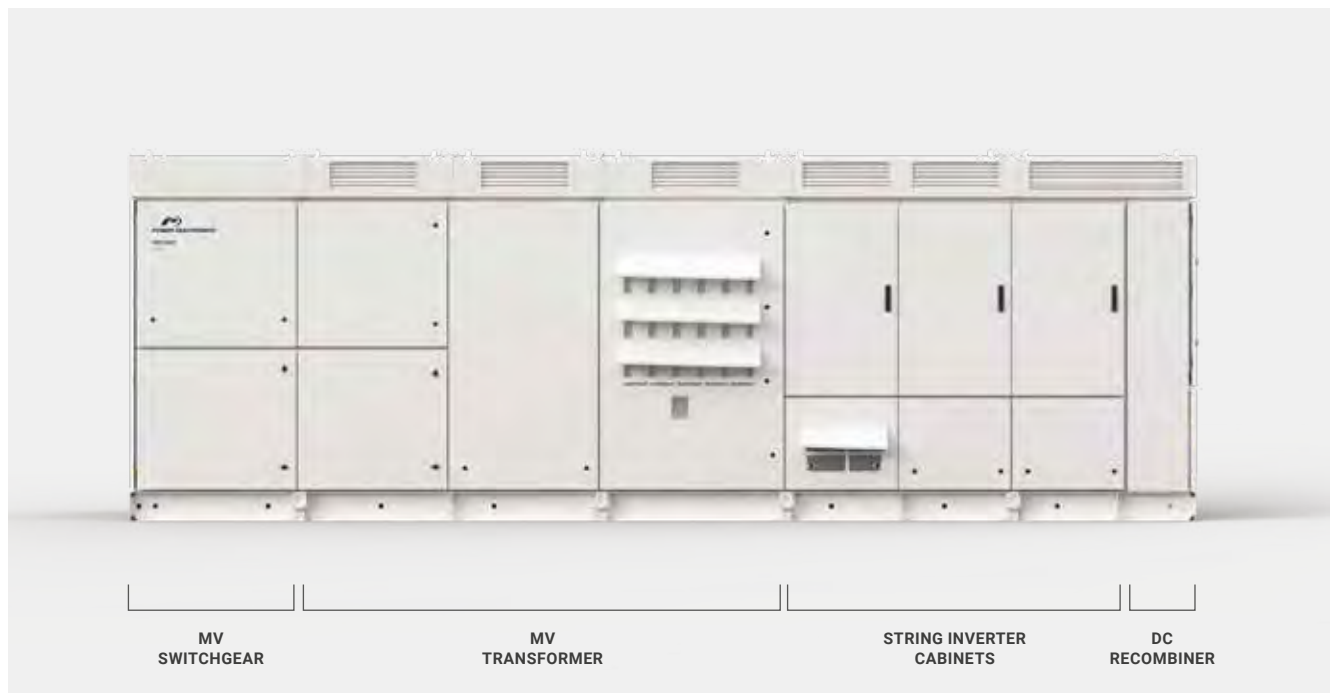
HEM inverter modules have a design life of greater than 30 years of operation in harsh environments and extreme weather conditions. HEM units are tested and ready to withstand conditions from the frozen Siberian tundra to the Californian Death Valley, featuring:

- Totally sealed electronics cabinet protects electronics against dust and moisture.
- Conformal coating on electronic boards shields PCBs from harsh atmospheres.
- Temperature and humidity controlled active heating prevents internal water condensation.
- C4 degree of protection according to ISO 12944. Up to C5-M optional.
- Closed-Cell insulation panel isolates the cabinet from solar heat gains.
- Roof cover designed to dissipate solar radiation, reduce heat build-up and avoid water leakages.
- The solid HEM structure avoids the need of additional external structures.
- Random units selected to pass a Factory Water Tightness Test ensuring product quality.
- NEMA 3R.

REAL TURN-KEY SOLUTION - EASY TO SERVICE

With the HEM, Power Electronics offers a real turn-key solution, including the MV transformer and switchgear fully assembled and tested at the factory. The HEM is a compact turn-key solution that will reduce site design, installation and connection costs, and therefore will minimize the LCOE.

By providing full front access the HEM series simplifies the maintenance tasks, reducing the MTTR (and achieving a lower OPEX). The total access allows a fast swap of the FRUs without the need of qualified technical personnel.



STRING CONCEPT POWER STAGES

The HEM combines the advantages of a central inverter with the modularity of the string inverters. Its power stages are designed to be easily replaceable on the field without the need of advanced technical service personnel, providing a safe, reliable and fast Plug&Play assembly system.

Following the modular philosophy of the Freesun series, the HEM is composed of 6 FRUs (field replaceable units), where all the power stages are physically joined in the DC side and therefore, in the event of a fault, the faulty module is taken off-line and its power is distributed evenly among the remaining functioning FRUs.



INNOVATIVE COOLING SYSTEM

Based on more than 3 years of experience with our MV Variable Speed Drive, the iCOOL3 system allows to get NEMA 3R degree of protection in an outdoor solar inverter. iCOOL3 delivers a constant stream of clean air to the FRUs and the MV transformer, being the most effective way of reaching up to NEMA 3R degree of protection, without

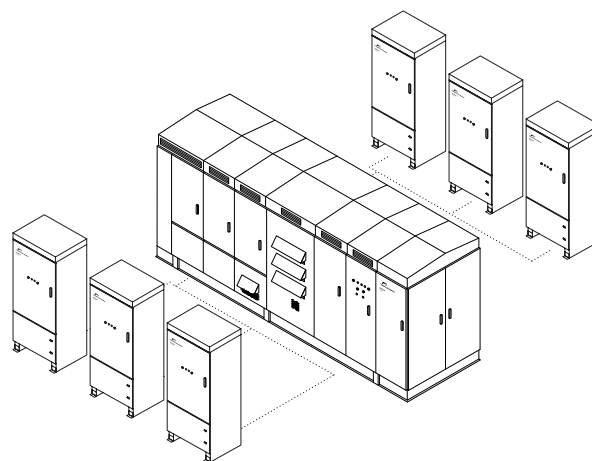
having to maintain cumbersome dust filters or having to use liquid-cooling systems, avoiding the commonly known inconveniences of it (complex maintenance, risk of leaks, higher number of components...), therefore resulting in an OPEX cost reduction and a LCOE improvement.



BUS PLUS READY - SOLAR + STORAGE

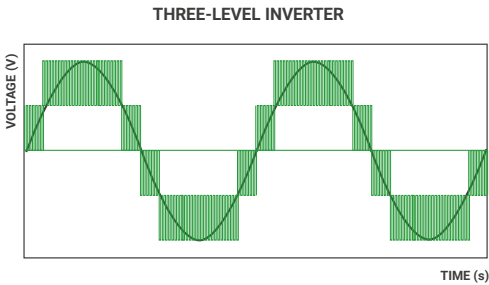
The Bus Plus feature allows the connection of up to six Freemaq DC/DC converters. It is the most cost competitive solution for solar-plus-storage retrofits. It prevents from additional connections out of the inverter between the DC/DC converters and the PV field. This solution provides considerable savings in CAPEX.

Power Electronics Freemaq DC/DC is a modular outdoor solution available from 500 kW to 3000 kW, fully compatible with different battery technologies and manufacturers. Freemaq DC/DC converter allows clipping energy recovery that will boost customer revenues and avoids the installation of additional station with a dedicated MV transformer.



MULTILEVEL TOPOLOGY

The multilevel IGBT topology is the most efficient approach to manage high DC link voltages and makes the difference in the 1,500 Vdc design. Power Electronics has many years of power design in both inverters and MV drives and the HEM design is the result of our experience with 3 level topologies. The 3 level IGBT topology reduces stage losses, increases inverter efficiency and minimizes total harmonic distortion. High efficiency to deliver the lowest LCOE.



VAR AT NIGHT

At night, in case of solar applications, the HEM inverter can shift to reactive power compensation mode. The inverter can respond to an external dynamic signal, a Power Plant Controller command or pre-set reactive power level (kVAr).

ACTIVE HEATING

At night, when the unit is not actively exporting power, the inverter can import a small amount of power to keep the inverter internal ambient temperature above -20°C, without using external resistors. This autonomous heating system is the most efficient and homogeneous way to prevent condensation, increasing the inverters availability and reducing maintenance. **PATENTED**

ECON MODE

This innovative control mode allows increasing the efficiency of the MV transformer up to 25%, reducing the power consumption of the plant and therefore providing considerable

savings. Available as an optional kit, this feature has a pay-back time of less than a few years, therefore resulting in the increase of the plant lifetime overall revenue.

EASY TO MONITOR

The Freesun app is the easiest way to monitor the status of our inverters. All our inverters come with built-in wifi, allowing remote connectivity to any smart device for detailed updates

and information without the need to open cabinet doors.

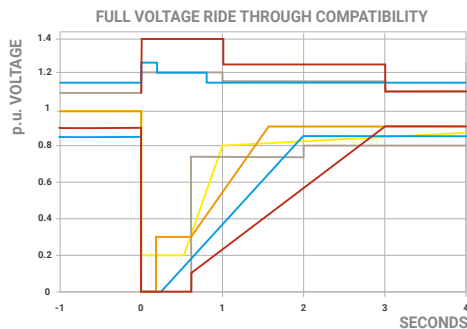
The app user-friendly interface allows quick and easy access to critical information (energy registers, production and events).

AVAILABLE INFORMATION	Grid and PV field data, inverter and power module data (voltages, currents, power, temperatures, I/O status...), weather conditions, alarms and warnings events, energy registers. Others.
FEATURES	Easy Wireless connection. Comprehensive interface. Real time data. Save and copy settings.
LANGUAGE	English, Spanish.
SYSTEM REQUIREMENTS	iOS or Android devices.
SETTINGS CONTROL	Yes.

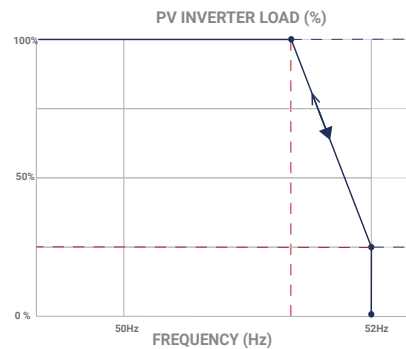


DYNAMIC GRID SUPPORT

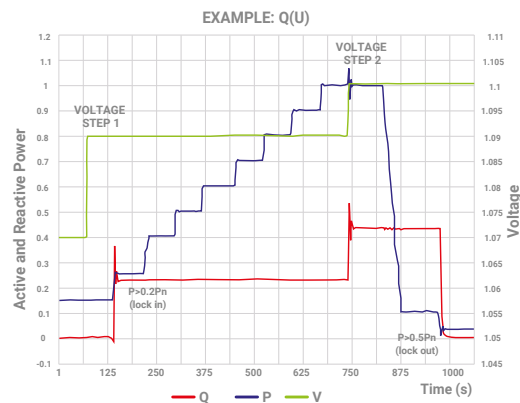
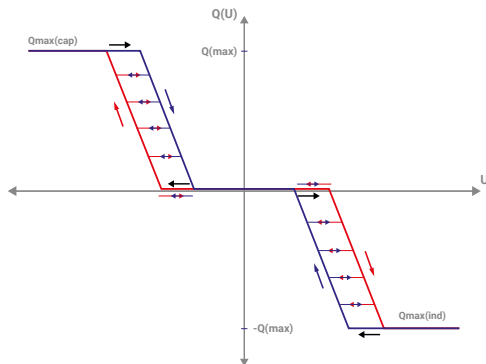
HEM firmware includes the latest utility interactive features (LVRT, OVRT, FRS, FRT, Anti-islanding, active and reactive power curtailment...), and can be configured to meet specific utility requirements.



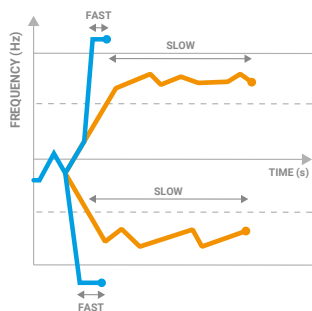
Low Voltage Ride Through (LVRT or ZVRT). Inverters can withstand any voltage dip or profile required by the local utility. In this situation, the inverter can inject current up to the nominal value.



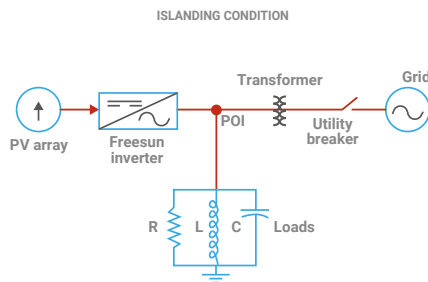
Frequency Regulation System (FRS). Frequency droop algorithm curtails the active power along a preset characteristic curve supporting grid stabilization.



Q(V) curve. It is a dynamic voltage control function which provides reactive power in order to maintain the voltage as close as possible to its nominal value.



Frequency Ride Through (FRT). Freesun solar inverters have flexible frequency protection settings and can be easily adjusted to comply with future requirements.



Anti-islanding. This protection combines passive and active detection methods that eliminate nuisance tripping and allow to comply with the IEC 62116 and IEEE 1547 standards.

FRONT VIEW



BACK VIEW



TECHNICAL CHARACTERISTICS

HEM

REFERENCE	FS3510M
OUTPUT	AC Output Power (kVA/kW) @50°C ^[1]
	3510
	AC Output Power (kVA/kW) @40°C ^[1]
	3630
	Operating Grid Voltage (VAC)
	34.5kV ±10%
INPUT	Operating Grid Frequency (Hz)
	60Hz
	Current Harmonic Distortion (THDi)
	< 3% per IEEE519
	Power Factor (cosine phi) ^[2]
	0.5 leading ... 0.5 lagging adjustable / Reactive Power injection at night
	MPPt @full power (VDC) @35°C ^[3]
	934V-1500V
EFFICIENCY & AUXILIARY SUPPLY	MPPt @full power (VDC) @50°C ^[3]
	934V-1310V
	Maximum DC voltage
	1500V
	Number of PV inputs ^[4]
	Up to 36
	Number of Freemaq DC/DC inputs ^[5]
	Up to 6
CABINET	Max. DC continuous current (A) ^[5]
	3970
	Max. DC short circuit current (A) ^[5]
	6000
ENVIRONMENT	Efficiency (Max) (η)
	97.80% including MV transformer
	CEC (η)
	97.51% including MV transformer
CONTROL INTERFACE	Max. Power Consumption (KVA)
	20
	Dimensions [WxDxH] (ft)
	21.7 x 7 x 7
PROTECTIONS	Dimensions [WxDxH] (m)
	6.6 x 2.2 x 2.2
	Weight (lb)
	30865
CERTIFICATIONS	Weight (kg)
	14000
	Type of ventilation
	Forced air cooling
ENVIRONMENT	Degree of protection
	NEMA 3R
	Permissible Ambient Temperature
	-35°C to +60°C / >50°C Active Power derating
CONTROL INTERFACE	Relative Humidity
	4% to 100% non condensing
	Max. Altitude (above sea level) ^[6]
	2000m
PROTECTIONS	Noise level ^[7]
	< 79 dBA
	Communication protocol
	Modbus TCP
CERTIFICATIONS	Plant Controller Communication
	Optional
	Keyed ON/OFF switch
	Standard
PROTECTIONS	Ground Fault Protection
	GFDI and Isolation monitoring device
	General AC Protection
	MV Switchgear (configurable)
CERTIFICATIONS	General DC Protection
	Fuses
	Overvoltage Protection
	AC, DC Inverter and auxiliary supply type 2
CERTIFICATIONS	Safety
	UL 1741, CSA 22.2 No.107.1-16
	Compliance
CERTIFICATIONS	NEC 2017
	Utility interconnect
	IEEE 1547.1-2005 / UL 1741 SA-Feb. 2018

[1] Values at 1.00•Vac nom and cos Φ= 1. Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar) = \sqrt{(S(kVA)^2 - P(kW)^2)}$.

[3] Consult Power Electronics for temperature derating curves.

[4] Consult Power Electronics for other configurations.

[5] Consult Power Electronics for Freemaq DC/DC connection configurations.

[6] Consult Power Electronics for altitudes above 1000m.

[7] Readings taken 1 meter from the back of the unit.

TECHNICAL CHARACTERISTICS

HEM

REFERENCE	FS3430M	
OUTPUT	AC Output Power (kVA/kW) @50°C ^[1]	3430
	AC Output Power (kVA/kW) @40°C ^[1]	3550
	Operating Grid Voltage (VAC)	34.5kV ±10%
	Operating Grid Frequency (Hz)	60Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) ^[2]	0.5 leading ... 0.5 lagging adjustable / Reactive Power injection at night
INPUT	MPPt @full power (VDC) @35°C ^[3]	913V-1500V
	MPPt @full power (VDC) @50°C ^[3]	913V-1310V
	Maximum DC voltage	1500V
	Number of PV inputs ^[4]	Up to 36
	Number of Freemaq DC/DC inputs ^[5]	Up to 6
	Max. DC continuous current (A) ^[5]	3970
	Max. DC short circuit current (A) ^[5]	6000
EFFICIENCY & AUXILIARY SUPPLY	Efficiency (Max) (η)	97.76% including MV transformer
	CEC (η)	97.50% including MV transformer
	Max. Power Consumption (KVA)	20
CABINET	Dimensions [WxDxH] (ft)	21.7 x 7 x 7
	Dimensions [WxDxH] (m)	6.6 x 2.2 x 2.2
	Weight (lb)	30865
	Weight (kg)	14000
	Type of ventilation	Forced air cooling
ENVIRONMENT	Degree of protection	NEMA 3R
	Permissible Ambient Temperature	-35°C to +60°C / >50°C Active Power derating
	Relative Humidity	4% to 100% non condensing
	Max. Altitude (above sea level) ^[6]	2000m
	Noise level ^[7]	< 79 dBA
CONTROL INTERFACE	Communication protocol	Modbus TCP
	Plant Controller Communication	Optional
	Keyed ON/OFF switch	Standard
PROTECTIONS	Ground Fault Protection	GFDI and Isolation monitoring device
	General AC Protection	MV Switchgear (configurable)
	General DC Protection	Fuses
	Overvoltage Protection	AC, DC Inverter and auxiliary supply type 2
CERTIFICATIONS	Safety	UL 1741, CSA 22.2 No.107.1-16
	Compliance	NEC 2017
	Utility interconnect	IEEE 1547.1-2005 / UL 1741 SA-Feb. 2018

[1] Values at 1.00•Vac nom and cos Φ= 1. Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA)^2-P(kW)^2)}$.

[3] Consult Power Electronics for temperature derating curves.

[4] Consult Power Electronics for other configurations.

[5] Consult Power Electronics for Freemaq DC/DC connection configurations.

[6] Consult Power Electronics for altitudes above 1000m.

[7] Readings taken 1 meter from the back of the unit.

TECHNICAL CHARACTERISTICS

HEM

REFERENCE	FS3350M	
OUTPUT	AC Output Power (kVA/kW) @50°C ^[1]	3350
	AC Output Power (kVA/kW) @40°C ^[1]	3465
	Operating Grid Voltage (VAC)	34.5kV ±10%
	Operating Grid Frequency (Hz)	60Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) ^[2]	0.5 leading ... 0.5 lagging adjustable / Reactive Power injection at night
INPUT	MPPt @full power (VDC) @35°C ^[3]	891V-1500V
	MPPt @full power (VDC) @50°C ^[3]	891V-1310V
	Maximum DC voltage	1500V
	Number of PV inputs ^[4]	Up to 36
	Number of Freemaq DC/DC inputs ^[5]	Up to 6
	Max. DC continuous current (A) ^[5]	3970
	Max. DC short circuit current (A) ^[5]	6000
EFFICIENCY & AUXILIARY SUPPLY	Efficiency (Max) (η)	97.75% including MV transformer
	CEC (η)	97.48% including MV transformer
	Max. Power Consumption (KVA)	20
CABINET	Dimensions [WxDxH] (ft)	21.7 x 7 x 7
	Dimensions [WxDxH] (m)	6.6 x 2.2 x 2.2
	Weight (lb)	30865
	Weight (kg)	14000
	Type of ventilation	Forced air cooling
ENVIRONMENT	Degree of protection	NEMA 3R
	Permissible Ambient Temperature	-35°C to +60°C / >50°C Active Power derating
	Relative Humidity	4% to 100% non condensing
	Max. Altitude (above sea level) ^[6]	2000m
	Noise level ^[7]	< 79 dBA
CONTROL INTERFACE	Communication protocol	Modbus TCP
	Plant Controller Communication	Optional
	Keyed ON/OFF switch	Standard
PROTECTIONS	Ground Fault Protection	GFDI and Isolation monitoring device
	General AC Protection	MV Switchgear (configurable)
	General DC Protection	Fuses
	Overvoltage Protection	AC, DC Inverter and auxiliary supply type 2
CERTIFICATIONS	Safety	UL 1741, CSA 22.2 No.107.1-16
	Compliance	NEC 2017
	Utility interconnect	IEEE 1547.1-2005 / UL 1741 SA-Feb. 2018

[1] Values at 1.00•Vac nom and cos Φ= 1. Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar) = \sqrt{(S(kVA))^2 - P(kW)^2}$.

[3] Consult Power Electronics for temperature derating curves.

[4] Consult Power Electronics for other configurations.

[5] Consult Power Electronics for Freemaq DC/DC connection configurations.

[6] Consult Power Electronics for altitudes above 1000m.

[7] Readings taken 1 meter from the back of the unit.

TECHNICAL CHARACTERISTICS

HEM

REFERENCE	FS3270M	
OUTPUT	AC Output Power (kVA/kW) @50°C ^[1]	3270
	AC Output Power (kVA/kW) @40°C ^[1]	3380
	Operating Grid Voltage (VAC)	34.5kV ±10%
	Operating Grid Frequency (Hz)	60Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) ^[2]	0.5 leading ... 0.5 lagging adjustable / Reactive Power injection at night
INPUT	MPPt @full power (VDC) @35°C ^[3]	870V-1500V
	MPPt @full power (VDC) @50°C ^[3]	870V-1310V
	Maximum DC voltage	1500V
	Number of PV inputs ^[4]	Up to 36
	Number of Freemaq DC/DC inputs ^[5]	Up to 6
	Max. DC continuous current (A) ^[5]	3970
	Max. DC short circuit current (A) ^[5]	6000
EFFICIENCY & AUXILIARY SUPPLY	Efficiency (Max) (η)	97.71% including MV transformer
	CEC (η)	97.47% including MV transformer
	Max. Power Consumption (KVA)	20
CABINET	Dimensions [WxDxH] (ft)	21.7 x 7 x 7
	Dimensions [WxDxH] (m)	6.6 x 2.2 x 2.2
	Weight (lb)	30865
	Weight (kg)	14000
	Type of ventilation	Forced air cooling
ENVIRONMENT	Degree of protection	NEMA 3R
	Permissible Ambient Temperature	-35°C to +60°C / >50°C Active Power derating
	Relative Humidity	4% to 100% non condensing
	Max. Altitude (above sea level) ^[6]	2000m
	Noise level ^[7]	< 79 dBA
CONTROL INTERFACE	Communication protocol	Modbus TCP
	Plant Controller Communication	Optional
	Keyed ON/OFF switch	Standard
PROTECTIONS	Ground Fault Protection	GFDI and Isolation monitoring device
	General AC Protection	MV Switchgear (configurable)
	General DC Protection	Fuses
	Overvoltage Protection	AC, DC Inverter and auxiliary supply type 2
CERTIFICATIONS	Safety	UL 1741, CSA 22.2 No.107.1-16
	Compliance	NEC 2017
	Utility interconnect	IEEE 1547.1-2005 / UL 1741 SA-Feb. 2018

[1] Values at 1.00•Vac nom and cos Φ= 1. Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA)^2-P(kW)^2)}$.

[3] Consult Power Electronics for temperature derating curves.

[4] Consult Power Electronics for other configurations.

[5] Consult Power Electronics for Freemaq DC/DC connection configurations.

[6] Consult Power Electronics for altitudes above 1000m.

[7] Readings taken 1 meter from the back of the unit.

TECHNICAL CHARACTERISTICS

HEM

REFERENCE		FS3190M
OUTPUT	AC Output Power (kVA/kW) @50°C ^[1]	3190
	AC Output Power (kVA/kW) @40°C ^[1]	3300
	Operating Grid Voltage (VAC)	34.5kV ±10%
	Operating Grid Frequency (Hz)	60Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) ^[2]	0.5 leading ... 0.5 lagging adjustable / Reactive Power injection at night
INPUT	MPPt @full power (VDC) @35°C ^[3]	849V-1500V
	MPPt @full power (VDC) @50°C ^[3]	849V-1310V
	Maximum DC voltage	1500V
	Number of PV inputs ^[4]	Up to 36
	Number of Freemaq DC/DC inputs ^[5]	Up to 6
	Max. DC continuous current (A) ^[5]	3970
	Max. DC short circuit current (A) ^[5]	6000
EFFICIENCY & AUXILIARY SUPPLY	Efficiency (Max) (η)	97.68% including MV transformer
	CEC (η)	97.47% including MV transformer
	Max. Power Consumption (KVA)	20
CABINET	Dimensions [WxDxH] (ft)	21.7 x 7 x 7
	Dimensions [WxDxH] (m)	6.6 x 2.2 x 2.2
	Weight (lb)	30865
	Weight (kg)	14000
	Type of ventilation	Forced air cooling
ENVIRONMENT	Degree of protection	NEMA 3R
	Permissible Ambient Temperature	-35°C to +60°C / >50°C Active Power derating
	Relative Humidity	4% to 100% non condensing
	Max. Altitude (above sea level) ^[6]	2000m
	Noise level ^[7]	< 79 dBA
CONTROL INTERFACE	Communication protocol	Modbus TCP
	Plant Controller Communication	Optional
	Keyed ON/OFF switch	Standard
PROTECTIONS	Ground Fault Protection	GFDI and Isolation monitoring device
	General AC Protection	MV Switchgear (configurable)
	General DC Protection	Fuses
	Overvoltage Protection	AC, DC Inverter and auxiliary supply type 2
CERTIFICATIONS	Safety	UL 1741, CSA 22.2 No.107.1-16
	Compliance	NEC 2017
	Utility interconnect	IEEE 1547.1-2005 / UL 1741 SA-Feb. 2018

[1] Values at 1.00•Vac nom and cos Φ= 1. Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for temperature derating curves.

[4] Consult Power Electronics for other configurations.

[5] Consult Power Electronics for Freemaq DC/DC connection configurations.

[6] Consult Power Electronics for altitudes above 1000m.

[7] Readings taken 1 meter from the back of the unit.



MV SKID

UTILITY SCALE STORAGE STATION



TURN-KEY SOLUTION



HIGH RELIABILITY



EASY TO INSTALL



OUTDOOR DURABILITY

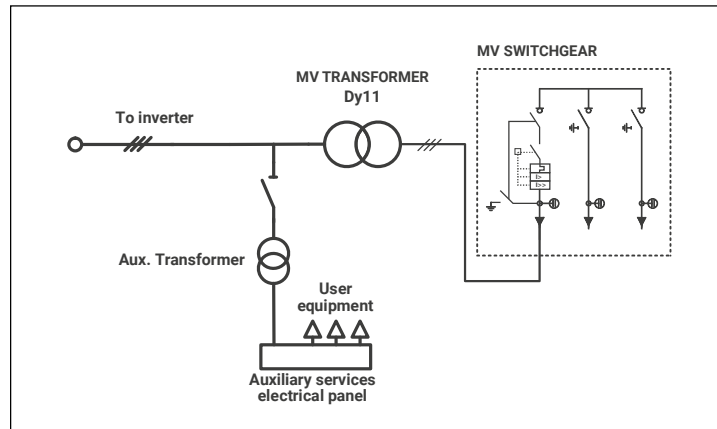
SIMPLIFY YOUR COMMISSIONING WITH THE MOST COMPETITIVE SOLUTION INTEGRATED WITH ALL THE MEDIUM VOLTAGE EQUIPMENT

The MV Skid is a compact turnkey outdoor platform made from high resistance galvanized steel with all the medium voltage equipment integrated, including an outdoor power transformer, MV switchgear, oil tank, filter and built in fast power connection to any PCSK. With between 480V - 690V in the low voltage range and 12 kV to 36 kV in the high voltage range, this compact platform achieves power outputs between 1700 kVA and 3800 kVA.

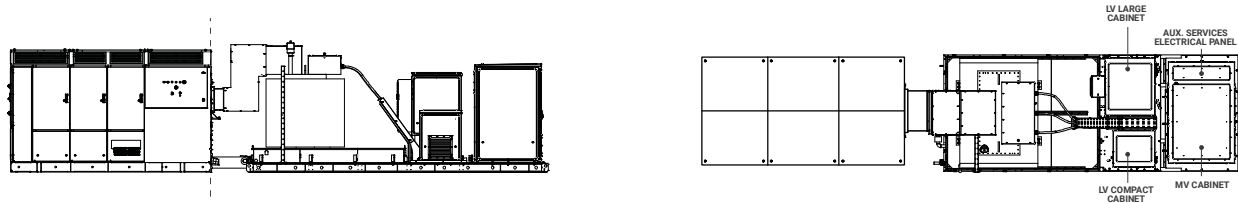
This compact solution also allows the installation of a low voltage cabinet that is fully configurable to the customer needs as well as different types of cells and even an enclosure fence among other options. The MV SKID simplifies the project design of the storage plant, reducing installation costs and the amount of resources needed. The benefits of the MV Skid and the fact that it is also easier to transport and deliver into remote sites makes it the optimal solution for EPC's (engineering, procurement and construction).

MODEL NUMBERS AND OPERATIONAL DIAGRAM

REFERENCE	RATED POWER @50°C (kVA)
MVS1700[]	1700
MVS1765[]	1765
MVS1770[]	1770
MVS2125[]	2125
MVS2180[]	2180
MVS2235[]	2235
MVS2285[]	2285
MVS2340[]	2340
MVS2445[]	2445
MVS2550[]	2550
MVS2660[]	2660
MVS2820[]	2820
MVS3190[]	3190
MVS3270[]	3270
MVS3350[]	3350
MVS3430[]	3430
MVS3510[]	3510
MVS3670[]	3670



SECTION



TECHNICAL CHARACTERISTICS

MV SKID

MEDIUM VOLTAGE EQUIPMENT	Rated power range @50°C	1700 kVA - 3670 kVA
	Rated power range @40°C	1760 kVA - 3800 kVA
	MV voltage range	6.6 kV / 11 kV / 13.2 kV / 15 kV / 20 kV / 22 kV / 23 kV / 25 kV / 30 kV / 33 kV / 34.5 kV
	LV voltage range	480 V / 500 V / 530 V / 600 V / 615 V / 630 V / 645 V / 660 V / 690 V
	Type of tank	Hermetically oil-sealed
	Cooling	ONAN
	Vector group	Dy11
	Transformer protection	Protection relay for pressure, temperature (two levels) and gassing. Monitoring of dielectric level decrease. PT100 optional.
	Oil retention tank	Integrated with hydrocarbon filter
	Transformer index of protection	IP54
	Switchgear configuration	Double feeder (2L)
	Switchgear protection ^[1]	Automatic circuit breaker (V)
CONNECTIONS	Inverter AC connection	Close coupled solution (Plug & Play)
	LV protection	Circuit breaker included in the inverter
	HV AC wiring	MV bridge between transformer and protection switchgear prewired
ENVIRONMENT	Ambient temperature ^[2]	-10°C...+50°C (T>50°C power derating)
	Max. altitude (above sea level)	Customizable
	Relative humidity	4% to 95% Non condensing
MECHANICAL CHARACTERISTICS	Skid dimensions (WxHxD) mm ^[3]	5780 x 2340 x 2240
	Skid weight with MV equipment ^[1]	< 11 Tn
	Oil retention tank material	Galvanized steel
	Skid material	Galvanized steel
	Cabinet type	Outdoor
	Anti-rodent protection	✓
AUXILIARY SERVICES ELECTRICAL PANEL	Auxiliary supply ^[1]	3 x 400 V, 50/60 Hz
	User power supply available	5 kVA / 20 kVA / 40 kVA
	Cabinet type	Outdoor
	Cooling	Air
	Auxiliary supply protection	✓
	Communication ^[4]	Ethernet (fiber optic or RJ45)
OTHER EQUIPMENT	UPS system ^[5]	1 kW (30 minutes) - 20 kW (20 minutes)
	Safety mechanism	Interlocking system
	Safety perimeter	Transformer access protection fence
	Backfeed tracker supply	Optional
	Emergency lighting	1h autonomy
	Fire extinguishing system (transformer accessory)	Optional
	LV revenue grade meter	For inverter output / for customer auxiliary supply
	I/O interface	Digital I/O, analog I/O
STANDARDS	Compliance	IEC 62271-212, IEC 62271-200, IEC 60076, IEC 61439-1

[1] Depending on customer configuration.

[2] For lower temperatures, consult Power Electronics.

[3] 2515 mm high with the cover for the LV terminals.

[4] By demand.

[5] Optional. For additional information of available configurations, consult Power Electronics.



Transformer Performance Specification

For: For reference only

Date: 3/20/2019

Quote: Item:

Spec:

Rating						
Type	Substation Non-Auto	Class	H Winding		X Winding	
Phase	3		69	kV	34.5	kV
Hertz	60	ONAN	72000	KVA	72000	KVA
Temp Rise	65 C	ONAF	96000	KVA	96000	KVA
Insulating Type	Mineral Oil	ONAF	120000	KVA	120000	KVA

Additional Tap Voltages	
H Winding (kV)	+2 -2 2.5%, DETC
X Winding (kV)	No Taps
Y Winding ()	-

Connections for Operation									
Transformers in Bank	To Transform from	Phase	Connected	To Transform from	Phase	Connected	To Transform To	Phase	Connected
1	69 kV	3	Delta	34.5 kV	3	Wye	-	3	-

Dielectric Tests				Insulation Levels	
Applied Voltage (To other windings and ground)	H Winding	34	kV	ITEMS	Basic Lightning Impulse Insulation Level (BIL kV)
	X Winding	34	kV		
	Y Winding	-	kV		
Induced Voltage	Enhancement level / 7200 Cycle (L-G)	72	kV	H line	350
				H neutral	-
	One hour level (L-G)	63	kV	X line	150
				X neutral	150
				Y line	-

Loss Data based on	NL @ 20C, LL @ 85C					
Based on loading at	69 kV	To	34.5 kV			
Winding Load KVA	H	72000	X	72000	Y	-
No Load Loss	TBD kW		Total Loss	TBD kW		

Regulation at		
69 kV	/	34.5 kV
72000		KVA
Power Factor	% Reg	% Load
1.0	TBD	100
0.8	TBD	100

Auxiliary Losses (Not included in above)		Percent Exciting Current	
TBD kW		100% V	110% V
		TBD	TBD
Average Sound Level			
dB(A)		Class	
77		ONAN	
79		ONAF	
80		ONAF	
Percent Impedance Voltage			
% IZ	Between Windings	At KVA	
7.5	HV-XV	72000	

Mechanical Data		
Not for Construction Purposes		
Drawing		
Height	(A)	216 in
Length	(B)	317 in
Width	(C)	188 in
Height over Cover	(D)	172 in
Untanking (Plus Slings)	(E)	291 in
Shipping Height		168 in
Shipping Width		118 in
Shipping Length		170 in
Oil Preservation		InertAir
Weights (approximate) (lbs)		
Core and Coils		112900 lbs
Tank and Fittings		66600 lbs
Fluid 7400 gal		54900 lbs
Total Weight		234400 lbs
Untanking Weight		112900 lbs
Shipping Weight		134900 lbs
Shipped in		Dry Air

****For reference only – Losses and dimensions needs to be revised****



WEG Transformers USA

One Pauwels Drive, Washington, MO 63090, USA
www.weg.net T: 1-636-239-9300 F: 1-636-239-9395

TECHNICAL SPECS

Customer Line No.: Battery Storage System **Quantity:** 36

Three Phase Pad-Mount Transformer(s)

kVA Rating: 3360 kVA
Envirotemp FR3

Model #:
Cooling Class: KNAN
Frequency: 60 Hz
Avg. Winding Temp. 65 °C
Secondary Voltage: 600Y volts
Secondary BIL Rating: 45 kV
LV Winding Matl: Aluminum

Primary Voltage: 34500 Delta volts

Primary BIL Rating: 150 kV

HV Winding Matl: Aluminum

High Voltage Taps: B Taps - Two 2.5% Taps below Nominal and Two 2.5% Taps above Nominal

No Load Loss: 4200 Watts

Load Loss: 24300 Watts

Total Loss: 28500 Watts

Impedance: 5.75 %

Tank Enclosure:

Welded Cover w/(1) Handhole(s) - 14x24

Cabinet Depth: 40 Inches, Pentahead Security Bolts

Steel HV-LV Barrier

Bushings:

Loop Feed ANSI Minimum Dimensions

Dead Front Primary Terminations: Integral Non-Loadbreak Bushings 600 Amp

Secondary Terminations: Epoxy Bushings w/Non-removable 12 Hole Spades, Spade Support

Protection:

PRCLF (), Weak Link Cartridge ()

Accessories:

Pressure Relief Valve Viat, Cover-Mounted Pressure Relief Device (), Drain valve w/Sampler

Liquid Level Gauge /w Contacts (Qty=1), Liquid Temperature Gauge, Pressure Vacuum Gauge

2-Winding SOLARPAD: Stadium Style Stacked Core Construction with Semi-Round Windings, Reduced Flux Density, Electrostatic Winding Shields, Increased Cooling, Door Gasketing, Hold down anchoring (x4 holes), Drain Valve & Sampler in External Box, Isolated Core Ground, Nitrogen Blanket, Schrader Valve, UL Listed

-Externally mounted gauges in pad lockable enclosure

-Externally mounted MV Switch in pad lockable enclosure

-HV located on the left and LV compartment located on the right

-Oil Temp Sensor: Analog output with 4-20mA transmitter, -50C to +150C

-Losses are at 20C core and 85C winding and are for reference only. ANSI tolerances will apply to quoted losses.

Switching:

Internally Isolated and Floating Neutral, One ON/OFF Transformer Switch (300 Amps)

Paint Color:

ASA #70 GRAY (Munsell 5.0BG7.0/0.4), Touch-up Paint Spray Can,

Standards:

Quoted in compliance with the latest applicable ANSI standards unless otherwise specified by the customer.

Appendix E

Vibration Calculations

Groundborne Noise and Vibration Modeling

Notes

The reference distance is measured from the nearest anticipated point of construction equipment to the nearest structure.

	Reference Level Inputs			
Equipment	PPV _{ref} (in/sec)	Lv _{ref} (VdB)	RMS _{ref} (in/sec)	Reference Distance
Pile Driver	0.644	104	0.158	25
Hoe Ram	0.089	87	0.022	25
Large bulldozer	0.089	87	0.022	25
Caisson drilling	0.089	87	0.022	25
Loaded trucks	0.076	83	0.014	25
Jack hammer	0.035	79	0.009	25
Small bulldozer	0.003	58	0.001	25

	Vibration Level at Receiver			
Equipment	Distance (feet)	PPV _x (in/sec)	Lv _x (VdB)	RMS _x (in/sec)
	190			
Pile Driver		0.0692	85	0.017
Hoe Ram	190	0.0096	68	0.002
Large bulldozer	190	0.0096	68	0.002
Caisson drilling	190	0.0096	68	0.002
Loaded trucks	190	0.0082	64	0.002
Jack hammer	190	0.0038	60	0.001
Small bulldozer	190	0.0003	39	0.000

	Vibration Contours		
	Distance to (feet)		
Equipment	0.200 PPV	72.0 VdB	0.0080 RMS
Pile Driver	72	712	378
Hoe Ram	12	120	64
Large bulldozer	12	120	64
Caisson drilling	12	120	64
Loaded trucks	10	79	42
Jack hammer	5	52	28
Small bulldozer	1	6	3

Source

California Department of Transportation (Caltrans). 2013. Transportation and
Last Updated: 4/11/2019

Variables	
Crest Factor (PPV/RMS)	4
Soil Type (Choice: default, hard, or sands)	default
if value	1.1

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Appendix N

Traffic Assessment



Traffic Assessment

Jasmine Solar Project

SF Jasmine, LLC

Revised December 2021

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1. Introduction

The purpose of this Traffic Assessment is to present an analysis for transportation impacts potentially related to construction and operation of the Jasmine Solar Project (Project) in southern Kern County, California (reference Figure 1, Project Location Map). The proposed 70 MWac Solar Facility would be located in unincorporated land in Kern County. The proposed Facility would be located on approximately 492 acres of the 520-acre site, located at the corner of Old River Road and Copus Road, approximately 15 miles east of the community of Maricopa, approximately 4 miles west of Interstate 5, and approximately 2.5 miles north of State Route 166. The Facility will interconnect to the existing Pacific Gas and Electric (PG&E) Lakeview Substation.

The information in this Traffic Assessment has been prepared using information provided by the Project proponent. Primary users of the transportation system will be during the construction phases, including: 12 months for solar facility development; 16 months for PG&E substation upgrades (limited construction activities). Construction is anticipated to commence in 2023 and be operational in 2024.

2. Existing Conditions

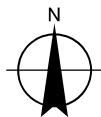
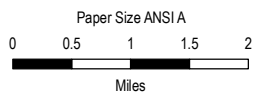
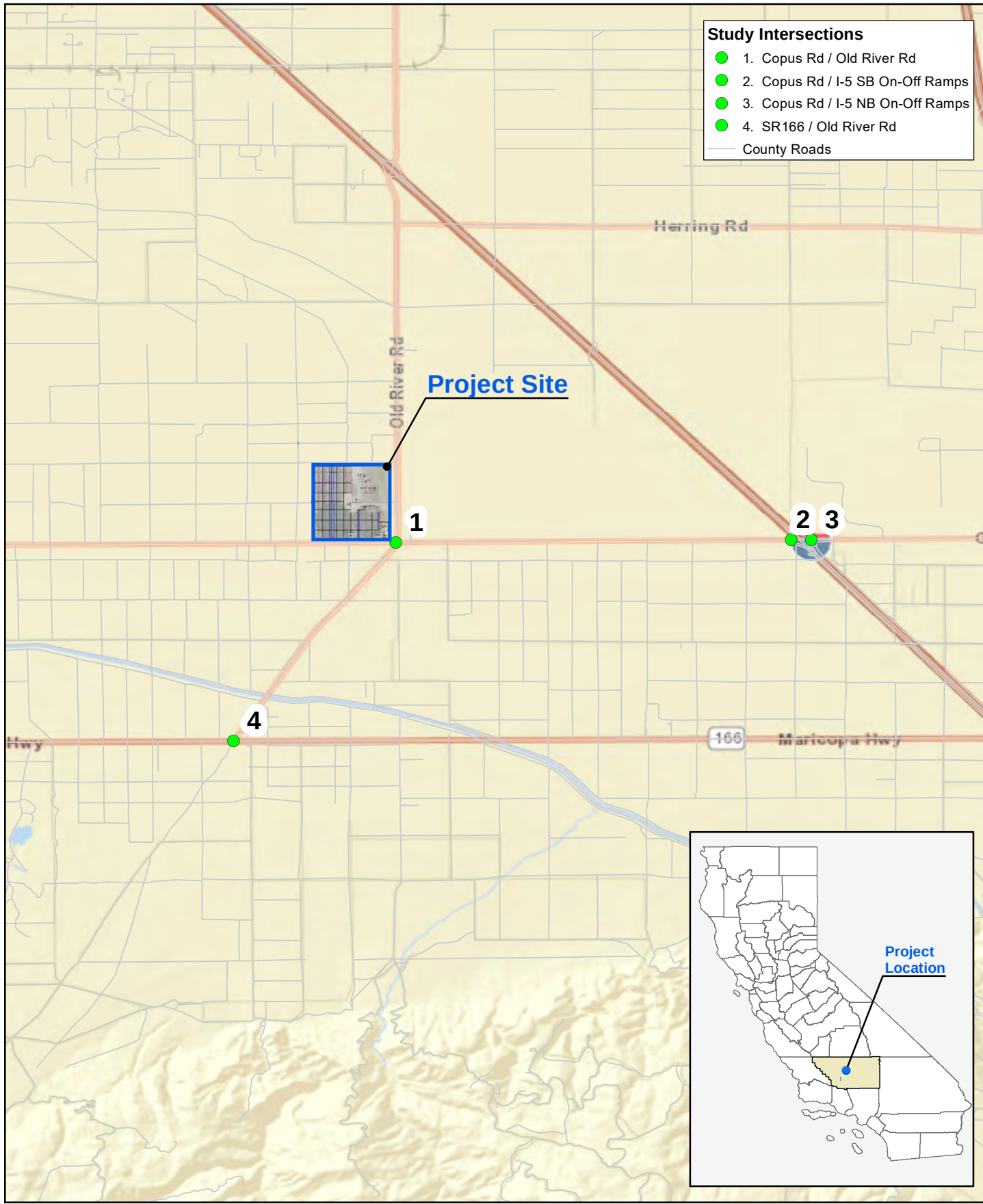
2.1 Existing Roadway System

Encompassing 8,202 square miles, Kern County is California's third largest county in land area (behind San Bernardino and Inyo). It is located at the southern end of the Central Valley and is bounded by Kings, Tulare, and Inyo Counties to the north; San Bernardino County to the east; Los Angeles and Ventura Counties to the south; and Santa Barbara and San Luis Obispo Counties to the west. Kern County includes a diverse geography of mountainous areas, agricultural lands, sparse and high-density urban areas, and desert areas.

Roadways that provide primary circulation in the vicinity of the Project site include Interstate 5, State Route 166, Corpus Road and Old River Road.

Interstate 5 (I-5, West Side Freeway) serves as a major north-south route of the Interstate Highway System in the United States, stretching from the Mexican border to the Canadian border. I-5 is functionally an Interstate within Kern County. This route segment extends from the Los Angeles County line at Fort Tejon north to the Kings County line. Geographically, I-5 is mostly located within the Valley region of Kern County, with small segment in the Mountain region, encompassing approximately 87 centerline miles.

I-5 is a combination of four- to eight-lane freeway sections. It is an eight-lane freeway from Los Angeles County line to its SR 99 separation and four-lane freeway from the SR 99 separation to the Kings County line. The freeway serves as the major truck route that connects to all major east-west routes. I-5 does not pass through any incorporated cities of Kern County.



Horizontal Datum: North American 1983
Grid: GCS North American 1983



Rincon Consultants, Inc.
Kern County Solar Farms - Jasmine Solar Project

Project No. 11219906
Revision No. -
Date 01/29/2021

PROJECT LOCATION MAP

FIGURE 1

Within the vicinity of the study area, I-5 is a four-lane divided freeway with a dirt median. Access to I-5 is currently provided at the interchange with Copus Road. At the State Route 166 interchange (PM 19.612), I-5 currently carries an annual average daily traffic (AADT) of approximately 37,000 vehicles (Source: *2017 Traffic Volumes on the California State Highways*, Caltrans Website). Truck traffic on I-5 near this location represents approximately 23.66% of the daily traffic at the nearby State Route 166 interchange (Source: *2017 Annual Average Daily Truck Traffic on the California State Highway System* published by Caltrans).

State Route 166 (SR 166, Maricopa Highway) is an east-west corridor serving southern Kern County, stretching approximately 25 centerline miles. SR 166 functions as a Minor Arterial facility that begins near Maricopa at SR 33 and terminates at SR 99 near Mettler. SR 166 is located within the Valley region of Kern County.

SR 166 is a combination of two-/four-lane conventional highway sections. Two-lane conventional highway from SR 33 to I-5 and two-/four-lane conventional highway from I-5 to SR 99. This route serves as the primary access route for the city of Maricopa. SR 166 is included as part of the STAA truck network. The Caltrans System Planning Ultimate Concept does not include any capacity increasing projects due to existing and projected acceptable operating conditions.

Within the vicinity of the study area, State Route 166 is a two-lane undivided highway. At the I-5 interchange, State Route 166 carries a back AADT 3,150 and an ahead AADT of 2,750 (Source: *2017 Traffic Volumes on the California State Highways*, Caltrans Website). Additionally, this highway segment carries a daily truck traffic of approximately 19.03% (Source: *2017 Traffic Volumes on the California State Highways*, Caltrans Website).

Copus Road is an east-west roadway that traverses southern Kern County. This roadway, designated as a major collector in the *Kern County General Plan Circulation Element*, generally extends from Basic School Road east through the I-5 and State Route 99 interchanges where it terminates at Edison Road. Near the study area, Copus Road is a 2-lane undivided road with unpaved shoulders that provides access to the I-5 interchange, local businesses, agricultural uses and scattered residences along the corridor.

Old River Road provides congestion relief to southwest Kern County. Currently, Old River Road extends from State Route 166 to Stockdale Highway (Bakersfield) relieving some of the north-south traffic on I-5 and State Route 99. Near the study area, Old River Road is a two-lane undivided roadway with shoulders and currently provides access to regional commuters, renewable energy facilities, agricultural lands, schools and residences. Old River Road is designated as a major collector in the *Kern County General Plan Circulation Element*.

2.1.1 Existing Traffic Data

Traffic counts near the proposed site were conducted on Wednesday, November 18, 2020, under favorable weather and traffic operating conditions. The following locations are analyzed:

Intersections:

- Copus Road/Old River Road
- Copus Road/I-5 SB On-Off Ramps

- Copus Road/I-5 NB On-Off Ramps
- State Route 166/Old River Road

Roadway Segments:

- Copus Road w/o Old River Road
- Copus Road e/o Old River Road
- Old River Road n/o Copus Road
- Old River Road s/o Copus Road

3. Level of Service Methodology and Guidelines

Traffic operations have been quantified through the determination of “Level of Service” (LOS). LOS is a qualitative measure of traffic operating conditions, whereby a letter grade “A” through “F” is assigned to an intersection of roadway segment representing progressively worsening traffic conditions. The following section outlines the methodology and analysis parameters used to quantify existing conditions.

3.1.1 Intersection Capacity

For All-Way Stop Control (AWSC) intersections, overall intersection delays and LOS are average values for all intersection movements. For Two-Way Stop-Control (TWSC) intersections, LOS is based upon worst approach delay. Table 3.1 presents the delay-based LOS criteria for different types of intersection control.

Table 3.1 Level of Service (LOS) Criteria for Intersections

Level of Service	Type of Flow	Delay	Maneuverability	Stopped Delay/Vehicle		
				Signalized	Un-signalized	All-Way Stop
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	<10.0	<10.0	<10.0
B	Stable Flow	Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles.	>10.0	>10.0	>10.0
				and <20.0	and <15.0	and <15.0
C	Stable Flow	Higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted	>20.0	>15.0	>15.0
				and <35.0	and <25.0	and <25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	>35.0	>25.0	>25.0
				and <55.0	and <35.0	and <35.0
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	>55.0	>35.0	>35.0
				and <80.0	and <50.0	and <50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors.	Jammed conditions. Back-ups from other locations restrict or prevent movement. Volumes may vary widely, depending principally on the downstream back-up conditions.	>80.0	>50.0	>50.0

Reference: Highway Capacity Manual 6th Edition

3.2 Table 3 Agency LOS Guidelines

3.2.1 Kern County LOS Guidelines¹

Kern County Circulation Element Goals and Objectives: Kern County to maintain a minimum Level of Service (LOS) D for all roads throughout the County unless the roads are part of an adopted Community Plan or Specific Plan which utilizes Smart Growth policies that encourage efficient multi-modal movements.

In order to provide consistency and to facilitate staff review of traffic studies, the Caltrans “Guide for The Preparation of Traffic Impact Studies” shall be followed in the preparation of traffic studies.

Facilities to be studied shall be any City, State or County facility (mainline, interchange, structure, intersection or any project on the Transportation Impact Fee (TIF) list) when the peak hour trip generation onto said facility exceeds 50 trips. For those facilities currently experiencing level-of-service (LOS) “C” or less, the following “sliding scale” of “added peak project trips” shall be applied as the procedure to determine whether the facility should be included:

EXISTING LOS	ADDED PEAK PROJECT TRIPS
“C”	50
“D”	40
“E”	20
“F”	10

902-2.01 Project Trip Generation and Design Hour Volumes must be calculated using the data contained within the Institute of Transportation Engineer’s (ITE) Trip Generation Manual, latest edition, or more appropriate local data as approved by the Traffic Engineer. (Formula Averaging is NOT acceptable for the calculation of Peak Hour trip generation rates as published in the ITE Trip Generation Manual, latest edition.)

902-2.02 Capacity Analysis must be determined by the methods contained within the Highway Capacity Manual (HCM), latest edition.

902-2.03 Traffic Signal requirements will be determined by the warrants contained in the California Manual on Uniform Traffic Control Devices (California MUTCD), latest edition.

902-2.04 Proportionate Shares along State highways shall be calculated using the Caltrans formula. All other County Proportionate Shares are calculated with the following formula: (Project Traffic/Future Forecasted Traffic) x 100.

As such, LOS “D” is the minimum standard that will be used for all County intersection control types in this report. LOS “C” will be used for state facilities.

3.3 Intersection Operation Analysis Software

Synchro 10 software suite was used to analyze the LOS analysis for unsignalized intersections analyzed within this study. This software is based upon the latest assumptions provided in the *Highway Capacity Manual* (HCM), 6th Edition.

¹ Kern County Public Works website: <https://kernpublicworks.com/building-and-development/engineering/development-standards/division-nine-standards-for-traffic-engineering/>

3.4 Technical Analysis Parameters

This assessment provides evaluation of traffic operating conditions by incorporating appropriate heavy vehicle adjustment factors, peak hour factors (PHF), and signal timings and reports the resulting intersection delays and LOS as estimated using *Synchro 10*. The following section describes all technical parameters incorporated into intersection analysis. Table 3.2 presents technical parameters that were applied to study intersections during the analysis.

Table 3.2 Technical Parameters

Technical Parameters	Assumption
% Trucks	Intersection approach, based on existing counts, min. 2%
PHF for Existing	Intersection approach, based on existing counts
PHF for Approve Pending and Future Conditions Scenarios	Intersection overall, 0.92 or higher
Signal Timings	Based upon agency timing plans (if necessary)
Grade	2% or less at all intersections
Passenger Car Equivalent (PCE)	2.0 passenger cars per heavy duty vehicle

Additionally, in terms of factors that affect how a road or intersection operates, PHFs are a significant measure of how concentrated traffic is during the busiest portion of the peak hour. A PHF at a given intersection is the sum of the traffic entering the intersection over the busiest 60 minutes divided by four times the entering volume of the busiest 15-minutes within the hour. A PHF of 1.0 means traffic levels are evenly spread out over the whole hour, where a lower number means traffic spikes for a short period (e.g., school site drop-offs/pick-ups).

3.5 Roadway Capacity

Roadway segment LOS were estimated using *Highway Capacity Manual* (HCM 6th Edition) methodologies. For standard roadways, LOS was estimated using ADT-based LOS thresholds, as presented in Table 3.3.

Table 3.3 Daily Roadway Capacity by Facility Type

Roadway Type	Average Daily Traffic (ADT) – Total of Both Directions				
	A	B	C	D	E
Six-Lane Freeway	42,000	64,800	92,400	111,600	120,000
Four-Lane Freeway	28,000	43,200	61,600	74,400	80,000
Six-Lane Divided Expressway	35,500	42,200	46,200	55,800	60,000
Four-Lane Divided Expressway	23,667	28,133	30,800	37,200	40,000
Four-Lane Divided Arterial	22,000	25,000	29,000	32,500	36,000
Four-Lane Arterial (w/LTL)	22,000	25,000	29,000	32,500	36,000
Four-Lane Arterial (No LTL)	18,000	21,000	24,000	27,000	30,000
Two-Lane Divided Arterial	11,000	12,500	14,500	16,000	18,000
Two-Lane Arterial (w/LTL)	11,000	12,500	14,500	16,000	18,000
Two-Lane Arterial (No LTL)	9,000	10,500	12,000	13,500	15,000
Two-Lane Roundabout Arterial	14,300	16,250	18,850	20,800	23,400
Four-Lane Collector	12,000	15,000	18,000	21,000	24,000
Two-Lane Collector	6,000	7,500	9,000	10,500	12,000
Two-Lane Local	1,000	2,000	3,000	4,000	5,000

Notes:

1. w/LTL indicates arterials with either continuous center left turn lane (LTL) or left turn lanes at major intersections.
2. No LTL indicates arterials without left turn lanes (LTL) at most major intersections.
3. Daily volume to capacity on roadway types does not supplant the need to perform peak-hour HCM-based analysis.

For purposes of this study, Copus Road and Old River Road are analyzed as two-lane arterial with no left turn lane. Although the *Kern County General Plan Circulation Element* functional classification system map identifies these two roads as major collectors, the daily capacity by facility type is more representative of a two-lane arterial with no left turn lane as a result of operational characteristics (12-foot lanes with shoulders), pavement condition and free-flow speed.

4. Existing Conditions

Existing conditions is the analysis scenario in which current operations at study locations are analyzed and establishes the baseline traffic conditions. Figure 2 identifies Existing Lane Geometrics & Control and Peak Hour Traffic Volumes.

4.1 Existing Intersection Operations

Existing weekday AM and PM peak hour intersection traffic operations were quantified utilizing the existing traffic volumes and intersection lane geometrics and control. Table 4.1 presents intersection operations for the *Existing* conditions.

Table 4.1 Existing Intersection Operations

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	Copus Road/Old River Road	TWSC	D	10.0	A	No	11.9	B	No
2	Copus Road/I-5 SB On-Off Ramps	TWSC	C	10.2	B	No	9.7	A	No
3	Copus Road/I-5 NB On-Off Ramps	TWSC	C	10.0	A	No	10.2	B	No
4	State Route 166/Old River Road	TWSC	D	12.4	B	No	10.1	B	No

Notes:

NB=Northbound, SB=Southbound

1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control

2. LOS = Delay based on worst minor approach for TWSC intersections; average of all approaches for AWSC, signal

3. Warrant = Based on California MUTCD Peak Hour Warrant 3 (70% Factor)

As presented in Table 1.6, all study intersections for Existing conditions currently operate at acceptable LOS B conditions or better during the AM and/or PM peak hour conditions.

4.2 Existing Roadway Segment Operations

LOS for the traffic counts were established using the capacities in Table 3.3. Table 4.2 contains a summary of the Existing roadway segment analysis and LOS conditions.

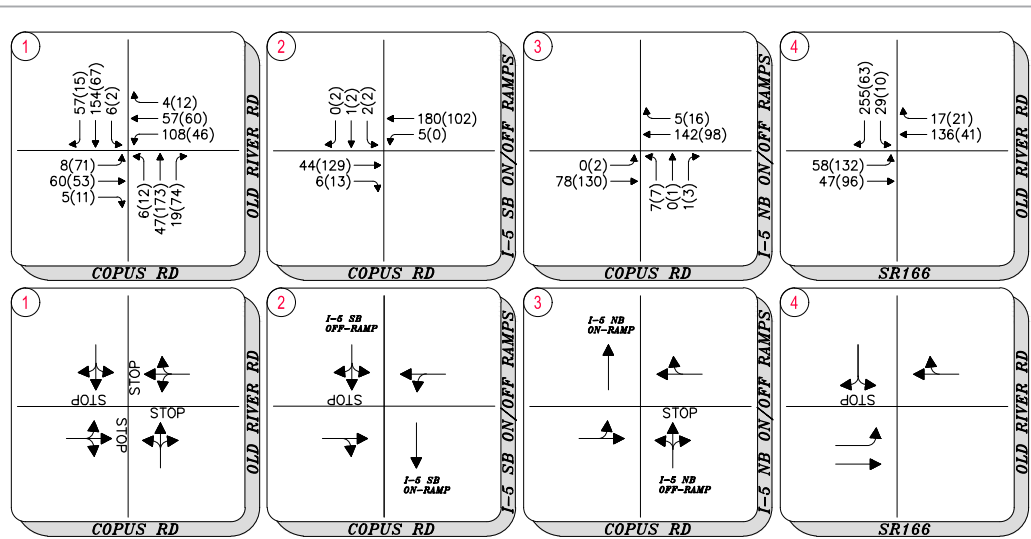
Table 4.2 Existing Roadway Segment LOS Conditions

#	Roadway	Location	Facility Type (# of Lanes)	Target LOS	Average Daily Traffic	LOS
1	Copus Road	w/o Old River Road	Two-Lane Arterial (No LTL)	D	2,080	A
2	Copus Road	e/o Old River Road	Two-Lane Arterial (No LTL)	D	2,600	A
3	Old River Road	n/o Copus Road	Two-Lane Arterial (No LTL)	D	3,560	A
4	Old River Road	s/o Copus Road	Two-Lane Arterial (No LTL)	D	4,280	A

Notes:

1. No LTL arterials without left turn lanes (LTL) at most major intersections (within study area).

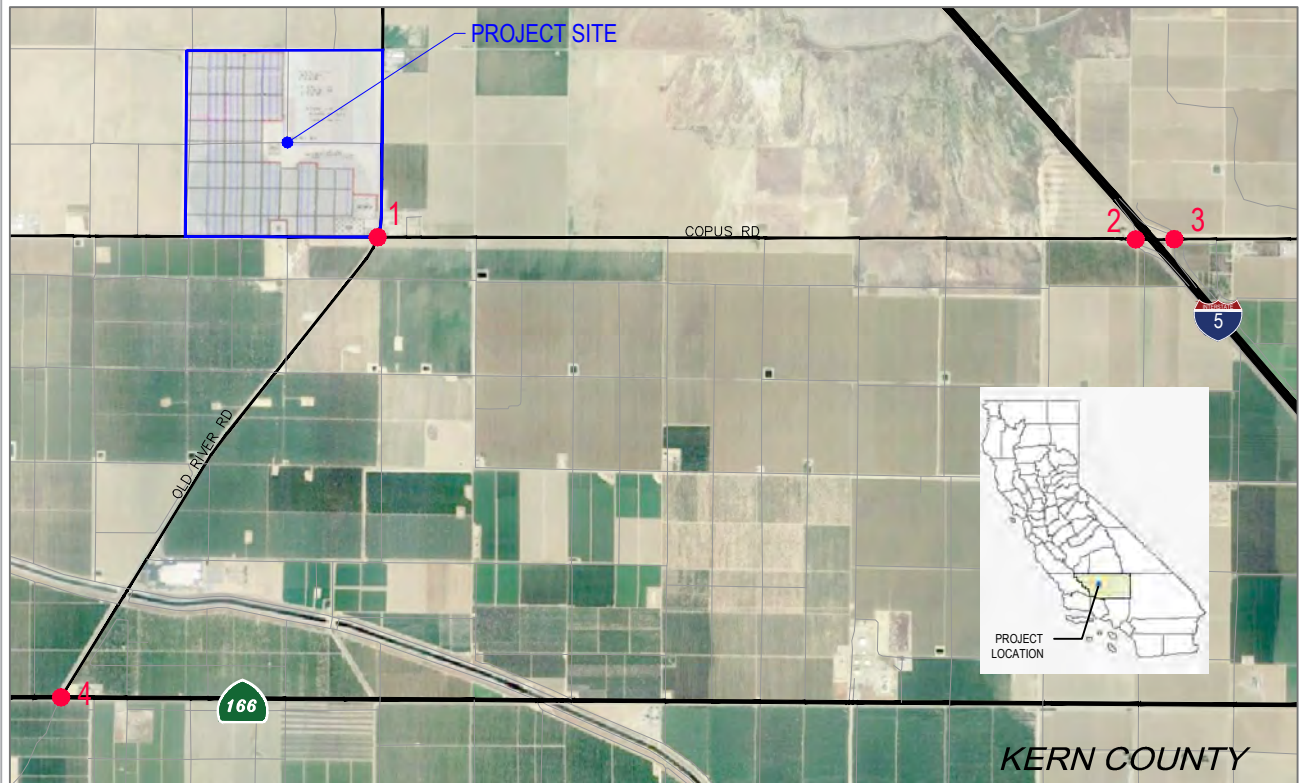
2. Daily volume to capacity on roadways does not supplant the need to perform peak-hour HCM-based analysis.



LEGEND:

XX - AM PEAK HOUR TRAFFIC VOLUMES
 (XX) - PM PEAK HOUR TRAFFIC VOLUMES
 ← VEHICLE LANE

● STUDY INTERSECTIONS
 — PROJECT BOUNDARY



Rincon Consultants, Inc.
 Kern County Solar Farms - Jasmine Solar Project
 Existing Conditions Lane
 Geometric and Control and
 Peak Hour Traffic Volumes

Project No. 11219906
 Report No. 001
 Date 01.29.2021

FIGURE 2

As presented in Table 4.2, all roadway segments are operating at acceptable LOS A conditions under Existing conditions scenario.

5. Approved/Pending Projects

In order to determine if any approved/pending projects in Kern County fall within a 6-mile radius of the Project, GHD reviewed all current Environmental Impact Reports (EIR) and Notices of Preparation (NOP) posted on Kern County's Planning and Natural Resources Department website. Additionally, GHD submitted two emails to this Department that were unanswered.

Based upon our review, it has determined that there are no approved/pending projects near the study site at Copus Road/Old River Road. As such, a short-term cumulative analysis scenario is not required. It should be noted that projects identified in the EIRs and NOPs are included in the long-term cumulative analysis (Year 2040) in a subsequent section of this report.

6. Existing plus Project

6.1 Project Description

The proposed Project is a commercial solar-generating facility sited on private lands located south of Bakersfield near the unincorporated community of Lakeview (north of Copus Road and west of Old River Road). The Project is a 70 MW utility-scale solar project paired with energy storage and will interconnect at PG&E's Lakeview Substation via a 0.50-mile generation-tie line.

6.2 Construction Vehicle and Passenger Car Equivalent (PCE) Trip Generation

As indicated in the Introduction, the proposed Project is a commercial solar-generating facility situated in southern Kern County as identified in Figure 1. Typically, trip generation rates would be estimated utilizing documentation from the *Institute of Transportation Engineers (ITE)*. However, the proposed land use is not a represented in *ITE Trip Generation (10th Edition)*. Therefore, in order to calculate trip generation for the proposed Project, GHD corresponded with the applicant, or Project proponent, to discuss operations.

Detailed trip generation was estimated for six phases: 1) Site Preparation and Grading; 2) Tracker Foundations; (3) Underground Cabling; (4) Mechanical Installation; (5) Electrical Installation; and (6) PG&E Substation. Each phase describes off-road equipment, construction vehicle types, number of units, phase duration, daily hours and daily mileage per vehicle. Types of vehicles include passenger (commuters), and truck type (pickup, water, flatbed, gravel, concreted, delivery trucks, etc.).

Because the six phases are staggered and overlap, i.e., they will not occur simultaneously, GHD assumed the worst-case construction phases (based upon vehicle/truck trips) that could potentially occur at the same time. This is based upon the Project Schedule provided by the applicant (Attachment A). It was determined that the combination of Phases 2, 3 and 4 make up the most trips

that could potentially overlap. As a result, Attachment B provides a detailed summary of Jasmine Solar Project Trip Generation implemented for this analysis.

In addition, a passenger car equivalent (PCE) was applied to vehicle type. A PCE is a metric used in transportation engineering to assess traffic-flow rate on a highway. A PCE is essentially the impact that a mode of transport has on highway variable (e.g., headway, speed, density, etc.) compared to a single passenger car. For this analysis, a conservative PCE of 2.0 was applied to account for large trucks. This is consistent with the methodology presented in *HCM 6th Edition*.

Trip generation for the construction phase is based on the types of vehicles used and the number of workers that are anticipated to report to the job site. Noise from construction limited by Kern County Ordinance 8.36.020 H between the hours of 9:00 p.m. and 6:00 a.m. on the weekdays and between the hours of 9:00 p.m. and 8:00 p.m. on the weekends. Therefore, construction may occur during the a.m. peak (7:00 – 9:00 a.m.) and the p.m. peak (4:00 to 6:00 p.m.) commute periods, even though construction activities will occur throughout the day.

In order to simulate the worst-case trip generation scenario, construction workers are assumed to arrive in the a.m. peak hour and leave during the p.m. peak hour each weekday. Although some construction workers may carpool, this is not assumed, i.e., each worker will drive alone to/from work. Based upon our understanding of the Project, a PCE of 194 construction workers are anticipated to commute to and from the proposed Project site during phases 2 through 4 (worst-case scenario).

As shown in Attachment B, approximately 512 daily trips (including PCE factor) are forecasted to be generated for short-term construction purposes. This would include short-term AM and PM peak hour trips of 194 in and out, respectively, during the construction phases. Following construction, it is estimated that day to day operations and maintenance trips and trips would be minimal, i.e., approximately 8 trips per day (discussed further under Cumulative plus Project conditions). This would include 1 full-time employee (commute and lunch break trips) with any deliveries and/or visitors.

6.3 Project Trip Distribution

The Project is expected to “generate” and “attract” construction-related trips throughout the County and from other locations throughout the region. However, the majority of trips will be from I-5. Based upon existing traffic flow patterns, geographical location of Project site, location of other similar destinations and previous traffic impact studies, these considerations resulted in a distribution of Project trip types throughout the study area shown in Figure 3 and assumed below:

- 5% to/from Copus Road west of Old River Road
- 45% to/from Copus Road east of Old River Road
- 40% to/from Old River Road north of Copus Road
- 10% to/from Old River Road south of Copus Road

6.4 Project Site Access

Access to the Project site is provided via one (1) main project driveway. This driveway is located on the north side of Copus Road, just west of Old River Road. Exhibit 1 presents the Project Site Plan and shows the main Project driveway.

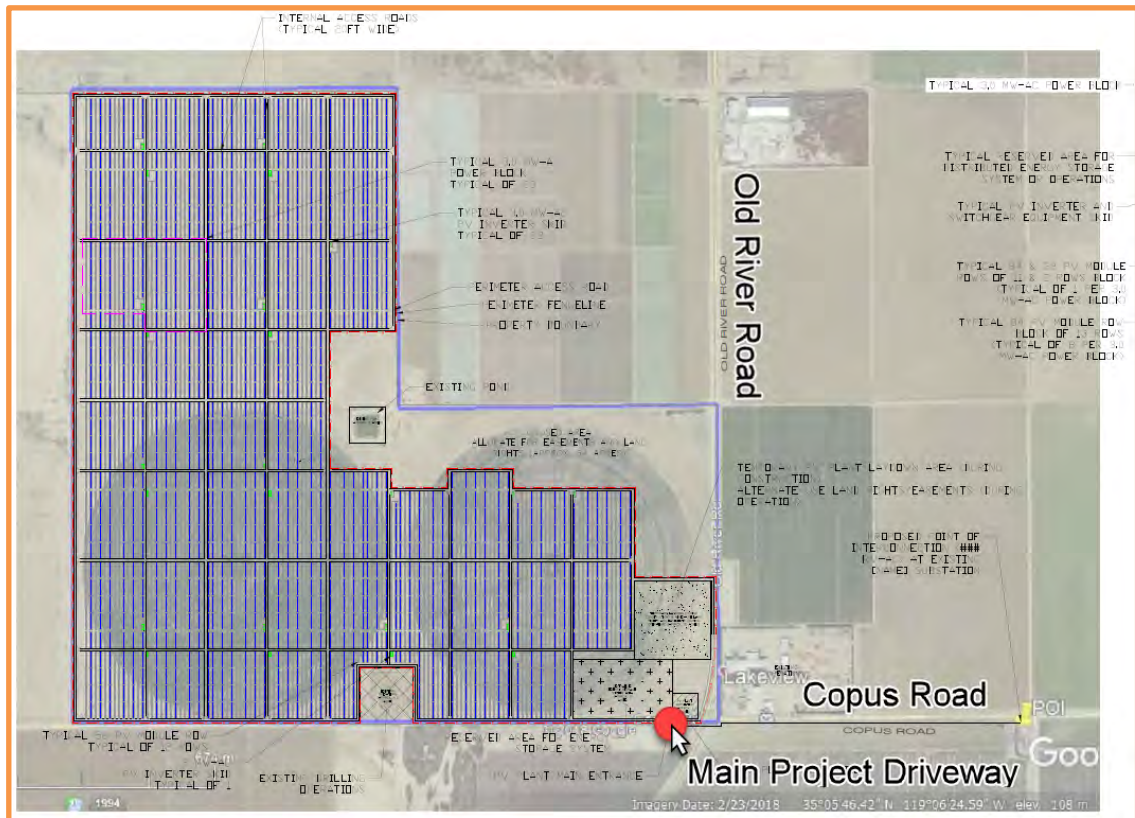
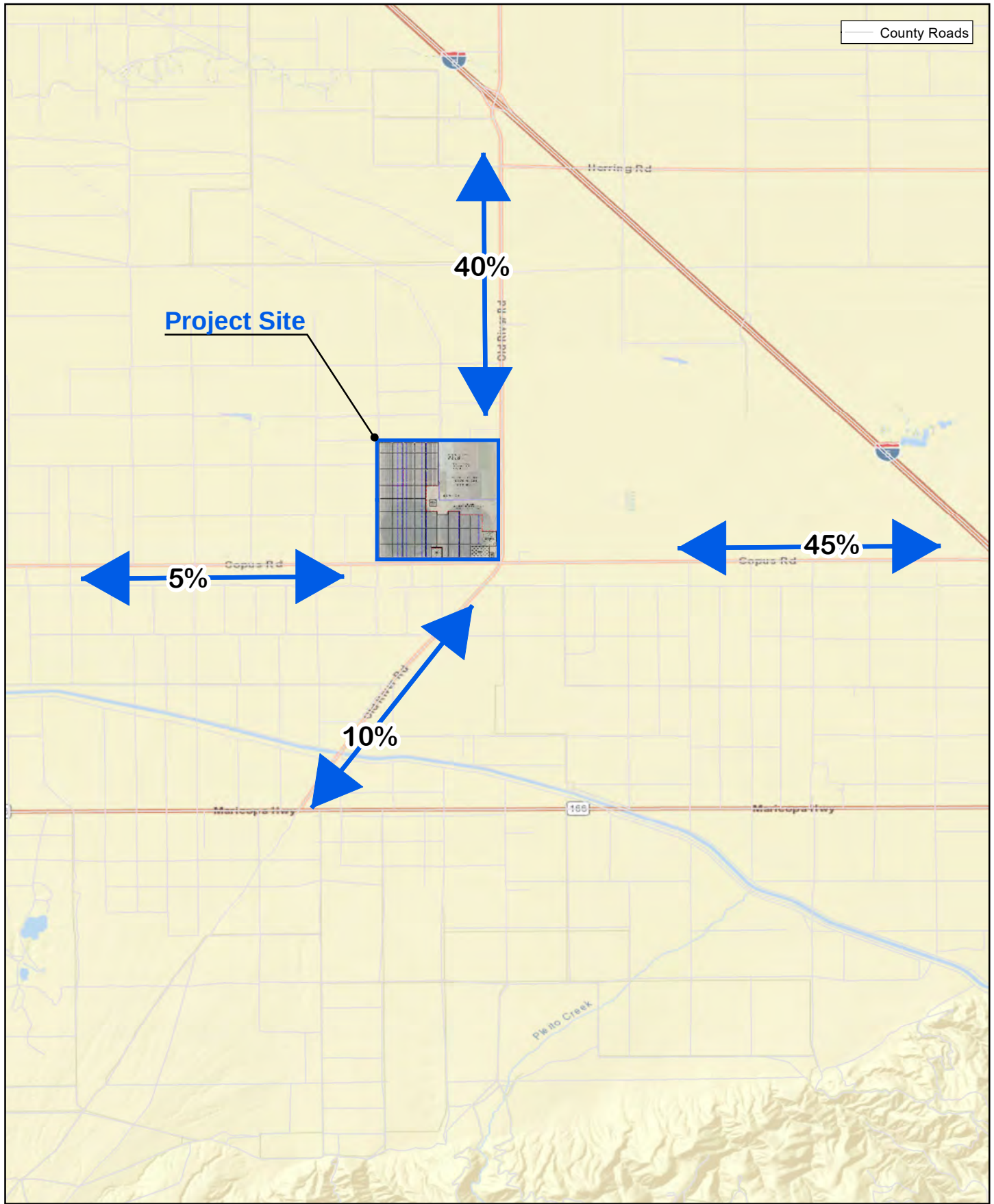


Exhibit 1 - Project Site Plan/Driveways



6.5 Existing plus Project Intersection Operations

Existing plus Project weekday AM and PM peak hour intersection traffic operations were quantified by superimposing traffic generated by the proposed Project onto Existing conditions (reference Figure 4). Table 6.1 shows the summary of the Existing plus Project roadway analysis and LOS conditions.

Table 6.1 Existing plus Project Intersection Operations

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	Copus Road/Old River Road	TWSC	D	12.5	B	No	19.4	C	No
2	Copus Road/I-5 SB On-Off Ramps	TWSC	C	10.9	B	No	10.3	B	No
3	Copus Road/I-5 NB On-Off Ramps	TWSC	C	10.7	B	No	11.1	B	No
4	State Route 166/Old River Road	TWSC	D	12.6	B	No	10.1	B	No
5	Copus Road/Project Driveway	OWSC	D	9.5	A	No	9.7	A	No

Notes:

NB=Northbound, SB=Southbound

1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; OWSC = One Way Stop Control

2. LOS = Delay based on worst minor approach for TWSC intersections; average of all approaches for AWSC, signal

3. Warrant = Based on California MUTCD Peak Hour Warrant 3 (70% Factor)

As presented in Table 6.1, all roadway segments are forecasted to operate at acceptable LOS C conditions or better under Existing plus Project conditions scenario.

6.6 Existing plus Project Roadway Segment Operations

Table 6.2 contains a summary of the Existing roadway segment analysis and LOS conditions.

Table 6.2 Existing plus Project Intersection Operations

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	Copus Road/Old River Road	TWSC	D	12.5	B	No	19.4	C	No
2	Copus Road/I-5 SB On-Off Ramps	TWSC	C	10.9	B	No	10.3	B	No
3	Copus Road/I-5 NB On-Off Ramps	TWSC	C	10.7	B	No	11.1	B	No
4	State Route 166/Old River Road	TWSC	D	12.6	B	No	10.1	B	No
5	Copus Road/Project Driveway	OWSC	D	9.5	A	No	9.7	A	No

Notes:

NB=Northbound, SB=Southbound

1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; OWSC = One Way Stop Control

2. LOS = Delay based on worst minor approach for TWSC intersections; average of all approaches for AWSC, signal

3. Warrant = Based on California MUTCD Peak Hour Warrant 3 (70% Factor)

Table 6.3 Existing plus Project Roadway Segment LOS Condition

#	Roadway	Location	Facility Type (# of Lanes)	Target LOS	Average Daily Traffic	LOS
1	Copus Road	w/o Old River Road	Two-Lane Arterial (No LTL)	D	2,110	A
2	Copus Road	e/o Old River Road	Two-Lane Arterial (No LTL)	D	2,830	A
3	Old River Road	n/o Copus Road	Two-Lane Arterial (No LTL)	D	3,770	A
4	Old River Road	s/o Copus Road	Two-Lane Arterial (No LTL)	D	4,320	A

Notes:

1. No LTL arterials without left turn lanes (LTL) at most major intersections (within study area).

2. Daily volume to capacity on roadways does not supplant the need to perform peak-hour HCM-based analysis.

As presented in Table 6.2, all roadway segments are forecasted to operate at acceptable LOS A conditions under Existing plus Project conditions scenario.

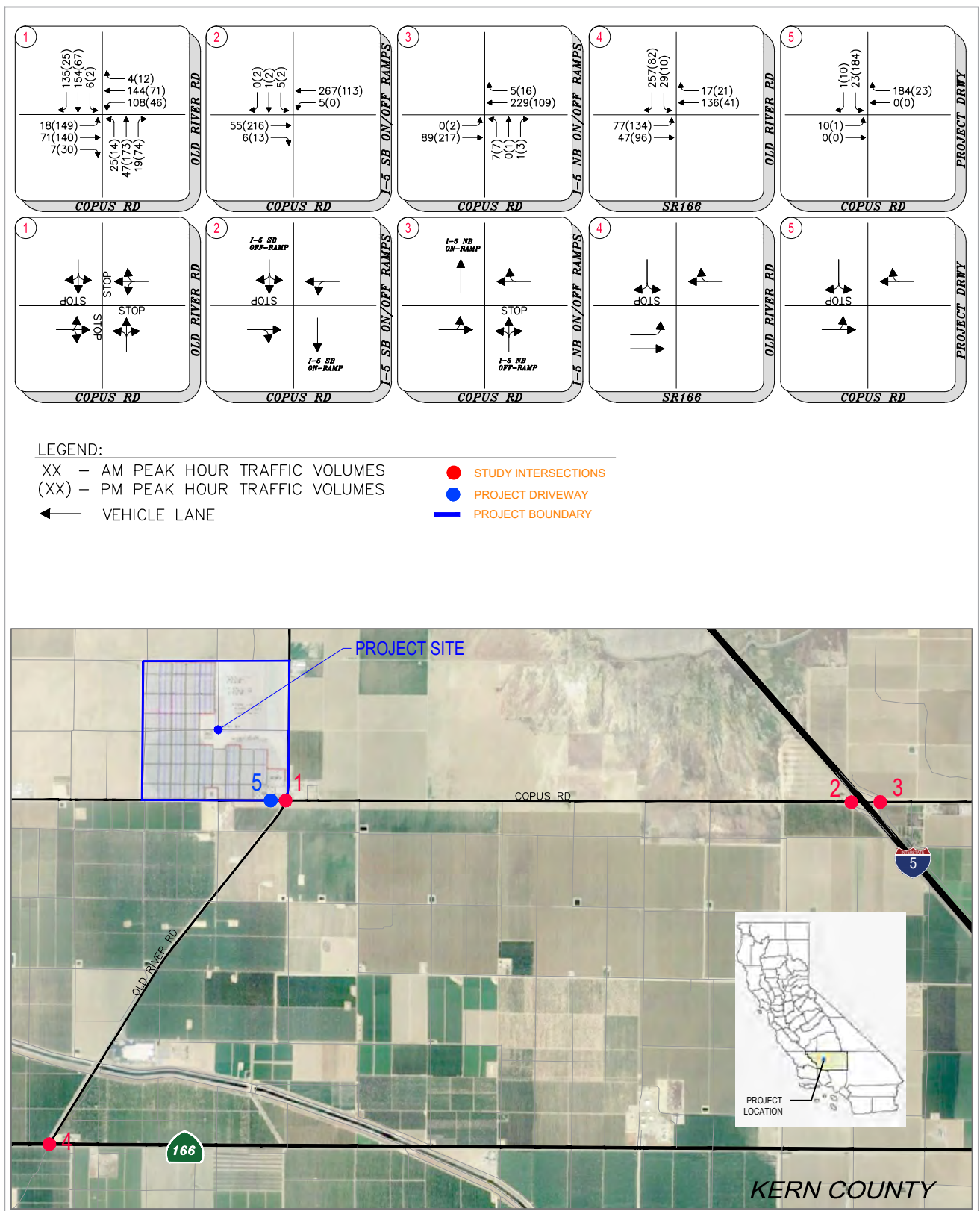


FIGURE 4

7. Cumulative Conditions

Kern COG provided 2020 and 2042 outputs from their *Regional Travel Demand Forecast Model* (Model). The latest General Plans from all agencies land use and circulation elements in Kern County are included in Kern COG's future Models. GHD used the Model's 2020 (validated Base) and 2042 (Cumulative) traffic forecasts to identify the incremental change in traffic volumes by approach and applied the factor to known (existing) traffic counts to forecast 2042 traffic volumes. The count delta method forecasts adjustment is based upon the difference of recent counts from interpolation resulting from Base and Cumulative years. Following this process, GHD checked the forecasted turning movements for reasonableness considering existing and future circulation conditions.

7.1 Cumulative Intersection Operations

Cumulative traffic volumes were forecasted and are shown in Figure 5. Table 7.1 presents a summary of the Cumulative study intersection LOS conditions.

Table 7.1 Cumulative Intersection Operations

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	Copus Road/Old River Road	TWSC	D	16.0	C	No	20.3	C	No
2	Copus Road/I-5 SB On-Off Ramps	TWSC	C	11.8	B	No	10.5	B	No
3	Copus Road/I-5 NB On-Off Ramps	TWSC	C	11.2	B	No	11.2	B	No
4	State Route 166/Old River Road	TWSC	D	26.6	D	Yes	11.5	B	No

Notes:

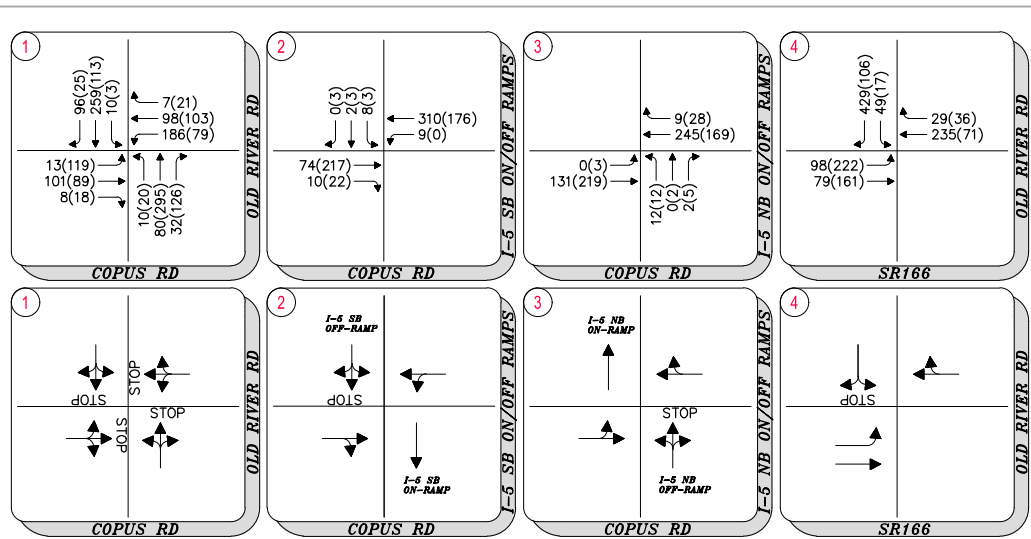
NB=Northbound, SB=Southbound

1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control

2. LOS = Delay based on worst minor approach for TWSC intersections; average of all approaches for AWSC, signal

3. Warrant = Based on California MUTCD Peak Hour Warrant 3 (70% Factor)

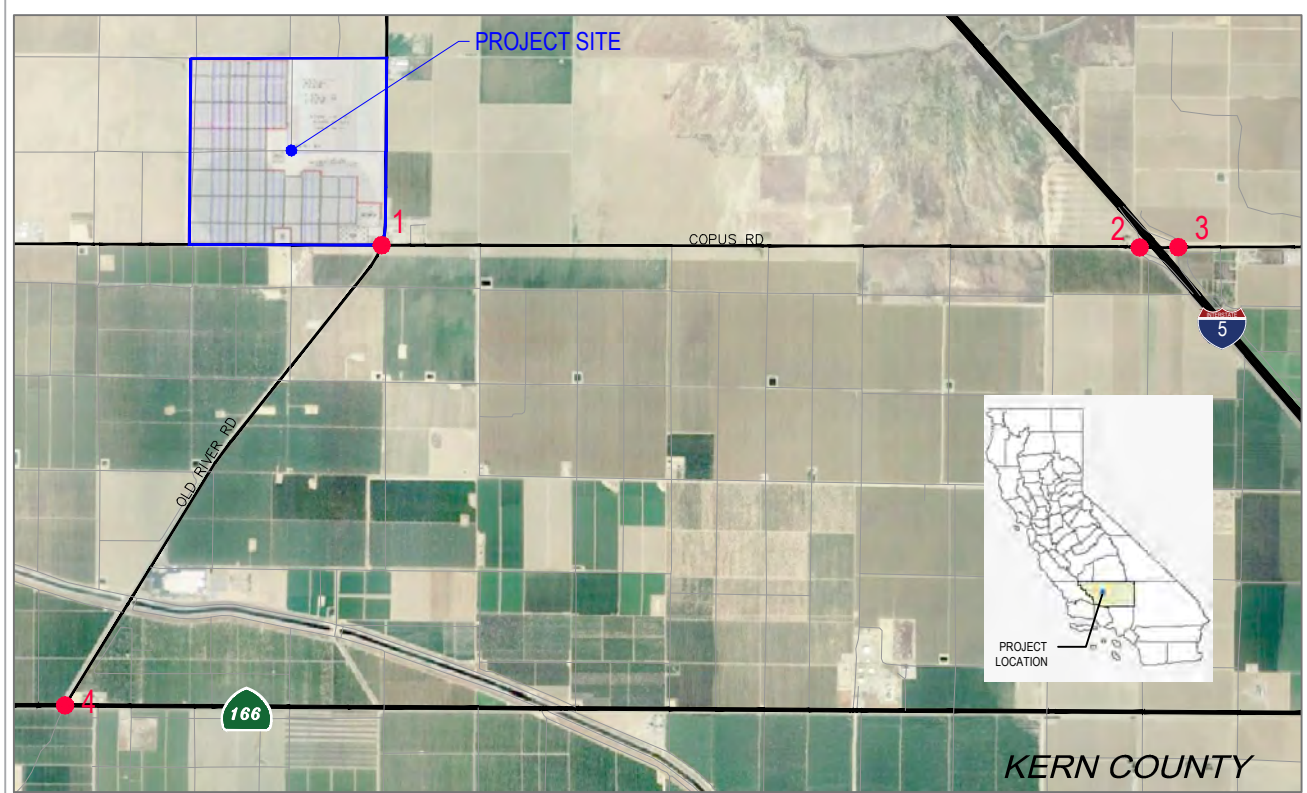
Under Cumulative conditions, all of the study intersections are forecasted to operate at acceptable LOS. However, intersection #4 (State Route 166/Old River Road) is projected to meet the Caltrans' Peak Hour Warrant 3 (70%) under the Cumulative AM peak hour scenario. All mitigation measures are discussed in a subsequent section of this report.



LEGEND:

XX – AM PEAK HOUR TRAFFIC VOLUMES
 (XX) – PM PEAK HOUR TRAFFIC VOLUMES
 ← VEHICLE LANE

● STUDY INTERSECTIONS
— PROJECT BOUNDARY



N.T.S.

Rincon Consultants, Inc.
Kern County Solar Farms - Jasmine Solar Project
Cumulative Conditions Lane
Geometric and Control and
Peak Hour Traffic Volumes

Project No. 11219906
 Report No. 001
 Date 01.29.2021

FIGURE 5

7.2 Cumulative Roadway Segment Operations

Table 7.2 contains a summary of the forecasted Cumulative roadway segment analysis and LOS conditions.

Table 7.2 Cumulative Roadway Segment LOS Conditions

#	Roadway	Location	Facility Type (# of Lanes)	Target LOS	Average Daily Traffic	LOS
1	Copus Road	w/o Old River Road	Two-Lane Arterial (No LTL)	C	3,480	A
2	Copus Road	e/o Old River Road	Two-Lane Arterial (No LTL)	C	4,070	A
3	Old River Road	n/o Copus Road	Two-Lane Arterial (No LTL)	C	6,460	A
4	Old River Road	s/o Copus Road	Two-Lane Arterial (No LTL)	C	7,040	A

Notes:

1. No LTL arterials without left turn lanes (LTL) at most major intersections.
2. Daily volume to capacity on roadways does not supplant the need to perform peak-hour HCM-based analysis.

As presented in Table 7.2, all roadway segments are forecasted to operate at acceptable LOS A conditions under Cumulative conditions scenario.

8. Cumulative plus Project Conditions

Project trip generation under cumulative conditions are much lower than under Existing plus Project conditions that included development of the solar facility. Following completion of the construction phase scheduled for December 2023, it is estimated that one employee will be assigned to the operations plant for maintenance and oversight. In order to calculate trip generation for post-construction activities, Table 8.1 was developed. It is assumed that the sole employee will generate 4 daily trips, including arrival and departure during the peak hour periods. It is further assumed that 4 daily trips would be generated by deliveries or “other” trip types.

Table 8.1 – Cumulative plus Project Trip Generation

Land Use Category	Unit	Daily Trip Rate/Unit	AM Peak Hour Trip Rate/Unit			PM Peak Hour Trip Rate/Unit		
			Total	In %	Out %	Total	In %	Out %
Solar Maintenance Worker	EMP	4.0	0.25	100%	0%	0.25	0%	100%
Project Name	Quantity (Units)	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			Total	In	Out	Total	In	Out
Employee	1	4	1	1	0	1	0	1
Deliveries/Other	2	4	2	1	1	2	1	1
Project Trips		8	3	2	1	3	1	2

Notes:

1. Estimated based upon data provided by Project proponent.
2. Deliveries are shown during peak hours.
3. Errors due to rounding may occur.

As shown in Table 8.1, the Cumulative plus Project daily trip generation assumes 8 trips, with 3 trips occurring during the AM and PM peak hours, respectively. These trips were distributed north/south on Old River Road and east/west on Copus Road.

8.1 Cumulative plus Project Intersection Operations

Cumulative plus Project traffic volumes were forecasted by applying traffic generated by the proposed Project (Table 8.1) onto Cumulative conditions (reference Figure 6). Cumulative plus Project weekday AM and PM peak hour intersection traffic operations are shown in Table 8.2.

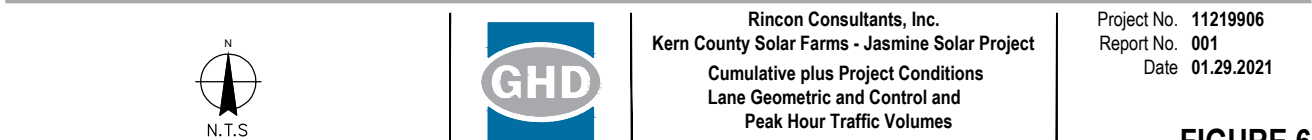
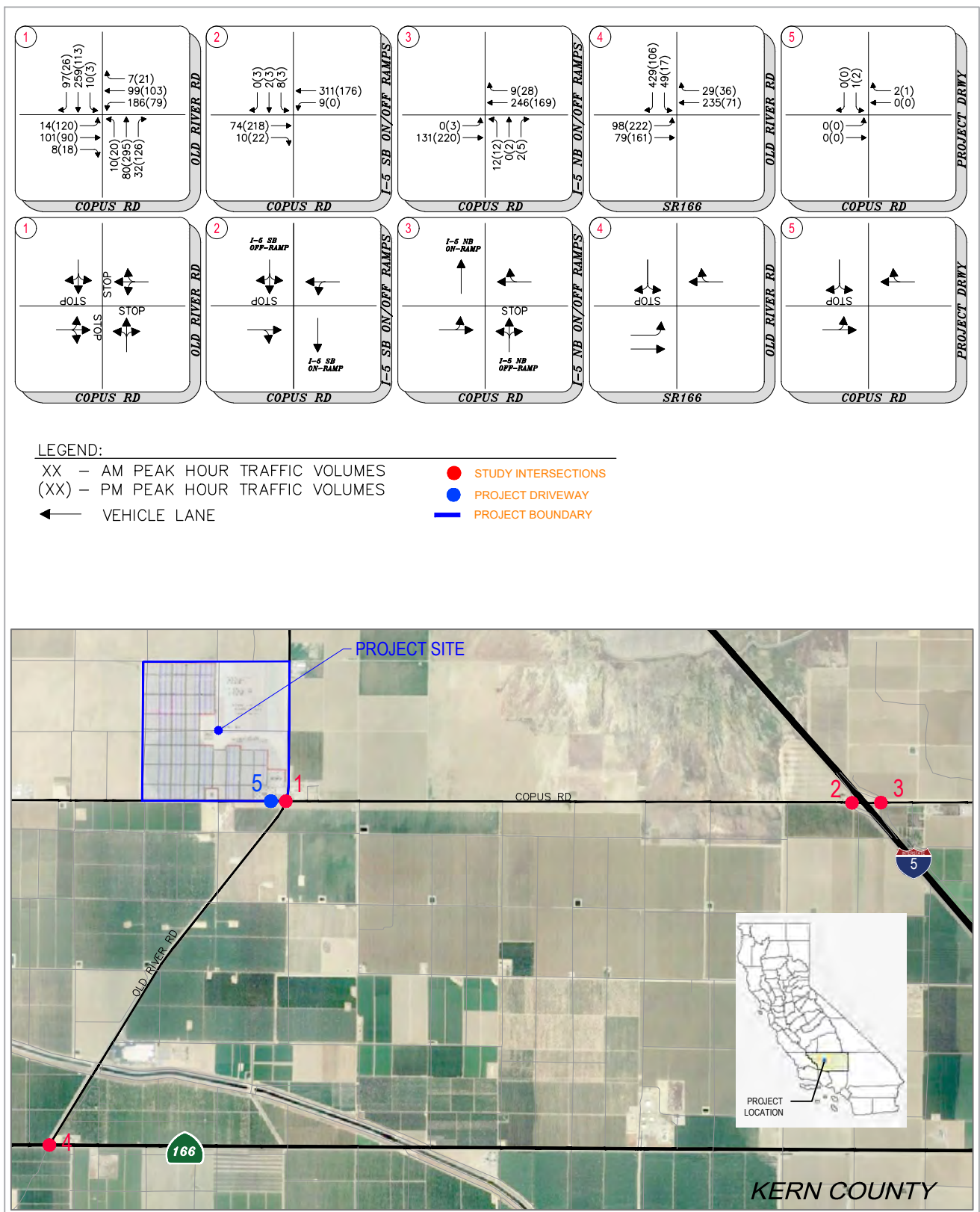


Table 8.2 Cumulative plus Project Intersection Operations

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	Copus Road/Old River Road	TWSC	D	16.1	C	No	20.4	C	No
2	Copus Road/I-5 SB On-Off Ramps	TWSC	D	11.8	B	No	10.5	B	No
3	Copus Road/I-5 NB On-Off Ramps	TWSC	C	11.2	B	No	11.2	B	No
4	State Route 166/Old River Road	TWSC	C	26.6	D	Yes	11.5	B	No
5	Copus Road/Project Driveway	OWSC	D	8.7	A	No	8.7	A	No

Notes:

NB=Northbound, SB=Southbound

1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; OWSC = One Way Stop Control

2. LOS = Delay based on worst minor approach for TWSC intersections; average of all approaches for AWSC, signal

3. Warrant = Based on California MUTCD Peak Hour Warrant 3 (70% Factor)

As shown in Table 8.2, three (3) of the study intersections are anticipated to operate at acceptable LOS under Cumulative plus Project conditions. However, Intersection #4 (State Route 166/Old River Road) is projected to operate at unacceptable LOS conditions and meets the Caltrans' Peak Hour Warrant 3 (70%) under the Cumulative plus Project AM peak hour scenario. All mitigation measures are discussed in a subsequent section of this report.

8.2 Cumulative Roadway Segment Operations

Table 8.3 contains a summary of the forecasted Cumulative roadway segment analysis and LOS conditions.

Table 8.3 Cumulative plus Project Roadway Segment LOS Conditions

#	Roadway	Location	Facility Type (# of Lanes)	Target LOS	Average Daily Traffic	LOS
1	Copus Road	w/o Old River Road	Two-Lane Arterial (No LTL)	D	3,490	A
2	Copus Road	e/o Old River Road	Two-Lane Arterial (No LTL)	D	4,070	A
3	Old River Road	n/o Copus Road	Two-Lane Arterial (No LTL)	D	6,470	A
4	Old River Road	s/o Copus Road	Two-Lane Arterial (No LTL)	D	7,040	A

Notes:

1. No LTL arterials without left turn lanes (LTL) at most major intersections (within study area).

2. Daily volume to capacity on roadways does not supplant the need to perform peak-hour HCM-based analysis.

As presented in Table 8.3, all roadway segments are forecasted to operate at acceptable LOS A conditions under Cumulative plus Project conditions.

9. Vehicle Miles Travelled (VMT)

Transportation planners have used VMT as a metric for several purposes going back decades. VMT measures the amount of travel for all vehicles in a geographic region over a given period of time. It is calculated by adding up all the miles driven by all the cars and trucks on all the roadways in a region, or simply by multiplying the number of vehicles by distance in miles. This metric plays an integral role in the transportation planning, policymaking, and revenue estimation processes due to its ability to indicate travel demand and behavior.

Per CEQA Guidelines section 15064.3, subdivision (b), VMT analysis under CEQA may be based on the following:

- **Qualitative Analysis:** If existing models or methods are not available to estimate VMT for the particular project being considered, a lead agency may analyze the project's VMT qualitatively. Such a qualitative analysis would evaluate factors such as the availability of transit, proximity to other destinations, etc. For many projects, a qualitative analysis of construction traffic may be appropriate.
- **Methodology:** A lead agency has discretion to choose the most appropriate methodology to evaluate a project's VMT, including whether to express the change in absolute terms, per capita, per household or in any other measure. A lead agency may use models to estimate a project's vehicle miles traveled and may revise those estimates to reflect professional judgement based on substantial evidence. Any assumptions used to estimate vehicle miles traveled and any revisions to model outputs should be documented and explained in the environmental document prepared for the project.

CEQA Guidelines section 15064.3, subdivision (b) was adopted in December 2018 by the California Natural Resources Agency. These revisions to the CEQA Guidelines criteria for determining the significance of transportation impacts are primarily focused on projects within transit priority areas and shifts the focus from driver delay to reduction of vehicular greenhouse gas emissions through creation of multimodal networks, and creation of a mix of land uses that can facilitate fewer and shorter vehicle trips.

VMT is a measure of the total number of miles driven for various purposes and is sometimes expressed as an average per trip or per person. Construction traffic would be temporary and would not permanently affect VMT characteristics in this part of Kern County or elsewhere. Long-term, operational traffic would be limited, with a small work force of approximately one (1) employee. It was assumed that the employee resides north of the Project, e.g., metro Bakersfield. According to technical guidance issued by the Office of Planning and Research (OPR), projects generating less than 110 or fewer daily vehicle trips may be presumed to have a less than significant impact involving VMT. This Project is anticipated to result in "Low VMT" based upon estimate of 8 daily trips and would have less than significant impact.

10. CEQA Checklist

The following analysis is provided to support environmental documentation pursuant to CEQA. Based upon the preliminary results, this project will have no transportation impacts related to program or plan conflicts, inconsistencies with CEQA, increase hazards due to design features or result in inadequate emergency access.

The conclusions of the study are summarized below.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. TRANSPORTATION. Would the project:				
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☐	☒
b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	☐	☒
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
d) Result in inadequate emergency access?	☐	☐	☐	☒

11. Recommended Improvements

This section presents a list of proposed improvements to be considered for the study intersections and roadways based upon the results of the analysis presented in this report. Improvement have been developed for worst case scenarios to achieve acceptable LOS conditions. The study intersections and roadway segments are projected to operate at acceptable LOS conditions if recommended improvements are implemented. Figure 7 identifies Mitigated Lane Geometrics and Control.

11.1 Existing Conditions

Under *Existing Conditions*, the study intersections and roadways currently operate at acceptable LOS. As such, no improvements at intersections are recommended at study intersections/roadways.

11.2 Existing plus Project Conditions

Under *Existing plus Project Conditions*, the study intersections and roadways are projected to operate at acceptable LOS. No improvements at intersections are recommended at study intersections/roadways.

Copus Road/Project Driveway: For primary Project access, it is recommended that the Project proponent locate the main project driveway on Copus Road a minimum of 300' west of the intersection of Old River Road. This is based upon Kern County intersection and driveway spacing requirements.

11.3 Cumulative Conditions

Under *Cumulative Conditions*, one (1) intersection is anticipated to operate at unacceptable LOS "E" conditions. As such the following improvements are recommended:

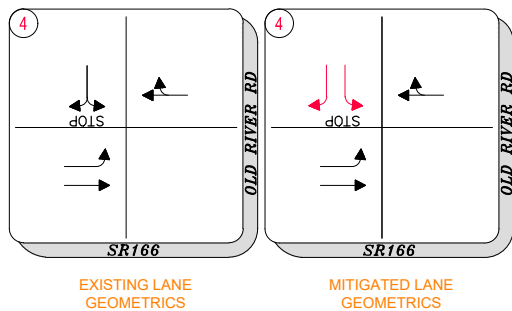
State Route 166/Old River Road (#4): Widen southbound approach to include dedicated right-turn lane with a minimum of 100' storage. This intersection is forecasted to operate at LOS "D" conditions during the AM peak hour (worst case scenario) and is anticipated to meet the Caltrans' Peak Hour Warrant 3 (70%). With installation of a southbound right-turn lane, this intersection is forecasted to operate at LOS "C" with 18.7 seconds of delay.

Although this intersection is anticipated to meet the Caltrans' Peak Hour Warrant 3 (70%), a traffic signal is not recommended at this time. According to the CA MUTCD, the satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal. Warrant 3 (70%) is one of 9 traffic signal warrants. Should the County desire to pursue a future traffic signal at this location, an engineering study should be prepared to determine if installing a traffic control signal will improve the overall safety and/or operation of the intersection.

11.4 Cumulative plus Project Conditions

Under *Cumulative plus Project Conditions*, **State Route 166/Old River Road (#4)** is again forecasted to operate at unacceptable LOS "E" conditions. Implementing recommended improvements identified under Cumulative Conditions will result in LOS "C" with 18.7 seconds of

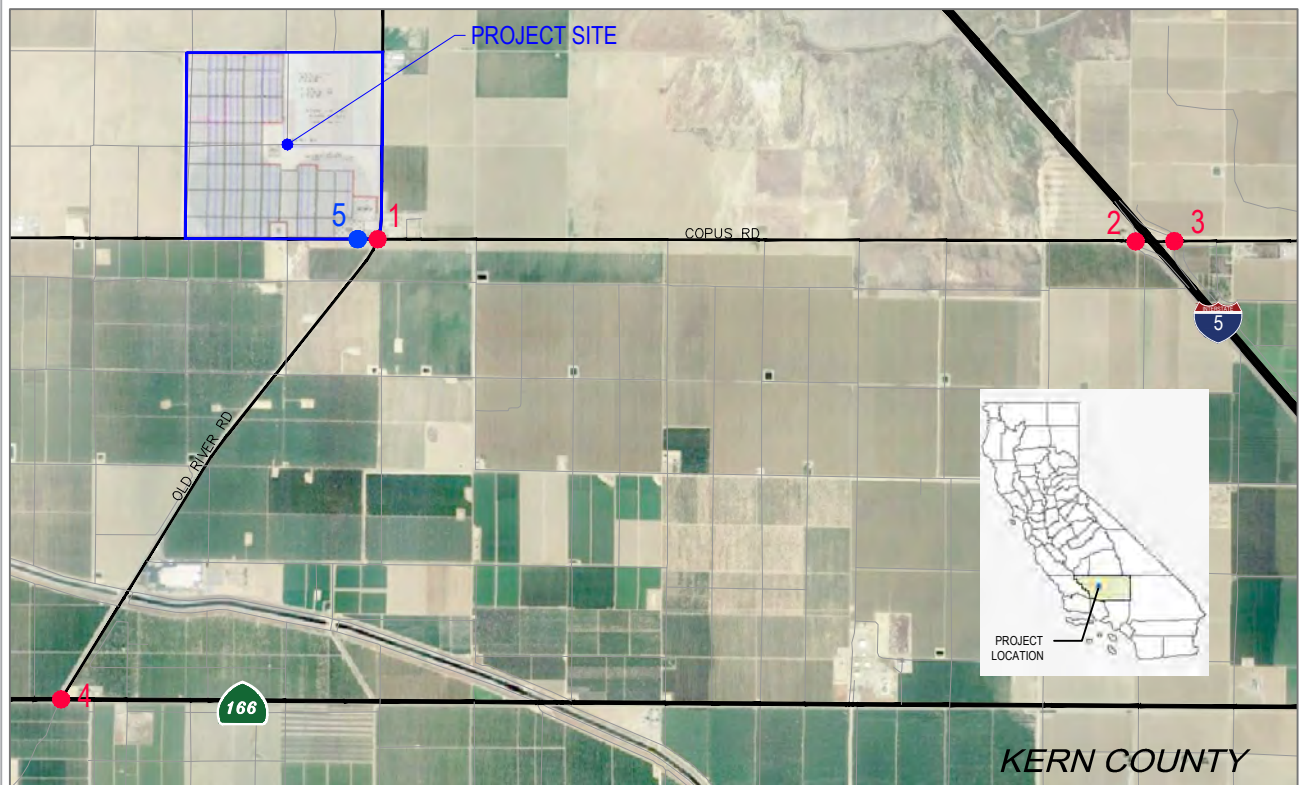
delay. Under Cumulative plus Project Conditions, no future Project trips are expected to utilize this intersection. Therefore, no Project responsibility is assigned to improvements at the State Route 166/Old River Road intersection.



LEGEND:

- ← EXISTING VEHICLE LANE
- ← MITIGATED VEHICLE LANE

- STUDY INTERSECTIONS
- PROJECT DRIVEWAY
- PROJECT BOUNDARY



Rincon Consultants, Inc.
Kern County Solar Farms - Jasmine Solar Project
MITIGATION
Cumulative Conditions Lane
Geometric and Control

Project No. 11219906
Report No. 001
Date 01.29.2021

FIGURE 7

Appendix Index

Attachment A	Project Schedule
Attachment B	Project Trip Generation
Appendix A	AM and PM Peak Hour Traffic Counts (Metro Traffic Data)
Appendix B	Synchro 10 Worksheet Output Files
Appendix C	California MUTCD Peak Hour Warrant 3 (70%) Worksheets
Appendix D	Mitigation Synchro 10 LOS Output Worksheet

Attachment A:
Project Schedule

Table 1 Overall Project Construction Schedule

Scenario	Workdays	Months															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Phase 1: Site Preparation & Grading	60																
Phase 2: Tracker Foundations (Piles)	103																
Phase 3: Underground Cabling	86																
Phase 4: Mechanical Installation	103																
Phase 5: Electrical Installation	129																
Phase 6: PG&E Substation Upgrades	336																

Note: Majority of the construction would occur in a 12-month period (i.e., Phases 1 through 5). The 16-month schedule accommodates the PG&E substation modification and power line construction.

Attachment B

Project Trip Generation

Attachment B: Jasmine Solar Project Construction Phase Trip Generation

Phase		Construction Vehicles				Vehicle Trip Generation							PCE Trip Generation								
						ADT	AM Peak Hour			PM Peak Hour			ADT	AM Peak Hour			PM Peak Hour				
Description	Duration	Description	#	Vehicle Type	PCE		In	Out	Tot	In	Out	Tot		In	Out	Tot	In	Out	Tot		
2) Tractor Foundations	120 Days	Workers	55	Passenger	1.0	110	55		55		55	55	110	55		55		55	55		
		Pickup Truck (On-site)	0	Passenger	1.0	0	0		0		0	0	0	0		0		0	0		
		Water, Flatbed, Gravel, Concrete, Delivery Trucks, etc.	13	Large Truck	2.0	26	4	4	8	4	4	8	52	8	8	16	8	8	16		
		Subtotal	68			136	59	4	63	4	59	63	162	63	8	71	8	63	71		
3) Underground Cabling	100 Days	Workers	55	Passenger	1.0	110	55		55		55	55	110	55		55		55	55		
		Pickup Truck (On-site)	0	Passenger	1.0	0	0		0		0	0	0	0		0		0	0		
		Water, Flatbed, Gravel, Concrete, Delivery Trucks, etc.	15	Large Truck	2.0	30	4	4	8	4	4	8	60	8	8	16	8	8	16		
		Subtotal	70			140	59	4	63	4	59	63	170	63	8	71	8	63	71		
4) Mechanical Installation	120 Days	Workers	60	Passenger	1.0	120	60		60		60	60	120	60		60		60	60		
		Pickup Truck (On-site)	0	Passenger	1.0	0	0		0		0	0	0	0		0		0	0		
		Water, Flatbed, Gravel, Concrete, Delivery Trucks, etc.	15	Large Truck	2.0	30	4	4	8	4	4	8	60	8	8	16	8	8	16		
		Subtotal	75			150	64	4	68	4	64	68	180	68	8	76	8	68	76		
						426	182	12	194	12	182	194	512	194	24	218	24	194	218		

Appendix A

AM and PM Peak Hour Traffic Counts (Metro Traffic Data)

Turning Movement Report

Prepared For:

GHD
943 Reserve Drive
Roseville, CA 95678

LOCATION Copus Rd @ Old River Rd

LATITUDE 35.0945

COUNTY Kern

LONGITUDE -119.1099

COLLECTION DATE Wednesday, November 18, 2020

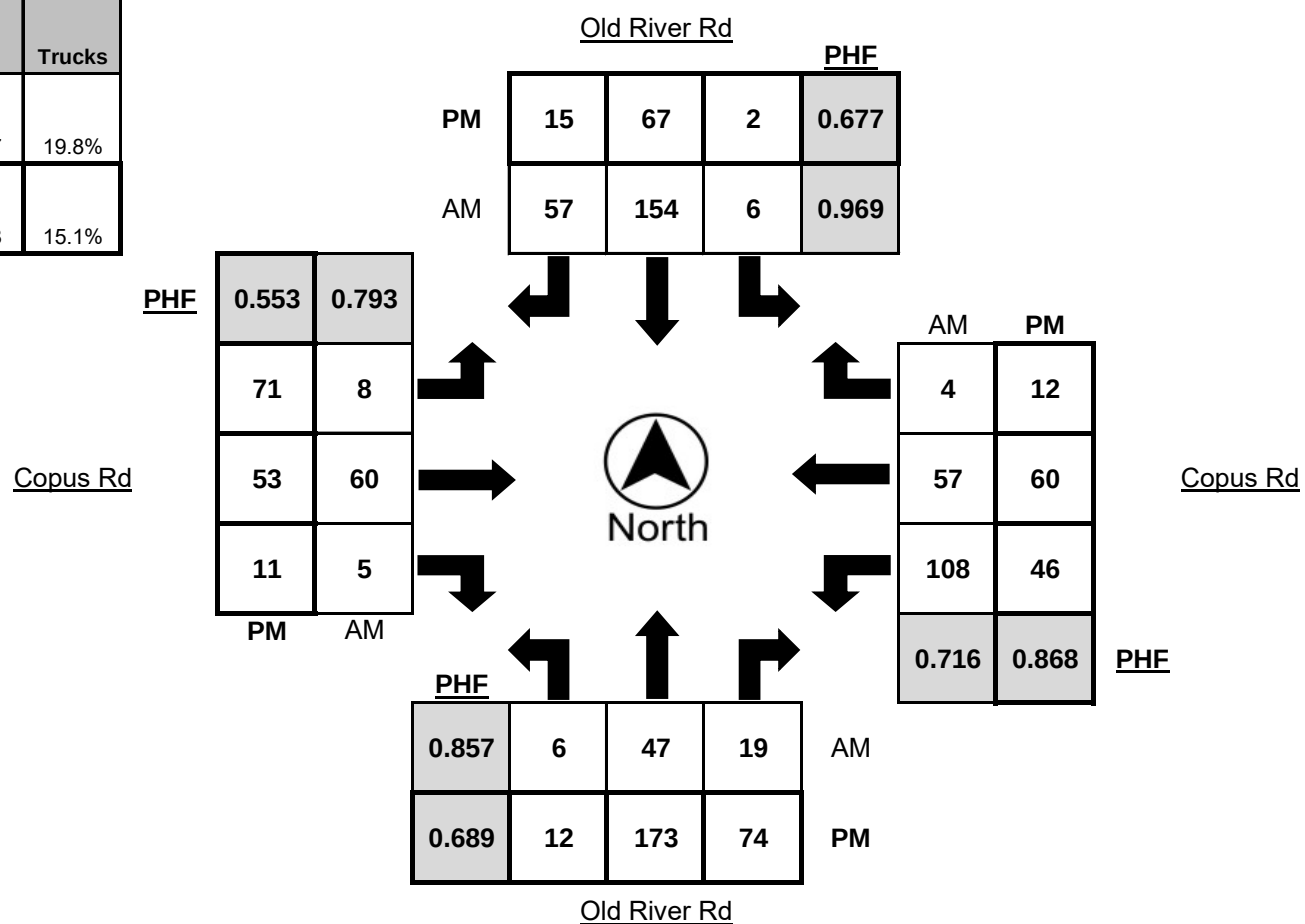
WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	1	8	4	8	0	32	5	18	3	6	1	2	18	5	0	7
7:15 AM - 7:30 AM	1	6	4	4	3	39	7	13	2	4	1	0	26	14	1	12
7:30 AM - 7:45 AM	1	10	2	9	1	36	18	9	0	3	1	1	22	18	2	3
7:45 AM - 8:00 AM	3	9	8	8	0	32	23	6	0	13	1	2	30	28	1	5
8:00 AM - 8:15 AM	2	16	3	10	2	42	12	11	1	12	0	0	27	16	1	4
8:15 AM - 8:30 AM	1	10	5	12	1	43	10	13	3	20	0	1	31	8	1	4
8:30 AM - 8:45 AM	0	12	3	4	3	37	12	17	4	15	4	1	20	5	1	7
8:45 AM - 9:00 AM	1	14	5	10	1	25	5	6	0	14	1	1	14	5	1	6
TOTAL	10	85	34	65	11	286	92	93	13	87	9	8	188	99	8	48

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
4:00 PM - 4:15 PM	5	63	26	12	0	10	6	3	33	26	2	3	10	16	5	5
4:15 PM - 4:30 PM	2	34	17	10	1	27	3	9	11	7	2	2	10	18	3	4
4:30 PM - 4:45 PM	1	44	23	11	0	20	3	5	16	12	2	2	22	10	2	4
4:45 PM - 5:00 PM	4	32	8	12	1	10	3	2	11	8	5	4	4	16	2	2
5:00 PM - 5:15 PM	2	42	24	15	0	10	3	4	8	12	1	2	2	7	0	0
5:15 PM - 5:30 PM	3	28	8	11	3	4	3	0	5	8	5	4	7	7	3	3
5:30 PM - 5:45 PM	0	18	7	11	0	3	0	1	3	4	0	1	5	8	0	0
5:45 PM - 6:00 PM	3	16	7	9	0	9	1	3	2	0	2	2	6	9	0	1
TOTAL	20	277	120	91	5	93	22	27	89	77	19	20	66	91	15	19

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:45 AM - 8:45 AM	6	47	19	34	6	154	57	47	8	60	5	4	108	57	4	20
4:00 PM - 5:00 PM	12	173	74	45	2	67	15	19	71	53	11	11	46	60	12	15

	PHF	Trucks
AM	0.897	19.8%
PM	0.738	15.1%





Metro Traffic Data Inc.
310 N. Irwin Street - Suite 20
Hanford, CA 93230

800-975-6938 Phone/Fax
www.metrotrafficdata.com

24 Hour Count Report

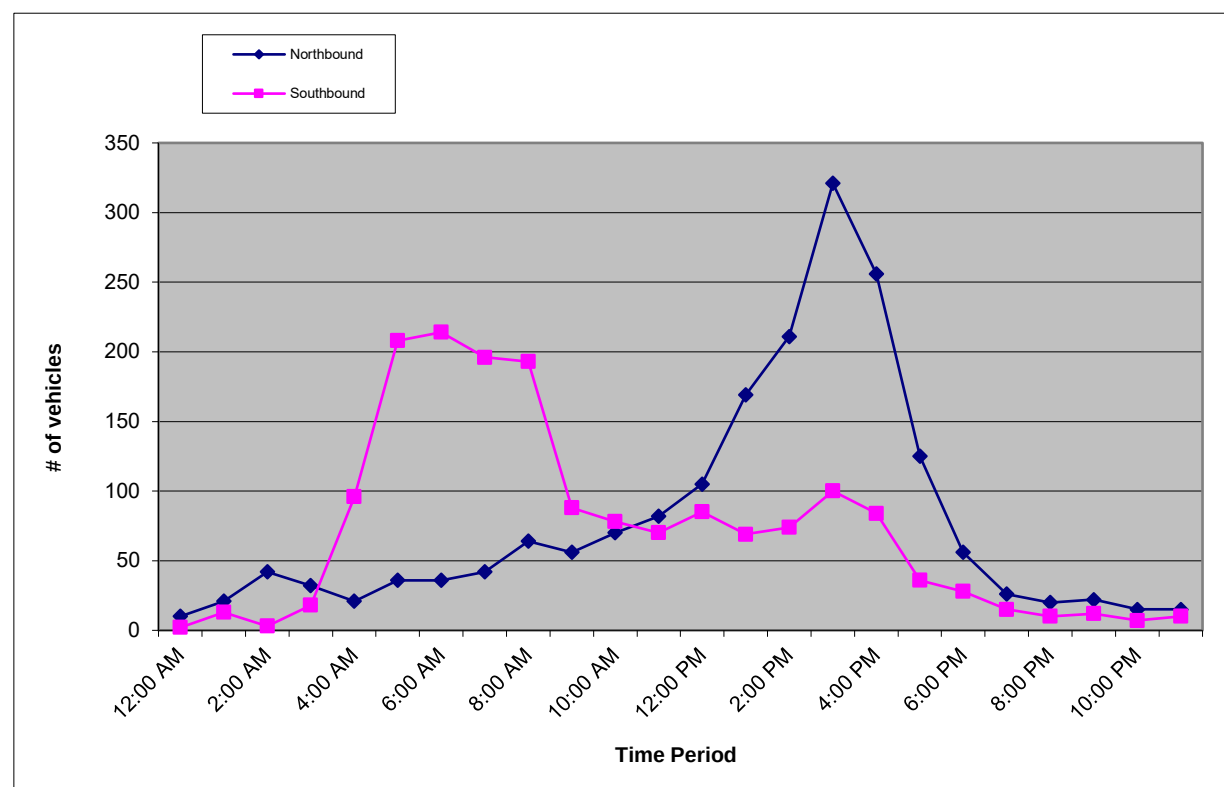
Prepared For: **GHD**
943 Reserve Drive
Roseville, CA 95678

STREET Old River Rd
SEGMENT North of Copus Rd
COLLECTION DATE Wednesday, November 18, 2020
NUMBER OF LANES 2

LATITUDE 35.094863°
LONGITUDE -119.109823°
WEATHER Clear

	Northbound					Southbound					Hourly
Hour	1st	2nd	3rd	4th	Total	1st	2nd	3rd	4th	Total	Totals
12:00 AM	3	4	1	2	10	1	1	0	0	2	12
1:00 AM	2	6	9	4	21	3	2	6	2	13	34
2:00 AM	22	4	5	11	42	0	1	1	1	3	45
3:00 AM	18	7	3	4	32	0	2	8	8	18	50
4:00 AM	3	2	10	6	21	11	19	39	27	96	117
5:00 AM	0	13	16	7	36	25	41	66	76	208	244
6:00 AM	6	5	7	18	36	87	38	37	52	214	250
7:00 AM	11	9	12	10	42	37	49	55	55	196	238
8:00 AM	18	14	17	15	64	56	54	52	31	193	257
9:00 AM	16	16	14	10	56	20	22	29	17	88	144
10:00 AM	27	13	14	16	70	15	24	14	25	78	148
11:00 AM	20	20	19	23	82	26	11	15	18	70	152
12:00 PM	20	23	27	35	105	14	20	25	26	85	190
1:00 PM	32	43	53	41	169	22	13	18	16	69	238
2:00 PM	50	46	55	60	211	15	24	18	17	74	285
3:00 PM	83	106	76	56	321	18	35	29	18	100	421
4:00 PM	101	48	62	45	256	16	31	23	14	84	340
5:00 PM	50	36	21	18	125	13	10	3	10	36	161
6:00 PM	21	15	10	10	56	7	8	6	7	28	84
7:00 PM	8	5	8	5	26	4	2	3	6	15	41
8:00 PM	5	4	6	5	20	3	3	3	1	10	30
9:00 PM	7	4	4	7	22	5	5	1	1	12	34
10:00 PM	2	7	3	3	15	1	4	1	1	7	22
11:00 PM	4	2	5	4	15	1	3	4	2	10	25
Total	52.0%				1853	48.0%				1709	
	3562										

AM% 47.5% AM Peak 276 7:45 am to 8:45 am AM P.H.F. 0.93
PM% 52.5% PM Peak 437 3:15 pm to 4:15 pm PM P.H.F. 0.77





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24 Hour Count Report

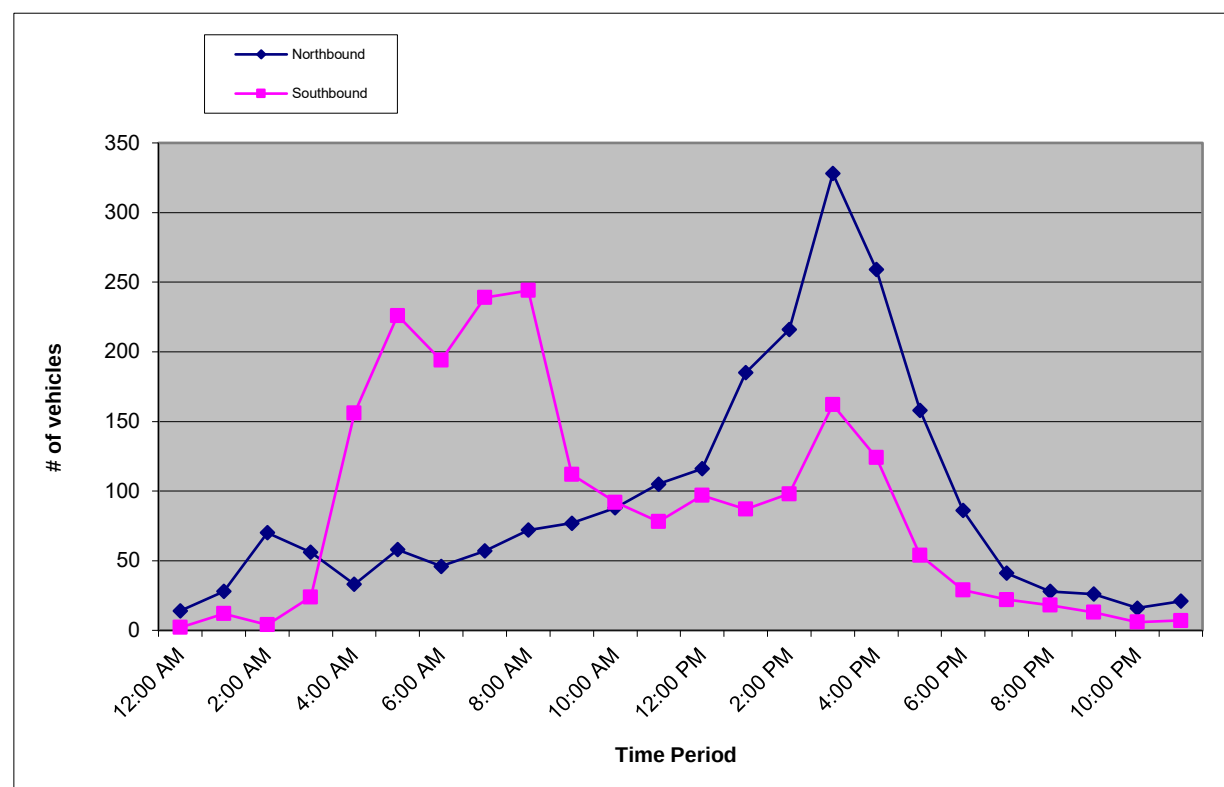
Prepared For: **GHD**
943 Reserve Drive
Roseville, CA 95678

STREET Old River Rd
SEGMENT South of Copus Rd
COLLECTION DATE Wednesday, November 18, 2020
NUMBER OF LANES 2

LATITUDE 35.093970°
LONGITUDE -119.110179°
WEATHER Clear

	Northbound					Southbound					Hourly
Hour	1st	2nd	3rd	4th	Total	1st	2nd	3rd	4th	Total	Totals
12:00 AM	5	5	2	2	14	1	1	0	0	2	16
1:00 AM	3	8	10	7	28	2	2	6	2	12	40
2:00 AM	36	9	11	14	70	0	2	1	1	4	74
3:00 AM	33	11	5	7	56	0	4	9	11	24	80
4:00 AM	3	2	22	6	33	19	39	56	42	156	189
5:00 AM	2	16	31	9	58	26	49	84	67	226	284
6:00 AM	11	7	11	17	46	64	39	35	56	194	240
7:00 AM	13	11	13	20	57	51	66	59	63	239	296
8:00 AM	21	16	15	20	72	69	74	61	40	244	316
9:00 AM	24	25	16	12	77	29	28	38	17	112	189
10:00 AM	28	17	28	15	88	25	20	23	24	92	180
11:00 AM	27	25	20	33	105	26	15	16	21	78	183
12:00 PM	24	27	26	39	116	16	20	27	34	97	213
1:00 PM	43	45	61	36	185	21	20	24	22	87	272
2:00 PM	57	44	46	69	216	19	24	32	23	98	314
3:00 PM	86	89	88	65	328	31	50	56	25	162	490
4:00 PM	94	53	68	44	259	22	39	44	19	124	383
5:00 PM	68	39	25	26	158	13	16	8	17	54	212
6:00 PM	26	22	20	18	86	9	10	5	5	29	115
7:00 PM	13	5	12	11	41	6	3	4	9	22	63
8:00 PM	8	6	6	8	28	4	6	7	1	18	46
9:00 PM	8	5	3	10	26	5	3	4	1	13	39
10:00 PM	2	9	3	2	16	0	2	2	2	6	22
11:00 PM	6	3	6	6	21	0	0	5	2	7	28
Total	51.0%				2184	49.0%				2100	
	4284										

AM% 48.7% AM Peak 339 7:45 am to 8:45 am AM P.H.F. 0.94
PM% 51.3% PM Peak 492 2:45 pm to 3:45 pm PM P.H.F. 0.85





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24 Hour Count Report

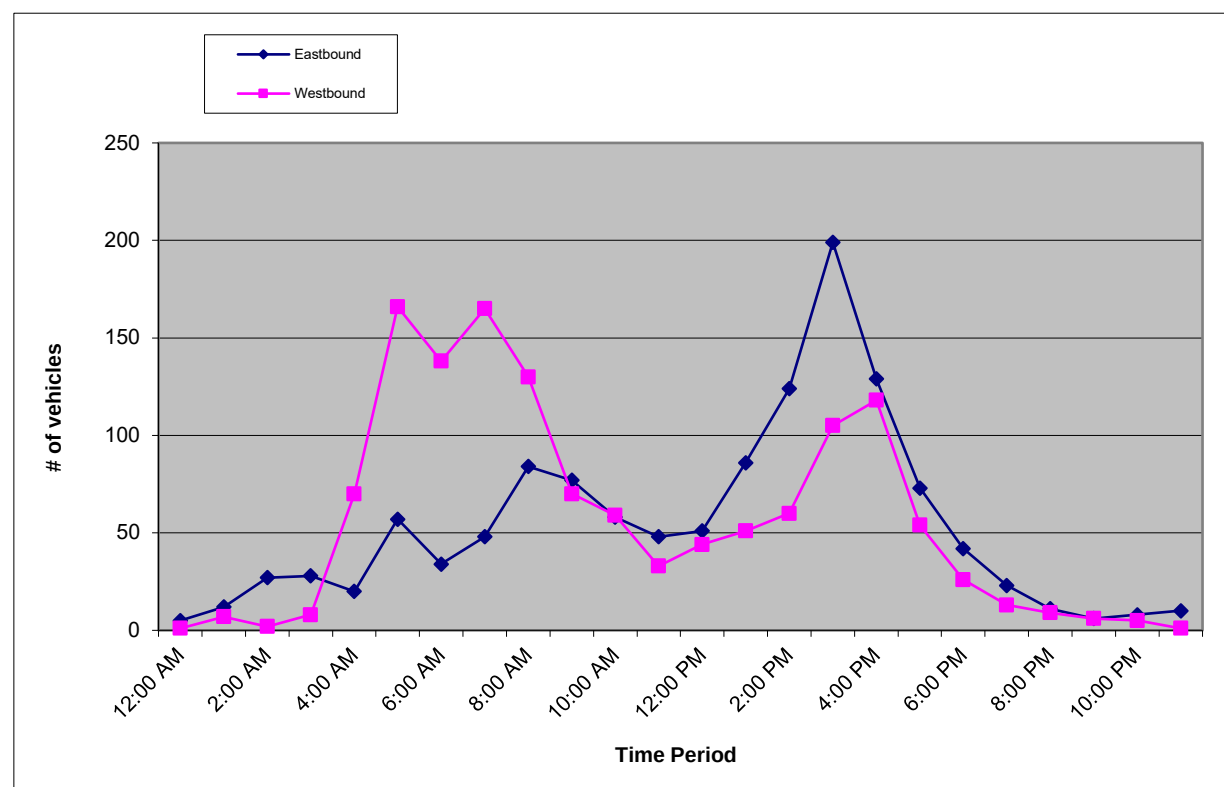
Prepared For: **GHD**
943 Reserve Drive
Roseville, CA 95678

STREET Copus Rd
SEGMENT East of Old River Rd
COLLECTION DATE Wednesday, November 18, 2020
NUMBER OF LANES 2

LATITUDE 35.094529°
LONGITUDE -119.109299°
WEATHER Clear

	Eastbound					Westbound					Hourly
Hour	1st	2nd	3rd	4th	Total	1st	2nd	3rd	4th	Total	Totals
12:00 AM	2	1	1	1	5	0	0	0	1	1	6
1:00 AM	3	2	3	4	12	3	2	1	1	7	19
2:00 AM	13	5	6	3	27	0	1	1	0	2	29
3:00 AM	15	4	5	4	28	0	1	2	5	8	36
4:00 AM	0	2	15	3	20	10	21	19	20	70	90
5:00 AM	3	10	25	19	57	13	23	65	65	166	223
6:00 AM	13	7	10	4	34	73	20	15	30	138	172
7:00 AM	10	11	6	21	48	23	41	42	59	165	213
8:00 AM	17	26	21	20	84	44	40	26	20	130	214
9:00 AM	19	23	23	12	77	20	15	18	17	70	147
10:00 AM	14	13	21	10	58	22	8	15	14	59	117
11:00 AM	12	9	13	14	48	8	8	9	8	33	81
12:00 PM	11	16	9	15	51	9	9	14	12	44	95
1:00 PM	22	15	22	27	86	11	12	14	14	51	137
2:00 PM	34	29	35	26	124	17	13	17	13	60	184
3:00 PM	57	65	48	29	199	17	28	40	20	105	304
4:00 PM	52	25	35	17	129	31	31	34	22	118	247
5:00 PM	36	19	11	7	73	9	17	13	15	54	127
6:00 PM	11	9	12	10	42	12	5	6	3	26	68
7:00 PM	7	2	6	8	23	2	6	4	1	13	36
8:00 PM	3	2	2	4	11	2	3	2	2	9	20
9:00 PM	1	1	1	3	6	1	1	2	2	6	12
10:00 PM	2	3	2	1	8	0	2	1	2	5	13
11:00 PM	2	3	2	3	10	0	0	1	0	1	11
Total	48.4%				1260	51.6%				1341	
	2601										

AM% 51.8% AM Peak 293 5:15 am to 6:15 am AM P.H.F. 0.81
PM% 48.2% PM Peak 313 3:15 pm to 4:15 pm PM P.H.F. 0.84





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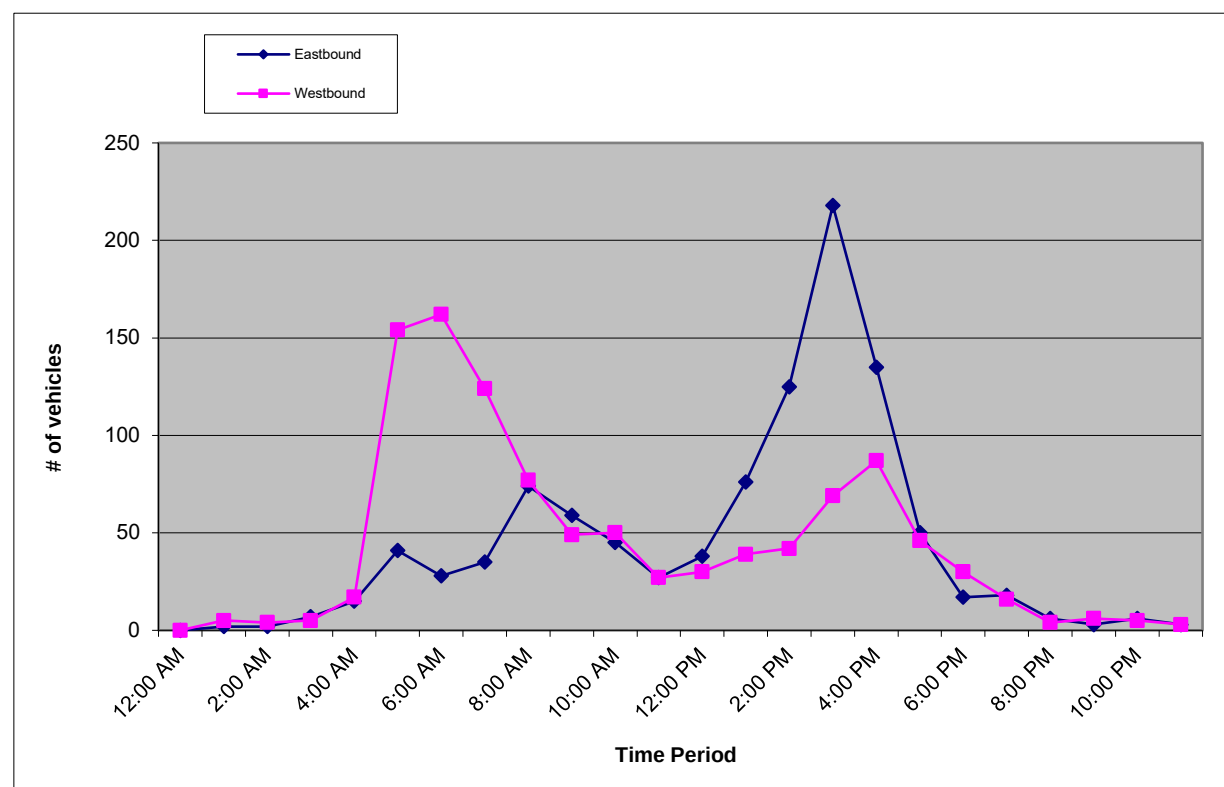
24 Hour Count Report

Prepared For: **GHD**
 943 Reserve Drive
 Roseville, CA 95678

STREET Copus Rd
SEGMENT West of Old River Rd
COLLECTION DATE Wednesday, November 18, 2020
NUMBER OF LANES 2
LATITUDE 35.094516°
LONGITUDE -119.110529°
WEATHER Clear

	Eastbound					Westbound					Hourly
Hour	1st	2nd	3rd	4th	Total	1st	2nd	3rd	4th	Total	Totals
12:00 AM	0	0	0	0	0	0	0	0	0	0	0
1:00 AM	0	0	1	1	2	2	2	0	1	5	7
2:00 AM	2	0	0	0	2	3	0	1	0	4	6
3:00 AM	0	2	3	2	7	0	1	1	3	5	12
4:00 AM	0	2	8	5	15	2	1	7	7	17	32
5:00 AM	1	10	11	19	41	12	18	48	76	154	195
6:00 AM	9	9	7	3	28	97	23	18	24	162	190
7:00 AM	10	7	4	14	35	11	22	37	54	124	159
8:00 AM	13	23	23	15	74	30	19	17	11	77	151
9:00 AM	12	20	20	7	59	12	15	8	14	49	108
10:00 AM	17	10	9	9	45	16	13	8	13	50	95
11:00 AM	7	5	9	6	27	10	5	5	7	27	54
12:00 PM	7	9	10	12	38	7	6	12	5	30	68
1:00 PM	13	18	10	35	76	14	10	4	11	39	115
2:00 PM	27	31	48	19	125	13	13	7	9	42	167
3:00 PM	64	84	43	27	218	14	15	20	20	69	287
4:00 PM	61	20	30	24	135	27	23	14	23	87	222
5:00 PM	21	18	7	4	50	12	13	8	13	46	96
6:00 PM	6	6	2	3	17	10	7	7	6	30	47
7:00 PM	7	2	3	6	18	5	5	4	2	16	34
8:00 PM	1	1	4	0	6	2	1	0	1	4	10
9:00 PM	0	0	3	0	3	1	3	0	2	6	9
10:00 PM	1	0	2	3	6	0	3	0	2	5	11
11:00 PM	0	1	1	1	3	1	2	0	0	3	6
Total	49.5%				1030	50.5%				1051	
	2081										

AM% 48.5% AM Peak 292 5:30 am to 6:30 am AM P.H.F. 0.69
 PM% 51.5% PM Peak 297 3:15 pm to 4:15 pm PM P.H.F. 0.75



Appendix B

Synchro 10 Worksheet Output Files

Existing Conditions

Jasmine Solar Project
1: Old River Rd & Copus Rd

Existing Conditions (base network)
AM - Peak Hour

Intersection	
Intersection Delay, s/veh	10
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	60	5	108	57	4	6	47	19	6	154	57
Future Vol, veh/h	8	60	5	108	57	4	6	47	19	6	154	57
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	20	20	20	20	20	20	20	20	20	20	20	20
Mvmt Flow	9	67	6	120	63	4	7	52	21	7	171	63
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.1	10.3	8.9	10.4
HCM LOS	A	B	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	11%	64%	3%
Vol Thru, %	65%	82%	34%	71%
Vol Right, %	26%	7%	2%	26%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	72	73	169	217
LT Vol	6	8	108	6
Through Vol	47	60	57	154
RT Vol	19	5	4	57
Lane Flow Rate	80	81	188	241
Geometry Grp	1	1	1	1
Degree of Util (X)	0.114	0.119	0.275	0.328
Departure Headway (Hd)	5.121	5.286	5.264	4.903
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	695	673	680	731
Service Time	3.19	3.357	3.324	2.957
HCM Lane V/C Ratio	0.115	0.12	0.276	0.33
HCM Control Delay	8.9	9.1	10.3	10.4
HCM Lane LOS	A	A	B	B
HCM 95th-tile Q	0.4	0.4	1.1	1.4

Jasmine Solar Project
2: Copus Rd & I-5 SB SB On-Off Ramp

Existing Conditions (base network)

AM - Peak Hour

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↵			↶					↷		
Traffic Vol, veh/h	0	44	6	5	180	0	0	0	0	5	1	0
Future Vol, veh/h	0	44	6	5	180	0	0	0	0	5	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	16	16	16	16	16	16	16	16	16	16	16	16
Mvmt Flow	0	47	6	5	191	0	0	0	0	5	1	0
Major/Minor	Major1		Major2				Minor2					
Conflicting Flow All	-	0	0	53	0	0				251	254	191
Stage 1	-	-	-	-	-	-				201	201	-
Stage 2	-	-	-	-	-	-				50	53	-
Critical Hdwy	-	-	-	4.26	-	-				6.56	6.66	6.36
Critical Hdwy Stg 1	-	-	-	-	-	-				5.56	5.66	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.56	5.66	-
Follow-up Hdwy	-	-	-	2.344	-	-				3.644	4.144	3.444
Pot Cap-1 Maneuver	0	-	-	1468	-	0				708	626	816
Stage 1	0	-	-	-	-	0				800	709	-
Stage 2	0	-	-	-	-	0				938	824	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1468	-	-				705	0	816
Mov Cap-2 Maneuver	-	-	-	-	-	-				705	0	-
Stage 1	-	-	-	-	-	-				800	0	-
Stage 2	-	-	-	-	-	-				934	0	-
Approach	EB		WB				SB					
HCM Control Delay, s	0		0.2				10.2					
HCM LOS							B					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1							
Capacity (veh/h)	-	-	1468	-	705							
HCM Lane V/C Ratio	-	-	0.004	-	0.009							
HCM Control Delay (s)	-	-	7.5	0	10.2							
HCM Lane LOS	-	-	A	A	B							
HCM 95th %tile Q(veh)	-	-	0	-	0							

Jasmine Solar Project
3: I-5 NB On-Off Ramp & Copus Rd

Existing Conditions (base network)
AM - Peak Hour

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	0	78	0	0	142	5	7	0	1	0	0	0
Future Vol, veh/h	0	78	0	0	142	5	7	0	1	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	17	17	17	17	17	17	17	17	17	17	17	17
Mvmt Flow	0	86	0	0	156	5	8	0	1	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	161	0	- - - 0 245 247 86
Stage 1	-	-	- - - 86 86 -
Stage 2	-	-	- - - 159 161 -
Critical Hdwy	4.27	-	- - - 6.57 6.67 6.37
Critical Hdwy Stg 1	-	-	- - - 5.57 5.67 -
Critical Hdwy Stg 2	-	-	- - - 5.57 5.67 -
Follow-up Hdwy	2.353	-	- - - 3.653 4.153 3.453
Pot Cap-1 Maneuver	1332	- 0 0	- - 712 630 933
Stage 1	-	- 0 0	- - 901 795 -
Stage 2	-	- 0 0	- - 834 737 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1332	- - -	- 712 0 933
Mov Cap-2 Maneuver	-	- - -	- 712 0 -
Stage 1	-	- - -	- 901 0 -
Stage 2	-	- - -	- 834 0 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	734	1332	-	-	-
HCM Lane V/C Ratio	0.012	-	-	-	-
HCM Control Delay (s)	10	0	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	0	0	-	-	-

Jasmine Solar Project
4: SR166 & Old River Rd

Existing Conditions (base network)
AM - Peak Hour

Intersection						
Int Delay, s/veh	7.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	58	47	136	17	29	255
Future Vol, veh/h	58	47	136	17	29	255
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	505	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	23	23	23	23	23	23
Mvmt Flow	64	52	151	19	32	283
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	170	0	-	0	341	161
Stage 1	-	-	-	-	161	-
Stage 2	-	-	-	-	180	-
Critical Hdwy	4.33	-	-	-	6.63	6.43
Critical Hdwy Stg 1	-	-	-	-	5.63	-
Critical Hdwy Stg 2	-	-	-	-	5.63	-
Follow-up Hdwy	2.407	-	-	-	3.707	3.507
Pot Cap-1 Maneuver	1290	-	-	-	615	832
Stage 1	-	-	-	-	819	-
Stage 2	-	-	-	-	803	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1290	-	-	-	584	832
Mov Cap-2 Maneuver	-	-	-	-	584	-
Stage 1	-	-	-	-	778	-
Stage 2	-	-	-	-	803	-
Approach	EB	WB		SB		
HCM Control Delay, s	4.4	0		12.4		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1290	-	-	-	797	
HCM Lane V/C Ratio	0.05	-	-	-	0.396	
HCM Control Delay (s)	7.9	-	-	-	12.4	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0.2	-	-	-	1.9	

Jasmine Solar Project
1: Old River Rd & Copus Rd

Existing Conditions (base network)

PM - Peak Hour

Intersection	
Intersection Delay, s/veh	11.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	71	53	11	46	60	12	12	173	74	2	67	15
Future Vol, veh/h	71	53	11	46	60	12	12	173	74	2	67	15
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	96	72	15	62	81	16	16	234	100	3	91	20
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.2	10.8	13.4	9.9
HCM LOS	B	B	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	53%	39%	2%
Vol Thru, %	67%	39%	51%	80%
Vol Right, %	29%	8%	10%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	259	135	118	84
LT Vol	12	71	46	2
Through Vol	173	53	60	67
RT Vol	74	11	12	15
Lane Flow Rate	350	182	159	114
Geometry Grp	1	1	1	1
Degree of Util (X)	0.504	0.292	0.255	0.177
Departure Headway (Hd)	5.188	5.764	5.768	5.613
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	697	624	622	639
Service Time	3.217	3.799	3.804	3.652
HCM Lane V/C Ratio	0.502	0.292	0.256	0.178
HCM Control Delay	13.4	11.2	10.8	9.9
HCM Lane LOS	B	B	B	A
HCM 95th-tile Q	2.9	1.2	1	0.6

Jasmine Solar Project
2: Copus Rd & I-5 SB On-Off Ramp

Existing Conditions (base network)

PM - Peak Hour

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↱						↱	
Traffic Vol, veh/h	0	129	13	0	102	0	0	0	0	2	2	2
Future Vol, veh/h	0	129	13	0	102	0	0	0	0	2	2	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	0	159	16	0	126	0	0	0	0	2	2	2
Major/Minor	Major1		Major2				Minor2					
Conflicting Flow All	-	0	0	175	0	0				293	301	126
Stage 1	-	-	-	-	-	-				126	126	-
Stage 2	-	-	-	-	-	-				167	175	-
Critical Hdwy	-	-	-	4.25	-	-				6.55	6.65	6.35
Critical Hdwy Stg 1	-	-	-	-	-	-				5.55	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.55	5.65	-
Follow-up Hdwy	-	-	-	2.335	-	-				3.635	4.135	3.435
Pot Cap-1 Maneuver	0	-	-	1326	-	0				671	591	891
Stage 1	0	-	-	-	-	0				869	767	-
Stage 2	0	-	-	-	-	0				832	730	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1326	-	-				671	0	891
Mov Cap-2 Maneuver	-	-	-	-	-	-				671	0	-
Stage 1	-	-	-	-	-	-				869	0	-
Stage 2	-	-	-	-	-	-				832	0	-
Approach	EB		WB				SB					
HCM Control Delay, s	0		0				9.7					
HCM LOS	A											
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1							
Capacity (veh/h)	-	-	1326	-	766							
HCM Lane V/C Ratio	-	-	-	-	0.01							
HCM Control Delay (s)	-	-	0	-	9.7							
HCM Lane LOS	-	-	A	-	A							
HCM 95th %tile Q(veh)	-	-	0	-	0							

Jasmine Solar Project
3: I-5 NB On-Off Ramp & Copus Rd

Existing Conditions (base network)

PM - Peak Hour

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				
Traffic Vol, veh/h	2	130	0	0	98	16	7	1	3	0	0	0
Future Vol, veh/h	2	130	0	0	98	16	7	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	13	13	13	13	13	13	13	13	13	13	13	13
Mvmt Flow	3	167	0	0	126	21	9	1	4	0	0	0
Major/Minor	Major1			Major2			Minor1					
Conflicting Flow All	147	0	-	-	-	0	310	320	167			
Stage 1	-	-	-	-	-	-	173	173	-			
Stage 2	-	-	-	-	-	-	137	147	-			
Critical Hdwy	4.23	-	-	-	-	-	6.53	6.63	6.33			
Critical Hdwy Stg 1	-	-	-	-	-	-	5.53	5.63	-			
Critical Hdwy Stg 2	-	-	-	-	-	-	5.53	5.63	-			
Follow-up Hdwy	2.317	-	-	-	-	-	3.617	4.117	3.417			
Pot Cap-1 Maneuver	1370	-	0	0	-	-	660	579	849			
Stage 1	-	-	0	0	-	-	831	735	-			
Stage 2	-	-	0	0	-	-	863	755	-			
Platoon blocked, %		-			-	-						
Mov Cap-1 Maneuver	1370	-	-	-	-	-	659	0	849			
Mov Cap-2 Maneuver	-	-	-	-	-	-	659	0	-			
Stage 1	-	-	-	-	-	-	829	0	-			
Stage 2	-	-	-	-	-	-	863	0	-			
Approach	EB			WB			NB					
HCM Control Delay, s	0.1			0			10.2					
HCM LOS							B					
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR							
Capacity (veh/h)	706	1370	-	-	-							
HCM Lane V/C Ratio	0.02	0.002	-	-	-							
HCM Control Delay (s)	10.2	7.6	0	-	-							
HCM Lane LOS	B	A	A	-	-							
HCM 95th %tile Q(veh)	0.1	0	-	-	-							

Jasmine Solar Project
4: SR166 & Old River Rd

Existing Conditions (base network)

PM - Peak Hour

Intersection						
Int Delay, s/veh	4.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	132	96	41	21	10	63
Future Vol, veh/h	132	96	41	21	10	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	505	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	28	28	28	28	28	28
Mvmt Flow	165	120	51	26	13	79
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	77	0	-	0	514	64
Stage 1	-	-	-	-	64	-
Stage 2	-	-	-	-	450	-
Critical Hdwy	4.38	-	-	-	6.68	6.48
Critical Hdwy Stg 1	-	-	-	-	5.68	-
Critical Hdwy Stg 2	-	-	-	-	5.68	-
Follow-up Hdwy	2.452	-	-	-	3.752	3.552
Pot Cap-1 Maneuver	1372	-	-	-	478	932
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	591	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1372	-	-	-	421	932
Mov Cap-2 Maneuver	-	-	-	-	421	-
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	591	-
Approach	EB	WB		SB		
HCM Control Delay, s	4.6	0		10.1		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1372	-	-	-	799	
HCM Lane V/C Ratio	0.12	-	-	-	0.114	
HCM Control Delay (s)	8	-	-	-	10.1	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0.4	-	-	-	0.4	

Existing plus Project Conditions

Jasmine Solar Project
1: Old River Rd & Copus Rd

Existing Conditions plus Project
AM - Peak Hour

Intersection	
Intersection Delay, s/veh	12.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	71	7	108	144	4	25	47	19	6	154	135
Future Vol, veh/h	18	71	7	108	144	4	25	47	19	6	154	135
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	20	20	20	20	20	20	20	20	20	20	20	20
Mvmt Flow	20	79	8	120	160	4	28	52	21	7	171	150
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.3	13.4	10.1	13.2
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	27%	19%	42%	2%
Vol Thru, %	52%	74%	56%	52%
Vol Right, %	21%	7%	2%	46%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	91	96	256	295
LT Vol	25	18	108	6
Through Vol	47	71	144	154
RT Vol	19	7	4	135
Lane Flow Rate	101	107	284	328
Geometry Grp	1	1	1	1
Degree of Util (X)	0.165	0.176	0.451	0.483
Departure Headway (Hd)	5.876	5.951	5.713	5.307
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	610	603	631	679
Service Time	3.919	3.992	3.745	3.34
HCM Lane V/C Ratio	0.166	0.177	0.45	0.483
HCM Control Delay	10.1	10.3	13.4	13.2
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	0.6	0.6	2.3	2.6

Jasmine Solar Project
2: Copus Rd & I-5 SB SB On-Off Ramp

Existing Conditions plus Project
AM - Peak Hour

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	55	6	5	267	0	0	0	0	5	1	0
Future Vol, veh/h	0	55	6	5	267	0	0	0	0	5	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	16	16	16	16	16	16	16	16	16	16	16	16
Mvmt Flow	0	59	6	5	284	0	0	0	0	5	1	0
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	65	0	0				356	359	284
Stage 1	-	-	-	-	-	-				294	294	-
Stage 2	-	-	-	-	-	-				62	65	-
Critical Hdwy	-	-	-	4.26	-	-				6.56	6.66	6.36
Critical Hdwy Stg 1	-	-	-	-	-	-				5.56	5.66	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.56	5.66	-
Follow-up Hdwy	-	-	-	2.344	-	-				3.644	4.144	3.444
Pot Cap-1 Maneuver	0	-	-	1452	-	0				615	546	723
Stage 1	0	-	-	-	-	0				725	645	-
Stage 2	0	-	-	-	-	0				926	814	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1452	-	-				613	0	723
Mov Cap-2 Maneuver	-	-	-	-	-	-				613	0	-
Stage 1	-	-	-	-	-	-				725	0	-
Stage 2	-	-	-	-	-	-				922	0	-
Approach	EB			WB			SB					
HCM Control Delay, s	0			0.1			10.9					
HCM LOS							B					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1							
Capacity (veh/h)	-	-	1452	-	613							
HCM Lane V/C Ratio	-	-	0.004	-	0.01							
HCM Control Delay (s)	-	-	7.5	0	10.9							
HCM Lane LOS	-	-	A	A	B							
HCM 95th %tile Q(veh)	-	-	0	-	0							

Jasmine Solar Project
3: I-5 NB On-Off Ramp & Copus Rd

Existing Conditions plus Project
AM - Peak Hour

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↱			↰↱				
Traffic Vol, veh/h	0	89	0	0	229	5	7	0	1	0	0	0
Future Vol, veh/h	0	89	0	0	229	5	7	0	1	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	17	17	17	17	17	17	17	17	17	17	17	17
Mvmt Flow	0	98	0	0	252	5	8	0	1	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	257	0	-	-	-	0	353	355	98
Stage 1	-	-	-	-	-	-	98	98	-
Stage 2	-	-	-	-	-	-	255	257	-
Critical Hdwy	4.27	-	-	-	-	-	6.57	6.67	6.37
Critical Hdwy Stg 1	-	-	-	-	-	-	5.57	5.67	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.57	5.67	-
Follow-up Hdwy	2.353	-	-	-	-	-	3.653	4.153	3.453
Pot Cap-1 Maneuver	1225	-	0	0	-	-	616	547	918
Stage 1	-	-	0	0	-	-	890	786	-
Stage 2	-	-	0	0	-	-	754	668	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1225	-	-	-	-	-	616	0	918
Mov Cap-2 Maneuver	-	-	-	-	-	-	616	0	-
Stage 1	-	-	-	-	-	-	890	0	-
Stage 2	-	-	-	-	-	-	754	0	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	642	1225	-	-	-
HCM Lane V/C Ratio	0.014	-	-	-	-
HCM Control Delay (s)	10.7	0	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	0	0	-	-	-

Intersection						
Int Delay, s/veh	7.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	77	47	136	17	29	257
Future Vol, veh/h	77	47	136	17	29	257
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	505	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	23	23	23	23	23	23
Mvmt Flow	86	52	151	19	32	286
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	170	0	-	0	385	161
Stage 1	-	-	-	-	161	-
Stage 2	-	-	-	-	224	-
Critical Hdwy	4.33	-	-	-	6.63	6.43
Critical Hdwy Stg 1	-	-	-	-	5.63	-
Critical Hdwy Stg 2	-	-	-	-	5.63	-
Follow-up Hdwy	2.407	-	-	-	3.707	3.507
Pot Cap-1 Maneuver	1290	-	-	-	579	832
Stage 1	-	-	-	-	819	-
Stage 2	-	-	-	-	766	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1290	-	-	-	540	832
Mov Cap-2 Maneuver	-	-	-	-	540	-
Stage 1	-	-	-	-	764	-
Stage 2	-	-	-	-	766	-
Approach	EB	WB		SB		
HCM Control Delay, s	5	0		12.6		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1290	-	-	-	789	
HCM Lane V/C Ratio	0.066	-	-	-	0.403	
HCM Control Delay (s)	8	-	-	-	12.6	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0.2	-	-	-	2	

Jasmine Solar Project
5: Copus Rd & Project Driveway

Existing Conditions plus Project
AM - Peak Hour

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↓	
Traffic Vol, veh/h	10	0	0	184	23	1
Future Vol, veh/h	10	0	0	184	23	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	11	0	0	200	25	1
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	200	0	-	0	122	100
Stage 1	-	-	-	-	100	-
Stage 2	-	-	-	-	22	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	1272	-	-	-	832	909
Stage 1	-	-	-	-	881	-
Stage 2	-	-	-	-	956	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1272	-	-	-	825	909
Mov Cap-2 Maneuver	-	-	-	-	825	-
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	956	-
Approach	EB	WB		SB		
HCM Control Delay, s	7.9	0		9.5		
HCM LOS				A		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1272	-	-	-	828	
HCM Lane V/C Ratio	0.009	-	-	-	0.032	
HCM Control Delay (s)	7.9	-	-	-	9.5	
HCM Lane LOS	A	-	-	-	A	
HCM 95th %tile Q(veh)	0	-	-	-	0.1	

Jasmine Solar Project
1: Old River Rd & Copus Rd

Existing Conditions plus Project
PM - Peak Hour

Intersection	
Intersection Delay, s/veh	19.4
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	149	140	30	46	71	12	14	173	74	2	67	25
Future Vol, veh/h	149	140	30	46	71	12	14	173	74	2	67	25
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	201	189	41	62	96	16	19	234	100	3	91	34
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	24.9	12.9	18.7	12
HCM LOS	C	B	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	47%	36%	2%
Vol Thru, %	66%	44%	55%	71%
Vol Right, %	28%	9%	9%	27%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	261	319	129	94
LT Vol	14	149	46	2
Through Vol	173	140	71	67
RT Vol	74	30	12	25
Lane Flow Rate	353	431	174	127
Geometry Grp	1	1	1	1
Degree of Util (X)	0.611	0.742	0.324	0.24
Departure Headway (Hd)	6.238	6.2	6.686	6.794
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	578	586	537	527
Service Time	4.288	4.2	4.742	4.86
HCM Lane V/C Ratio	0.611	0.735	0.324	0.241
HCM Control Delay	18.7	24.9	12.9	12
HCM Lane LOS	C	C	B	B
HCM 95th-tile Q	4.1	6.4	1.4	0.9

Jasmine Solar Project
2: Copus Rd & I-5 SB On-Off Ramp

Existing Conditions plus Project
PM - Peak Hour

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	216	13	0	113	0	0	0	0	2	2	2
Future Vol, veh/h	0	216	13	0	113	0	0	0	0	2	2	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	0	267	16	0	140	0	0	0	0	2	2	2
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	283	0	0				415	423	140
Stage 1	-	-	-	-	-	-				140	140	-
Stage 2	-	-	-	-	-	-				275	283	-
Critical Hdwy	-	-	-	4.25	-	-				6.55	6.65	6.35
Critical Hdwy Stg 1	-	-	-	-	-	-				5.55	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.55	5.65	-
Follow-up Hdwy	-	-	-	2.335	-	-				3.635	4.135	3.435
Pot Cap-1 Maneuver	0	-	-	1208	-	0				570	503	875
Stage 1	0	-	-	-	-	0				856	757	-
Stage 2	0	-	-	-	-	0				742	654	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1208	-	-				570	0	875
Mov Cap-2 Maneuver	-	-	-	-	-	-				570	0	-
Stage 1	-	-	-	-	-	-				856	0	-
Stage 2	-	-	-	-	-	-				742	0	-
Approach	EB			WB			SB					
HCM Control Delay, s	0			0			10.3					
HCM LOS							B					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1							
Capacity (veh/h)	-	-	1208	-	690							
HCM Lane V/C Ratio	-	-	-	-	0.011							
HCM Control Delay (s)	-	-	0	-	10.3							
HCM Lane LOS	-	-	A	-	B							
HCM 95th %tile Q(veh)	-	-	0	-	0							

Jasmine Solar Project
3: I-5 NB On-Off Ramp & Copus Rd

Existing Conditions plus Project
PM - Peak Hour

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	2	217	0	0	109	16	7	1	3	0	0	0
Future Vol, veh/h	2	217	0	0	109	16	7	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	13	13	13	13	13	13	13	13	13	13	13	13
Mvmt Flow	3	278	0	0	140	21	9	1	4	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	161	0	- - - 0 435 445 278
Stage 1	-	-	- - - 284 284 -
Stage 2	-	-	- - - 151 161 -
Critical Hdwy	4.23	-	- - - 6.53 6.63 6.33
Critical Hdwy Stg 1	-	-	- - - 5.53 5.63 -
Critical Hdwy Stg 2	-	-	- - - 5.53 5.63 -
Follow-up Hdwy	2.317	-	- - - 3.617 4.117 3.417
Pot Cap-1 Maneuver	1354	- 0 0	- - 558 492 735
Stage 1	-	- 0 0	- - 740 657 -
Stage 2	-	- 0 0	- - 851 744 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1354	- - -	- 556 0 735
Mov Cap-2 Maneuver	-	- - -	- 556 0 -
Stage 1	-	- - -	- 738 0 -
Stage 2	-	- - -	- 851 0 -

Approach	EB	WB	NB
HCM Control Delay, s	0.1	0	11.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	600	1354	-	-	-
HCM Lane V/C Ratio	0.024	0.002	-	-	-
HCM Control Delay (s)	11.1	7.7	0	-	-
HCM Lane LOS	B	A	A	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Intersection						
Int Delay, s/veh	5.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	134	96	41	21	10	82
Future Vol, veh/h	134	96	41	21	10	82
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	505	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	28	28	28	28	28	28
Mvmt Flow	168	120	51	26	13	103
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	77	0	-	0	520	64
Stage 1	-	-	-	-	64	-
Stage 2	-	-	-	-	456	-
Critical Hdwy	4.38	-	-	-	6.68	6.48
Critical Hdwy Stg 1	-	-	-	-	5.68	-
Critical Hdwy Stg 2	-	-	-	-	5.68	-
Follow-up Hdwy	2.452	-	-	-	3.752	3.552
Pot Cap-1 Maneuver	1372	-	-	-	474	932
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	587	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1372	-	-	-	416	932
Mov Cap-2 Maneuver	-	-	-	-	416	-
Stage 1	-	-	-	-	788	-
Stage 2	-	-	-	-	587	-
Approach	EB	WB		SB		
HCM Control Delay, s	4.7	0		10.1		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1372	-	-	-	821	
HCM Lane V/C Ratio	0.122	-	-	-	0.14	
HCM Control Delay (s)	8	-	-	-	10.1	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0.4	-	-	-	0.5	

Jasmine Solar Project
5: Copus Rd & Project Driveway

Existing Conditions plus Project
PM - Peak Hour

Intersection						
Int Delay, s/veh	8.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↓	↓
Traffic Vol, veh/h	1	0	0	23	184	10
Future Vol, veh/h	1	0	0	23	184	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	15	15	15	15	15	15
Mvmt Flow	1	0	0	25	200	11
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	25	0	-	0	15	13
Stage 1	-	-	-	-	13	-
Stage 2	-	-	-	-	2	-
Critical Hdwy	4.25	-	-	-	6.55	6.35
Critical Hdwy Stg 1	-	-	-	-	5.55	-
Critical Hdwy Stg 2	-	-	-	-	5.55	-
Follow-up Hdwy	2.335	-	-	-	3.635	3.435
Pot Cap-1 Maneuver	1509	-	-	-	971	1031
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	988	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1509	-	-	-	970	1031
Mov Cap-2 Maneuver	-	-	-	-	970	-
Stage 1	-	-	-	-	976	-
Stage 2	-	-	-	-	988	-
Approach	EB	WB		SB		
HCM Control Delay, s	7.4	0		9.7		
HCM LOS				A		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1509	-	-	-	973	
HCM Lane V/C Ratio	0.001	-	-	-	0.217	
HCM Control Delay (s)	7.4	-	-	-	9.7	
HCM Lane LOS	A	-	-	-	A	
HCM 95th %tile Q(veh)	0	-	-	-	0.8	

Cumulative Conditions

Jasmine Solar Project
1: Old River Rd & Copus Rd

Future Conditions
AM - Peak Hour

Intersection	
Intersection Delay, s/veh	16
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	13	101	8	186	98	7	10	80	32	10	259	96
Future Vol, veh/h	13	101	8	186	98	7	10	80	32	10	259	96
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	20	20	20	20	20	20	20	20	20	20	20	20
Mvmt Flow	14	110	9	202	107	8	11	87	35	11	282	104
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.6	16.6	11.3	18.5
HCM LOS	B	C	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	11%	64%	3%
Vol Thru, %	66%	83%	34%	71%
Vol Right, %	26%	7%	2%	26%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	122	122	291	365
LT Vol	10	13	186	10
Through Vol	80	101	98	259
RT Vol	32	8	7	96
Lane Flow Rate	133	133	316	397
Geometry Grp	1	1	1	1
Degree of Util (X)	0.231	0.238	0.546	0.636
Departure Headway (Hd)	6.283	6.474	6.21	5.769
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	566	550	579	623
Service Time	4.377	4.565	4.281	3.838
HCM Lane V/C Ratio	0.235	0.242	0.546	0.637
HCM Control Delay	11.3	11.6	16.6	18.5
HCM Lane LOS	B	B	C	C
HCM 95th-tile Q	0.9	0.9	3.3	4.5

Jasmine Solar Project
2: Copus Rd & I-5 SB SB On-Off Ramp

Future Conditions
AM - Peak Hour

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	74	10	9	310	0	0	0	0	8	2	0
Future Vol, veh/h	0	74	10	9	310	0	0	0	0	8	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	16	16	16	16	16	16	16	16	16	16	16	16
Mvmt Flow	0	80	11	10	337	0	0	0	0	9	2	0
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	91	0	0				443	448	337
Stage 1	-	-	-	-	-	-				357	357	-
Stage 2	-	-	-	-	-	-				86	91	-
Critical Hdwy	-	-	-	4.26	-	-				6.56	6.66	6.36
Critical Hdwy Stg 1	-	-	-	-	-	-				5.56	5.66	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.56	5.66	-
Follow-up Hdwy	-	-	-	2.344	-	-				3.644	4.144	3.444
Pot Cap-1 Maneuver	0	-	-	1420	-	0				547	485	674
Stage 1	0	-	-	-	-	0				678	604	-
Stage 2	0	-	-	-	-	0				903	793	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1420	-	-				542	0	674
Mov Cap-2 Maneuver	-	-	-	-	-	-				542	0	-
Stage 1	-	-	-	-	-	-				678	0	-
Stage 2	-	-	-	-	-	-				895	0	-
Approach	EB			WB			SB					
HCM Control Delay, s	0			0.2			11.8					
HCM LOS							B					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1							
Capacity (veh/h)	-	-	1420	-	542							
HCM Lane V/C Ratio	-	-	0.007	-	0.02							
HCM Control Delay (s)	-	-	7.6	0	11.8							
HCM Lane LOS	-	-	A	A	B							
HCM 95th %tile Q(veh)	-	-	0	-	0.1							

Jasmine Solar Project
3: I-5 NB On-Off Ramp & Copus Rd

Future Conditions
AM - Peak Hour

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	0	131	0	0	245	9	12	0	2	0	0	0
Future Vol, veh/h	0	131	0	0	245	9	12	0	2	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	17	17	17	17	17	17	17	17	17	17	17	17
Mvmt Flow	0	142	0	0	266	10	13	0	2	0	0	0

Major/Minor	Major1		Major2			Minor1			
Conflicting Flow All	276	0	-	-	-	0	413	418	142
Stage 1	-	-	-	-	-	-	142	142	-
Stage 2	-	-	-	-	-	-	271	276	-
Critical Hdwy	4.27	-	-	-	-	-	6.57	6.67	6.37
Critical Hdwy Stg 1	-	-	-	-	-	-	5.57	5.67	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.57	5.67	-
Follow-up Hdwy	2.353	-	-	-	-	-	3.653	4.153	3.453
Pot Cap-1 Maneuver	1205	-	0	0	-	-	568	504	867
Stage 1	-	-	0	0	-	-	849	751	-
Stage 2	-	-	0	0	-	-	741	655	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1205	-	-	-	-	-	568	0	867
Mov Cap-2 Maneuver	-	-	-	-	-	-	568	0	-
Stage 1	-	-	-	-	-	-	849	0	-
Stage 2	-	-	-	-	-	-	741	0	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	597	1205	-	-	-
HCM Lane V/C Ratio	0.025	-	-	-	-
HCM Control Delay (s)	11.2	0	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Jasmine Solar Project
4: SR166 & Old River Rd

Future Conditions
AM - Peak Hour

Intersection						
Int Delay, s/veh	14.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	98	79	235	29	49	429
Future Vol, veh/h	98	79	235	29	49	429
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	505	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	23	23	23	23	23	23
Mvmt Flow	107	86	255	32	53	466
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	287	0	-	0	571	271
Stage 1	-	-	-	-	271	-
Stage 2	-	-	-	-	300	-
Critical Hdwy	4.33	-	-	-	6.63	6.43
Critical Hdwy Stg 1	-	-	-	-	5.63	-
Critical Hdwy Stg 2	-	-	-	-	5.63	-
Follow-up Hdwy	2.407	-	-	-	3.707	3.507
Pot Cap-1 Maneuver	1164	-	-	-	449	720
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	706	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1164	-	-	-	408	720
Mov Cap-2 Maneuver	-	-	-	-	408	-
Stage 1	-	-	-	-	661	-
Stage 2	-	-	-	-	706	-
Approach	EB	WB		SB		
HCM Control Delay, s	4.7	0		26.6		
HCM LOS				D		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1164	-	-	-	668	
HCM Lane V/C Ratio	0.092	-	-	-	0.778	
HCM Control Delay (s)	8.4	-	-	-	26.6	
HCM Lane LOS	A	-	-	-	D	
HCM 95th %tile Q(veh)	0.3	-	-	-	7.5	

Jasmine Solar Project
1: Old River Rd & Copus Rd

Future Conditions
PM - Peak Hour

Intersection	
Intersection Delay, s/veh	20.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	119	89	18	79	103	21	20	295	126	3	113	25
Future Vol, veh/h	119	89	18	79	103	21	20	295	126	3	113	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	129	97	20	86	112	23	22	321	137	3	123	27
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	15.5	14.6	27.8	12.4
HCM LOS	C	B	D	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	53%	39%	2%
Vol Thru, %	67%	39%	51%	80%
Vol Right, %	29%	8%	10%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	441	226	203	141
LT Vol	20	119	79	3
Through Vol	295	89	103	113
RT Vol	126	18	21	25
Lane Flow Rate	479	246	221	153
Geometry Grp	1	1	1	1
Degree of Util (X)	0.791	0.461	0.415	0.285
Departure Headway (Hd)	5.937	6.751	6.776	6.689
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	609	533	530	536
Service Time	3.978	4.804	4.831	4.748
HCM Lane V/C Ratio	0.787	0.462	0.417	0.285
HCM Control Delay	27.8	15.5	14.6	12.4
HCM Lane LOS	D	C	B	B
HCM 95th-tile Q	7.6	2.4	2	1.2

Jasmine Solar Project
2: Copus Rd & I-5 SB On-Off Ramp

Future Conditions
PM - Peak Hour

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	217	22	0	176	0	0	0	0	3	3	3
Future Vol, veh/h	0	217	22	0	176	0	0	0	0	3	3	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	0	236	24	0	191	0	0	0	0	3	3	3
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	260	0	0				439	451	191
Stage 1	-	-	-	-	-	-				191	191	-
Stage 2	-	-	-	-	-	-				248	260	-
Critical Hdwy	-	-	-	4.25	-	-				6.55	6.65	6.35
Critical Hdwy Stg 1	-	-	-	-	-	-				5.55	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.55	5.65	-
Follow-up Hdwy	-	-	-	2.335	-	-				3.635	4.135	3.435
Pot Cap-1 Maneuver	0	-	-	1233	-	0				552	485	819
Stage 1	0	-	-	-	-	0				811	718	-
Stage 2	0	-	-	-	-	0				764	670	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1233	-	-				552	0	819
Mov Cap-2 Maneuver	-	-	-	-	-	-				552	0	-
Stage 1	-	-	-	-	-	-				811	0	-
Stage 2	-	-	-	-	-	-				764	0	-
Approach	EB			WB			SB					
HCM Control Delay, s	0			0			10.5					
HCM LOS							B					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1							
Capacity (veh/h)	-	-	1233	-	660							
HCM Lane V/C Ratio	-	-	-	-	0.015							
HCM Control Delay (s)	-	-	0	-	10.5							
HCM Lane LOS	-	-	A	-	B							
HCM 95th %tile Q(veh)	-	-	0	-	0							

Jasmine Solar Project
3: I-5 NB On-Off Ramp & Copus Rd

Future Conditions
PM - Peak Hour

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	3	219	0	0	169	28	12	2	5	0	0	0
Future Vol, veh/h	3	219	0	0	169	28	12	2	5	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	13	13	13	13	13	13	13	13	13	13	13	13
Mvmt Flow	3	238	0	0	184	30	13	2	5	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	214	0	- - - 0 443 458 238
Stage 1	-	-	- - - 244 244 -
Stage 2	-	-	- - - 199 214 -
Critical Hdwy	4.23	-	- - - 6.53 6.63 6.33
Critical Hdwy Stg 1	-	-	- - - 5.53 5.63 -
Critical Hdwy Stg 2	-	-	- - - 5.53 5.63 -
Follow-up Hdwy	2.317	-	- - - 3.617 4.117 3.417
Pot Cap-1 Maneuver	1293	-	0 0 - - 552 483 775
Stage 1	-	-	0 0 - - 771 684 -
Stage 2	-	-	0 0 - - 809 705 -
Platoon blocked, %	-	-	- -
Mov Cap-1 Maneuver	1293	-	- - - 550 0 775
Mov Cap-2 Maneuver	-	-	- - - 550 0 -
Stage 1	-	-	- - - 769 0 -
Stage 2	-	-	- - - 809 0 -

Approach	EB	WB	NB
HCM Control Delay, s	0.1	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	601	1293	-	-	-
HCM Lane V/C Ratio	0.034	0.003	-	-	-
HCM Control Delay (s)	11.2	7.8	0	-	-
HCM Lane LOS	B	A	A	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Jasmine Solar Project
4: SR166 & Old River Rd

Future Conditions
PM - Peak Hour

Intersection						
Int Delay, s/veh	5.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	222	161	71	36	17	106
Future Vol, veh/h	222	161	71	36	17	106
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	505	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	28	28	28	28	28	28
Mvmt Flow	241	175	77	39	18	115
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	116	0	-	0	754	97
Stage 1	-	-	-	-	97	-
Stage 2	-	-	-	-	657	-
Critical Hdwy	4.38	-	-	-	6.68	6.48
Critical Hdwy Stg 1	-	-	-	-	5.68	-
Critical Hdwy Stg 2	-	-	-	-	5.68	-
Follow-up Hdwy	2.452	-	-	-	3.752	3.552
Pot Cap-1 Maneuver	1326	-	-	-	342	893
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	470	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1326	-	-	-	280	893
Mov Cap-2 Maneuver	-	-	-	-	280	-
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	470	-
Approach	EB		WB		SB	
HCM Control Delay, s	4.8		0		11.5	
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1326	-	-	-	686	
HCM Lane V/C Ratio	0.182	-	-	-	0.195	
HCM Control Delay (s)	8.3	-	-	-	11.5	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0.7	-	-	-	0.7	

Cumulative plus Project Conditions

Jasmine Solar Project
1: Old River Rd & Copus Rd

Future Conditions plus Project
AM - Peak Hour

Intersection	
Intersection Delay, s/veh	16.1
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	14	101	8	186	99	7	10	80	32	10	259	97
Future Vol, veh/h	14	101	8	186	99	7	10	80	32	10	259	97
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	20	20	20	20	20	20	20	20	20	20	20	20
Mvmt Flow	15	110	9	202	108	8	11	87	35	11	282	105
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.7	16.7	11.3	18.6
HCM LOS	B	C	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	11%	64%	3%
Vol Thru, %	66%	82%	34%	71%
Vol Right, %	26%	7%	2%	27%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	122	123	292	366
LT Vol	10	14	186	10
Through Vol	80	101	99	259
RT Vol	32	8	7	97
Lane Flow Rate	133	134	317	398
Geometry Grp	1	1	1	1
Degree of Util (X)	0.232	0.241	0.548	0.639
Departure Headway (Hd)	6.299	6.484	6.218	5.779
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	565	549	578	621
Service Time	4.392	4.578	4.293	3.847
HCM Lane V/C Ratio	0.235	0.244	0.548	0.641
HCM Control Delay	11.3	11.7	16.7	18.6
HCM Lane LOS	B	B	C	C
HCM 95th-tile Q	0.9	0.9	3.3	4.6

Jasmine Solar Project
2: Copus Rd & I-5 SB SB On-Off Ramp

Future Conditions plus Project
AM - Peak Hour

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↱			↰						↰↱	
Traffic Vol, veh/h	0	74	10	9	311	0	0	0	0	8	2	0
Future Vol, veh/h	0	74	10	9	311	0	0	0	0	8	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	16	16	16	16	16	16	16	16	16	16	16	16
Mvmt Flow	0	80	11	10	338	0	0	0	0	9	2	0
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	91	0	0				444	449	338
Stage 1	-	-	-	-	-	-				358	358	-
Stage 2	-	-	-	-	-	-				86	91	-
Critical Hdwy	-	-	-	4.26	-	-				6.56	6.66	6.36
Critical Hdwy Stg 1	-	-	-	-	-	-				5.56	5.66	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.56	5.66	-
Follow-up Hdwy	-	-	-	2.344	-	-				3.644	4.144	3.444
Pot Cap-1 Maneuver	0	-	-	1420	-	0				546	485	673
Stage 1	0	-	-	-	-	0				678	604	-
Stage 2	0	-	-	-	-	0				903	793	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1420	-	-				541	0	673
Mov Cap-2 Maneuver	-	-	-	-	-	-				541	0	-
Stage 1	-	-	-	-	-	-				678	0	-
Stage 2	-	-	-	-	-	-				895	0	-
Approach	EB			WB			SB					
HCM Control Delay, s	0			0.2			11.8					
HCM LOS							B					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1							
Capacity (veh/h)	-	-	1420	-	541							
HCM Lane V/C Ratio	-	-	0.007	-	0.02							
HCM Control Delay (s)	-	-	7.6	0	11.8							
HCM Lane LOS	-	-	A	A	B							
HCM 95th %tile Q(veh)	-	-	0	-	0.1							

Jasmine Solar Project
3: I-5 NB On-Off Ramp & Copus Rd

Future Conditions plus Project
AM - Peak Hour

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	0	131	0	0	246	9	12	0	2	0	0	0
Future Vol, veh/h	0	131	0	0	246	9	12	0	2	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	17	17	17	17	17	17	17	17	17	17	17	17
Mvmt Flow	0	142	0	0	267	10	13	0	2	0	0	0

Major/Minor	Major1		Major2			Minor1			
Conflicting Flow All	277	0	-	-	-	0	414	419	142
Stage 1	-	-	-	-	-	-	142	142	-
Stage 2	-	-	-	-	-	-	272	277	-
Critical Hdwy	4.27	-	-	-	-	-	6.57	6.67	6.37
Critical Hdwy Stg 1	-	-	-	-	-	-	5.57	5.67	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.57	5.67	-
Follow-up Hdwy	2.353	-	-	-	-	-	3.653	4.153	3.453
Pot Cap-1 Maneuver	1204	-	0	0	-	-	567	503	867
Stage 1	-	-	0	0	-	-	849	751	-
Stage 2	-	-	0	0	-	-	740	655	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1204	-	-	-	-	-	567	0	867
Mov Cap-2 Maneuver	-	-	-	-	-	-	567	0	-
Stage 1	-	-	-	-	-	-	849	0	-
Stage 2	-	-	-	-	-	-	740	0	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	596	1204	-	-	-
HCM Lane V/C Ratio	0.026	-	-	-	-
HCM Control Delay (s)	11.2	0	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Intersection						
Int Delay, s/veh	14.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	98	79	235	29	49	429
Future Vol, veh/h	98	79	235	29	49	429
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	505	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	23	23	23	23	23	23
Mvmt Flow	107	86	255	32	53	466
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	287	0	-	0	571	271
Stage 1	-	-	-	-	271	-
Stage 2	-	-	-	-	300	-
Critical Hdwy	4.33	-	-	-	6.63	6.43
Critical Hdwy Stg 1	-	-	-	-	5.63	-
Critical Hdwy Stg 2	-	-	-	-	5.63	-
Follow-up Hdwy	2.407	-	-	-	3.707	3.507
Pot Cap-1 Maneuver	1164	-	-	-	449	720
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	706	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1164	-	-	-	408	720
Mov Cap-2 Maneuver	-	-	-	-	408	-
Stage 1	-	-	-	-	661	-
Stage 2	-	-	-	-	706	-
Approach	EB	WB		SB		
HCM Control Delay, s	4.7	0		26.6		
HCM LOS				D		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1164	-	-	-	668	
HCM Lane V/C Ratio	0.092	-	-	-	0.778	
HCM Control Delay (s)	8.4	-	-	-	26.6	
HCM Lane LOS	A	-	-	-	D	
HCM 95th %tile Q(veh)	0.3	-	-	-	7.5	

Jasmine Solar Project
5: Copus Rd & Project Driveway

Future Conditions plus Project
AM - Peak Hour

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↓	↓
Traffic Vol, veh/h	0	0	0	2	1	0
Future Vol, veh/h	0	0	0	2	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	0	0	2	1	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	-	0	-	0	1	1
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	0	-
Critical Hdwy	-	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	-	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	0	-	-	-	977	1033
Stage 1	0	-	-	-	977	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	977	1033
Mov Cap-2 Maneuver	-	-	-	-	977	-
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		8.7		
HCM LOS				A		
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1		
Capacity (veh/h)	-	-	-	977		
HCM Lane V/C Ratio	-	-	-	0.001		
HCM Control Delay (s)	-	-	-	8.7		
HCM Lane LOS	-	-	-	A		
HCM 95th %tile Q(veh)	-	-	-	0		

Jasmine Solar Project
1: Old River Rd & Copus Rd

Future Conditions plus Project
AM - Peak Hour

Intersection	
Intersection Delay, s/veh	20.4
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	120	90	18	79	103	21	20	295	126	3	113	26
Future Vol, veh/h	120	90	18	79	103	21	20	295	126	3	113	26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	130	98	20	86	112	23	22	321	137	3	123	28
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	15.6	14.6	28	12.5
HCM LOS	C	B	D	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	53%	39%	2%
Vol Thru, %	67%	39%	51%	80%
Vol Right, %	29%	8%	10%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	441	228	203	142
LT Vol	20	120	79	3
Through Vol	295	90	103	113
RT Vol	126	18	21	26
Lane Flow Rate	479	248	221	154
Geometry Grp	1	1	1	1
Degree of Util (X)	0.792	0.465	0.416	0.287
Departure Headway (Hd)	5.949	6.761	6.79	6.699
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	609	533	530	536
Service Time	3.99	4.811	4.843	4.757
HCM Lane V/C Ratio	0.787	0.465	0.417	0.287
HCM Control Delay	28	15.6	14.6	12.5
HCM Lane LOS	D	C	B	B
HCM 95th-tile Q	7.7	2.4	2	1.2

Jasmine Solar Project
2: Copus Rd & I-5 SB On-Off Ramp

Future Conditions plus Project
AM - Peak Hour

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	218	22	0	176	0	0	0	0	3	3	3
Future Vol, veh/h	0	218	22	0	176	0	0	0	0	3	3	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	0	237	24	0	191	0	0	0	0	3	3	3
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	261	0	0				440	452	191
Stage 1	-	-	-	-	-	-				191	191	-
Stage 2	-	-	-	-	-	-				249	261	-
Critical Hdwy	-	-	-	4.25	-	-				6.55	6.65	6.35
Critical Hdwy Stg 1	-	-	-	-	-	-				5.55	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.55	5.65	-
Follow-up Hdwy	-	-	-	2.335	-	-				3.635	4.135	3.435
Pot Cap-1 Maneuver	0	-	-	1232	-	0				551	484	819
Stage 1	0	-	-	-	-	0				811	718	-
Stage 2	0	-	-	-	-	0				763	669	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1232	-	-				551	0	819
Mov Cap-2 Maneuver	-	-	-	-	-	-				551	0	-
Stage 1	-	-	-	-	-	-				811	0	-
Stage 2	-	-	-	-	-	-				763	0	-
Approach	EB			WB			SB					
HCM Control Delay, s	0			0			10.5					
HCM LOS							B					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1							
Capacity (veh/h)	-	-	1232	-	659							
HCM Lane V/C Ratio	-	-	-	-	0.015							
HCM Control Delay (s)	-	-	0	-	10.5							
HCM Lane LOS	-	-	A	-	B							
HCM 95th %tile Q(veh)	-	-	0	-	0							

Jasmine Solar Project
3: I-5 NB On-Off Ramp & Copus Rd

Future Conditions plus Project
AM - Peak Hour

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↱			↰↱				
Traffic Vol, veh/h	3	220	0	0	169	28	12	2	5	0	0	0
Future Vol, veh/h	3	220	0	0	169	28	12	2	5	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	13	13	13	13	13	13	13	13	13	13	13	13
Mvmt Flow	3	239	0	0	184	30	13	2	5	0	0	0

Major/Minor	Major1		Major2			Minor1			
Conflicting Flow All	214	0	-	-	-	0	444	459	239
Stage 1	-	-	-	-	-	-	245	245	-
Stage 2	-	-	-	-	-	-	199	214	-
Critical Hdwy	4.23	-	-	-	-	-	6.53	6.63	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	5.53	5.63	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.53	5.63	-
Follow-up Hdwy	2.317	-	-	-	-	-	3.617	4.117	3.417
Pot Cap-1 Maneuver	1293	-	0	0	-	-	551	483	774
Stage 1	-	-	0	0	-	-	771	684	-
Stage 2	-	-	0	0	-	-	809	705	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1293	-	-	-	-	-	549	0	774
Mov Cap-2 Maneuver	-	-	-	-	-	-	549	0	-
Stage 1	-	-	-	-	-	-	769	0	-
Stage 2	-	-	-	-	-	-	809	0	-

Approach	EB	WB	NB
HCM Control Delay, s	0.1	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	600	1293	-	-	-
HCM Lane V/C Ratio	0.034	0.003	-	-	-
HCM Control Delay (s)	11.2	7.8	0	-	-
HCM Lane LOS	B	A	A	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Intersection						
Int Delay, s/veh	5.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	222	161	71	36	17	106
Future Vol, veh/h	222	161	71	36	17	106
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	505	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	28	28	28	28	28	28
Mvmt Flow	241	175	77	39	18	115
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	116	0	-	0	754	97
Stage 1	-	-	-	-	97	-
Stage 2	-	-	-	-	657	-
Critical Hdwy	4.38	-	-	-	6.68	6.48
Critical Hdwy Stg 1	-	-	-	-	5.68	-
Critical Hdwy Stg 2	-	-	-	-	5.68	-
Follow-up Hdwy	2.452	-	-	-	3.752	3.552
Pot Cap-1 Maneuver	1326	-	-	-	342	893
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	470	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1326	-	-	-	280	893
Mov Cap-2 Maneuver	-	-	-	-	280	-
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	470	-
Approach	EB	WB		SB		
HCM Control Delay, s	4.8	0		11.5		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1326	-	-	-	686	
HCM Lane V/C Ratio	0.182	-	-	-	0.195	
HCM Control Delay (s)	8.3	-	-	-	11.5	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0.7	-	-	-	0.7	

Jasmine Solar Project
5: Copus Rd & Project Driveway

Future Conditions plus Project
AM - Peak Hour

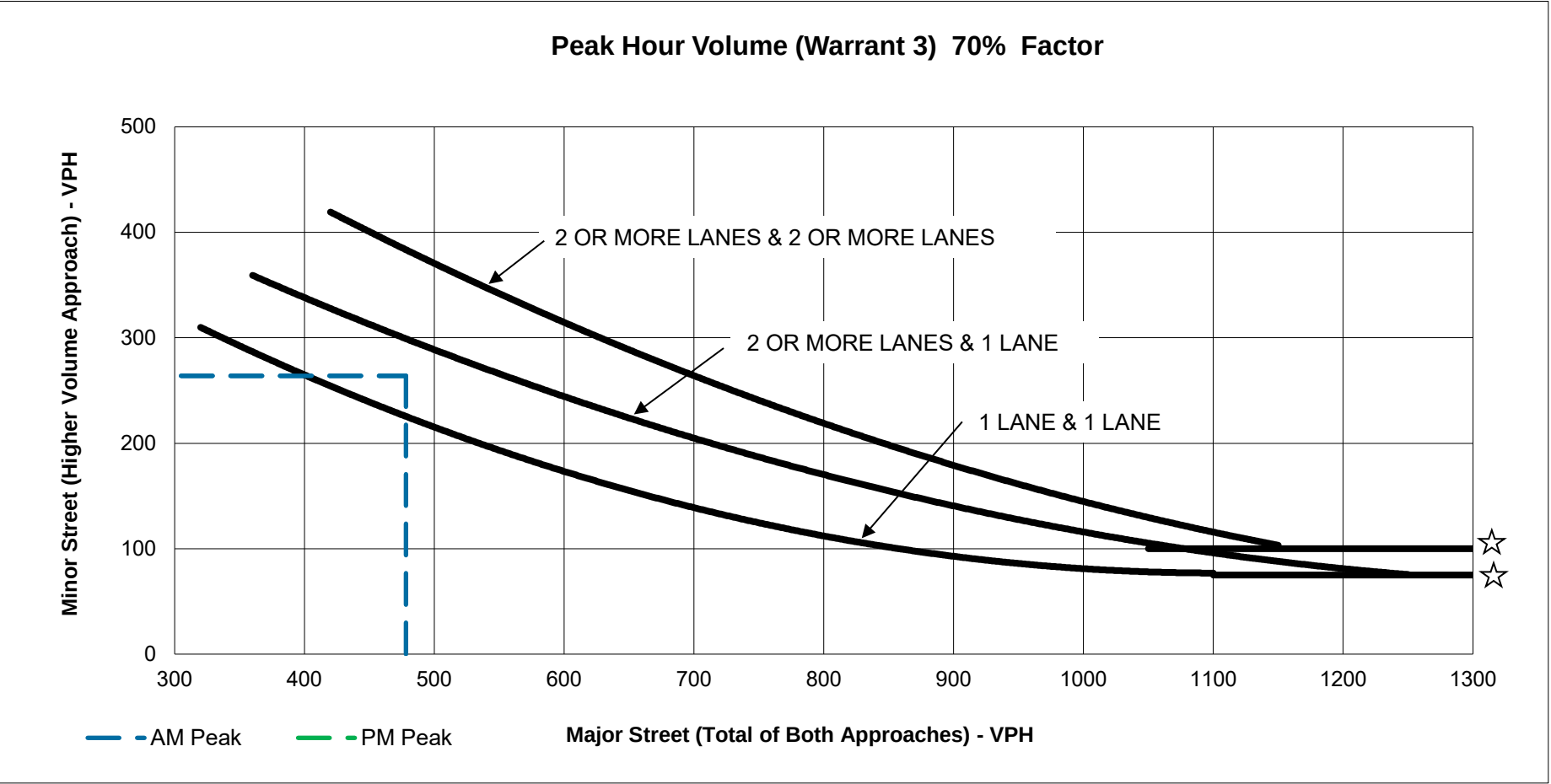
Intersection						
Int Delay, s/veh	5.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↓	↓
Traffic Vol, veh/h	0	0	0	1	2	0
Future Vol, veh/h	0	0	0	1	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	0	0	1	2	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	-	0	-	0	1	1
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	0	-
Critical Hdwy	-	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	-	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	0	-	-	-	977	1033
Stage 1	0	-	-	-	977	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	977	1033
Mov Cap-2 Maneuver	-	-	-	-	977	-
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		8.7		
HCM LOS				A		
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1		
Capacity (veh/h)	-	-	-	977		
HCM Lane V/C Ratio	-	-	-	0.002		
HCM Control Delay (s)	-	-	-	8.7		
HCM Lane LOS	-	-	-	A		
HCM 95th %tile Q(veh)	-	-	-	0		

Appendix C

California MUTCD Peak Hour Warrant 3 (70%) Worksheet

Both 1 Lane Approaches		2 or more Lane and One Lane Approaches		Both 2 or more Lane Approaches	
Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach
400	265	400	340	400	N/A
500	210	500	290	500	375
600	180	600	240	600	310
700	150	700	200	700	260
800	90	800	175	800	220
900	100	900	140	900	180
1000	85	1000	120	1000	150
1100	75	1100	95	1150	100
1200	75	1200	80	1200	100
1300	75	1250	75	1300	100

* Note: Values in Table are approximate, actual curves based upon 2nd order polynomial equation



NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

SCENARIO (AM/PM)		Number of Lanes
Major Approach	SR166	1
Minor Approach	Old River Rd	1
	AM Peak	PM Peak
Major St. Volume:	478	0
Minor St. Volume:	264	0
Warrant Met?:	Yes	-

Appendix D

Mitigation Synchro LOS Worksheets

Jasmine Solar Project
4: SR166 & Old River Rd

Future Conditions
AM - Peak Hour

Intersection						
Int Delay, s/veh	10.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	98	79	235	29	49	429
Future Vol, veh/h	98	79	235	29	49	429
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	505	-	-	-	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	23	23	23	23	23	23
Mvmt Flow	107	86	255	32	53	466
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	287	0	-	0	571	271
Stage 1	-	-	-	-	271	-
Stage 2	-	-	-	-	300	-
Critical Hdwy	4.33	-	-	-	6.63	6.43
Critical Hdwy Stg 1	-	-	-	-	5.63	-
Critical Hdwy Stg 2	-	-	-	-	5.63	-
Follow-up Hdwy	2.407	-	-	-	3.707	3.507
Pot Cap-1 Maneuver	1164	-	-	-	449	720
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	706	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1164	-	-	-	408	720
Mov Cap-2 Maneuver	-	-	-	-	408	-
Stage 1	-	-	-	-	661	-
Stage 2	-	-	-	-	706	-
Approach	EB	WB		SB		
HCM Control Delay, s	4.7	0		18.3		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1164	-	-	-	408	720
HCM Lane V/C Ratio	0.092	-	-	-	0.131	0.648
HCM Control Delay (s)	8.4	-	-	-	15.1	18.7
HCM Lane LOS	A	-	-	-	C	C
HCM 95th %tile Q(veh)	0.3	-	-	-	0.4	4.8

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