APPENDIX F
NOISE IMPACT ANALYSIS

AECOM Environment

Prepared for:
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Omaha, Nebraska

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Camarillo, CA
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April 2014

Noise Impact Analysis

WISTARIA RANCH SOLAR ENERGY CENTER PROJECT
IMPERIAL COUNTY, CALIFORNIA

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IMPERIAL COUNTY, CALIFORNIA

Prepared By Jeff Goodson

Reviewed By Johanna Falzarano

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Executive Summary

The Wistaria Ranch Solar Energy Center Project (Project) is a proposed approximate 250-megawatt (MW) photovoltaic (PV) solar power energy-generating facility located in Imperial County, California, just north of the United States/Mexico border. The Project site is located in a remote rural location and includes clusters of land parcels, which total approximately 2,793 acres of private lands currently used for agriculture. The Project is being developed by Wistaria Ranch Solar, LLC (WRS) to sell its electricity and all renewable and environmental attributes to an electric utility purchaser under a long-term contract to help meet California Renewable Portfolio Standards goals.

The Project may be constructed entirely over 18 months, or be built out over time, as allowable with up to 17 conditional use permits (CUPs). Each CUP area consists of approximately 200 acres of land and would generate approximately 20 MW. For a conservative analysis, the Project is assumed to be built out in entirety over an 18-month period.

As part of its standard practice for constructing a project, the Applicant, WRS, has incorporated the following noise-reducing and vibration-reducing design features into the Project:

- All Project components (e.g., inverters, trackers, substation, energy storage units, etc.), construction vehicle, and equipment operation shall be sited at least 50 feet from farmhouses on-site or in the vicinity of the Project.
- Construction equipment shall be encouraged to operate 600 feet or more away from sensitive receptors. When construction equipment is planned to occur within the 50- to 600-foot range of occupied sensitive receptors, the Applicant shall implement the following measures:
  - All diesel equipment shall be operated with closed engine doors and shall be equipped with factory-recommended mufflers or better; and
  - Equipment staging areas shall be located away from occupied residences (i.e., farmhouses) or schools to the extent feasible.
- Whenever feasible, electrical power shall be used to run air compressors and similar power tools.
- Temporary long-term construction equipment staging areas shall be located away from occupied residences and schools.
- During the construction and decommissioning phases, in the event that activities are anticipated to occur outside the hours of 7 a.m. to 7 p.m., Monday through Friday, and 9 a.m. to 5 p.m. on Saturday, they shall not include the operation of construction equipment. No commercial construction operations are permitted on Sunday or holidays.
- Vibratory rollers and other ground compaction equipment shall not be used within 50 feet of residences, in order to avoid the potential for structural damage from vibration.
- Any inverters located within 100 feet of an existing occupied residence shall be shielded with a structural barrier capable of reducing the inverter's noise and the ambient increase at the receptor to less than 5 A-weighted decibels (dBA) Community Noise Equivalent Level (CNEL) and less than 10 dBA equivalent continuous noise level (L_{eq}) in order to avoid a substantial permanent increase in ambient noise.

- Any energy storage facilities located within 150 feet of an existing occupied residence shall be shielded with a structural barrier capable of reducing the facility's noise and the ambient increase at the receptor to less than 5 dBA Community Noise Equivalent Level (CNEL) and less than 10 dBA equivalent continuous noise level (L_{eq}), in order to avoid a substantial permanent increase in ambient noise.

- Wherever all three operational facilities (inverters, transformers, and energy storage facilities) are located together within 180 feet of an existing occupied residence, they shall be shielded with a structural barrier capable of limiting their combined noise generated and ambient increase at the receptor to less than 5 dBA CNEL and less than10 dBA L_{eq} in order to avoid a substantial permanent increase in ambient noise.

This report analyzes the Project's noise and vibration impacts based upon the Project, including its Project design features.

Project construction activities will include site preparation, development of staging areas and site access roads, solar array assembly and installation, and construction of electrical facilities. Project construction would also generate vehicle trips primarily from the delivery of construction equipment, vehicles and materials; and daily trips from an average of 250 construction workers totaling 664 average daily trips (ADT). Therefore, traffic on the local roadways would increase during construction; however, when compared to existing traffic ADT, the increase in traffic noise would be less than perceptible.

Construction noise would vary depending on the construction activity, type of mobile and stationary equipment and vehicles, proximity to sensitive receptors (i.e., residences, schools, hospitals, parks and office buildings), and duration of construction activities. Site preparation would involve demolition, grading, compacting, and excavating, which would include backhoes, bulldozers, loaders, excavation equipment (e.g., graders and scrapers), pile drivers and compaction equipment. Finishing activities may include the use of pneumatic hand tools, scrapers, concrete trucks, vibrators, and haul trucks. Maximum noise levels from typical construction equipment typically range from approximately 80 to 90 A-weighted decibels (dBA) at 50 feet from the source. Impact equipment (e.g., pile drivers) and rock drills generate noise levels on the higher end of this scale. However, such construction equipment does not run constantly; therefore, impacts are measured using either 1-hour or 8-hour average construction noise levels. For this Project, the 8-hour average construction noise levels are appropriate and are estimated at approximately 75 dBA L_{eq} at 50 feet.

Project components will include PV solar modules mounted on fixed tilt or tracking racking systems; inverters/transformers/power conversion stations; pad-mounted transformers; combining switchgear; communication system (fiber-optic or microwave tower); substations, energy storage component(s); and/or operations and maintenance building(s). On-site noise sources associated with Project operations will primarily be the panel tracker systems (if equipped), inverter/transformer stations, and equipment maintenance and washing activities. Off-site operational noise sources include 30 ADT per day for traffic accessing the Project site.

The Project is subject to the County's General Plan Noise Element and Noise Ordinance, which limits construction noise levels to 75 dBA L_{eq} average over an 8-hour construction period, measured at a noise sensitive receptor (e.g., residence). Project construction hourly average noise levels are approximated at 75 dBA L_{eq} at 50 feet, based on established maximum noise levels of anticipated construction equipment to be used on the Project. Construction noise levels would not exceed the County noise level threshold at the nearest receptor (e.g., residence). This impact would be less than significant.

The County Noise Element sets standards associated with project operation and related noise-sensitive land uses, and establishes guidelines on determining a substantial increase in ambient noise levels for adjacent land uses. Based on measurements of similar equipment and standard noise attenuation calculations, Project operations would not exceed County land use compatibility standards. This impact would be less than significant. The Project construction would result in a substantial temporary increase in daytime ambient noise levels at adjacent properties at the property line, due to daytime construction noise levels at the property line at existing ambient noise levels based on a screening threshold that triggered a further evaluation of whether this substantial temporary increase would create a significant noise impact in the context of the Project and the Project vicinity. The significance evaluation revealed that very few residences are in the vicinity of the Project and the residences are farmhouses associated with the agricultural land use of the adjacent properties that operate heavy farm machinery. Furthermore, the Project would not operate construction equipment at night; therefore, ambient noise levels during night hours (when sleeping activities occur) would not be affected at the farmhouses. Accordingly, this impact would be less than significant. In addition, the Project operation would not result in a substantial permanent increase in ambient noise levels at adjacent farmhouses due to operational noise. This impact would be less than significant.

This report includes an assessment of ground-borne vibration impacts to sensitive receptors (i.e., structures and humans) based on vibration significance guidelines for Project construction and operation. Project construction activities would be 50 feet or greater from structures and, therefore, would not be close enough to structures to result in structural damage or human annoyance from vibration. This impact would be less than significant.

At the end of the Project's useful life, a final decommissioning phase would occur on-site, where the solar facility would be removed and the Project site would be restored to agricultural use. The decommissioning effort-related traffic and equipment operation are anticipated to be half that of the construction-related traffic, because few workers, inspectors, and equipment are needed to perform the decommissioning work. The equipment used would not generate more noise or vibration than the equipment used in the construction phase. Therefore, this impact would be less than significant.

In summary, construction noise levels from the Project would result primarily from the operation of construction vehicles and equipment for site grading and construction of new facilities. Some impact pile driving and vibration pile driving may be required for solar array foundations. Temporary off-site construction-related traffic increases would result in substantial minor, temporary increase in vehicle ADT, which would not be a perceptible increase in traffic noise. Average daytime construction noise would not exceed the limits of the County Noise Element of 75 dBA L_{eq} over an 8-hour average during the daytime at the nearest noise sensitive receptor. No major noise-generating construction activities would occur at night. No significant impacts due to noise would occur; therefore, no mitigation measures are required to be implemented.

1.0 Introduction

Wistaria Ranch Solar, LLC (Project Proponent, Applicant, or WRS) is proposing to construct and operate the Wistaria Ranch Solar Energy Center Project (Project), a 250-megawatt (MW) photovoltaic (PV) or concentrated photovoltaic (CPV) solar power-generating facility in Imperial County, California, as is more fully described in Section 2.0 of the Project's Environmental Impact Report (EIR) and summarized herein. This chapter of the Noise Impact Analysis, as well as Section 2.0 of the EIR, defines key terms relevant to understanding the spatial arrangement of the Project and surrounding lands. It also describes features and components of the proposed Project, including Project construction, operation, and decommissioning. Information identified in this chapter regarding the proposed Project is based on technical studies, mapping, figures, and the 17 Conditional Use Permit (CUP) applications submitted to the Imperial County Planning and Development Services Department (ICPDSD) by WRS. Land disturbance acreages, equipment, schedule, mileage, and workforce information is based on the most up-to-date engineering available from the Applicant and generally represent conservative estimates. The Project configuration within the parcels may change based on final engineering and permit requirements for the Project components. The goal of the Project is to generate and sell electricity and all renewable and environmental attributes to an electric utility purchaser under a long-term contract in order to help meet California Renewable Portfolio Standards goals.

The purpose of this noise impact analysis is to describe the existing ambient noise conditions of the Project area, provide a summary of applicable noise regulations, and identify potential noise impacts associated with the Project, as well as mitigation measures necessary to reduce significant noise impacts and/or reduce noise levels. The Project would primarily involve temporary, short-term construction noise, in addition to minor noise associated with operations and maintenance of the proposed facility, mainly during the daytime. At the end of the Project's useful life, the facility would be decommissioned and removed, and the Project site restored as an agricultural use.

This report was prepared in accordance with applicable noise regulations, and thresholds of significance pursuant to the California Environmental Quality Act (CEQA).

2.0 Project Description

The full project description for this study is in Section 2 of the Environmental Impact Report. The proposed Project consists of up to 17 CUP areas and 32 parcels and ancillary off-site components, which total approximately 2,793 acres anticipated to be disturbed. Each CUP area will generate approximately 20 MW. The Project is anticipated to generate 250 MW, but the ultimate energy output depends on several variables, including off-take arrangements and the evolving efficiency of PV panels. As a result, the Project could generate more or less than 250 MW but shall not exceed 2,793 acres of disturbance area.

All CUP areas are anticipated to use the existing generation interconnection (gen-tie) line that extends from the Project site parcels through the Mount Signal Solar Project to the Imperial Solar Energy Center South (ISECS) switchyard. Approximately eight additional towers will be added to the Mount Signal Solar Project segment of the gen-tie to accommodate co-location of the Project's lines with the Mount Signal Solar gen-tie area. The CUP areas are anticipated to use the main Project switchyard; however, each CUP area may independently construct a 230-kilovolt (kV) step-up transformer and switchyard. In addition to the structures associated with the solar field, such as PV panels, inverters, transformers, Power Conversion System enclosures, etc., the Project design would include operations and maintenance (O&M) building(s) and a type of energy storage facility that could accommodate a variety of evolving energy storage technologies within the CUPs. The Project shall also include additional auxiliary facilities such as raw water/fire water storage, treated water storage, evaporation ponds, water filtration buildings and equipment, equipment control buildings, septic system(s), and parking. The Project will include electric line and vehicular crossings over Imperial Irrigation District (IID) facilities and Imperial County facilities, which may include infrastructure improvements, such as a bridge widening. It is anticipated that electric line crossings would be either overhead or underground, which may include either trenching or horizontal directional drilling to place the electric or water lines under existing IID and County facilities.

In March 2012, the Applicant began performing environmental studies to support the Project's CEQA process. On August 5, 2013, WRS filed 17 applications for 17 CUPs to develop the above-described solar projects. Subsequently, WRS filed 17 variance requests (V 13-0002 thru V-13-0018) to allow transmission gen-tie structures to be up to 140 feet high.

2.1 Project Location

The Project consists of approximately 2,793 noncontiguous acres located approximately 6 miles southwest of the City of El Centro and approximately 5.5 miles west of the City of Calexico (refer to Tables 1 and 2 and Figures 1 and 2).

Table 1. Project CUP and Parcel Numbers and Acreage

Conditional Use Permit Number	Assessor's Parcel Number	Area (Acres)
13-0036	052-210-006	0.38
	052-210-025	55.54
	052-210-026	61.38
	052-210-029	73.33
13-0037	052-180-028	71.25
	052-180-039	152.43
13-0038	052-180-045	162.93
13-0039	052-180-034	77.16[a]
	052-180-054	82.72
13-0040	052-180-015	148.54
13-0041	052-180-012	153.62
13-0042	052-170-014	36.98
	052-180-001	36.56
	052-180-002	40.42
	052-180-011	115.26
	052-440-009	2.10
13-0043	052-350-021	150.12
	052-350-022	2.01
13-0044	052-440-006	79.82
13-0045	052-350-020	76.65
13-0046	052-350-001	159.59
	052-350-002	23.20
	052-350-003	12.90
	052-350-004	6.57
13-0047	052-360-008	75.54
	052-360-009	4.83
	052-410-006	51.54
13-0048	052-440-005	160.00
13-0049	052-440-003	3.05
	052-440-004	156.85
13-0050	052-210-019	123.54
13-0051 and 13-0052	052-210-020	436.03

Sources: Wistaria Ranch Solar; LLC 2013; ICPDSD 2012

[a] According to the Imperial County Planning and Development Services Department, the acreage of Assessor's Parcel Number (APN) 052-180-034 is 82.16 acres; however, approximately 5 acres will be retained by the landowner as an agricultural home site and are not included in the total parcel or Project site acreage estimates.

Table 2. Wistaria Ranch Solar Energy Center Project Generation Interconnection Transmission Line Parcels

APNs
052-190-011
052-190-012
052-190-022
052-190-037
052-210-015
052-210-016

Source: Wistaria Ranch Solar, LLC 2013

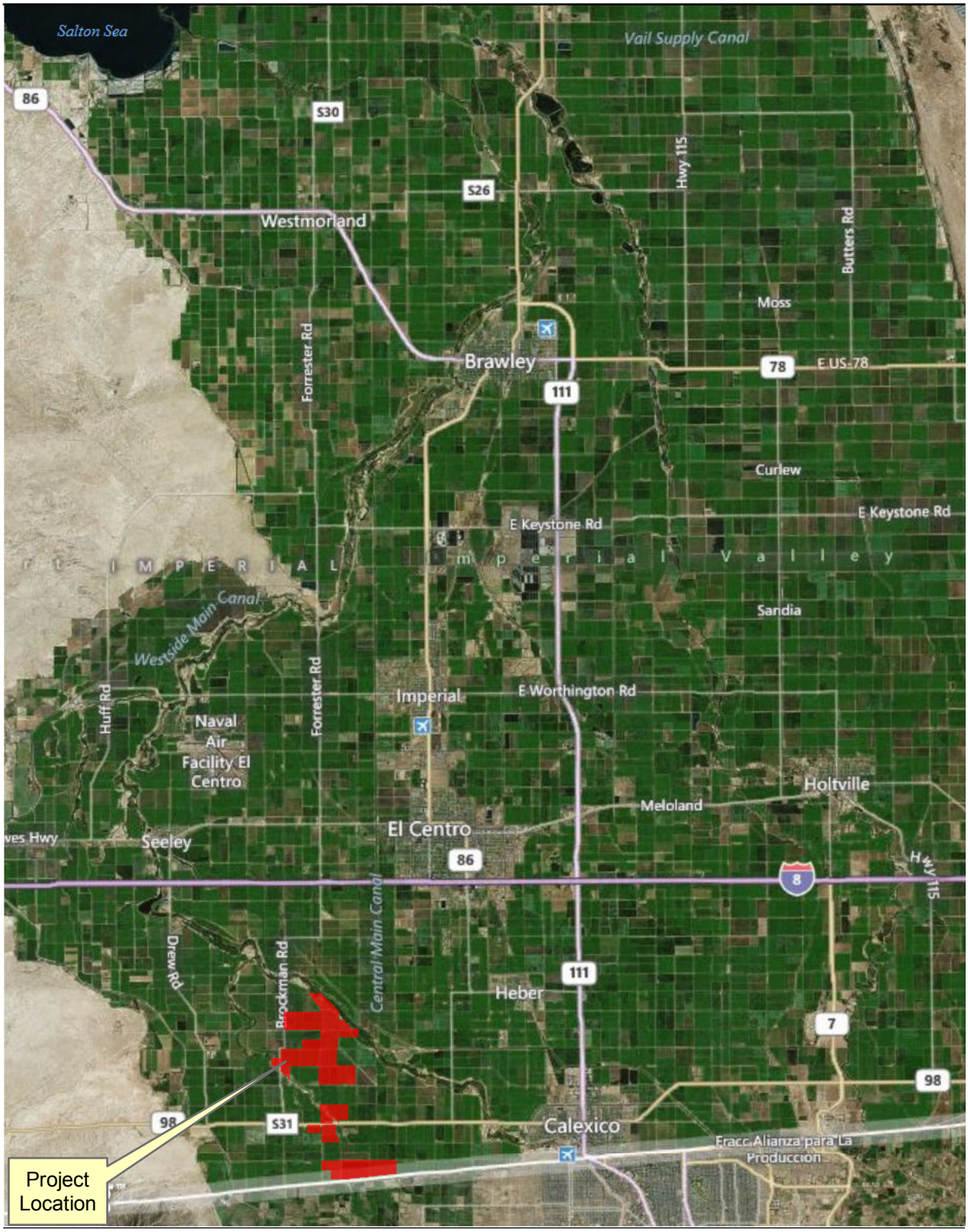
Notes: The APNs listed above represent those parcels where the Project's gen-tie line will be co-located with the Mount Signal Solar Project's previously approved gen-tie line.

APNs identified as part of the Project site parcels are not included above. The northern portion of the Project will be connected to the central portion via a corridor along the western boundary of APN 052-180-048. The central portion of the Project will be connected with the southern portion via a corridor along the boundary of APN 052-210-016 and APN 052-210-015.

Specifically, the 32 individual solar field site parcels are located within the area south of Interstate 8, east of Pulliam Road, and north of the All American Canal in southwestern unincorporated Imperial County. The solar field site parcels are located on three clusters of privately owned agricultural land generally bounded by Wahl Road on the north, Brockman and Rockwood Roads on the west, the United States/Mexico border on the south, and Ferrell and Corda Roads on the east. The geographic center of the solar field and electric collector line corridor roughly corresponds with 32° 41' 48" North and 115° 37' 00" West, at an elevation of 13 feet below sea level. The gen-tie component of the Project generally starts to the east of Rockwood Road, north of Anza Road, and heads due west to Pulliam Road and then south towards the ISECS Project.

Figure 2 shows the Project's Assessor's Parcel Numbers (APNs), CUP areas, and transmission line routes. The APNs, CUP numbers, zoning, and approximate acreages that compose the Project site and Project generation interconnection *(*gen-tie*)* transmission line route are included in this report in Tables 1 and 2. The Project's gen-tie transmission line will be partially co-located with previously approved interconnection facilities along an unnamed road (located just south of State Route 98 [SR98]), which were previously evaluated as part of the 8minutenergy Renewables' and AES Solar's Mount Signal Solar Project.

The land use of the Project site is designated as agricultural by the Land Use Element of the County of Imperial General Plan (County of Imperial 2008), and the Project site parcels are composed of privately owned lands zoned as A-3 (Agricultural, Heavy), A-2-R (General Agricultural Rural Zone), and A-2 (Agricultural, General).



Source: ESRI; AECOM; Wistaria 2013; © Harris Corp, Earthstar Geographics LLC © 2013 Microsoft Corporation © 2010 NAVTEQ © AND

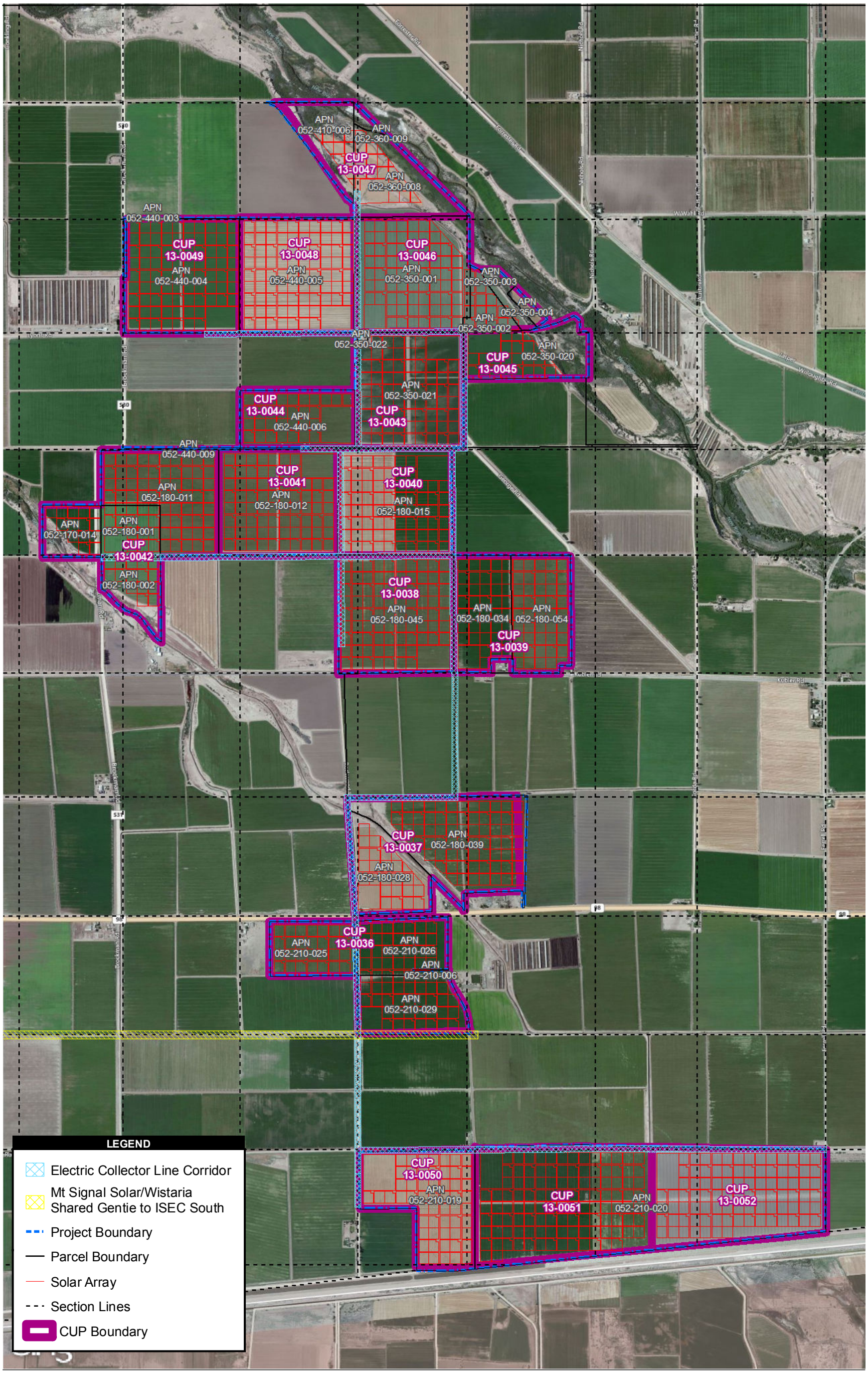
4 2 0 4 Miles

Scale: 1:253,440; 1 inch = 4 miles

Figure 1
Project Location Map

Wistaria Ranch Solar Energy Center

Path: P:\2012\60250473\06GIS\6.3_Layout\Proj_Descr\ProjectLocation.mxd, 7/24/2013, steinb



Source: Image courtesy of USGS © AND © 2013 Nokia © AND ; AECOM; Wistaria 2013

Figure 2
Project Site Plan

Path: P:\2012\60250473\06GIS\6.3_Layout\Noise\ProjectSitePlan.mxd, 2/25/2014, steinb

2.2 Project Construction Activities

2.2.1 Project Design Features

As part of its standard practice for constructing a project, the Applicant has incorporated the following noise-reducing and vibration-reducing design features into the Project:

- All Project components (e.g., inverters, trackers, substation, energy storage units, etc.), construction vehicle, and equipment operation shall be sited at least 50 feet from farmhouses on-site or in the vicinity of the Project.
- Construction equipment shall be encouraged to be operated 600 feet or more away from sensitive receptors. When construction equipment is planned to occur within the 50- to 600-foot range of occupied sensitive receptors, the Applicant shall implement the following measures:
  - All diesel equipment shall be operated with closed engine doors and shall be equipped with factory-recommended mufflers or better; and
  - Equipment staging areas shall be located away from occupied residences (i.e., farmhouses) or schools to the extent feasible.
- Whenever feasible, electrical power shall be used to run air compressors and similar power tools.
- Temporary long-term construction equipment staging areas shall be located away from occupied residences and schools.
- During the construction and decommissioning phases, in the event that activities are anticipated to occur outside the hours of 7 a.m. to 7 p.m. Monday through Friday, and 9 a.m. to 5 p.m. on Saturday, they shall not include the operation of construction equipment. No commercial construction operations are permitted on Sunday or holidays.
- Vibratory rollers and other ground compaction equipment shall not be used within 50 feet of residences, in order to avoid the potential for structural damage from vibration.
- Any inverters located within 100 feet of an existing occupied residence shall be shielded with a structural barrier capable of reducing the inverter's noise and the ambient increase at the receptor to less than 5 dBA Community Noise Equivalent Level (CNEL) and less than 10 dBA equivalent continuous noise level (L_{eq}), in order to avoid a substantial permanent increase in ambient noise.
- Any energy storage facilities located within 150 feet of an existing occupied residence shall be shielded with a structural barrier capable of reducing the facility's noise and the ambient increase at the receptor to less than 5 dBA Community Noise Equivalent Level (CNEL) and less than 10 dBA equivalent continuous noise level (L_{eq}), in order to avoid a substantial permanent increase in ambient noise.
- Wherever all three operational facilities (inverters, transformers, and energy storage facilities) are located together within 180 feet of an existing occupied residence, they shall be shielded with a structural barrier capable of reducing their combined noise and ambient increase at the receptor to less than 5 dBA CNEL and less than 10 dBA L_{eq} in order to avoid a substantial permanent increase in ambient noise.

2.2.2 Development Scenarios

The Project entitlements provide the Applicant the flexibility to construct the Project by constructing all 17 CUP areas at one time or in phases consisting of individual CUPs or smaller groupings of CUPs. Once a CUP is initiated by commencing construction or obtaining its ministerial permits, its term lasts for 30 years. Any of the 17 individual CUPs not initiated within 10 years of approval shall expire. This creates several development scenarios described as follows:

- The Existing Conditions Scenario refers to the Project's direct, indirect, and cumulative impacts if the entire Project (all 17 CUPs) were constructed over 18 months starting in Year 2013, the year the Notice of Preparation of the EIR was filed.
- The Near-Term Scenario refers to the Project's direct, indirect, and cumulative impacts if the entire Project (all 17 CUPs) were constructed over 18 months starting in Year 2015, which is the year the Applicant anticipates construction could actually begin following final engineering and Project financing.
- The Long-Term Construction Scenario refers to the Project's direct, indirect, and cumulative impacts if the entire Project (all 17 CUPs) were constructed over 18 months starting in Year 2024, the last year the Applicant could commence construction if the CUPs are approved in 2014.
- The Phased Construction Scenario refers to the Project's direct, indirect, and cumulative impacts if the Project was constructed at an even pace by individual CUPs or smaller groupings of CUPs from 2015 to 2024.
- The Decommissioning Phase Scenario refers to the Project's direct, indirect, and cumulative impacts from the decommissioning of the Project and restoration of the agricultural soils at the end of the operational life of the 17 CUPs to the extent these impacts would not be too speculative.

In contrast to other types of technical studies prepared for this Project or for noise studies prepared for projects in a non-rural setting, the ambient noise levels for a solar project in a rural setting do not change considerably. Even where construction or operational noise is generated from other solar projects in the vicinity, such noise attenuates with distance when it reaches the Project site and thus adds a negligible increase to the average ambient noise levels at the Project site. Accordingly, the measured ambient noise level of approximately 43 dBA L_{eq} is the appropriate baseline noise level for the Existing Conditions Scenario, Near-Term Scenario, Long-Term Construction Scenario, Phased Construction Scenario, and Decommissioning Phase Scenario.

To provide the public and Imperial County decision-makers with meaningful information about the potential noise impact generated by the Project under any of these development scenarios, the key is to analyze the Project under the worst-case scenario, with particular focus on how construction, operation, and decommissioning activities would impact the closest sensitive noise receptors in the vicinity of the Project. Developing the Project in its entirety over an 18-month period under the Existing Conditions Scenario, Near-Term Construction Scenario, or Long-Term Construction Scenario may overall generate more construction noise over the entire Project area over the shorter time period, compared to construction of the CUP areas in the Phased Construction Scenario, where noise is generated temporarily in specific areas of the Project site and overall spread out over a longer duration.

Project construction activities will include site preparation, development of staging areas and site access roads, solar array assembly and installation, and construction of electrical facilities. Under all development scenarios, the construction work would move around the site and only be located in the

immediate vicinity of a sensitive noise receptor for short intervals. As the construction activity moves farther from the sensitive receptor, the noise levels at the receptor attenuate with distance. Accordingly, it is proper to analyze the potential construction noise impacts based on whether the Project's construction noise exceeds the County's construction noise level limit of 75 dBA averaged over 8 hours during the daytime at the nearest noise sensitive receptor. Therefore, to be conservative and accurate, this noise analysis focuses on the daytime construction noise generated and averaged over an 8-hour period at the nearest occupied farmhouse.

Project construction work hours are typically planned to occur on weekdays and Saturdays from 6:00 a.m. to 5:00 p.m. Special circumstances, including but not limited to, protecting workers from excessive midday summer heat and complying with biological mitigation and overall Project schedule requirements, may occasionally require work to be performed outside the typical work schedule. However, operating noise-generating and vibration-generating construction equipment is limited to 7:00 a.m. to 7:00 p.m. Monday through Friday and 9:00 a.m. to 5:00 p.m. on Saturday by the County General Plan Noise Element.

2.2.3 Site Development

Initial construction activities would include the development of the staging and assembly areas, and the grading of site access roads for initial array installation. Construction staging and material lay-down areas would be distributed across the Project site evenly to allow for efficient distribution of components to different parts of the Project. These lay-down areas would be temporary and would be converted to solar arrays as work is completed in the general area. Temporary facilities would be developed on each site to facilitate the construction process. These facilities may include construction trailers, a temporary septic system or holding tank, parking areas, material receiving/storage areas, water storage ponds or tanks, construction power service, recycling / waste handling areas, and others. These facilities will be located at the construction areas designated on the final site plans.

2.2.4 Facility Components

The Project will use PV technology or a combination of various PV technologies, including crystalline silicon-based systems, thin-film systems, and concentrating PV systems. The technology will be used to convert sunlight into direct current (DC) electricity. Groups of PV modules will be wired together to form a PV array. Through a system of inverters and transformers, power will be conveyed to the facility substation and ultimately to the Imperial Valley Substation. Disconnect switches, fuses, circuit breakers, and other miscellaneous equipment will be installed throughout the system as well for electrical protection and O&M purposes.

Each CUP area includes the following facilities:

1. PV solar modules and tracking racking system and foundation;
2. Inverters/transformers/power conversion stations;
3. Pad-mounted transformers (if different from above);
4. Combining switchgear;
5. Communication system (fiber optic or microwave tower);
6. Breakers, buswork, protective relaying, Supervisory Control and Data Acquisition (SCADA), and associated substation equipment;
7. O&M building(s);
8. Back-up emergency generators; and

9. Energy storage component.

Each of the major components of the Project is described below in more detail.

PV Solar Modules and Trackers

The Project will utilize conventional PV modules (either crystalline or thin-film) or CPV modules. The PV modules operate in response to sunlight (i.e., during daylight hours), and operate at peak output when the sunlight is most intense, though they also produce power in low light conditions.

Depending on the selected manufacturer for the PV or CPV modules, the modules will be mounted on fixed-tilt, single- or dual-axis tracking structures. CPV modules will be mounted on top of a dual-axis tracker. The mast will be secured to a foundation below grade or vibratory driven into the ground; in which case, the mast will serve as the foundation and the supporting structure. The solar array field will be arranged in groups, called "blocks." The entire array block will be connected to an inverter and transformer station to convert the current from DC to Alternating current (AC) and to step up the voltage to a higher voltage, which is a more efficient for transmitting power to the Project substation.

During normal operation, each substation will "back feed" power to maintain "house" power. This would include O&M buildings, security systems, SCADA, communication systems, and Plant Control Systems, etc. Therefore, much of the electrical equipment will be in some stage of electrical operation 24 hours per day. Additionally, security and some maintenance personnel will be on-site at night.

Inverters, Pad-mounted Transformers, and Transmission Facilities

At the center of each array, there will be a power conversion station where inverters take the DC power output from the PV modules and convert it to AC power. An adjacent pad-mounted transformer will step the voltage up to a medium voltage level (typically 34.5 kV). The medium voltage outputs from each of the pad-mounted transformers will be collected together in combining switchgear located at discrete locations on the Project site. The medium voltage output from the combining switchgear will be connected to the Project substation where it will then be stepped up to 230 kV for export to the grid. The Project's gen-tie line will co-locate with 8minutenergy Renewables' and AES Solar's Mount Signal Solar Project gen-tie line and interconnect to the ISECS switchyard in order to connect to San Diego Gas & Electric's Imperial Valley Substation. The power would flow to the Imperial Valley Substation via the Drew Road Switchyard.

Substation, Switchyard, and Communication Systems

An on-site substation/switchyard on each of the 17 sub-Project areas will step-up the voltage from the collection level voltage to 230 kV. Breakers, buswork, protective relaying, SCADA, and associated substation equipment will be constructed as part of each phase as well. The communication system may include above or belowground fiber-optic cable or a microwave tower.

O&M Building Complex

Each O&M building complex may contain administrative offices, parts storage, a maintenance shop, plant security systems, a site control center, and plant monitoring equipment. A specific design for the building(s) has not been finalized as of the date of this analysis. The building(s) may have exterior lighting on motion sensors and will also include fire and security alarms. The building(s) will be located on a graded area with adjacent worker parking, per County building requirements.

The Project may also include additional auxiliary facilities, such as raw water/fire water storage, treated water storage, evaporation ponds, water filtration buildings and equipment, equipment control buildings, and a wastewater/septic system, as the O&M buildings will provide sanitary facilities for employees and visitors.

Energy Storage Component

The Project may incorporate an energy storage component, or if the Project is constructed in phases, each phase may have its own energy storage component. The field of energy storage is rapidly advancing; thus, a single technology or provider has not yet been selected for the energy storage component(s) of the Project. The energy storage component of the Project will utilize storage technologies that operate based upon the principles of potential (e.g., pumped storage), chemical (e.g., batteries), mechanical energy (e.g., a flywheel), or any combination thereof. The energy storage component may be centralized and located adjacent to the substation or switchgear, or alternatively, the energy storage component may be distributed throughout the plant adjacent to individual power conversion centers. The energy storage component would be housed in a warehouse-type building, or, alternatively, in smaller modular structures such as cargo shipping containers.

Site Access/Traffic and Circulation

Many County-maintained roads provide access throughout the Project site. Primary access to the Project site will be via County Highway S30, Lyons Road, Rockwood Road, and SR-98, as well as other roads in the area. Access to components of the solar field will be controlled through security gates at several entrances. Multiple gate-restricted access points will be used during construction and operation.

Daily trip generation during construction of the Project would primarily include the delivery of construction equipment, vehicles, and materials, as well as construction worker trips. The number of workers expected on-site during construction of the Project would vary over the construction period and is anticipated to average up to maximum of350 workers per day, equating to approximately 526 ADT. Equipment and supply deliveries to the site would also vary over the construction period but have the potential to average approximately 138 ADT during the construction period. The total of approximately 664 ADT expected construction trips would temporarily increase the existing traffic on the local roads during the construction period. Existing traffic volumes on SR-98 along the Project site are approximately 1,800 ADT, with a peak hour traffic volume of 200 vehicles (Caltrans 2011). Up to a dozen road crossings over the IID canal or other feature may be widened in the unlikely event construction traffic accessing the site required a wider crossing. In addition, parking for Project-related vehicles would be provided on-site during construction.

2.3 Project Operations and Maintenance

Once the Project facilities are constructed, facility operation would be limited to general maintenance, panel washing, and security. It is possible that each CUP area could require approximately two full-time equivalent personnel to operate the facility; however, the Project may also be supported by one staff who manages the entire Project. Assuming that all employees would work at their respective sites, operation of 17 CUP areas simultaneously would require up to 34 full-time equivalent workers to arrive and leave the Project site on a daily basis. These personnel will perform maintenance, panel washing, and security functions. Panel washing would occur during the dry weather months of April through October. Each solar panel surface would be washed with water from a water truck twice during that period to clean the active surface of solar panels to optimize transmission of light and energy production. Security staff would traverse the perimeter of the site in a light-duty pickup truck.

Operation of the site would be expected to generate approximately 30 trips per day from maintenance and security personnel.

2.4 Project Decommissioning and Site Restoration

At the end of the Project's useful life, the facility would be decommissioned. Facility structures and infrastructures would be removed from the Project site, and the Project site would then undergo restoration to the preconstruction agricultural land use.

3.0 Noise Terminology

3.1 Noise Descriptors

Noise is generally defined as unwanted or objectionable sound. Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz, or thousands of hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance and, in the extreme, hearing impairment. The unit of measurement used to describe a noise level is the decibel (dB); decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3-dB decrease.

Without “A-weighting”, the decibel scale alone would not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, a method called “A-weighting” is used to filter noise frequencies that are not audible to the human ear. The A-scale approximates the frequency response of the average young ear when listening to most ordinary everyday sounds. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-scale levels of those sounds. Therefore, the “A-weighted” noise scale is used for measurements and standards involving the human perception of noise.[1] In this report, all noise levels are A-weighted and “dBA” is understood to identify the A-weighted dB. Table 3 provides typical noise levels associated with common activities.

[1] While other methodologies exist for measuring sound, this methodology is preferred by many public agencies, because it captures the human perception of the noise and what annoyance is associated with that increase. Even if other methodologies capture other types of sound, the “A-weighted” noise scale is the most complete method for measuring noise impacts from a development project.

Table 3. Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
-	110	Rock Band
Jet Fly-over at 300 m (1,000 ft)	100	-
Gas Lawn Mower at 1 m (3 ft)	90	-
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	80	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	70	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	60	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	50	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	30	Library
Quiet Rural Nighttime	20	Bedroom at Night, Concert Hall (Background)
-	10	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans 2009
Notes: m=meters ft=feet
km/hr=kilometers per hour
mph=miles per hour

In addition to noise levels, the duration of noise over time is also important for the assessment of potential noise disturbance. Noise levels varying over time are averaged over a period of time, usually hour(s), expressed as dBA L_{eq}. For example, $L_{eq(3)}$ would be a 3-hour average noise level. When no period is specified, a 1-hour average is assumed ($L_{eq(1)}$ or L_{eq}).

The time of day of noise is also an important factor to consider when assessing potential community noise impacts, as noise levels that may be acceptable during the daytime hours may create disturbance during evening or nighttime hours, when people are typically at home and sleeping The Community Noise Equivalent Level (CNEL) is a descriptor used to characterize average noise levels over a 24-hour period, calculated from hourly Leq values, with 5 dBA added to the hourly Leq levels occurring between 7:00 p.m. and 10:00 p.m. and 10 dBA added to the hourly Leq levels occurring between 10:00 p.m. and 7:00 a.m., to reflect the greater disturbance potential from evening and nighttime noise, respectively. The day/night average sound level (L_{dn}) is the same as the CNEL, except the evening period is included in the daytime period.

Construction Noise Levels

Construction noise varies depending on construction activities and duration, type of equipment involved, proximity to sensitive receptors, and the duration of the construction activities. Construction equipment used on the site may be mobile (e.g., loaders, graders, dozers) or stationary (e.g., air compressor, generator, concrete saw). Heavy construction equipment typically operates for short periods at full power followed by extended periods of operation at lower power, idling, or powered-off conditions. Site preparation involves demolition, grading, compacting, and excavating and would include backhoes, bulldozers, loaders, excavation equipment (e.g., graders and scrapers), pile

drivers, and compaction equipment. Finishing activities may include the use of pneumatic hand tools, scrapers, concrete trucks, vibrators, and haul trucks. Typical noise sources and noise levels associated with construction activities are shown in Table 4.

Table 4. Typical Construction Equipment Noise Levels

Type of Equipment	Range of Maximum Sound Levels Measured (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Rock Drills	83-99	96
Jack Hammers	75-85	82
Pneumatic Tools	78-88	85
Pumps	74-84	80
Dozers	77-90	85
Scrapers	83-91	87
Haul Trucks	83-94	88
Cranes	79-86	82
Portable Generators	71-87	80
Rollers	75-82	80
Tractors	77-82	80
Front-End Loaders	77-90	86
Hydraulic Backhoe	81-90	86
Hydraulic Excavators	81-90	86
Graders	79-89	86
Air Compressors	76-89	86
Trucks	81-87	86
Pile Driver (Vermeer PD10)[1]	-	84

Source: Bolt, Beranek & Newman, 1987.

[1] Based on a 105.8 dBA at the operator's ear, as specified by Vermeer (2012). According to Mr. Dale Siever of Vermeer Sales Southwest, the operator's ear is approximately 4 feet from the part of the pile driver where noise is emitted. Therefore, based on the standard noise attenuation rate of -6 dBA per doubling of distance for point sources, noise from the pile driver would attenuate to approximately 84 dBA at 50 feet (AECOM 2013).

3.2 Corona Noise

When a transmission or subtransmission line is in operation, an electric field is generated in the air surrounding the conductors forming a "corona." Corona results from the partial breakdown of the electrical insulating properties of the air surrounding the conductors. When the intensity of the electric field at the surface of the conductor exceeds the insulating strength of the surrounding air, a corona discharge occurs at the conductor surface, representing a small dissipation of heat and energy. Some of the energy may dissipate in the form of small local pressure changes that result in audible noise or

in radio or television interference. Audible noise generated by corona discharge is characterized as a hissing or crackling sound that may be accompanied by a 120-Hz hum.

Slight irregularities or water droplets on the conductor and/or insulator surface accentuate the electric field strength near the conductor surface, thereby making corona discharge and the associated audible noise more likely. Under weather conditions such as rain and high wind, ambient noise levels would generally be higher than those generated by the transmission line operation, and would mask the corona noise levels. Therefore, audible noise from transmission lines is generally a wet weather (wet conductor) phenomenon. However, during dry weather, insects and dust on the conductors can also serve as sources of corona discharge, and the associated audible noise more likely. Under weather conditions such as rain and high wind, ambient noise levels would generally be higher than those generated by the transmission line operation, and would mask the corona noise levels. Therefore, audible noise from transmission lines is generally a foul weather (wet conductor) phenomenon. However, during fair weather, insects and dust on the conductors can also serve as sources of corona discharge.

The Electric Power Research Institute (EPRI) has conducted several studies of corona effects. Typical noise levels for transmission lines with wet conductors are shown below in Table 5.

Table 5. Transmission Line Voltage and Audible Noise Level

Line Voltage (kV)	Audible Noise Level Directly Below the Conductor (dBA)
138	33.5
240	40.4
356	51.0

kV = kilovolt
Sources: EPRI 1978,EPRI 1987

As shown in Table 5, corona noise levels decrease with lower voltage. Beyond 100 feet of the transmission line, the corona noise level attenuates at a rate of approximately 3 dB for each doubling of the distance.

3.3 Ground-borne Noise and Vibration

In addition to noise, construction activities generate vibration, which can be interpreted as energy transmitted in waves through the soil mass. These energy waves generally dissipate with distance from the vibration source, due to spreading of the energy and frictional losses. The energy transmitted through the ground as vibration, if great enough, can result in structural damage.

Typical outdoor sources of perceptible ground-borne vibration are construction equipment and traffic on rough (i.e., unpaved or uneven) roads. Construction activity can also result in varying degrees of ground-borne vibration, depending on the type of equipment, methods employed, distance between source and receptor, duration, number of perceived vibration events, and local geology.

Ground-borne vibrations from typical construction activities do not often reach levels that can damage structures in proximity to construction, but their effects may manifest and be noticeable in buildings that are within 25 feet of construction activities. One major concern with regard to construction vibration is potential building damage, which is assessed in terms of peak particle velocity (ppv),

typically in units of inches per second (in/sec). In addition to structural damage, the vibration of room surfaces affects people as human annoyance.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Table 6 presents various vibration magnitudes and the related effect on humans and structures.

Table 6. Effects on People and Structures at Various Vibration Levels

Vibration Level (in/sec ppv)	Effects on People	Effects on Structures
0.006-0.019	Threshold of perception; possibility of intrusion	Unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level for ruins and ancient monuments
0.1	Threshold of annoyance	Virtually no risk of damage
0.2	Annoying to people in buildings	Threshold of risk of architectural damage to normal dwelling with plastered walls and ceilings
0.4-0.6	Considered unpleasant	Architectural damage and possibly minor structural damage

Source: Jones & Stokes 2004

Note: Caltrans considers most construction vibrations, with the exception of pile driving and blasting, to be continuous.

As shown in Table 6, a vibration level of 0.1 in/sec ppv is the threshold of human annoyance, and a vibration level of 0.2 ppv is the threshold of risk of structural damage.

Construction operations generally include a wide range of activities that can generate various levels of ground-borne vibration. In general, blasting and demolition of structures generate the highest vibrations. Heavy truck transport can also generate ground-borne vibrations, which vary depending on vehicle type, weight, and pavement conditions. Typical, ground-borne vibration levels associated with typical construction equipment are presented in Table 7.

Table 7. Typical Construction Equipment Vibration Emissions

Equipment	Peak Particle Velocity (inches per second)[1]		
	At 25 feet	At 50 feet	At 100 feet
Clam Shovel Drop (slurry wall)	**0.202**	0.071	0.025
Vibratory Roller	**0.210**	0.074	0.026
Hoe Ram	**0.089**	0.031	0.011
Large Bulldozer	**0.089**	0.031	0.011
Caisson Drilling	**0.089**	0.031	0.011
Loaded Trucks	0.076	0.027	0.010
Jackhammer	0.035	0.012	0.004
Small Bulldozer	0.003	0.001	0.0004

Source: Federal Transit Administration: Transit Noise and Vibration Impact Assessment, 2006

[1] Bold values are considered an annoyance to people.

As shown in Table 7, at 25 feet, construction equipment generates vibration at levels exceeding the threshold of human annoyance (0.1 in/sec ppv), and at levels exceeding the threshold of risk of structural damage (0.2 in/sec ppv). At 50 feet, this equipment is below the thresholds of human annoyance (0.1 in/sec ppv) and structural damage (0.2 in/sec ppv).

3.4 Sensitive Receptors

Some land uses are considered more sensitive to noise than others due to the types of persons or activities involved. The County defines sensitive noise receptors, in general, as areas of habitation where the intrusion of noise has the potential to adversely impact the occupancy, use, or enjoyment of the environment (County of Imperial 1993). Noise sensitive receptors include, but are not limited to, residences, schools, hospitals, parks, and office buildings. Noise sensitive receptors may also be non-human species; many riparian bird species are sensitive to excessive noise. The United States Fish and Wildlife Service establishes a noise level of 60 dBA L_{eq}, above which nesting protected bird species would be disturbed and, therefore, impacted. These noise impacts are addressed in the Project's Biological Technical Study, which has been prepared by AECOM under separate cover.

Human perception of noise has no simple correlation with acoustical energy. The perception of noise is not linear in terms of dBA or in terms of acoustical energy. Two noise 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); that a change of 5 dBA is readily perceptible; and that an increase (or decrease) of 10 dBA sounds twice (or half) as loud (Caltrans 2009).

From the source to the receiver, noise changes both in level and frequency spectrum. The most obvious change is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on the following important factors: ground absorption, atmospheric effects and refraction, shielding by natural and man-made features, noise barriers, diffraction, and reflection. For a point or stationary noise source, such as construction equipment, the attenuation or drop-off in noise level would be at least -6 dBA for each doubling of unobstructed distance between source and the receiver and could attenuate to -7.5 dBA depending on the acoustic

characteristics of the intervening ground. For a linear noise source, such as vehicles traveling on a roadway, the attenuation or drop-off in noise level would be approximately -3 dBA for each doubling of unobstructed distance between source and the receiver and could attenuate to -4.5 dBA depending on the acoustic characteristics of the intervening ground.

A large object in the path between a noise source and a receiver can significantly attenuate noise levels at that receiver. 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, as well as man-made features, such as buildings and walls, can significantly alter noise levels. Walls or berms are often specifically used to reduce, or attenuate, noise.

The noise sensitive receptors in proximity to the Project are residences, specifically farmhouses located near the perimeter of the farmland associated with the farmhouse, as shown in Figure 3. The currently single-family farmhouses are located adjacent to or within CUP areas 13-0036, 13-0037, 130038, 13-0039, 13-0042, 13-0049, and 13-0050, as shown in Figure 3. Therefore, construction could occur adjacent to the farmhouses. However, a minimum construction setback distance of 50 feet has been established as a Project design feature for noise and vibration purposes, as discussed further in subsequent sections of this noise impact analysis.

The Project site plan includes a 5-acre buffer of undeveloped area around the SR 15 farmhouse, as the home site will be retained by the homeowner; however, the homeowner is leasing the remaining land to the Project.

4.0 Applicable Regulations and Standards

4.1 Federal

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which promulgated noise emission standards for interstate commerce, assisted state and local abatement efforts, and promoting noise education and research. Federal noise policies and programs are developed by federal agencies and interagency committees. For example, the Occupational Safety and Health Administration agency limits noise exposure of workers to 90 dB L_{eq} or less for 8 continuous hours or 105 L_{eq} or less for 1 continuous hour.

The U.S. Department of Transportation assumed a significant role in noise control through its various operating agencies, such as the Federal Aviation Administration, the Federal Transit Administration (FTA), and the Federal Highway Administration. The federal government actively advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that "noise sensitive" uses are either prohibited from being sited adjacent to a highway or, alternately that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation sources, the County of Imperial is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

4.2 State

4.2.1 California State Government Code

California does not promulgate statewide standards for environmental noise, but the California State Government Code Section 65302 (f) requires each local jurisdiction to draft a Noise Element for their General Plan to establish acceptable noise limits for various land uses. The proposed Project site is located within unincorporated Imperial County; the applicable construction noise regulations of the County are provided below. California Code of Regulations Title 24 (California Building Code)

The California Code of Regulations also establishes noise insulation standards and a maximum interior noise level, with windows closed, of 45 dB CNEL, due to exterior sources (Title 24, Section 3501 et seq.). This requirement is applicable to new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings.

4.2.2 California Department of Transportation

The California Department of Transportation (Caltrans) provides vibration level thresholds for architectural and structural damage and human perception thresholds. Caltrans vibrations are provided in Table 6 for reference. To assess the potential for structural damage associated with vibration from construction activities, the vibratory ground motion in the vicinity of an affected structure is measured in terms of ppv, typically in units of inches per second (in/sec). As shown in Table 6, damage to structures occurs when vibration levels range from 2 to 6 inches per second (in/sec) ppv. One half this minimum threshold, or 1 inch per second ppv, is considered a safe criterion that would

protect against structural damage. Caltrans uses a vibration criterion of 0.2 in/sec ppv for its construction projects, except for pile driving and blasting.

4.3 County of Imperial

The Project is subject to applicable County environmental regulations identified in the Noise Element of the County General Plan (County of Imperial 1993), which can be enforced through mechanisms identified in the County Code, Title 9 (Land Use Ordinance), Division 7, Noise Abatement and Control (Noise Ordinance) (County of Imperial 1998). Each of these regulations is presented in more detail below.

4.3.1 Noise Element of the County of Imperial General Plan

The Noise Element of the County General Plan contains goals, policies, and implementation measures for identifying and managing existing and future noise sources in the County. Goals and objectives applicable to the Project are presented below.

Goals and Objectives

Noise Environment

Goal 1: Provide an acceptable noise environment for existing and future residents in Imperial County.

Objective 1.3 Control noise levels at the source where feasible.

Project/Land Use Planning

Objective 2.3 Work with project proponents to utilize site planning, architectural design, construction, and noise barriers to reduce noise impacts as projects are proposed.

Implementation Programs and Policies

The primary mechanism to implement the County's noise goals and objectives is to address noise concerns in the land use planning process and the planning of noise-producing projects. Future noise/land use incompatibilities can be avoided or reduced by establishing criteria and standards for acceptable noise limits for various land uses throughout Imperial County. The following is a discussion of these criteria and standards and how they apply or do not apply to the Project.

Noise Impact Zones

A Noise Impact Zone is an area that is likely to be exposed to significant noise. The County defines a Noise Impact Zone as an area that may be exposed to noise greater than 60 dB CNEL or 75 dB L_{eq}. The purpose of the Noise Impact Zone is to define areas and properties where an acoustical analysis of a proposed project is required to demonstrate project compliance with land use compatibility requirements and other applicable environmental noise standards. Properties meeting at least one of the following criteria, shown below and in Table 8, are defined as being within a Noise Impact Zone if located:

- Within the Noise Impact Zone distances to classified roadways, as indicated in Table 8;
- Within 750 feet of the centerline of any railroad;

- Within 1,000 feet of the boundary of any railroad switching yard;
- Within the existing or projected 60 dB CNEL contour of any airport;[2] and/or
- Within one-quarter mile (1,320 feet) of existing farmland, which is in an agricultural zone.

Table 8. Roadway Noise Impact Zones

Roadway Classification	Distance from Centerline (feet)
Interstate	1,500
State Highway or Prime Arterial	1,100
Major Arterial	750
Secondary Arterial	450
Collector Street	150

Noise/Land Use Compatibility Standards

Land use compatibility defines the acceptability of a land use in a specified noise environment. Table 9 provides the County's Noise/Land Use Compatibility Guidelines. When an acoustical analysis is performed, conformance of a proposed project with the Noise/Land Use Compatibility Guidelines is used to evaluate potential noise impact and will provide criteria for environmental impact findings and conditions for project approval.

The entire Project site and surrounding area are designated for agricultural land uses. Based on the Noise/Land Use Compatibility Guidelines (Table 9), noise levels of up to 70 dBA CNEL are considered "normally acceptable" in areas designated for agricultural land uses. As described earlier, CNEL is a 24-hour averaged noise level weighted 5 dB for evening hour noise and 10 dB for nighttime noise.

[2] As shown in the Imperial County Airport Land Use Compatibility Plan (ALUCP) or an approved airport master plan, which supersedes the ALUCP. Note, however, that a land use compatibility analysis, which may include an acoustical analysis, is required for projects proposed within the "airport vicinity" of each airport, as defined on the Compatibility Maps shown in the ALUCP. This may encompass a much larger area than the 60 dB CNEL contour.

Table 9. County of Imperial Noise/Land Use Compatibility Guidelines

Land Use Category	Community Noise Exposure L_{dn} or CNEL, dB					
	55	60	65	70	75	80
Residential – Low-Density Single-Family, Duplexes, and Mobile Homes						
Transient Lodging – Motels, Hotels						
Schools, Libraries, Churches, Hospitals, Nursing Homes						
Auditoriums, Concert Halls, Amphitheaters						
Sports Arenas, Outdoor Spectator Sports						
Playgrounds, Neighborhood Parks						
Golf Courses, Riding Stables, Water Recreation, Cemeteries						
Office Buildings, Businesses, Commercial and Professional						
Industrial, Manufacturing, Utilities, Agriculture						

Source: County of Imperial. 2003. General Plan: Noise Element.

Key:

Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design.

Normally Unacceptable: New construction and development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features must be included in the design.

Clearly Unacceptable: New construction or development clearly should not be undertaken.

The following guidelines are established by the County for the evaluation of a substantial increase in ambient noise levels and are included in the Noise Element of the County General Plan:

- If the future noise level after the project is completed will be within the "normally acceptable" levels shown in the Noise/Land Use Compatibility Guidelines, but will result in an increase of 5 dB CNEL or greater, the project will have a potentially significant noise impact and mitigation measures must be considered.
- If the future noise level after the project is completed will be greater than the "normally acceptable" noise levels shown in the Noise/Land Use Compatibility Guidelines, a noise increase of 3 dB CNEL or greater shall be considered a potentially significant noise impact and mitigation measures must be considered.

Where a potential conflict with County noise standards is indicated, and/or for projects that result in noise levels that exceed the "normally acceptable" criteria of the Noise/Land Use Compatibility Guidelines, mitigation measures are required to be implemented to eliminate the project impact or to reduce the project impact to an acceptable level. Noise reduction measures may be applied at the source of the noise, along the path of the noise, or at the receptor.

Where a project has the potential to cause a significant noise impact to sensitive receptors along area roadways, the County also requires consideration of reduction measures to reduce the impact to a less than significant level, including a reduction of the intensity of the proposed project, construction of noise attenuation walls and/or landscaped earth berms, or other changes in project design or its proposed access. For nonresidential projects, reduced hours of operation may also be required by the County.

Interior Noise Standards

In addition to the California Code of Regulations Title 24 standards, the Noise Element of the County General Plan established the following additional interior noise standards to be considered in acoustical analyses:

- The interior noise standard for detached single family dwellings shall be 45 dB CNEL.

Property Line Noise Standards

The Property Line Noise Limits discussed in the County General Plan Noise Element apply to operational noise, not construction noise, generated from one property to an adjacent property and

also applies to properties zoned for residential, commercial, and industrial land uses. The noise limits are intended to be enforced through the County's code enforcement program on the basis of complaints received from persons impacted by excessive noise.

No properties within or near the Project are zoned for residential, commercial, or industrial land use. All of the parcels included in the Project area and adjacent to the Project area are zoned for agricultural use and, therefore, an analysis based on the Property Line Noise Standards is not necessary. This issue will not be discussed further.

Construction Noise Standards

The Noise Element of the County General Plan states that construction noise, from a single piece of equipment or a combination of equipment, shall not exceed 75 dB L_{eq} when averaged over an 8-hour period, and measured at the nearest sensitive receptor. This standard assumes a construction period relative to an individual sensitive receptor of days or weeks. In cases of extended length construction times, the standard may be tightened so as not to exceed 75 dB L_{eq} when averaged over a 1-hour period.

Construction activities at the Project site would move around the site and are not anticipated to be performed proximate to a sensitive receptor more than a few days or weeks.

The Noise Element of the County General Plan also limits the operation of construction equipment to the hours between 7 a.m. and 7 p.m. Monday through Friday, and 9 a.m. to 5 p.m. on Saturday. No commercial construction operations are permitted on Sunday or holidays.

4.3.2 Noise Ordinance

The County of Imperial Land Use Code, Title 9 (Land Use Ordinance), Division 7.0 Noise Abatement and Control (Noise Ordinance), establishes standards to regulate noise within certain zones in the County.

Per Section 90702.00 of the Noise Ordinance (Sound Level Limits), “It shall be unlawful for any person to cause noise by any means to the extent that the applicable one hour average sound level set out in the following table (Table 10) is exceeded, at any location in the County of Imperial on or beyond the boundaries of the property on which the noise is produced.”

Table 10. Property Line Noise Level Limits

Land Use Zone	Time of Day	One Hour Average Sound Level (decibels)
Residential: All R-1	7 a.m. to 10 p.m.	50
	10 p.m. to 7 a.m.	45
Residential: All R-2	7 a.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
Residential: R-3, R-4 & All Other Residential	7 a.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
All Commercial	7 a.m. to 10 p.m.	60
	10 p.m. to 7 a.m.	55
Manufacturing, All Other Industrial, including Agricultural & Extraction Industry	(Anytime)	70
General Industrial	(Anytime)	75

Notes: The sound level limit between two zoning districts (different land uses) shall be measured at the property line between the properties.

Fixed-location public utility distribution or transmission facilities located on or adjacent to a property line shall be subject to the noise level limits above, measured at or beyond six feet from the boundary of the easement upon which the equipment is located.

As stated previously in Section 2.1, the Project site and immediate properties in its vicinity are currently zoned for agricultural use by the Land Use Element of the County of Imperial General Plan (County of Imperial 2008), and the Project site parcels are composed of privately owned lands zoned as A-3 (Agricultural, Heavy), A-2-R (General Agricultural Rural Zone), and A-2 (Agricultural, General). The Project site and surrounding properties are currently zoned for agricultural use (A2 and A3), not zoned for Agricultural-Industrial Use AM-1 or AM-Z from Table 10. Therefore, the Noise Ordinance does not prescribe a property line noise level limit on Project operations per Table 10. Conversion of the Project parcels from agricultural to solar power generation does not change the land use zone; therefore, there is no operational noise level limit at the property line.

These property line noise limits (Table 10) do not apply to construction activities. The Noise Ordinance does not set new limitations on construction; rather, its mechanisms can be used to enforce the construction noise level limits and the time of day/day of week limitations set by the County Noise Element, as discussed previously in Section 4.3.1.

5.0 Existing Conditions

5.1 Existing Land Uses

Land uses within and adjacent to the Project site consist of privately owned active and fallow agricultural fields, a dairy farm, dirt roads, dispersed single-family farmhouses associated with agricultural operations; and IID-owned lateral canals and drains.

5.2 Sensitive Receptors

Noise sensitive receptors currently located within and adjacent to the Project site include single-family homes associated with the agriculture land uses. Currently occupied single-family residential properties are located primarily adjacent to CUP areas 13-0036, 13-0037, 13-0038, 13-0039, 13-0042, 13-0049, and 13-0050 of the Project, as shown in Figure 3.

5.3 Existing Noise Levels

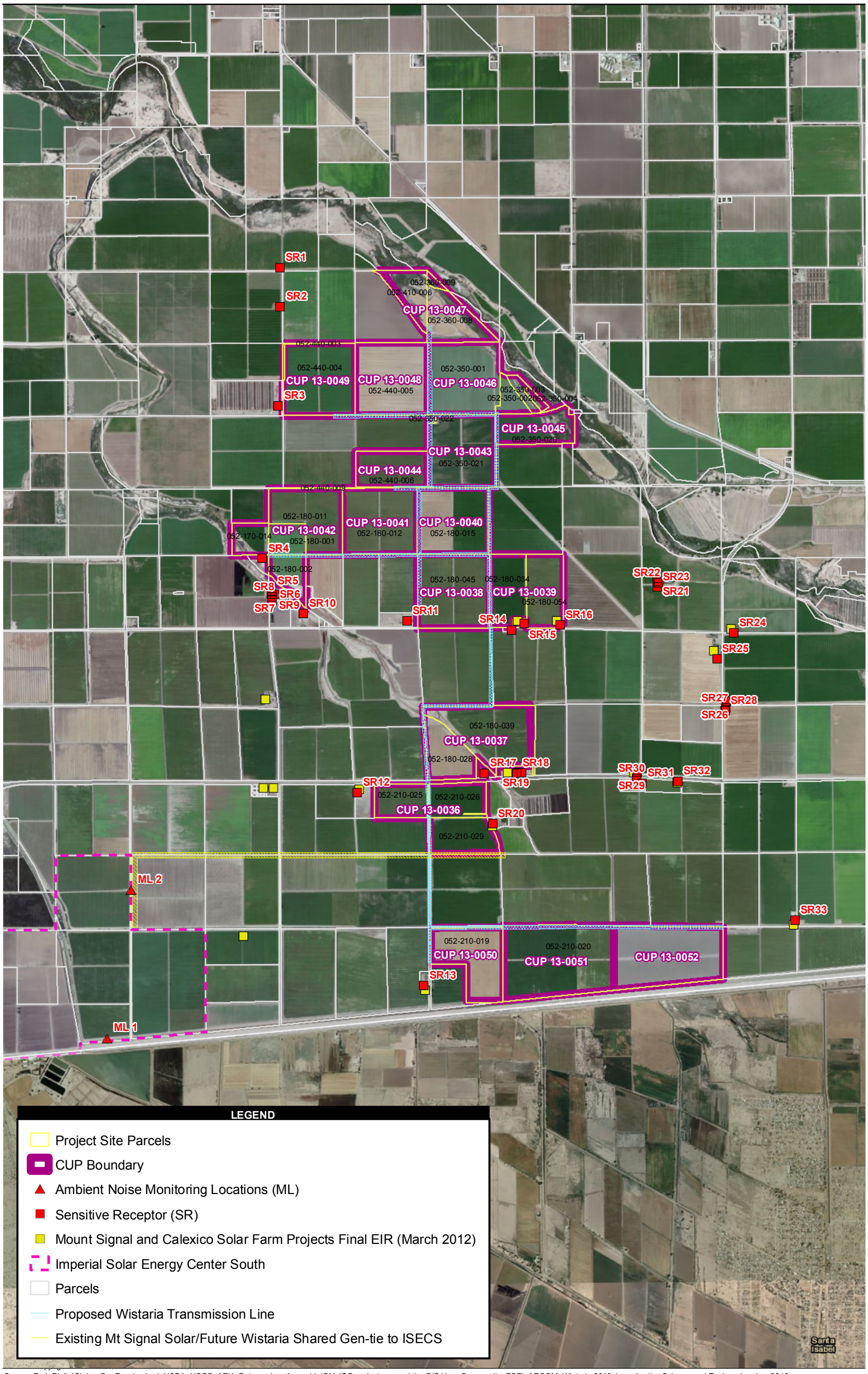
Ambient noise measurements were taken in the vicinity of the Project site by Investigative Science and Engineering, Inc. (Figure 3). The measurements collected by Investigative Science and Engineering, Inc. (2010) are representative of the Project site's rural agricultural setting and reveal a baseline ambient noise level with an hourly average of approximately 43 dBA L_{eq}. The dominant noise source at location "ML 1" was determined to result from the infrequent movement of U.S. Border Patrol units, while at location "ML 2," noise mainly resulted from background community and far-field noise. No unusual noise sources or levels were indicated during the testing by Investigative Science and Engineering, Inc. The results of the sound level monitoring are presented below in Table 11.

The values for the predicted sound equivalent level (L_{eq}), the maximum and minimum measured sound levels (L_{max} and L_{min}), and the statistical indicators L_{10}, L_{50}, and L_{90}, are provided in Table 11 for each monitoring location.

Table 11. Measured Ambient Sound Levels – Imperial Solar Energy Center South Project

		1-Hour Noise Level Descriptors in dBA					
Monitoring Location[1]	**Start Time**	**L_{eq} (1)**	**L_{max}**	**L_{min}**	**L_{10}**	**L_{50}**	**L_{90}**
ML-1	11:00 a.m.	44.2	75.8	36.3	43.6	40.2	38.7
ML-2	11:30 a.m.	43.3	66.8	30.7	42.8	36.2	34.3

[1] Monitoring locations (ML) are shown in Figure 3.



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; ESRI; AECOM; Wistaria 2013; Investigative Science and Engineering, Inc. 2010

3,500 1,750 0 3,500 Feet

Scale: 1:42,000; 1 inch = 3,500 feet

Figure 3

Sensitive Receptor and Noise Measurement Locations

Wistaria Ranch Solar Energy Center

Path: P:\2012\60250473\06GIS\6.3_Layout\Noise\MeasurementLocs.mxd, 3/27/2014, steinb

6.0 Impact Analysis

6.1 Thresholds of Significance

Pursuant to CEQA, a project typically would have a significant noise impact if it would:

1. Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

2. Expose persons to or generate excessive ground-borne vibration or ground-borne noise levels.

3. Result in a substantial[3] temporary or permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

4. Expose people residing or working in the project area to excessive noise levels due to the site's proximity to an airport (for projects located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport).

5. Expose people residing or working in the project area to excessive noise levels due to the site's proximity to a private airstrip.

6.2 Project Impacts

As the Project site is located on and adjacent to existing farmland, it is entirely within a Noise Impact Zone, as defined by the County. Therefore, an acoustical analysis of the Project is required to evaluate compliance with land use compatibility requirements and other applicable environmental noise standards. The County standards and CEQA thresholds, defined previously in this report, are used to evaluate noise and vibration effects associated with implementation of the Project.

Would the Project expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction Noise Impacts

Construction noise impacts are based on the proximity of noise sensitive receptors to the construction activity, the magnitude and duration of construction noise at the nearest sensitive receptor, and the day of week/time of day. As shown in Figure 3, noise sensitive receptors currently located within and adjacent to the Project site include single-family homes associated with the agriculture land uses. Currently occupied single-family residential properties are located primarily adjacent to CUP areas

[3] The County General Plan Noise Element defines a substantial increase as "an increase of 5 dB CNEL or greater if the future noise level after the project is completed will be within the "normally acceptable" category as shown in the Noise/Land Use Compatibility Guidelines (60 dBA CNEL for residential land uses); or "an increase of 3 dB CNEL or greater if the future noise level after the project is completed will be greater than the "normally acceptable" category as shown in the Noise/Land Use Compatibility Guidelines.

130036, 13-0037, 13-0038, 13-0039, 13-0042, 13-0049, and 13-0050 of the Project, as shown in Figure 3. One farmhouse (SR 15) on CUP 13-0039 (see Figure 3) has been identified as remaining occupied by the owner during Project construction and operation.

Construction of the Project would generate noise from site preparation and installation of the solar facilities. Construction noise would vary depending on the construction activity, type of mobile and stationary equipment and vehicles, and duration of construction activities. Site preparation involves demolition, grading, compacting, and excavating, which would include backhoes, bulldozers, loaders, excavation equipment (e.g., graders and scrapers), pile drivers, and compaction equipment. Finishing activities may include the use of pneumatic hand tools, scrapers, concrete trucks, vibrators, and haul trucks.

Construction Equipment Use. The magnitude of construction noise impacts depends on the type of construction activity, the noise level generated by various pieces of construction equipment, the duration of the activity, and the attenuation distance between the activity and the noise-sensitive receivers. As shown in Table 4, maximum noise levels from construction equipment typically range from approximately 71 dBA to 99 dBA L_{max} at 50 feet from the source.

Site preparation and panel installation are expected to produce the most noise during Project construction. Earthmoving and pile driving equipment generating approximately 85 dBA L_{max} at 50 feet is suggested as the maximum sound level for analysis purposes, as shown in Table 4. Typical operating cycles may involve 2 minutes of full power, followed by 3 or 4 minutes at lower settings. Therefore, hourly average noise levels at construction sites typically range from approximately 65 to 88 dB L_{eq} at 50 feet, depending on the activities performed. However, hourly average construction noise levels would be approximately 75 dBA L_{eq} at 50 feet from the construction activity.

In accordance with the Project design features, all Project components (e.g., inverters, trackers, substation, energy storage units, etc.), construction vehicle, and equipment operation shall be sited at least 50 feet from farmhouses on-site or in the vicinity of the Project.

Therefore, even when construction activities occur near onsite farmhouses, the appropriate distance of at least 50 feet is maintained from a farmhouse and, in a worst-case scenario, Project construction noise levels would not exceed the 75 dBA L_{eq} standard averaged over an 8-hour workday. Worker breaks, equipment adjustments, and transitions between activities occur over an 8-hour workday so that equipment does not run continuously for 8 hours. The County General Plan Noise Element limits construction noise to 75 dBA L_{eq} over an 8-hour average, measured at the receptor (i.e., occupied residence). Therefore, Project construction noise would not exceed the County's construction noise level threshold at an occupied farmhouse (i.e., SR 15), resulting in a less than significant impact from Project construction.

Major construction activities (e.g., earthmoving activities) involving construction equipment would generally occur between 7:00 a.m. and 5:00 p.m. Monday through Friday and 9:00 a.m. and 4:00 p.m. on– Saturday. These activities are permitted under the Noise Element of the County General Plan between 7 a.m. and 7 p.m., from Monday through Friday, and 9 a.m. to 5 p.m. on Saturday; therefore, the proposed Project construction hours would be consistent with the County Noise Element.

Operational Noise Impacts

Operational activities of the constructed Project facility would not generate high noise levels, due to the relatively quiet nature of PV technology, and operational noise limited to daylight periods when ambient noise levels are highest. Sources of operational noise include on-site maintenance and security vehicle operation, as well as general operation of the facility, including the on-site substation

and the inverters of the solar arrays. Limited amounts of intermittent maintenance vehicle traffic would occur on the site, which would not be expected to generate off-site noise impacts.

The County Noise Ordinance prohibits operational noise from exceeding applicable 1-hour average sound levels (see Table 10) on or beyond the boundaries of the property on which the noise is produced, based on the designated land use. The Project site and surrounding properties are currently zoned for agricultural use (A2 and A3); however, they are not zoned for Agricultural-Industrial Uses AM-1 or AM-Z from Table 10, above. Therefore, the Noise Ordinance does not prescribe a property line noise level limit on Project operations in Table 10.

Based on the County General Plan Noise Element, Noise/Land Use Compatibility Guidelines (Table 9), noise levels of up to 70 dBA CNEL are considered “normally acceptable” in areas designated for agricultural land uses.

Operation of the Inverters. The inverters of the solar arrays would produce low noise levels during facility operations, which would occur primarily during daylight hours (from sunrise to sunset), when the solar arrays are generating electricity. Daytime noise generation from an inverter (manufacturer rated at 77 dBA at 5 feet) (AECOM 2011) would attenuate to approximately an hourly average of 58 dBA L_{eq} at 50 feet, which if conservatively assumed to occur over 24 hours would average to approximately 64.7 dBA CNEL hours (though nighttime inverter noise would be substantially less), Therefore, the CNEL (day-night average) inverter noise level would not exceed County Noise/Land Use Compatibility Guidelines threshold for agricultural use of 70 dBA CNEL and are therefore not significant.

Operation of the Transformers. The transformers of the substation would produce low levels of noise during facility operations, but, as with the inverters, this noise would primarily occur during daytime hours. Transformers at the on-site substations would have cooling fans that operate during daytime hours. Daytime noise generation from the on-site substations (manufacturer rated at 60 dBA at 5 feet) (AECOM 2011) would be approximately 41 dBA L_{eq} at 50 feet, which if conservatively assumed to occur over 24 hours would average to approximately 41.7 dBA CNEL hours (though nighttime transformer noise would be substantially less). The CNEL noise level at 50 feet from a transformer would not exceed the County land use compatibility threshold for agricultural use of 70 dBA CNEL and therefore is not significant.

Operation of the Energy Storage Facility. The energy storage facility would produce low levels of noise during facility operations, but, as with the inverters, this noise would primarily occur during daytime hours. Daytime noise generation from the facility (manufacturer rated at 85 dBA L_{eq} at 1 meter) (SustainX 2014) would be approximately 61 dBA L_{eq} at 50 feet, which if conservatively assumed to occur over 24 hours would average to approximately 67.7 dBA CNEL hours (though nighttime facility noise would be substantially less The CNEL noise level at 50 feet from an energy storage facility would not exceed the County land use compatibility threshold for agricultural use of 70 dBA CNEL and therefore is not significant.

The potential of combined operational noise levels of an inverter (58 L_{eq} at 50 feet), a transformer (41 dBA L_{eq} at 50 feet), and an energy storage facility (61 L_{eq} at 50 feet) would be approximately 62.8 dBA L_{eq} at 50 feet, which if conservatively assumed to occur over 24 hours would average to approximately 69.7 dBA CNEL hours (though nighttime combined operational noise would be substantially less). The noise level at 50 feet from a transformer, an energy storage facility, and an inverter would not exceed County land use compatibility thresholds of 70 dBA CNEL and therefore is not significant.

For the farmhouse to remain occupied during Project operation (SR 15 on CUP area 13-0039), inverters and transformers shall be situated outside the 5-acre buffer of undeveloped area around the SR 15 farmhouse, reserved by the homeowner leasing the remaining land to the Project, which far exceeds the minimum 50-foot distance required by the Project design features. Therefore, because operational noise levels would remain within 70 dBA CNEL, there would be no significant operational noise impacts to the on-site noise sensitive receptor.

Transmission Lines. The Project's 230 kV gen-tie line will co-locate with the Mount Signal Solar Project gen-tie line, as shown on Figure 3. The corona noise associated with a 230 kV line is not expected to exceed 40 dBA Leq (CPUC 2009) below the conductor during worst-case weather conditions that contribute to high corona noise (e.g., high humidity, fog and rain). Therefore, the noise level at the edge of the transmission line corridor right-of-way would not exceed the County land use compatibility threshold for agricultural use of 70 dBA CNEL and therefore would not result in a significant impact.

Decommissioning Noise Impacts

Decommissioning activities are similar to construction activities but generate approximately half the vehicle traffic and equipment compared to the construction activities and, overall, are not anticipated to last as long as the construction activities. However, even though the decommissioning activities would move around the site, the duration of the deconstruction activities (e.g., demolition, excavation, restoration) immediately proximate to a sensitive noise receptor would be approximately the same as during the construction period. Therefore, decommissioning noise impacts would be the same as the construction noise impacts. Decommissioning noise impacts are based on the proximity of the decommissioning activity to noise sensitive receptors, the magnitude and duration of construction noise at the nearest sensitive receptor, and the day of week/time of day.

Decommissioning of the Project would generate noise from the removal of the solar facilities and site restoration. Noise generated would vary depending on the activity, type of mobile and stationary equipment and vehicles, and duration of activities. Facilities removal and site restoration involves demolition, grading, compacting, and excavating, which would include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers). Site demolition and restoration are expected to produce the highest noise levels during the Project decommissioning period. Earthmoving activities generate hourly average construction noise levels of approximately 75 dBA L_{eq} at 50 feet, which would be substantially less when averaged over an 8-hour workday. The County Noise Element limits construction noise to 75 dBA L_{eq} over an 8-hour average, measured at the receptor (i.e., occupied residence). Therefore, Project decommissioning noise would not exceed the County's noise level threshold at an occupied farmhouse, resulting in a less than significant impact from Project decommissioning.

Major decommissioning activities (e.g., earthmoving activities) involving construction equipment would generally occur between 7:00 a.m. and 5:00 p.m. Monday through Friday and 9:00 a.m. and 4:00 p.m. on Saturday. These activities are permitted under the Noise Element of the County General Plan between 7 a.m. and 7 p.m. Monday through Friday, and 9 a.m. to 5 p.m. on Saturday. Therefore, the proposed Project decommissioning hours would be consistent with the County Noise Element, resulting in a less than significant impact from Project decommissioning.

Would the Project result in a substantial temporary or permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project?

Construction/Decommissioning Noise Impacts

Daytime ambient noise levels were previously measured in the Project area at 43 dBA L_{eq}, as described in Section 5.3. Worst-case hourly average daytime construction noise levels at the nearest sensitive receptor (i.e., farmhouse) would be approximated at 75 dBA L_{eq}, which would be a temporary ambient increase during construction and decommissioning of approximately 32 dBA L_{eq} at the receptor. A substantial noise increase (temporary or permanent) is typically defined as an increase of 10 dBA above existing conditions, which is based on an increase of 10 dBA sounding twice as loud to the human ear. The County Noise Element guidelines for determining substantial increases based on land use capability apply to future ambient noise levels, after a project is completed, and therefore do not apply to temporary construction activities.

A substantial temporary increase in noise does not automatically trigger a significant noise impact. Rather, it is a screening threshold that triggers a further evaluation of increase in the context of all the Project design features and the circumstances in the vicinity of the Project to determine if the substantial increase is also a significant environmental impact.

The properties adjacent to the Project site are zoned agricultural and some of the residences (i.e., farmhouses) associated with those properties are located near the property lines. Construction and decommissioning noise adjacent to these farmhouses would, by definition here, result in a substantial temporary increase in daytime ambient noise levels; however, given the existing agricultural activities on-site and adjacent properties, the daytime operation of agricultural equipment near these farmhouses would produce noise levels similar to construction/demolition sources. Furthermore, the operation of Project construction equipment would not occur at night. Therefore, ambient noise levels during night hours (i.e., when sleeping activities occur) would not be affected. Additionally, the farmhouses are not zoned as residential use, which would have more stringent (i.e., lower) ambient noise limits than agricultural use (i.e., construction noise of 75 dBA L_{eq} would be less than the County Noise Land Use Compatibility Guidelines to 70 dBA CNEL for agricultural land uses. Finally, the increase in ambient noise level during construction would be less than the County construction noise level limit of 75 dBA L_{eq} averaged over an 8-hour daytime period and would occur within the County's allowable daytime construction hours. Furthermore, the Applicant's Project design features (as listed in Section 2.2.1), when combined with the factors described above, prevent the substantial temporary increases in noise from rising to the level of a significant temporary noise impact.

Construction Period/Decommissioning Period Vehicle Trips. The vehicle trips generated by construction of the Project would result in a negligible increase in existing traffic volumes and noise levels along SR-98 and at residences adjacent to the materials delivery route along SR-98 and other smaller roadways in the Project area. Worst-case Project construction traffic assumes 664 ADT, with approximately 209 peak hour trips. Existing traffic volumes on SR-98 along the Project site are approximately 1,800 ADT, with 200 peak hour trips (Caltrans 2011). Therefore, Project ADT would be less than half of the existing roadway ADT, and peak hour Project trips would approximately double along SR-98 during the peak hour. Decommissioning ADT and peak hour trips are anticipated to be half those of construction.

As discussed in Section 3.3, when traffic volumes are doubled, noise levels increase by 3 dBA, which is barely perceptible to the human ear. A 10 dBA increase is considered by many agencies (e.g., Caltrans) as a substantial increase, since an increase of 10 dBA sounds twice as loud to the human ear (Caltrans 2009). Therefore, traffic noise associated with Project construction and decommissioning will not cause a substantial temporary increase in ambient noise levels. No further analysis is needed to conclude that construction/decommissioning-related traffic noise will not cause a significant temporary impact to ambient noise levels.

Operational Noise Impacts

Based on the County Noise/Land Use Compatibility Guidelines, noise levels of up to 70 dBA CNEL are considered "normally acceptable" in areas designated for agricultural land uses. Nevertheless, the County General Plan Noise Element establishes guidelines for the evaluation of a substantial increase in ambient noise levels after a project is operational: "if the future noise level after the project is completed will be within the 'normally acceptable' noise levels shown in the Noise/Land Use Compatibility Guidelines, a noise increase of 5 dB CNEL or greater shall be considered a potentially significant noise impact and mitigation measures must be considered." Additionally, a noise increase of 10 dBA L_{eq}, an increase that the human ear perceives as doubling of noise levels, can be used to evaluate whether a permanent increase in noise qualifies as a substantial increase.

Daytime ambient noise levels were measured at 43 dBA L_{eq}, based on 1-hour daytime measurements. Therefore, the ambient noise level of 43 dBA represents the daytime ambient noise levels and is expressed as L_{eq}. A noise increase of 10 dBA L_{eq}, an increase that the human ear perceived as doubling of noise levels, was used in this analysis to assist in defining a substantial increase.

Inverter noise of 58 dBA L_{eq} at 50 feet on-site would result in an increase in daytime ambient noise levels (43 dBA L_{eq}) by approximately 15 dBA L_{eq} at the inverter on the Project site. However, inverter noise would attenuate with distance to approximately 52 dBA L_{eq} at 100 feet. The Applicant's Project design features require unshielded inverters to be located 100 feet from a noise sensitive receptor. An increase of 9 dBA L_{eq} would not be a significant permanent increase, because it is less than a 10 dBA L_{eq} increase. Accordingly, no further analysis is required to conclude that the permanent increase would not result in a significant noise impact. The Applicant's Project design features require that any inverter located within 100 feet of a noise sensitive receptor be shielded with a barrier effective in limiting the noise increase at the sensitive receptor to less than 5 dB CNEL. Therefore, no further analysis is needed to conclude that there is no significant noise impact from the Project's operation of an inverter.

Transformer noise during the daytime of approximately 41 dBA L_{eq} at 50 feet would result in a negligible increase over ambient noise levels of less than approximately 1 dBA L_{eq} at the transformer location, where daytime ambient noise levels are estimated at 43 dBA. Transformer noise would not result in a substantial permanent increase in ambient noise levels. In addition, an increase of 1 dBA L_{eq} would be less than a 5 dBA CNEL increase. Accordingly, no further analysis is required to conclude that the permanent increase does not result in a significant noise impact.

The energy storage facility noise of approximately 61 dBA L_{eq} at 50 feet would result in an increase in daytime ambient noise levels (43 dBA L_{eq}) of approximately 18 dBA L_{eq}, at an inverter on the Project site. However, the facility noise would attenuate with distance to approximately 52 dBA L_{eq} at 150 feet. . An increase of 9 dBA L_{eq} would not be a significant permanent increase because it is less than a 10 dBA L_{eq} increase. The Applicant's Project design features require unshielded energy storage facilities to be located 150 feet from a noise sensitive receptor. Accordingly, no further analysis is required to conclude that the permanent increase does not result in a significant noise impact. The Applicant's Project design features require that any energy storage facility located within 150 feet of a noise sensitive receptor be shielded with a barrier effective in limiting the noise increase at the sensitive receptor to less than 5 dB CNEL. Therefore, no further analysis is needed to conclude that there is no significant noise impact from the Project's operation of an energy storage facility.

Combined operational noise levels of an unshielded inverter (58 L_{eq} at 50 feet), an unshielded transformer (41 dBA L_{eq} at 50 feet), and an unshielded energy storage facility (61 dBA L_{eq} at 50 feet) would be approximately 62.8dBA L_{eq} at 50 feet, which would result in an increase in daytime ambient

noise levels (43 dBA L_{eq}) of approximately 20 dBA L_{eq}, at the combined facilities on the Project site. However, the combined facility noise would attenuate with distance to approximately 52 dBA L_{eq} at 180 feet. The Applicant's Project design features provide that wherever all three operational facilities (inverters, transformers, and energy storage facilities) are located together less than 180 feet of an existing occupied residence, they shall each be shielded with a structural barrier capable of reducing their combined noise increase at the receptor to less than 5 dBA CNEL and less than 10 dBA L_{eq} in order to avoid a substantial permanent increase in ambient noise. Accordingly, the Project's operation will not create a substantial permanent increase in the existing ambient levels. Accordingly, no further analysis is required to conclude that the permanent increase does not result in a significant noise impact.

The corona noise associated with a 230 kV line is expected not to exceed 40 dBA Leq (CPUC 2009) below the conductor during worst-case weather conditions that contribute to high corona noise (e.g., high humidity, fog and rain). Therefore, the noise level at the edge of the transmission line corridor right-of-way would result in an increase in daytime ambient noise levels (43 dBA L_{eq}) by less than approximately 3 dBA L_{eq}, which would not be a significant permanent increase (i.e., greater than a 10 dBA L_{eq} increase). Therefore, no further analysis is needed to conclude that there is no significant noise impact from the Project's operation of the transmission line.

Operational Vehicle Trips. Operation of the site would be expected to generate approximately 30 ADT from maintenance and security personnel. As discussed previously in Section 3.3, a doubling of the energy of a noise source would result in a 3 dBA increase in noise levels, below which noise is not perceptible to the human ear. Therefore, the Project would need to result in a doubling in traffic along affected roadways in order to increase ambient noise levels by 3 dBA.

Existing traffic volumes on SR-98 along the Project site are approximately 1,800 ADT, with 200 peak hour trips (Caltrans 2011). The Project's 30 ADT for operation are so far below the 1,800 ADT necessary to double the road traffic, that the operational period vehicle trips would be far below 3 dBA and not perceptible to the human ear. Therefore, given10 dBA L_{eq} for a substantial permanent ambient noise increase due to traffic, no further analysis is required to conclude that the permanent increase does not result in a significant noise impact.

Would the Project expose persons to or generate excessive ground-borne vibration or ground-borne noise levels?

Construction / Decommissioning Vibration Impacts

The County does not establish significance criteria for ground-borne vibration or ground-borne noise. The FTA has identified guideline vibration damage criteria for various structural categories (FTA 2006). As shown in Table 6, vibration levels that exceed 0.20 in/sec PPV can risk structural damage to buildings of typical construction. The FTA has also established thresholds for human disturbance due to ground-borne noise. As shown in Table 6, a vibration level of 0.1 in/sec ppv is the threshold of human annoyance.

As shown in Table 7, at 25 feet, construction/decommissioning equipment generates vibration at levels exceeding the threshold of human annoyance (0.1 in/sec ppv), as well as exceeding the threshold of risk of structural damage (0.2 in/sec ppv). At 50 feet, this equipment is below the thresholds of human annoyance (0.1 in/sec ppv) and structural damage (0.2 in/sec ppv). Vibration would not result in structural damage to farmhouses from construction and decommissioning, if equipment is not operated within5 0 feet of structures. At 50 feet, vibration would be well below the level of human annoyance. The Applicant's Project design features require the Project components, construction vehicles, and equipment operation to be sited at least 50 feet from farmhouses on-site or

in the vicinity of the Project. Therefore, construction and decommissioning of the Project would not generate a significant vibration impact.

Operational Vibration Impacts

Operation of the constructed Project facilities would generate negligible ground-borne vibration at the source (i.e., inverters, energy storage components, transformers, trackers, and transmission lines, etc.). Therefore, Project operation would not result in ground-borne vibration impacts at the nearest residences. No significant impact would occur.

Would the Project expose people residing or working in the Project area to excessive noise levels due to the site's proximity to an airport (for projects located within 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); and/or expose people residing or working in the project area to excessive noise levels due to the site's proximity to a private airstrip?

Airport-Related Noise Impacts

The County's General Plan Noise Element provides criteria for Airport Land Use Compatibility in order to evaluate aircraft noise impacts. However, the Project site is not located within the sphere of influence of a public or private airport. The nearest airport to the Project site is a private airport, the Johnson Brothers Private Airstrip, located approximately 1.5 miles to the east. Other airports in the vicinity include the Calexico International Airport, located 3.4 miles to the east, and the Naval Air Facility El Centro, located approximately 5 miles north of the Project site.

The Project does not include the addition of new sensitive receptors to the Project area. In addition, the Project would not place O&M buildings within 2 miles of a public airport; therefore, the Project would not expose individuals to excessive noise levels resulting from proximity to an airport.

Project facilities may be located in proximity to the Johnson Brothers Private Airstrip. However, this private airstrip does not experience high levels of air traffic or air traffic from large, noisy aircraft. Therefore, noise levels at the Project site associated with the private airstrip are not expected to be excessive, and noise impacts are considered less than significant.

6.3 Cumulative Impacts

The proposed Project is located in an area of other potential project development (e.g., other solar projects). Construction, operational, and decommissioning noise and vibration associated with the Project, combined with noise generated by other foreseeable developments in the Project vicinity is considered in determining the potential to result in cumulative impacts to noise-sensitive receptors in the Project area.

The noise sensitive receptors in the Project vicinity, shown in Figure 3, are subject to noise and vibration generated by the Project. As already described in the direct impact analysis herein, they do not result in a significant impact. These same sensitive receptors are located too far away from other noise and vibrations generated by the other projects' construction, operation and decommissioning to be impacted. Development noise and vibrations from other projects are primarily from construction, which is localized to large agricultural parcels surrounded by other large agricultural parcels, of relative short-term duration occurring during the day, and limited to construction of uninhabited facilities with limited small structures. Once constructed, the facilities would operate at relatively low localized noise levels during daylight periods of daytime ambient noise levels, and generate negligible vehicle trips to the area. Substantial land area is present to act as a noise attenuation buffer.

Therefore, the noise and vibrations generated by the Project when combined with negligible noise and vibration impacts from other projects would not have a cumulatively considerable impact on the sensitive receptors in the vicinity of the Project.

7.0 Mitigation Measures

The Project does not result in significant direct, indirect, or cumulatively considerable noise or vibration impacts; therefore, no mitigation measures are required to be implemented.

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