SECTION 4.8

NOISE

This section defines technical terminology used in the analysis of noise; identifies federal, state and local regulations applicable to noise; and describes the environmental setting with regard to existing ambient noise levels. This section also analyzes potential noise impacts associated with construction, operation and decommissioning of the proposed Project. The information in this section is based on the *Noise Analysis for the Drew Solar Project, Imperial County, California* prepared by RECON (RECON 2018b). This document is provided on the attached CD of Technical Appendices as **Appendix G** of this EIR.

Noise is analyzed with regard to potential impacts resulting from implementation of the Full Build-out Scenario or the Phased CUP Scenario, as applicable. The discussion focuses on the proposed Project noise impacts during daytime construction over an 8-hour period at the nearest sensitive receptor (i.e. the nearest occupied farmhouse) because this approach represents the most conservative (i.e. worst-case) analysis for the proposed Project.

FUNDAMENTALS OF NOISE

Noise is defined as a loud or unpleasant sound that causes disturbance. Sound levels are described in units called 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.

In technical terms, sound levels are described as either a "sound power level" or a "sound pressure level," which while commonly confused are two distinct characteristics of sound. Both share the same unit of measure, the dB. However, sound power, expressed as L_{pw}, is the energy converted into sound by the source. As sound energy travels through the air, it creates a sound wave that exerts pressure on receivers such as an eardrum or microphone, the sound pressure level. Sound measurement instruments only measure sound pressure, and limits used in standards are generally sound pressure levels.

The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this phenomenon, the A-scale, which approximates the frequency response of the average young ear when listening to most ordinary everyday sounds, was devised. 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.

Noise levels using A-weighted measurements are designated with the notation dB(A). Changes in noise levels are generally perceived by the average human ear as follows:

3 dB(A) is barely perceptible, 5 dB(A) is readily perceptible, and 10 dB(A) is perceived as a doubling or halving of noise (California Department of Transportation [Caltrans] 2013a).

NOISE DESCRIPTORS

The impact of noise is not a function of loudness alone. The time of day when noise occurs, and the duration of the noise are also important. In addition, most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors has been developed. Consistent with the County's General Plan Noise Element, the noise descriptors used for this study are the equivalent noise level (L_{eq}) and the community noise equivalent level (CNEL). The L_{eq} is the equivalent steady-state noise level in a stated period of time that is calculated by averaging the sound energy over a time period; when no period is specified, a 1-hour period is assumed. The CNEL is a 24-hour equivalent sound level.

The CNEL calculation applies an additional 5 A-weighted decibels dB(A) penalty to noise occurring during evening hours, between 7:00 p.m. and 10:00 p.m., and a 10 dB(A) penalty is added to noise occurring during the night, between 10:00 p.m. and 7:00 a.m. These increases for certain times are intended to account for the added sensitivity of humans to noise during the evening and night.

NOISE PROPAGATION

Sound from a small, localized source (approximating a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern, known as geometric spreading. The sound level decreases or drops off at a rate (drop-off rate) of 6 dB(A) for each doubling of the distance.

Traffic noise is not a single, stationary point source of sound. The movement of vehicles makes the source of the sound appear to emanate from a line (line source) rather than a point when viewed over some time interval. The drop off rate for a line source is 3 dB(A) for each doubling of distance.

The propagation of noise is also affected by the intervening ground, known as ground absorption. A hard site (such as parking lots or smooth bodies of water) receives no additional ground attenuation, and the changes in noise levels with distance are simply the geometric spreading from the source, which equates to 6 dB(A) per doubling distance. A soft site (such as soft dirt, grass, or scattered bushes and trees) provides an additional ground attenuation value of 1.5 dB(A) per doubling of distance. Thus, a point source over a soft site would drop off at 7.5 dB(A) per doubling of distance.

NOISE ATTENUATION

Noise attenuation refers to the decline in noise level that occurs in association with increased distance from the receptor. Sounds generated from a point source typically attenuate or decrease at a rate of 6 dBA for each doubling of distance. For example, a noise level of 87 dBA measured at a distance of 50 feet from the noise source would be reduced to 81 dBA at 100 feet from the source and be further reduced to 75 dBA at 200 feet from the source. When the noise source is a continuous line (e.g., vehicle traffic on a highway), the noise levels radiate in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions (e.g. concrete, asphalt and hard pack dirt) and at a rate of 4.5 dBA for soft site conditions (e.g. areas having slight grade changes, landscaped areas and vegetation). Barriers, obstructions, and weather conditions can all affect how noise travels.

SENSITIVE RECEPTORS

Some land uses are considered more sensitive to noise than others due to the types of persons or activities involved. The Imperial County General Plan Noise Element, Existing Conditions and Trends, number 4) "Other Sources", item "C" 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" (Imperial County 2015a, p. 12). 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 Leq, above which nesting protected bird species would be disturbed and, therefore, impacted.

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.

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.

LOCALIZED NOISE

Sound from a small localized source (a "point" source) radiates uniformly outward as it travels away from the source. The sound level attenuates or drops-off at a rate of 6 dBA for each doubling of distance.

MOBILE NOISE

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore, the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiate in an almost oblique fashion from the source and decrease at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. In contrast, fixed or point sources radiate outward uniformly as it travels away from the source. Point source sound levels attenuate or decrease at a rate of 6 dBA for each doubling of distance.

CONSTRUCTION NOISE

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. **Table 4.8-1** summarizes typical noise sources and noise levels associated with construction activities.

TABLE 4.8-1
TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS

Equipment	Noise Level at 50 Feet [dB(A) Leq]	Typical Duty Cycle
Impact Pile Driver (diesel or drop)	95	20%
In situ Soil Sampling Rig	84	20%
Jackhammer	85	20%
Mounted Impact Hammer (hoe ram)	90	20%

TABLE 4.8-1
TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS

Equipment	Noise Level at 50 Feet [dB(A) Leq]	Typical Duty Cycle
Paver	85	50%
Pneumatic Tools	85	50%
Pumps	77	50%
Rock Drill	85	20%
Roller	74	40%
Scraper	85	40%
Tractor	84	40%
Vacuum Excavator (vac-truck)	85	40%
Vibratory Concrete Mixer	80	20%
Vibratory Pile Driver	95	20%

Source: Federal Highway Administration 2006 in RECON 2018b.
dB(A) L_{eq} = weighted decibels equivalent noise level.

CORONA NOISE

When a transmission or sub-transmission 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. **Table 4.8-2** summarizes typical noise levels for transmission lines with wet conductors.

TABLE 4.8-2
TRANSMISSION LINE VOLTAGE AND AUDIBLE NOISE LEVELS

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

Sources: Imperial County 2014, p. 4.8-5.
Notes: kV = kilovolt

As shown in **Table 4.8-2**, 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 distance.

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.

NOISE REDUCTION METHODS

The most effective noise reduction methods consist of controlling the noise at the source, blocking the noise transmission with barriers or relocating the receiver. Any or all of these methods could be required to reduce noise levels to an acceptable level.

4.8.1 REGULATORY FRAMEWORK

A. FEDERAL

The Noise Control Act of 1972 (P.L. 92-574)

The Noise Control Act and several other federal laws require the federal government to set and enforce uniform noise standards for aircraft and airports, interstate motor carriers and railroads, workplace activities, medium and heavy-duty trucks. Most federal noise standards focus on preventing hearing loss

by limiting exposure to sounds of 90 dBA and higher. However, some are stricter and focus on limiting exposure to quieter levels that are annoying to most individuals and can diminish one's quality of life.

Occupational Safety and Health Act of 1970

The Federal Occupational Safety and Health Administration (OSHA) regulates onsite noise levels and protects workers from occupational noise exposure. To protect hearing, worker noise exposure is limited to 90 dBA over an 8-hour work shift (29 Code of Regulations [CFR] § 1910.95). Employers are required to develop a hearing conservation program when employees are exposed to noise levels exceeding 85 dBA. These programs include provision of hearing protection devices testing employees for hearing loss on a periodic basis.

B. STATE

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 its General Plan to establish acceptable noise limits for various land uses. The proposed Project 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, §§ 3501 *et seq.*). This requirement is applicable to new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings.

California Department of Transportation

Caltrans' standards and methodologies used to determine when local land uses may be subject to unacceptable vibrations are based on the *Transportation and Construction Vibration Guidance Manual* (Caltrans 2013b). Maximum recommended vibration limits, set in units of inches per second as measured by the peak particle velocity (PPV), by the American Association of State Highway and Transportation Officials (AASHTO) are identified in **Table 4.8-3**.

TABLE 4.8-3
AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

Structure	Peak Particle Velocity (inches/second)
Historic sites or other critical locations	0.1
Residential buildings, plastered walls	0.2–0.3
Residential buildings in good repair with gypsum board walls	0.4–0.5
Engineered structures, without plaster	1.0–1.5

Source: Caltrans 2013b, Table 15, p. 25.

Based on AASHTO recommendations, limiting vibration levels to below 0.2 PPV at residential structures would prevent structural damage regardless of building construction type. These limits are applicable regardless of the persistence of the source. However, as shown in **Table 4.8-4** and **Table 4.8-5**, potential human response associated with vibration is typically dependent on the persistence (i.e. whether it is a steady or transient vibration source). These levels are summarized in **Table 4.8-4** and **Table 4.8-5**.

TABLE 4.8-4
HUMAN RESPONSE TO STEADY STATE VIBRATION

Peak Particle Velocity (inches/second)	Human Response
3.6 (at 2 Hertz)–0.4 (at 20 Hertz)	Very disturbing
0.7 (at 2 Hertz)–0.17 (at 20 Hertz)	Disturbing
0.10	Strongly perceptible
0.035	Distinctly perceptible
0.012	Slightly perceptible

Source: Caltrans 2013b, Table 4, p. 21.

As shown in **Table 4.8-5**, the vibration level threshold at which transient vibration sources (such as construction equipment) are considered to be distinctly perceptible is 0.24 PPV. Although groundborne vibration is sometimes noticeable in outdoor environments, groundborne vibration is almost never annoying to people who are outdoors due to the lack of a reference for the vibration, such as an object on a shelf. Therefore, the vibration level threshold for human perception is assessed at occupied structures (Federal Transit Administration 2006).

TABLE 4.8-5
HUMAN RESPONSE TO TRANSIENT VIBRATION

Peak Particle Velocity (inches/second)	Human Response
2.0	Severe
0.9	Strongly perceptible
0.24	Distinctly perceptible
0.035	Barely perceptible

Source: Caltrans 2013b, Table 6, p. 22.

C. LOCAL

County of Imperial General Plan

The Noise Element of the Imperial County General Plan (Imperial County 2015a) identifies and defines existing and future environmental noise levels from sources of noise within or adjacent to the County; establishes goals and objectives to address these impacts and provides implementation programs to implement these goals and objectives. **Table 4.8-6** summarizes the Project's consistency with the applicable General Plan noise policies. While this EIR analyzes the Project's consistency with the General Plan pursuant to State CEQA Guidelines section 15125(d), the Imperial County Board of Supervisors ultimately determines consistency with the General Plan.

TABLE 4.8-6
IMPERIAL COUNTY GENERAL PLAN CONSISTENCY ANALYSIS

General Plan Policies	Consistent with General Plan?	Analysis
NOISE ELEMENT		
Noise Environment		
Goal 1 Provide an acceptable noise environment for existing and future residents in Imperial County.	Yes	A Noise Analysis (RECON 2018b) was prepared for the proposed Project which examined noise generated in association with Project construction, operation and decommissioning. Impacts associated with Project construction noise levels would comply with 75 dB(A) Leq(8h) noise level limit established by County Noise Element. Likewise, noise levels would not exceed applicable property line noise level limits from the County General Plan Noise Element. Therefore, the proposed Project is consistent with this goal for both the Full Build-out Scenario and Phased CUP Scenario.
Objective 1.3 Control noise levels at the source where feasible.	Yes	Due to the large size of the Project site, average construction noise levels over the life of project construction (i.e. equal distribution of construction equipment noise across the site) would attenuate to 46 dB(A) Leq(8h) at the property line of the nearest residence. Operational noise would attenuate to 44 dB(A) Leq at the nearest single-family residence (a bee company operates out of this location) immediately west of the intersection of Drew Road and SR 98. Based on the size of the Project and attenuation, no noise control would be necessary for both the Full Build-out Scenario and Phased CUP Scenario.
Project/Land Use Planning		
Goal 2 Review proposed Projects for noise impacts and require design which will provide acceptable indoor and outdoor noise environments.	Yes	As noted under the analysis of Goal 1, above, a Noise Analysis (RECON 2018b) was prepared for the proposed Project. Noise levels during construction, operation and decommissioning would not exceed acceptable indoor or outdoor thresholds. Therefore, the proposed Project is consistent with this goal for both the Full Build-out Scenario and Phased CUP Scenario.

TABLE 4.8-6
IMPERIAL COUNTY GENERAL PLAN CONSISTENCY ANALYSIS

<table>
<tr><th>General Plan Policies</th><th>Consistent with General Plan?</th><th>Analysis</th></tr>
<tr><td>Objective 2.2 Provide acoustical analysis guidelines which minimize the burden on project proponents and project reviewers.</td><td>Yes</td><td>The Imperial County General Plan Noise Element includes noise standards by which projects are assessed. The proposed Project was analyzed using these standards and found to be below established noise thresholds with regard to the construction, operation and decommissioning. Therefore, the proposed Project is consistent with this objective for both the Full Build-out Scenario and Phased CUP Scenario.</td></tr>
<tr><td colspan="3">Policies and Programs</td></tr>
<tr><td>1) Acoustical Analysis of Proposed Projects
The County shall require the analysis of proposed discretionary projects which may generate excessive noise or which may be impacted by existing excessive noise levels, including but not limited to the following:
• An analysis shall be required for any project which would be located, all or in part, in a Noise Impact Zone as specified above.
• An analysis shall be required for any project which has the potential to generate noise in excess of the Property Line Noise Limits stated in Table 9.
• An analysis shall be required for any project which, although not located in a Noise Impact Zone, has the potential to result in a significant increase in noise levels to sensitive receptors in the community.
• An acoustical analysis and report shall be prepared by a person deemed qualified by the Director of Planning. The report shall describe the existing noise environment, the proposed project, the projected noise</td><td>Yes</td><td>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 Leq. 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;
Table 8. Roadway Noise Impact Zones
<table>
<tr><th>Roadway Classification</th><th>Distance from Centerline (feet)</th></tr>
<tr><td>Interstate</td><td>1,500</td></tr>
<tr><td>State Highway or Prime Arterial</td><td>1,100</td></tr>
<tr><td>Major Arterial</td><td>750</td></tr>
<tr><td>Secondary Arterial</td><td>450</td></tr>
<tr><td>Collector Street</td><td>150</td></tr>
</table>
• 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</td></tr>
</table>

TABLE 4.8-6
IMPERIAL COUNTY GENERAL PLAN CONSISTENCY ANALYSIS

General Plan Policies	Consistent with General Plan?	Analysis
impact and, if required, the proposed mitigation to ensure conformance with applicable standards.		contour of any airport;[1] and/or • Within one-quarter mile (1,320 feet) of existing farmland, which is in an agricultural zone. The proposed Project includes parcels within a Noise Impact Zone and has the potential to generate an increase in noise. Therefore, a Noise Impact Analysis was prepared for the proposed Project consistent with this policy/program for both the Full Build-out Scenario and Phased CUP Scenario.
2) Noise/Land Use Compatibility. Where acoustical analysis of a proposed project is required, the County shall identify and evaluate potential noise/land use conflicts that could result from the implementation of the project. Projects which result in noise levels that exceed the "Normally Acceptable" criteria of the Noise/Land Use Compatibility Guidelines, Table 7, shall include mitigation measures to eliminate or reduce to an acceptable level the adverse noise impacts.	Yes	Land use compatibility defines the acceptability of a land use in a specified noise environment. **Figure 4.8-1** 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 impacts and provide criteria for environmental impact findings and conditions for project approval. The County Noise/Land Use Compatibility Guidelines (**Figure 4.8-1**) identify noise levels of up to 70 dBA CNEL as "normally acceptable" in areas designated for agricultural land uses. The Noise Analysis indicated that the proposed Project would not exceed to 70 dBA CNEL. Therefore, the proposed Project is consistent with this objective for both the Full Build-out Scenario and Phased CUP Scenario.

[1] 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 4.8-6
IMPERIAL COUNTY GENERAL PLAN CONSISTENCY ANALYSIS

General Plan Policies	Consistent with General Plan?	Analysis
5) New Noise Generating Projects. The County shall identify and evaluate projects which have the potential to generate noise in excess of the Property Line Noise Limits. An acoustical analysis must be submitted which demonstrates the project's compliance.	Yes	Construction and decommissioning would cause short-term increases in noise on and in the vicinity of the solar field site parcels/CUPs. Likewise, noise would be generated during Project operation. The Noise Analysis revealed that construction, operation and decommissioning activities would not exceed Property Line Noise Limits. Therefore, the proposed Project is consistent with this objective for both the Full Build-out Scenario and Phased CUP Scenario.
6) Project Which Generate Off-site Traffic Noise. The acoustical analysis shall identify and evaluate projects which will generate traffic and increase noise levels on off-site roadways. If the Project site has the potential to cause a significant noise impact to sensitive receptors along those roadways, the acoustical analysis report shall consider noise reduction measures to reduce the impact to a level less than significant.	Yes	Construction, operation and decommissioning off-site traffic noise would generate a negligible noise increase. As such the proposed Project does not have the potential to cause a significant noise impact to sensitive receptors along the roadways. Operational vehicle trip noise impacts to sensitive receptor would be well below the limit of 10 dBA for a substantial permanent ambient noise increase due to off-site traffic. Therefore, the proposed Project is consistent with this objective for both the Full Build-out Scenario and Phased CUP Scenario.

Construction Noise Standards

Imperial County General Plan Noise Element Section IV.C.3 addresses noise generated by construction activities. It states:

- Construction noise, from a single piece of equipment or a combination of equipment, shall not exceed 75 dB L_{eq}, when averaged over an eight (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 one (1) hour period.
- Construction equipment operation shall be limited to the hours of 7 a.m. to 7 p.m., Monday through Friday, and 9 a.m. to 5 p.m. Saturday. No commercial construction operations are permitted on Sunday or holidays.

Operational Standards

Property Line Noise Level Limits

The County General Plan Noise Element identifies property line noise level limits that apply to noise generation from one property to an adjacent property (excluding construction noise). As stated in the Noise Element, the property line noise level limits imply the existence of a sensitive receptor on the adjacent, or receiving, property. In the absence of a sensitive receptor, an exception or variance to the standards may be appropriate. The property line noise standards are codified in the County Code or Ordinances.

County Ordinance, Title 9, Division 7 states that it is unlawful for any person to make or cause any noise to the extent that the one-hour average sound level, at any point on or beyond the boundaries of the individual's property, exceeds the applicable limits shown in **Table 4.8-7**.

TABLE 4.8-7
PROPERTY LINE NOISE LEVEL LIMITS

Zone	Time	Applicable Limit One-hour Average Sound Level
Residential Zones (all R-1)	7 a.m. to 10 p.m.	50 dB
	10 p.m. to 7 a.m.	45 dB
Multi-residential Zones (all R-2)	7 a.m. to 10 p.m.	55 dB
	10 p.m. to 7 a.m.	50 dB
Commercial Zones	7 a.m. to 10 p.m.	60 dB
	10 p.m. to 7 a.m.	55 dB
Light Industrial/Industrial Park Zones	Anytime	70 dB
General Industrial Zones	Anytime	75 dB
When the noise-generating property and the receiving property have different uses, the more restrictive standard shall apply. When the ambient noise level is equal to or exceeds the Property Line noise standard, the increase of the existing or proposed noise shall not exceed 3 dB L_{eq}. 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 of subsection A of this section, measured at or beyond six feet from the boundary of the easement upon which the equipment is located. This section does not apply to noise generated by helicopters at heliports or helistops authorized by a conditional use permit. This section does not apply to noise generated by standard agricultural field operating practices such as planting and harvesting of crops. The County of Imperial has a Right to Farm Ordinance (1031) which serves as recognition to agricultural practices to new development. Agricultural/industrial operations shall comply with the noise levels prescribed under the general industrial zones.		

Source: Imperial County 1993.
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.

The limits shown in **Table 4.8-7** imply the existence of a sensitive receptor on the adjacent, or receiving, property. In the absence of a sensitive receptor, an exception or variance to the standards may be appropriate. These standards do not apply to construction noise and are intended to be enforced through the County's code enforcement program on the basis of complaints received from persons impacted by excessive noise. It is important to note that a noise nuisance may occur even though an objective measurement with a sound level meter is not available. In such cases, the County may act to restrict disturbing, excessive, or offensive noise which causes discomfort or annoyance to reasonable persons of normal sensitivity residing in an area.

The solar farm site parcels and immediate properties are currently designated "Agriculture" use by the Imperial County Land Use Plan (Imperial County 2007). Likewise, the solar field site parcels and surrounding properties are zoned A-3 (Agricultural, Heavy), A-2-R (General Agricultural Rural Zone), and

A-2 (Agricultural, General). Because none of the parcels are zoned for Agricultural-Industrial Use AM-1 or AM-Z, the Noise Ordinance does not prescribe a property line noise level limit on Project operations per **Table 4.8-7**. Conversion of the solar field site parcels from agricultural to solar generation facility does not change the land use zone; therefore, there is no operational noise level limit at the property line.

It should also be noted that the property line noise limits shown in **Table 4.8-8** 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.

Imperial County Noise Abatement and Control

Imperial County Code of Ordinances Title 9, Division 7: Noise Abatement and Control, specifies noise level limits. Noise level limits are summarized in **Table 4.8-8**. Noise level limits do not apply to construction equipment.

TABLE 4.8-8
IMPERIAL COUNTY PROPERTY LINE NOISE LIMITS

Zone	Time	One-Hour Average Sound Level [dB(A) Leq]
Low-Density Residential Zones	7:00 a.m. to 10:00 p.m.	50
	10:00 p.m. to 7:00 a.m.	45
Medium to High-Density-Residential Zones	7:00 a.m. to 10:00 p.m.	55
	10:00 p.m. to 7:00 a.m.	50
Commercial Zones	7:00 a.m. to 10:00 p.m.	60
	10:00 p.m. to 7:00 a.m.	55
Manufacturing/Light Industrial/Industrial Park Zones including agriculture	(anytime)	70
General Industrial Zones	(anytime)	75

Source: Imperial County Noise Abatement and Control Ordinance, Tit. 9, Div. 7, § 90702.00(A).
dB(A) Leq = weighted decibels equivalent noise level.

Guidelines for the Determination of Significance

To be conservative, the most restrictive applicable sound limits identified in Section 90702.00 of the Noise Ordinance were used in this analysis to accommodate not only the existing residential uses but also potential future residential uses that could be adjacent to the proposed CUPs. Section 90702.00 of the Noise Ordinance, which is used as the limit for CUPs, sets a residential sound level limit of 50 dBA Leq for daytime hours from 7 a.m. to 10 p.m. and 45 dBA Leq during the noise sensitive nighttime hours from 10 p.m. to 7 a.m. Most of the proposed Project components would operate only during the daytime hours. However, work at night may be performed occasionally on limited areas of the CUPs. Therefore, to be conservative the most restrictive nighttime standard of 45 dBA Leq is applied at the boundary of the CUPs.

4.8.2 ENVIRONMENTAL SETTING

The Project site is located in the unincorporated Mount Signal area. All parcels in the vicinity of the Project site are zoned General Agricultural (A-2), General Agricultural/Rural Zone (A-2-R), or Heavy Agricultural (A-3). The General Plan land use designation for all parcels in the immediate vicinity of the Project site is Agriculture; west of the Westside Main Canal, the General Plan land use designation is generally Recreation/Open Space.

Source: Imperial County 2015a, Table 7.

FIGURE 4.8-1
COUNTY OF IMPERIAL NOISE/LAND USE COMPATIBILITY

Agricultural uses are located on the Project site and properties to the north, west, and southwest; associated buildings include a single-family residence located immediately west of the intersection of Drew Road and SR 98 (approximately 100 feet from Project site), and a single-family residence is located northeast of the intersection of Kubler Road and Pulliam Road (approximately 400 feet from the Project site). Additionally, three single-family residences are located to the west of the intersection of Kubler Road and Drew Road (approximately 0.5 miles west of the Drew Solar Project site).

Solar generation facilities are located on properties to the east and south of the Project site; associated buildings include an O&M building at the SDG&E Drew Switchyard (approximately 400 feet from the Drew Solar Project site), and an O&M building at the Centinela Solar Project (approximately 0.7 miles east of the Drew Solar Project site).

A. Transportation Network

Mapping indicates that road elements in the vicinity of the Project site include SR 98, Drew Road, Pulliam Road, Kubler Road, and Mandrapa Road.

The segment of SR 98 adjacent to the Project site is a two-lane undivided highway with a 24-foot-wide paved width. Access from Drew Road and Pulliam Road is regulated by stop signs. The highway is in good condition. The posted speed limit for SR 98 was observed to be 65 miles per hour (mph), with a reduced speed limit of 55 mph for any vehicle towing.

The segment of Drew Road adjacent to the Project site is a 2-lane undivided roadway with an approximate paved width of 24 feet. No posted speed limit was observed for this segment of Drew Road.

The segment of Pulliam Road adjacent to the Project site is a two-lane undivided roadway with a paved width of up to 24-feet. No posted speed limit was observed for this segment of Pulliam Road. Pulliam Road does not accommodate substantial traffic volumes; traffic is generally limited to trips generated by adjacent agricultural uses and solar generation facilities.

The segment of Kubler Road adjacent to the Project site is a two-lane undivided roadway with a paved width of up to 24 feet. No posted speed limit was observed for this segment of Kubler Road. Kubler Road does not accommodate substantial traffic volumes; traffic is generally limited to trips generated by adjacent agricultural uses and solar generation facilities.

Mandrapa Road is an unpaved, access route for agricultural uses. Grading was observed to be uneven and plants were observed on sections of the access route. Access from SR 98 is afforded by a gap in traffic barriers with no traffic control device. Mandrapa Road does not accommodate substantial traffic volumes.

A. Ambient Noise Environment

Three short-term noise measurements were taken on December 5, 2017 and one 24-hour measurement was taken between December 5 and 6, 2017. Measurements were taken using two Larson-Davis Model LxT Type 1 Integrating Sound Level Meter, serial numbers 3827 and 3828. The meters meet American National Standards Institute (ANSI) S1-4 specifications for Type 1 instruments. Meter was calibrated before and after measurements.

The following parameters were used:

Filter:	A-weighted
Response:	Slow
Time History Period:	5 seconds
Height	5 feet above ground

Noise measurements were taken to obtain existing ambient noise levels. Noise measurements are described below and shown in **Table 4.8-9**. Observed traffic volumes were counted during noise measurements; the results are shown in **Table 4.8-10**. The locations of the measurements are shown on **Figure 4.8-2**, and the noise measurement data are contained in Attachment 1 of **Appendix F** of this Draft EIR.

TABLE 4.8-9
NOISE MEASUREMENT DATA

Site ID	Location	Start Time	Duration	Noise Level (dB[A])			Noise Sources
				Leq	Lmax	Lmin	
1	Southwest of the intersection of Pulliam Road and Kubler Road	2:27 pm	20 minutes	38.8	57.8	28.4	Wind; Vehicle traffic on Pulliam Road
2	Southeast of the intersection of Drew Road and Kubler Road	2:58 pm	20 minutes	60.0	80.8	27.4	Vehicle traffic on Drew Road
3	North of SR 98, 50 feet from SR 98 centerline	3:30 pm	20 minutes	63.9	87.6	27.3	Vehicle traffic on SR 98
4	Along Brockman Drain, 1,420 feet north of SR 98	2:30 pm	24 hours	47.8*	49.2*	28.0*	Wind; Distant vehicle traffic on SR 98

Source: RECON 2018b.

dB(A) = A-weighted decibels; L_{eq} = equivalent noise level; L_{max} = maximum hourly L_{eq}; L_{min} = minimum hourly L_{eq}; SR 98 = State Route 98

* Measurement 4 was a 24-hour measurement. The community noise equivalent level is reported in the L_{eq} column, the maximum hourly L_{eq} is reported in the L_{max} column, and the minimum hourly L_{eq} is reported in the L_{min} column.

TABLE 4.8-10
OBSERVED TRAFFIC COUNTS

Measurement	Roadway	Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motor-Cycles
1	Pulliam Road and Kubler Road	Any	1	0	0	0	0
2	Drew Road	Any	7	0	0	0	0
3	State Route 98	Eastbound	30	0	2	0	0
		Westbound	8	0	1	0	0

Source: Field traffic counts in RECON 2018b.
**Tractor on State Route 98 categorized as a heavy truck*

Measurement 1 was located at the northeast corner of the Project site, 75 feet south of the centerline of Kubler Road and 50 feet west of the centerline of Pulliam Road. During the measurement, one pickup truck approached the intersection heading northbound on Pulliam Road and turned east onto Kubler Road. The primary source of noise at this location was wind. The average measured noise level during Measurement 1 was 38.8 dB(A) L_{eq}.

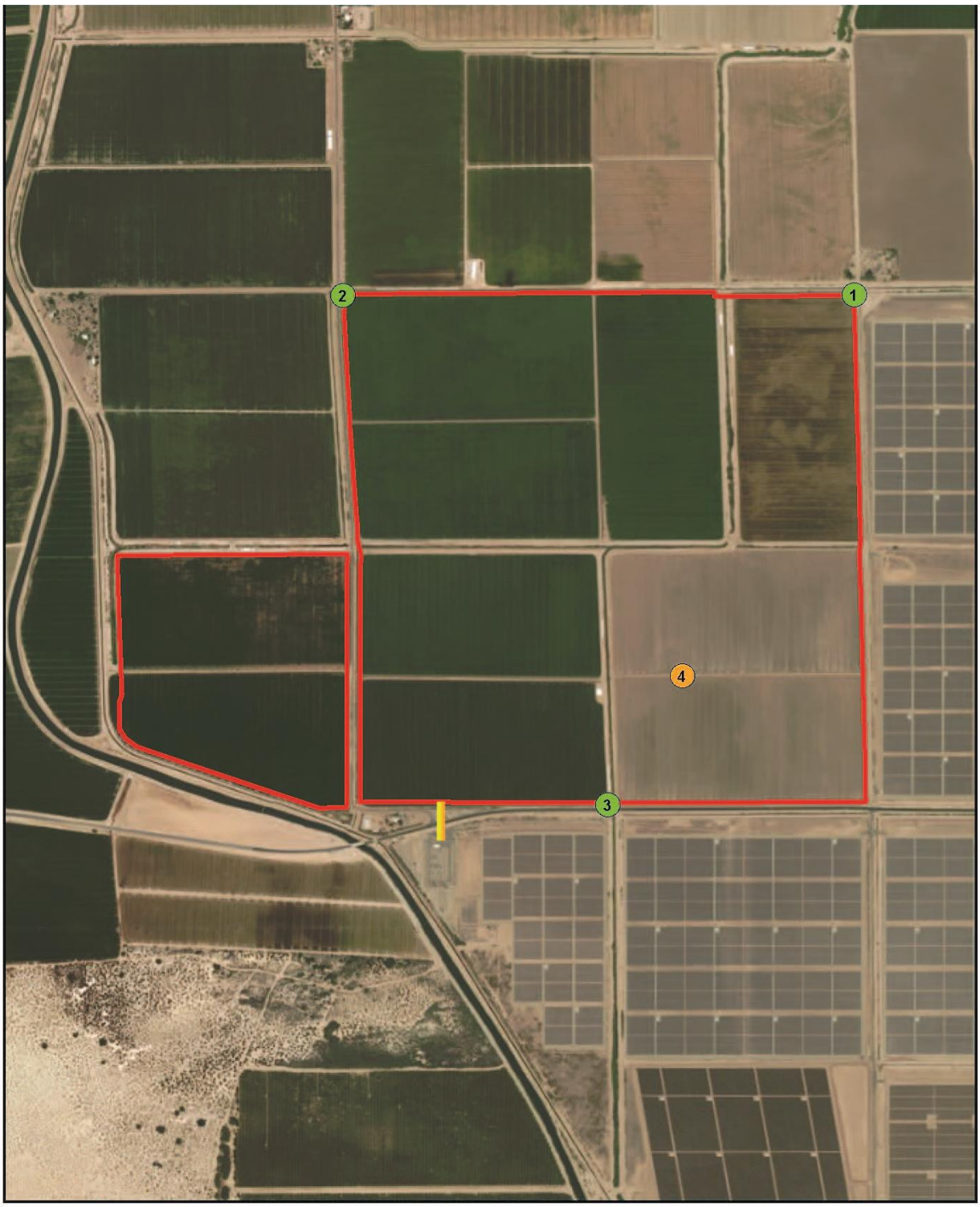

FIGURE 4.8-2
NOISE MEASUREMENT LOCATIONS

Measurement 2 was located at the northwest corner of the Project site, 50 feet south of the centerline of Kubler Road and 50 feet east of the centerline of Drew Road. During the measurement, seven passenger vehicles traveled along Drew Road. No traffic was observed on Kubler Road. The primary source of noise at this location was vehicle traffic on Drew Road.

Due to the deteriorated condition of Drew Road, traffic noise levels were notably higher than would be expected. No posted speed limit for Drew Road was observed and vehicle speeds were highly varied. The average measured noise level during Measurement 2 was 60.0 dB(A) L_{eq}.

Measurement 3 was located along the southern boundary of the Project site, 50 feet north of the centerline of SR 98 and across from the driveway to the solar farm to the south. During the measurement, 38 passenger vehicles, 2 heavy trucks, and 1 farm-tractor traveled along SR 98. The primary source of noise at this location was vehicle traffic on SR 98. Traffic was free flow and nearly all vehicles were observed to travel near the posted speed limit of 65 mph. The average measured noise level during Measurement 3 was 63.9 dB(A) L_{eq}.

Measurement 4 was located along a drainage ditch in the interior of the Project site, approximately 1,420 feet north of the centerline of SR 98 and approximately 2,000 feet west of Pulliam Road. The measured noise level during Measurement 4 was 47.8 CNEL. A minimum hourly noise level of 28.0 dB(A) L_{eq} was measured between 12:30 and 1:30 a.m. and a maximum hourly noise level of 49.2 dB(A) L_{eq} was measured between 1:30 and 2:30 p.m.

4.8.3 IMPACTS AND MITIGATION MEASURES

A. STANDARDS OF SIGNIFICANCE

The impact analysis provided below is based on the following CEQA Guidelines, as listed in Appendix G. The Project would result in a significant impact to noise if it would result in any of the following:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

b) Generation of excessive groundborne vibration or groundborne noise levels.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the Project area to excessive noise levels.

B. ISSUES SCOPED OUT AS PART OF THE INITIAL STUDY

Criterion "c" was eliminated from the Initial Study checklist because the Project site is not located within two miles of a public airport or a private airstrip. Thus, the Project site would not be exposed to excessive aircraft noise. As a solar facility, the Project is industrial in nature and therefore is not a noise sensitive land use. No impacts are identified with regard to airport noise and this issue will not be discussed in the EIR.

C. METHODOLOGY

Construction Analysis Methodology

Project construction noise would be generated by diesel engine-driven construction equipment used for site preparation activities such as clearing, grading, perimeter fencing, development of staging areas and site access roads; and would involve facility installation activities such as installation of support masts (impact pile driving), trenching utility connections, construction of electrical distribution facilities, and construction of the O&M building(s). Diesel engine-driven trucks also would bring materials to the site.

Construction equipment with diesel engines typically generate maximum noise levels from 80 to 90 dB(A) L_{eq} at a distance of 50 feet (Federal Highway Administration [FHWA] 2006). **Table 4.8-11** summarizes typical construction equipment noise levels. During excavation, grading, and paving operations, equipment moves to different locations and goes through varying load cycles, and there are breaks for the operators and for non-equipment tasks, such as measurement. Thus, average hourly noise levels would be less than maximum noise levels.

TABLE 4.8-11
TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS

Equipment	Noise Level at 50 Feet [dB(A) Leq]	Typical Duty Cycle
Auger Drill Rig	85	20%
Backhoe	80	40%
Blasting	94	1%
Chain Saw	85	20%
Clam Shovel	93	20%
Compactor (ground)	80	20%
Compressor (air)	80	40%
Concrete Mixer Truck	85	40%
Concrete Pump	82	20%
Concrete Saw	90	20%
Crane (mobile or stationary)	85	20%
Dozer	85	40%
Dump Truck	84	40%
Excavator	85	40%
Front End Loader	80	40%
Generator (25 kilovolt amps or less)	70	50%
Generator (more than 25 kilovolt	82	50%
Grader	85	40%
Hydra Break Ram	90	10%
Impact Pile Driver (diesel or drop)	95	20%
In situ Soil Sampling Rig	84	20%
Jackhammer	85	20%
Mounted Impact Hammer (hoe ram)	90	20%
Paver	85	50%
Pneumatic Tools	85	50%
Pumps	77	50%
Rock Drill	85	20%
Roller	74	40%
Scraper	85	40%
Tractor	84	40%
Vacuum Excavator (vac-truck)	85	40%
Vibratory Concrete Mixer	80	20%
Vibratory Pile Driver	95	20%

Source: FTA 2006. dB(A) Leq = weighted decibels equivalent noise level.

Earthwork activities generally result in the highest noise levels at adjacent properties. During earthworks operations, equipment moves to different locations and goes through varying load cycles, and there are breaks for the operators and for non-equipment tasks, such as measurement. Although maximum noise levels reach 80 to 90 dB(A) at a distance of 50-feet during most construction activities, hourly equivalent noise level generated by typical earthworks and paving activities is generally 82 dB(A) L_{eq} at 50 feet from the center of construction activity when assessing the loudest pieces of equipment working simultaneously.

The Project site and the area surrounding all off-site roadway extensions are relatively flat. This analysis conservatively assumes no attenuation from barriers and topography. Ground conditions typically change during construction due to fugitive dust control practices such as soil stabilization through site watering and best management practices such as subgrade compaction. This analysis conservatively models ground conditions as acoustically hard. Thus, construction noise would be characterized by hard site attenuation rate of 6 dB(A) per doubling of distance.

Operations Analysis Methodology

Noise level predictions and contour mapping were developed using noise modeling software, SoundPlan Essential (SoundPlan), version 3.0 (Navcon Engineering 2015). SoundPlan calculates noise propagation based on algorithms and reference levels published by various government agencies, FHWA, and the International Standards Organization (ISO). For traffic the model uses the FHWA traffic noise model algorithms to predict noise levels. For stationary sources, SoundPlan models propagation based on ISO Standard 9613-2, "Attenuation of Sound during Propagation Outdoors, Part 2: General Method of Calculation." The ISO Standard 9613-2 assumes that all receptors would be downwind of stationary sources. This is a worst-case assumption for total noise impacts, since, in reality,only some receptors will be downwind at any one time. The model uses various input parameters, such as distances between sources, barriers, and receivers; and shielding provided by intervening terrain, barriers, and structures. Sources and receivers were input into the model using three-dimensional coordinates. This analysis conservatively assumes no attenuation from barriers and topography. In all cases, receivers were modeled at 5 feet above ground elevation, which represents the average height of the human ear. The model outputs include noise level contours and noise levels at specific receivers.

Stationary sources of noise associated with the operation of the project would include inverters, transformers, solar panel tracker motors, a substation, and transmission gen-tie lines (one gen-tie is for solar generation and one is for energy storage). As the solar generation facility would only generate electricity between sunrise and sunset, noise from solar field inverters and transformers would likely be limited to daylight hours. After daylight hours energy storage facilities may continue to contribute energy to the grid. A single technology or provider has not been selected for the energy storage component of the project. Energy storage technology may be centralized or may be distributed throughout the plant. Depending on the technology selected for the energy storage component, the substation and transmission gen-tie lines as well as the solar field inverters and transformers may be active during both daylight and nighttime hours.

Inverters, transformers, and solar panel tracker motors would be distributed throughout the facility at each solar array block. It is not known at this time which manufacturer, brand, or model of units would be selected for use in the project, or the specific location units would be placed.

Inverters

Based on review of various manufacturer specifications of inverters sized for nominal 1-to-2-MW solar arrays, a representative sound pressure level of 65 dB(A) at 5 feet from each inverter unit was

selected for analysis (Satcon 2008; Attachment 2). This sound level equates to a sound power level of 77 dB(A). The height of the noise source was modeled at 1 meter.

Transformers

The National Electrical Manufacturers Association (NEMA) specifies audible sound level limits for transformers. Based on these standards and the anticipated size of project transformers (up to 2 kVA), project transformers may generate noise levels up to 61 dB(A) at 5 feet (NEMA 2013; Attachment 3). This equates to a sound power level of 73 dB(A). The height of the noise source was modeled at 1 meter.

Tracker Motors

Based on available information for similar equipment, solar panel tracker motors typically generate instantaneous sound power levels of up to 79 dB(A), which equates to sound pressure levels of up to 67 dB(A) at 5 feet (ICF International 2010). Solar panel tracker motors are not in operation continuously. Solar panel tracker motors would generally reposition the arrays several times during daylight hours and would also reposition the arrays once at sunset (resetting array position in preparation for the following day). Each individual repositioning would be brief and the frequency at which arrays are repositioned would be anticipated to be limited to a few times each hour or less. Hourly average noise levels would be less than instantaneous noise levels. During ambient noise measurements, solar panel tracker motors at adjacent solar generation facilities were observed. Repositioning lasted only a few seconds, was infrequent, and did not substantially contribute to the ambient noise environment. As solar panel tracker motors would not substantially contribute to the ambient noise environment they were not included in noise contour modeling.

Substation

The project would include the construction of up to one substation for each of the six proposed CUPs and the Gen-Tie Lines. The substation would include equipment such as switches, circuit breakers, and transformers. Switches and circuit breakers do not typically generate substantial noise. The power rating for substation transformers would be several times higher than the power rating for transformers distributed throughout the facility at each solar array block. Based on NEMA standards for oil-immersed transformers, a sound level of 67 dB(A) at 5 feet would be representative of the substation (NEMA 2013). This equates to a sound power level of 97 dB(A). The height of the noise source was modeled at 2 meters.

Gen-Tie

The Gen-Tie Lines would be extended between the Project's substation and the SDG&E Drew Switchyard. Corona discharge results from the partial breakdown of the electrical insulating properties of the air surrounding the conductors; energy discharged from the line may form small local pressure changes that result in audible hissing or crackling noises. The intensity of corona noise varies depending on the atmospheric conditions such as atmospheric moisture and pressure (which is related to altitude). The noise generated by similar transmission lines (i.e. approximately 230 kV) has previously been analyzed to be 25 dB(A) at 50 feet. This equates to a sound power level per length of 45 dB(A) per meter. The height of the noise source was modeled at 6 meters.

Table 4.8-12 summarizes equipment noise levels and heights.

TABLE 4.8-12
PROJECT EQUIPMENT MODELING PARAMETERS

Equipment	Sound Power Level	Noise Source Height
Inverter	87 dB(A)	1 meter
Transformer	86 dB(A)	1 meter
Substation	87 dB(A)	2 meters
Gen-Tie Line	45 dB(A) per meter	6 meters
dB(A) = A=weighted decibels		

Source: RECON 2018b.

Traffic Noise Analysis Methodology

Traffic noise increase would be considered significant where the increase would degrade the existing ambient noise environment at a noise-sensitive use. As discussed in section 1.2, changes in noise levels are generally perceived by the average human ear as follows: 3 dB(A) is barely perceptible, 5 dB(A) is readily perceptible, and 10 dB(A) is perceived as a doubling or halving of noise (Caltrans 2013a). Thus, for this analysis, a substantial permanent increase in the ambient noise levels is defined as a 3 dB(A) increase.

Vibration Analysis Methodology

A quantitative assessment of potential vibration impacts from construction activities, such as blasting, pile-driving, vibratory compaction, demolition, drilling, or excavation, may be conducted using the following equations (Caltrans 2013b).

Vibration impacts from normal equipment to structures may be estimated at any distance from the following equation:

$PPV_{equipment} = PPV_{reference} \times (25/Distance)^{1.5}$

Where: $PPV_{equipment}$ is the peak particle velocity in inches per second of the equipment adjusted for distance; and $PPV_{reference}$ is the reference vibration level in inches per second as shown in **Table 4.8-13**.

TABLE 4.8-13
CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Equipment	Peak Particle Velocity at 25 feet (inches per second)[1]	Approximate Groundborne Noise Level at 25 feet[1]
Large Bulldozer	0.089	87
Trucks	0.076	86
Mounted Impact Hammer	0.089	87
Impact Pile Driver	0.644	104

Source: FTA 2006; Caltrans 2013b in RECON 2018b.

[1] Where noise level is the level in decibels referenced to 1 micro-inch/second and based on the root mean square velocity amplitude.

Sensitive Receptors

Where a project has the potential to cause a significant noise impact to sensitive receptors along area roadways, the County requires measures to reduce the impact to a less than significant level. Possible measures include 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 non-residential projects, reduced hours of operation may also be required by the County.

Operational Noise

Operational noise impacts are based on current daytime ambient noise levels, the County Noise/Land Use Compatibility Guidelines and measurements of similar equipment and standard noise attenuation calculations of solar facilities. Land disturbance acreages, equipment, schedule, mileage and workforce information is based on the most up-to-date engineering available from the Applicant and typically represent conservative estimates.

Daytime ambient noise levels were measured between 38.8 and 63.9 dBA Leq (refer to **Table 4.8-9**), based on 1-hour daytime measurements. The ambient noise level represents the daytime ambient noise levels and is expressed as Leq (average over sample length). A noise increase of 10 dBA Leq, is considered a substantial increase in noise. Based on the County Noise/Land Use Compatibility Guidelines (**Figure 4.8-1**), noise levels of up to 70 dBA CNEL are considered to be "normally acceptable" in areas designated for agricultural land uses.

Corona Noise/Corona Discharge

The permanent noise sources that would occur within the solar field site parcels are limited to corona noise from the Gen-Tie line. The potential for noise from corona discharge is greatest with high voltage lines during wet weather or near inconsistencies or cuts in the metal surface of the line itself. The corona noise associated with a 230-kV line is not expected to exceed 40 dBA (Imperial County 2014, p. 4.8-19).

Decommissioning Noise

Decommissioning noise impacts are based on the proximity of the decommissioning activity to noise sensitive receptors, the magnitude and duration of deconstruction noise at the nearest sensitive receptor, and the day of week/time of day.

The Gen-Tie and collector lines will be decommissioned with the respective CUP. However, if the Gen-Tie and/or collector line of the CUP is still being utilized by another CUP, or nearby project, the line and/or structures of the respective Gen-Tie and/or collector line will remain. For example, if the Mount Signal Solar Farm or Calexico Solar Farms is using the Gen-Tie, it will not be decommissioned.

D. Project Impacts and Mitigation Measures

Substantial Temporary or Permanent Noise Increase in Excess of Standards

Impact 4.8.1 Construction and decommissioning activities would cause short-term increases in noise on and in the vicinity of the Project. Likewise, operation of the Full Build-out Scenario or the Phased CUP Scenario could cause permanent noise levels to rise. However, the Project includes noise- and vibration-reducing design features which would reduce noise levels during construction, operation and decommissioning to be within County standards. Therefore, impacts with regard to noise levels in excess of standards and substantial temporary and permanent noise increases are considered **less than significant** for both the Full Build-Out Scenario and Phased CUP Scenario.

FULL BUILD-OUT SCENARIO/PHASED CUP SCENARIO

Nearby noise-sensitive receivers include a single-family residence located immediately west of the intersection of Drew Road and SR 98 (approximately 100 feet from Project site; a bee company operates out of this location) and a single-family residence located northeast of the intersection of Kubler Road and Pulliam Road (approximately 400 feet from Project site).

Construction

Noise associated with the site preparation and facility installation will potentially result in short-term impacts to surrounding properties. Site preparation and facility installation would include use of a variety of noise-generating equipment such as scrapers, excavators, loaders, and water trucks, along with others, would be used during each construction phase.

As discussed in **Table 4.8-12**, the loudest construction activities typically result in hourly average noise levels of approximately 82 dB(A) L_{eq} at 50 feet from the center of the construction activity. Actual noise levels would vary depending on the nature of the construction phase, including the duration of specific activities, nature of the equipment involved, location of a sensitive receiver, and nature of intervening barriers. Therefore, the use of 82 dB(A) L_{eq} at 50 feet is considered a conservative value.

As previously discussed, the County General Plan Noise Element establishes construction time of day restrictions and noise level limits. Construction activities may only occur Monday through Friday between the hours of 7:00 a.m. and 7:00 p.m. or Saturday between the hours of 9:00 a.m. and 5:00 p.m., excluding holidays.

Construction activities can be evaluated as point sources and noise from construction sites typically attenuate at a rate of 6 dB(A) for every doubling of the distance. Due to the large size of the Project site, construction activities are anticipated to be phased. This analysis assumes construction may be temporarily focused in a 10-acre area for at least 8 hours; this focused area is equivalent to approximately one-quarter of a typical 40-acre lot (i.e. land division quarter-quarter section). The assumption that construction would be focused in a small area is conservative because it would reduce the average distance between construction equipment and adjacent receivers. In a worst-case scenario with all construction activity occurring in the 10-acre area nearest to the sensitive receptor immediately west of the intersection of Drew Road and SR 98 (approximately 100 feet from Project site; a bee company operates out of this location), the distance from the center of construction activity to the nearest property line would be approximately 760 feet. Thus, construction noise levels would attenuate to 58 dB(A) $L_{eq(8h)}$ at the nearest sensitive receptor.

Thus, construction noise levels would comply with 75 dB(A) $L_{eq(8h)}$ noise level limit established by County Noise Element. Therefore, impacts with regard to noise levels in excess of standards and substantial temporary noise increases are considered **less than significant** during Project construction for both the Full Build-Out Scenario and Phased CUP Scenario.

Operation

Following the Operational Analysis Methodology described above, ground-floor noise level contours were modeled. Stationary sources of noise associated with the operation of the project would include inverters, transformers, solar panel tracker motors, substation(s), and transmission gen-tie lines. Noise associated with project operation would attenuate to less than 50 dB(A) L_{eq} within the Project site boundary. On-site generated noise would attenuate to 44 dB(A) L_{eq} at the nearest single-family residence immediately (west of the intersection of Drew Road and SR 98). Noise contours are shown on **Figure 4.8-3**. SoundPLAN data for on-site generated noise modeling are contained in Attachment 4 of **Appendix F** of this Draft EIR.

Source: RECON 2018b.

FIGURE 4.8-3
NOISE CONTOURS

The County Code of Ordinances establishes property line noise standards for residential, commercial, light industrial, and general industrial zoning districts. The Project site and all surrounding properties are in agricultural zoning districts. The property line noise standard for manufacturing, light industrial, industrial park, and agricultural zoning districts is 70 dB(A) L_{eq}. The nearest non-agricultural zone is the parcel at the southeast corner of the intersection of SR 98 and Brockman Road, which is approximately 5,040 feet from the Project site.

As shown in **Figure 4.8-3**, noise associated with project operation would attenuate to less than 50 dB(A) Leq within the Project site boundary. On-site generated noise would attenuate to 44 dB(A) Leq at the single-family residence immediately west of the intersection of Drew Road and SR 98 (approximately 100 feet from Project site; General Agricultural [A2] zone). On-site generated noise would attenuate to 20 dB(A) Leq at the single-family residence located northwest of the intersection of Kubler Road and Pulliam Road (approximately 400 feet from Project site; Agricultural/Rural Zone [A2R] zone). Property line noise level limits from the County General Plan Noise Element are 70 dB(A) Leq for agricultural zones. Noise levels would not exceed applicable daytime or nighttime property line noise level limits from the County General Plan Noise Element.

During operations, project-generated traffic would increase volumes on local roadways and thereby increase traffic noise levels in the Project area. Project trip generation would be extremely limited–up to 20 trips per day. Ambient noise level increases attributable to project-generated traffic are anticipated to be less than 3 dB(A) along all roadways. Therefore, impacts with regard to noise levels in excess of standards and substantial permanent noise increases are considered **less than significant** during Project operation for both the Full Build-Out Scenario and Phased CUP Scenario.

Decommissioning/Reclamation

Decommissioning activities are similar to construction activities but generate approximately half the vehicle traffic and equipment compared to construction activities. Overall, decommissioning activities are not anticipated to last as long as construction activities. However, even though the decommissioning activities would move around each CUP, the duration of the decommissioning activities (e.g., demolition, excavation, restoration) immediately proximate to a sensitive noise receptors would be approximately the same as would occur during construction. Decommissioning noise impacts are based on the proximity of the 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 each CUP (17-0031 thru 17-0035 and 18-0001), would generate noise from the removal of the solar facilities and site reclamation. Noise 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).

During Project decommissioning, site demolition and restoration are expected to produce the highest noise levels. Earthmoving activities generate hourly average construction noise levels of approximately 75 dBA Leq at a distance 50 feet. However, noise from earthmoving activities would be substantially less when averaged over an 8-hour workday. The Imperial County General Plan Noise Element limits construction noise to 75 dBA Leq over an 8-hour average, measured at the receptor (i.e., occupied residence). Decommissioning noise for the Project is not anticipated to exceed the County Noise/Land Use Compatibility Guidelines threshold of 70 dBA CNEL at an occupied farmhouse when averaged over an 8-hour period. Therefore, Project decommissioning noise would not exceed the County's construction noise level threshold at the nearest residence. Therefore, impacts associated with decommissioning noise levels in excess of standards or a substantial temporary noise increase would be **less than**

significant for both the Full Build-out Scenario and the Phased CUP Scenario. Following reclamation, noise levels would be similar to existing conditions.

Mitigation Measures

None required.

Significance After Mitigation

Not applicable.

Groundborne Vibration or Groundborne Noise Level Impacts

Impact 4.8.2 The proposed Project would generate groundborne vibration or noise levels associated with construction and operation of on-site equipment. However, the levels are anticipated to be below the level of human annoyance and the significance threshold. Therefore, groundborne vibration and noise impacts are considered **less than significant** for both the Full Build-Out Scenario and Phased CUP Scenario.

FULL BUILD-OUT SCENARIO/PHASED CUP SCENARIO

Construction

Project construction would include the use of vibration-generating construction equipment such as large bulldozers, loaded trucks, jackhammers, and mast impact pile drivers. As shown in **Table 4.8-7**, the vibration level threshold at which transient vibration sources (such as construction equipment) are considered to be distinctly perceptible is 0.24 PPV. Groundborne noise and vibration from vibration-generating construction equipment such as large bulldozers, loaded trucks, and jackhammers would attenuate to less than 0.2 PPV at 12, 10, and 5 feet, respectively.

Project-generated groundborne noise and vibration levels would be highest during impact pile driving. Project solar array support masts would generally be set back from the property line at least 40 feet to accommodate perimeter access roads. The Project site is also bounded by Kubler Road to the north, Westside Main Canal to the west, SR 98 to the south, and Pulliam Road to the east. Groundborne noise and vibration from impact pile drivers would attenuate to less than the transient vibration level threshold within 72 feet, which would generally be within the public right-of-way.

The nearest structure to the Project site is the single-family residence (approximately 100 feet from Project site; a bee company operates out of this location) immediately west of the intersection of Drew Road and SR 98. Project construction is not anticipated to involve the use of construction equipment within 15 feet of existing structures. Impact pile driving would be anticipated to occur approximately 180 feet from this structure. Transient vibration levels at the single-family residence would be anticipated to reach up to 0.073 PPV. Vibration levels would not exceed the transient vibration level threshold of 0.2 PPV. Limiting vibration levels to below 0.2 PPV at residential structures would prevent structural damage regardless of building construction type. Therefore, groundborne noise and vibration impacts would be less than significant during construction for both the Full Build-Out Scenario and Phased CUP Scenario.

Operation

Operation of both the Full Build-out Scenario and the Phased CUP Scenario would generate negligible ground-borne vibration at the source (i.e., inverters, energy storage components, transformers, trackers, and transmission lines, etc.). As a result, Project operation would not result in ground-borne vibration

impacts at the nearest residences. No significant impact would occur. Therefore, operational groundborne vibration or noise level impacts would be **less than significant** for both the Full Build-out Scenario and the Phased CUP Scenario.

Decommissioning

As described under the discussion of construction, the County of Imperial does not have established significance criteria for groundborne vibration or groundborne noise. Instead, the FTA guidelines for vibration damage criteria for various structural categories and the FTA thresholds for human disturbance due to groundborne noise are applied. Potential for groundborne vibration during decommissioning would be similar to construction. As with construction, impact pile driving would be anticipated to occur approximately 180 feet from the single-family residence immediately west of the intersection of Drew Road and SR 98. Thus, during Project decommissioning activities, vibration would be well below the level of human annoyance and structural damage. Therefore, decommissioning groundborne vibration or noise level impacts would be **less than significant** for both the Full Build-out Scenario and the Phased CUP Scenario.

Mitigation Measures

None required.

Significance After Mitigation

Not applicable.

4.8.4 CUMULATIVE SETTING, IMPACTS AND MITIGATION MEASURES

A. CUMULATIVE SETTING

The geographic scope for cumulative noise impacts is the area surrounding the proposed solar field site parcels where other potential project development similar to the proposed Project is occurring, such as: Centinela Solar (422 acres to the north); Wistaria Ranch, Iris Cluster (to the east) and Calexico 1-A and 1-B to the southeast. Construction, operational, and decommissioning noise and vibration associated with the Project, combined with noise generated by other foreseeable developments in the vicinity of the solar field site parcels is considered in determining the potential to result in cumulative impacts to noise-sensitive receptors in the Project area. The cumulative projects are identified Table 3.0-1 in Chapter 3.0, Introduction to the Environmental Analysis and Assumptions Used.

B. CUMULATIVE IMPACTS AND MITIGATION MEASURES

Cumulative Noise Increases/Groundborne Vibration

Impact 4.8.3 Long-term operation of the proposed Project, in combination with other proposed, approved and reasonably foreseeable projects in the region, would not result in a substantial contribution to cumulative noise levels or groundborne vibration. Therefore, cumulative noise impacts and groundborne vibration would be considered **less than cumulatively considerable** for both the Full Build-Out Scenario and Phased CUP Scenario.

FULL BUILD-OUT SCENARIO/PHASED CUP SCENARIO

Construction

The proposed Project is located in an area of other potential cumulative development, including other solar projects (refer to Table 3.0-1 and Figure 3.0-1 in Chapter 3.0, Introduction to the Environmental Analysis and Assumptions Used). Project construction noise and groundborne vibration combined with construction noise and vibration 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 would be subject to noise and vibration generated during construction activities. As previously described in Impacts 4.8.1, 4.8.2 and 4.8.3, noise sensitive receptors would not be subject to construction noise levels in excess of County and/or FTA standards (for vibration). These same sensitive receptors are located too far from construction noise and vibrations generated by other cumulative projects. Construction noise and vibration from other cumulative projects is localized to large agricultural parcels surrounded by other large agricultural parcels; occurs over a relatively short-term duration during daytime hours; and, is limited to construction of uninhabited facilities with small O&M buildings.

Therefore, the contribution of construction noise and vibration generated by the Full Build-out Scenario or the Phased CUP Scenario to cumulative construction noise impacts would be **less than cumulatively considerable**. Likewise, construction noise and vibration from the Full Build-out Scenario or the Phased CUP Scenario, when combined with negligible construction noise and vibration impacts from other cumulative projects, would result in a **less than cumulatively considerable impact** on the sensitive receptors in the Project area.

Operation

Once constructed, the proposed facilities would operate at relatively low localized noise levels during periods of daytime ambient noise levels. Vehicle trip noise associated with operation of the Full Build-out Scenario or the Phased CUP Scenario would be negligible based on the extremely limited number of trips (i.e. up to 20 trips per day). Substantial land area is present to act as a noise attenuation buffer between cumulative projects. Therefore, the contribution of operational noise and vibrations generated by the Full Build-out Scenario or the Phased CUP Scenario to cumulative noise impacts would be **less than cumulatively considerable**. Likewise, operational noise and vibration from the Full Build-out Scenario or the Phased CUP Scenario, when combined with negligible noise and vibration impacts from other cumulative projects, would result in a **less than cumulatively considerable impact** on the sensitive receptors in the Project area.

Decommissioning/Reclamation

Project decommissioning would entail removal of all Project components, and restoration of the solar field site parcels to its original condition. Project decommissioning noise and vibration combined with potential decommissioning of other cumulative projects in the 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 area would be subject to decommissioning noise and vibration. As previously described in Impacts 4.8.1, 4.8.2 and 4.8.3, noise sensitive receptors would not be subject to decommissioning noise levels in excess of County and/or FTA standards (for vibration). These same sensitive receptors are located too far from decommissioning noise and vibrations potentially

generated by other cumulative projects that may be undergoing decommissioning at the same time as the Full Build-out Scenario or any phase of the Phased CUP Scenario. As with construction, decommissioning noise and vibration from other cumulative projects would be localized and occur for a short duration during daytime hours. None of the on-site uses being removed as part of decommissioning are sensitive receptors (i.e. O&M Buildings). Therefore, the contribution of decommissioning noise and vibrations generated by the Full Build-out Scenario or the Phased CUP Scenario to potential cumulative decommissioning noise impacts would be **less than cumulatively considerable**. Likewise, decommissioning noise and vibration from the Full Build-out Scenario or the Phased CUP Scenario, when combined with potential negligible decommissioning noise and vibration impacts from other cumulative projects, would result in a **less than cumulatively considerable impact** on the sensitive receptors in the Project area.

Mitigation Measures

None required.

Significance After Mitigation

Not applicable.