

Noise Impact Assessment

Vega SES 4 Solar Energy Storage Project

County of Imperial, California

Prepared For:

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LIST OF ACRONYMS AND ABBREVIATIONS

CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dB	Decibel
dBA	Decibel is A-weighted
FHWA	Federal Highway Administration

FTA	Federal Transit Administration
L_{eq}	Measure of ambient noise
OPR	Office of Planning and Research
OSHA	Federal Occupational Safety and Health Administration
OSHPD	Office of State Health Planning and Development
PPV	Peak particle velocity
Project	Vega SES 4 Solar Energy Storage Project
A-3-RE	Heavy Agriculture with a Renewable Energy Overlay
RMS	Root mean square
SR	State Route
WEAL	Western Electro-Acoustic Laboratory, Inc.
Aqueduct	All-American Canal

1.0 INTRODUCTION

This report documents the results of a Noise Impact Assessment completed for the Vega SES 4 Solar Energy Storage Project (Project), which includes the construction of a nominal 100-megawatt alternating current (MWAC) solar photovoltaic (PV) energy generation system with an integrated 100 MW battery storage project on approximately 531.53 acres of land in the County of Imperial, California. This report was prepared as a comparison of predicted Project noise levels to noise standards promulgated by the County of Imperial General Plan Noise Element. The purpose of this report is to estimate Project-generated noise and to determine the level of impact the Project would have on the environment.

1.1 Project Overview

The Project proposes to construct a nominal 100 MWAC PV energy generation system, accompanied by a 100 MW battery storage, utilizing either thin film or crystalline solar PV technology modules mounted either on fixed frames or horizontal single-axis tracker (HSAT) systems. The fixed frame PV module arrays would be mounted on racks that would be supported by driven piles. The individual PV systems would be arranged in large arrays by placing them in columns spaced approximately ten feet apart to maximize operational performance and to allow access for panel cleaning and maintenance.

1.2 Project Location

The Project site is an approximately 531.53-acre site located between the California/Mexico border and the All-American Canal (Aqueduct), on the California side in southcentral Imperial County (see Figure 1). The Project site is located approximately 1.92 miles southeast of the Bonds Corner Rd/East Cedar Street/California State Route 98 intersection near the unincorporated community of Bonds Corner. The Project would be located on Imperial County Assessor's Parcel Numbers (APNs) 059-300-015-000 (approximately 301.73 acres), 059-300-017-000 (approximately 148.88 acres) and 059-290-010-000 (approximately 80.92 acres). The irregular shaped site is bound by undeveloped agricultural land to the south, west and east, and the Aqueduct running southwest on the northern border of the proposed Project site. The Project site is currently characterized by flat and undeveloped agricultural land.

1.3 Applicable Land Use Regulations

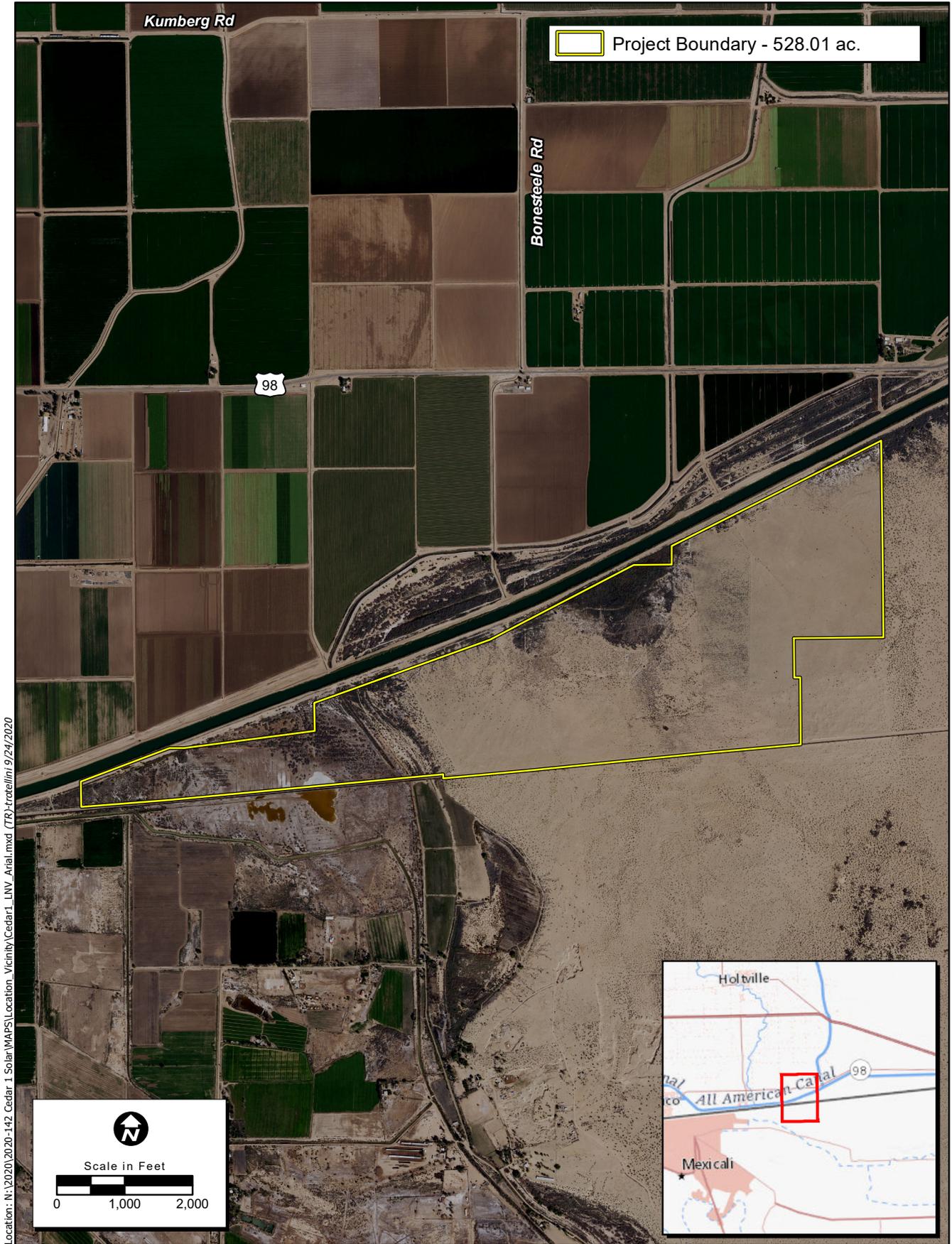
All three of the Project area parcels are designated as "Agriculture" in the Imperial County General Plan and are zoned A-3-RE (Heavy Agriculture with a Renewable Energy Overlay-areas that are suitable for agricultural land uses; to prevent the encroachment of incompatible uses onto and within agricultural lands; and to prohibit the premature conversion of such lands to non-agricultural uses). Pursuant to Section 91703.02 (CONDITIONAL USE PERMITS), Renewable Energy Projects must be located within the Renewable Energy Overlay Zone and may be permitted only through the issuance of a Conditional Use Permit (CUP) as approved by the Approving Authority unless otherwise allowed by applicable law. At present, the Project is located within the Renewable Energy Zone

1.4 Project Site Access

The Project site would include one primary access driveway, currently contemplated across the East Highline Check of the Aqueduct, in the far northeastern corner of the Project area and a secondary access driveway (if required) with a to-be-determined location . This driveway would be provided with a minimum of 30-foot double swing gates with "Knox Box" for keyed entry. Internal to the Project site up to 30-foot wide roads would be provided between the PV arrays, as well as around the perimeter of each Project site inside the perimeter security fence to provide access to all areas of each site for maintenance and emergency vehicles.

1.5 Project Construction

Construction activities would primarily involve demolition and grubbing; grading of the Project area to establish access roads and pads for electrical equipment (inverters and step-up transformers); trenching for underground electrical collection lines; and the installation of solar equipment and security fencing. The construction of the site is estimated to take 12-18 months and would begin in 2022. A temporary, portable construction supply container would be located at the Project site at the beginning of construction and removed at the end of construction. The number of on-site construction workers for the solar project facilities is not expected to exceed 150 workers at any one time. The number of on-site construction workers for the battery storage facility and the substation is not expected to exceed 100 workers at any one time. Onsite parking would be provided for all construction workers.



Location: N:\2020\2020-142_Cedar_1_Solar\WAPS\Location_Vicinity\Cedar1_LNV_Arial.mxd (TR)-truelin 9/24/2020

Map Date: 9/24/2020

Service Layer Credits:
Photo Source: NAIP (2018)

Figure 1. Project Location and Vicinity

2.0 ENVIRONMENTAL NOISE AND GROUNDBORNE VIBRATION ANALYSIS

2.1 Fundamentals of Noise and Environmental Sound

2.1.1 Addition of Decibels

The decibel (dB) scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted (dBA), an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound and twice as loud as a 60-dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be three dB higher than one source under the same conditions (Federal Transit Administration [FTA] 2018). For example, a 65-dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by three dB). Under the decibel scale, three sources of equal loudness together would produce an increase of five dB.

Typical noise levels associated with common noise sources are depicted in Figure 2. *Common Noise Levels*

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
<u>Jet Fly-over at 300m (1000 ft)</u>	110	<u>Rock Band</u>
<u>Gas Lawn Mower at 1 m (3 ft)</u>	100	
<u>Diesel Truck at 15 m (50 ft), at 80 km (50 mph)</u>	90	<u>Food Blender at 1 m (3 ft)</u>
<u>Noisy Urban Area, Daytime</u>	80	<u>Garbage Disposal at 1 m (3 ft)</u>
<u>Gas Lawn Mower, 30 m (100 ft)</u>	70	<u>Vacuum Cleaner at 3 m (10 ft)</u>
<u>Commercial Area</u>		<u>Normal Speech at 1 m (3 ft)</u>
<u>Heavy Traffic at 90 m (300 ft)</u>	60	<u>Large Business Office</u>
<u>Quiet Urban Daytime</u>	50	<u>Dishwasher Next Room</u>
<u>Quiet Urban Nighttime</u>	40	<u>Theater, Large Conference Room (Background)</u>
<u>Quiet Suburban Nighttime</u>		<u>Library</u>
<u>Quiet Rural Nighttime</u>	30	<u>Bedroom at Night,</u>
	20	<u>Concert Hall (Background)</u>
	10	<u>Broadcast/Recording Studio</u>
<u>Lowest Threshold of Human Hearing</u>	0	<u>Lowest Threshold of Human Hearing</u>

Source: California Department of Transportation (Caltrans) 2020a



2.1.2 Sound Propagation and Attenuation

Noise can be generated by a number of sources, including mobile sources such as automobiles, trucks and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately six dB for each doubling of distance from a stationary or point source. Sound from a line source, such as a highway, propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately three dB for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics (Federal Highway Administration [FHWA] 2011). No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. For line sources, an overall attenuation rate of three dB per doubling of distance is assumed (FHWA 2011).

Noise levels may also be reduced by intervening structures; generally, a single row of detached buildings between the receptor and the noise source reduces the noise level by about five dBA (FHWA 2006), while a solid wall or berm generally reduces noise levels by 10 to 20 dBA (FHWA 2011). However, noise barriers or enclosures specifically designed to reduce site-specific construction noise can provide a sound reduction 35 dBA or greater (Western Electro-Acoustic Laboratory, Inc. [WEAL] 2000). To achieve the most potent noise-reducing effect, a noise enclosure/barrier must physically fit in the available space, must completely break the "line of sight" between the noise source and the receptors, must be free of degrading holes or gaps, and must not be flanked by nearby reflective surfaces. Noise barriers must be sizable enough to cover the entire noise source and extend lengthwise and vertically as far as feasibly possible to be most effective. The limiting factor for a noise barrier is not the component of noise transmitted through the material, but rather the amount of noise flanking around and over the barrier. In general, barriers contribute to decreasing noise levels only when the structure breaks the "line of sight" between the source and the receiver.

The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows (Caltrans 2002). The exterior-to-interior reduction of newer residential units is generally 30 dBA or more (Harris Miller, Miller & Hanson Inc. [HMMH] 2006). Generally, in exterior noise environments ranging from 60 dBA Community Noise Equivalent Level (CNEL) to 65 dBA CNEL, interior noise levels can typically be maintained below 45 dBA, a typically residential interior noise standard, with the incorporation of an adequate forced air mechanical ventilation system in each residential building, and standard thermal-pane residential windows/doors with a minimum rating of Sound Transmission Class (STC) 28. (STC is an integer rating of how well a building partition attenuates airborne sound. In the U.S., it is widely used to rate interior partitions, ceilings, floors, doors, windows, and exterior wall configurations.) In exterior noise environments of 65 dBA CNEL or greater, a combination of forced-air mechanical ventilation and sound-rated construction methods is often required to meet the interior noise level limit. Attaining the necessary noise reduction from exterior to interior spaces is readily achievable in noise environments less than 75 dBA CNEL with proper wall construction techniques following California Building Code methods, the selections of proper windows and doors, and the incorporation of forced-air mechanical ventilation systems.

2.1.3 Noise Descriptors

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise on people is largely dependent on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The L_{eq} is a measure of ambient noise, while the L_{dn} and CNEL (Community Noise Equivalent Level) are measures of community noise. Each is applicable to this analysis and defined in Table 2-1.

Table 2-1. Common Acoustical Descriptors	
Descriptor	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micropascals (or 20 micronewtons per square meter), where 1 pascal is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micropascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
L_{max} , L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01} , L_{10} , L_{50} , L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	A 24-hour average L_{eq} with a 10 dBA “weighting” added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn} .
Community Noise Equivalent Level, CNEL	A 24-hour average L_{eq} with a 5 dBA “weighting” during the hours of 7:00 p.m. to 10:00 p.m. and a 10 dBA “weighting” added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends on its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.

The A weighted decibel sound level scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about ± 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends on the distance between the receptor and the noise source. Close to the noise source, the models are accurate to within about ± 1 to 2 dBA.

2.1.4 Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings with noise levels as low as 20 dBA and quiet, suburban, residential streets with noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with noisier urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in A-weighted noise levels (dBA), the following relationships should be noted in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by humans.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change in level of at least 5 dBA is required before any noticeable change in community response would be expected. An increase of 5 dBA is typically considered substantial.
- A 10-dBA change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

2.1.5 Effects of Noise on People

Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over eight hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. For ground vehicles, a noise level of about 55 dBA L_{dn} is the threshold at which a substantial percentage of people begin to report annoyance.

2.2 Fundamentals of Environmental Groundborne Vibration

2.2.1 *Vibration Sources and Characteristics*

Sources of earthborne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or manmade causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions).

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

PPV is generally accepted as the most appropriate descriptor for evaluating the potential for building damage. For human response, however, an average vibration amplitude is more appropriate because it takes time for the human body to respond to the excitation (the human body responds to an average vibration amplitude, not a peak amplitude). Because the average particle velocity over time is zero, the RMS amplitude is typically used to assess human response. The RMS value is the average of the amplitude squared over time, typically a 1- sec. period (FTA 2018).

Table 2-2 displays the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in the table should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high-noise environments,

which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Ground vibration can be a concern in instances where buildings shake, and substantial rumblings occur. However, it is unusual for vibration from typical urban sources such as buses and heavy trucks to be perceptible. For instance, heavy-duty trucks generally generate groundborne vibration velocity levels of 0.006 PPV at 50 feet under typical circumstances, which as identified in Table 2-2 is considered very unlikely to cause damage to buildings of any type. Common sources for groundborne vibration are planes, trains, and construction activities such as earth-moving which requires the use of heavy-duty earth moving equipment.

Peak Particle Velocity (inches/second)	Approximate Vibration Velocity Level (VdB)	Human Reaction	Effect on Buildings
0.006–0.019	64–74	Range of threshold of perception	Vibrations unlikely to cause damage of any type
0.08	87	Vibrations readily perceptible	Recommended upper level to which ruins and ancient monuments should be subjected
0.1	92	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities	Virtually no risk of architectural damage to normal buildings
0.2	94	Vibrations may begin to annoy people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings
0.4–0.6	98–104	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Architectural damage and possibly minor structural damage

Source: Caltrans 2020b

3.0 EXISTING ENVIRONMENTAL NOISE SETTING

3.1 Noise-Sensitive Land Uses

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as hospitals, historic sites, cemeteries, and certain recreation areas are considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

The nearest existing noise-sensitive land use to the Project site is a single-family residence located 1,342 feet from the northeastern corner of Project site.

3.2 Existing Ambient Noise Environment

The Project site consists of flat undeveloped land and is bound by agricultural land to the north with State Route (SR) 98 beyond, agricultural land to the west, vacant undisturbed land to the east, and a mix of vacant undisturbed and agricultural land to the south. In order to quantify existing ambient noise levels in the Project area, ECORP Consulting, Inc. conducted three short-term noise measurements on January 12th, 2021. The noise measurement sites were representative of typical existing noise exposure within and adjacent to the Project site during the daytime (see Attachment A for a visual depiction of the Noise Measurement Locations). The 15-minute measurements were taken between 1:51 p.m. and 2:45 p.m. Short-term (L_{eq}) measurements are considered representative of the noise levels throughout the day. As shown in Table 3-1, the existing noise levels (Baseline) in the Project-vicinity ranges from 65.4 to 68.7 dBA.

Location Number	Location	L_{eq} dBA	L_{min} dBA	L_{max} dBA	Time
1	CA-98 East of Bonds Corner Rd	65.4	36.3	79.8	2:30 p.m.- 2:45 p.m.
2	CA-98 East of Bonesteel Rd	68.7	25.2	86.2	2:10 p.m. – 2:25 p.m.
3	CA-98 Southeastern Extent	66.1	40.8	81.5	1:51 p.m. – 2:06 p.m.

Source: Measurements were taken by ECORP with a Larson Davis LxT SE precision sound level meter, which satisfies the American National Standards Institute for general environmental noise measurement instrumentation. See Attachment A for noise measurement outputs.

The most common noise in the Project vicinity is produced by automotive vehicles (e.g., cars, trucks, buses, motorcycles) traversing SR 98. Traffic moving along streets produces a sound level that remains relatively constant and is part of the minimum ambient noise level in the project vicinity. Vehicular noise varies with the volume, speed and type of traffic. Slower traffic produces less noise than fast-moving traffic. Trucks typically generate more noise than cars. Infrequent or intermittent noise also is associated with vehicles, including sirens, vehicle alarms, slamming of doors, trains, garbage and construction vehicle activity and honking of horns. These noises add to urban noise and are regulated by a variety of agencies.

4.0 REGULATORY FRAMEWORK

4.1 Federal

4.1.1 Occupational Safety and Health Act of 1970

OSHA regulates onsite noise levels and protects workers from occupational noise exposure. To protect hearing, worker noise exposure is limited to 90 decibels with A-weighting (dBA) over an eight-hour work shift (29 Code of Regulations 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 and testing employees for hearing loss on a periodic basis.

4.2 State

4.2.1 State of California General Plan Guidelines

The State of California regulates vehicular and freeway noise affecting classrooms, sets standards for sound transmission and occupational noise control, and identifies noise insulation standards and airport noise/land-use compatibility criteria. The State of California General Plan Guidelines (State of California 2003), published by the Governor's Office of Planning and Research (OPR), also provides guidance for the acceptability of projects within specific CNEL/L_{dn} contours. The guidelines also present adjustment factors that may be used in order to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

4.2.2 State Office of Planning and Research Noise Element Guidelines

The State OPR *Noise Element Guidelines* include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The Noise Element Guidelines contain a Land Use Compatibility table that describes the compatibility of various land uses with a range of environmental noise levels in terms of the CNEL.

4.3 Local

4.3.1 Imperial County General Plan Noise Element

The County of Imperial General Plan Noise Element establishes maximum allowable average-hourly noise limits for various land use designations (refer to Table 4-1). These noise standards are to be applied at the property line of the noise-generating land use. In instances where the adjoining land use designations differ from that of the noise-generating land use, the more restrictive noise standard shall apply. Where 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 dBA L_{eq}, which is a just-perceivable increase in noise. L_{eq} is defined as the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure.

Land Use Zone	Time Period	Average-Hourly Noise Level (dBA L_{eq})
Residential	7 a.m. - 10 p.m.	50
	10 p.m. - 7 a.m.	45
Multi-residential	7 a.m. - 10 p.m.	55
	10 p.m. - 7 a.m.	50
Commercial	7 a.m. - 10 p.m.	60
	10 p.m. - 7 a.m.	55
Light Industrial/Industrial Park	Any time	70
General Industrial	Any time	75

Source: Imperial County 2015.

Notes: 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 dBA L_{eq}.

Construction Noise Standards

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 are required to be limited to the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, and 9:00 a.m. to 5:00 p.m. Saturday. No commercial construction operations are permitted on Sunday or holidays. In cases of a person constructing or modifying a residence for himself/herself, and if the work is not being performed as a business, construction equipment operations may be performed on Sundays and holidays between the hours of 9:00 a.m. and 5:00 p.m. Such non-commercial construction activities may be further restricted where disturbing, excessive, or offensive noise causes discomfort or annoyance to reasonable persons of normal sensitivity residing in an area.

Significant Increase of Ambient Noise Levels

The increase of noise levels generally results in an adverse impact to the noise environment. The Noise/Land Use Compatibility Guidelines are not intended to allow the increase of ambient noise levels up to the maximum without consideration of feasible noise reduction measures. The following guidelines are established by the County of Imperial for the evaluation of significant noise impact.

- If the future noise level after a project is completed will be within the "normally acceptable" noise 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 a 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.

Noise/Land Use Compatibility

The Imperial County General Plan Noise Element Noise/Land Use Compatibility Standards defines the acceptability of a land use in a specified noise environment. Table 4-2 provides the County of Imperial Noise/Land Use Compatibility Guidelines. When an acoustical analysis is performed, conformance of the proposed project with the Noise/Land Use Compatibility Guidelines will be used to evaluate potential noise impact and will provide criteria for environmental impact findings and conditions for project approval.

Table 4-2. County of Imperial Noise/Land Use Compatibility Guidelines		
Land Use Category	Community Noise Exposure L_{dn} or CNEL, dB	Acceptability
Residential	< 60	Normally Acceptable
	60 - 70	Conditionally Acceptable
	70 - 75	Normally Unacceptable
	> 75	Clearly Unacceptable
Transient Lodging-Motels, Hotels	< 60	Normally Acceptable
	60 - 75	Conditionally Acceptable
	75 - 80	Normally Unacceptable
	> 80	Clearly Unacceptable
Schools, Libraries, Churches, Hospitals, Nursing Homes	< 60	Normally Acceptable
	60 - 70	Conditionally Acceptable
	70 - 80	Normally Unacceptable
	> 80	Clearly Unacceptable
Auditoriums, Concert Halls, Amphitheaters	< 70	Conditionally Acceptable
	> 70	Clearly Unacceptable
Sports Arenas, Outdoor Spectator Sports	< 70	Conditionally Acceptable
	70 - 75	Normally Unacceptable
	> 75	Clearly Unacceptable
Playgrounds, Neighborhood Parks	< 70	Normally Acceptable
	70 - 75	Normally Unacceptable
	> 75	Clearly Unacceptable
Golf Courses, Riding Stables, Water Recreation, Cemeteries	< 70	Normally Acceptable
	70 - 80	Normally Unacceptable
	> 80	Clearly Unacceptable
Office Buildings, Business Commercial and Professional	< 65	Normally Acceptable
	65 - 75	Conditionally Acceptable
	75 - 80	Normally Unacceptable
	> 80	Clearly Unacceptable
Industrial, Manufacturing Utilities, Agriculture	< 70	Normally Acceptable
	70 - 75	Conditionally Acceptable
	75 - 80	Normally Unacceptable
	> 80	Clearly Unacceptable

Source: Imperial County 2015.

Notes: Interpretation (For Land Use Planning Purposes):

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 included in the design

Normally Unacceptable: New construction or 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 included in the design.

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

5.0 IMPACT ASSESSMENT

5.1 Thresholds of Significance

The impact analysis provided below is based on the following California Environmental Quality Act Guidelines Appendix G thresholds of significance. The project would result in a significant noise-related impact if it would produce:

- 1) 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.
- 2) Generation of excessive groundborne vibration or groundborne noise levels.
- 3) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

For purposes of this analysis, Project construction noise is compared to the County's construction noise standard of 75 dBA, when averaged over an eight (8) hour period and measured at the nearest sensitive receptor. Noise generated onsite is compared against the County's property line standards identified in Table 4-1.

5.2 Methodology

This analysis of the existing and future noise environments is based on empirical observations. Predicted construction noise levels were calculated utilizing the FHWA's Roadway Construction Model (2006). Groundborne vibration levels associated with construction-related activities for the Project have been evaluated utilizing typical groundborne vibration levels associated with construction equipment. Potential groundborne vibration impacts related to structural damage and human annoyance were evaluated, taking into account the distance from construction activities to nearby structures and typically applied criteria for structural damage and human annoyance.

In order to estimate the worst-case operational noise levels that may occur at the nearest noise-sensitive receptor, onsite operational noise levels have been calculated with the SoundPLAN 3D noise model (which predicts noise propagation from a noise source based on the location, noise level, and frequency spectra of the noise sources as well as the geometry and reflective properties of the local terrain, buildings, and barriers), coupled with noise measurements that were taken by ECORP Consulting, Inc. (ECORP) at an existing solar energy generation facility. Specifically, ECORP conducted a 30-minute reference noise measurement within the IVC solar generation facility in Imperial County with a Larson Davis SoundExpert LxT precision sound-level meter, which satisfies the American National Standards Institute for general environmental noise measurement instrumentation. This reference measurement identified an ambient noise environment of 47.1 dBA at the existing solar energy generation facility (see Attachment C).

Therefore, a noise level of 47.1 dBA was employed as the reference noise level in the SoundPLAN 3D noise model to determine noise-level propagation associated with Project operations.

5.3 Impact Analysis

5.3.1 Project Construction Noise

Would the Project Result in Short-Term Construction-Generated Noise in Excess of Standards?

Onsite Construction Noise

Construction noise associated with the proposed Project would be temporary and would vary depending on the nature of the activities being performed. Noise generated would primarily be associated with the operation of off-road equipment for onsite construction activities as well as construction vehicle traffic on area roadways. Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g., land clearing, grading, excavation, paving). Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Other primary sources of acoustical disturbance would be random incidents, which would last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts). During construction, exterior noise levels could negatively affect sensitive land uses in the vicinity of the construction site.

Nearby noise-sensitive land uses consist of a scattering of single-family residential units located within 1 mile of the proposed Project site boundary to the north across the Aqueduct. The closest sensitive receptor is located 1,342 feet from the northeastern corner of the Project site. As previously described, the County's General Plan Noise Element states construction equipment operation shall be limited to the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, and 9:00 a.m. to 5:00 p.m. on Saturdays. No commercial construction operations are permitted on Sundays or holidays. 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.

The anticipated short-term construction noise levels generated for the necessary construction equipment are presented in Table 5-1.

Table 5-1. Construction Average (dBA) Noise Levels at Nearest Receptor			
Equipment	Estimated Exterior Construction Noise Level at Existing Residences	Construction Noise Standards (dBA L_{eq})	Exceeds Standards?
Site Preparation			
Rubber Tired Dozers (2)	46.6 (each)	75	No
Tractors/Loaders/Backhoes (2)	51.4 (each)	75	No
Combined Site Preparation Equipment	55.7	75	No
Grading			
Excavators (4)	48.2 (each)	75	No
Graders (3)	52.4 (each)	75	No
Rubber Tired Dozers (2)	49.1 (each)	75	No
Scrapers (2)	51 (each)	75	No
Tractors/Loaders/Backhoes (4)	51.4 (each)	75	No
Combined Grading Equipment	62.5	75	No
Facility Construction			
Crane	44	75	No
Paver	45.6	75	No
Paving Equipment (2)	53.9 (each)	75	No
Pile Drivers (4)	65.7 (each)	75	No
Rollers (2)	44.4 (each)	75	No
Rough Terrain Forklifts (4)	50.8 (each)	75	No
Tractors/Loaders/Backhoes (4)	51.4 (each)	75	No
Trenchers (2)	48.8 (each)	75	No
Combined Construction, Trenching, & Paving	72.2	75	No

Source: Construction noise levels were calculated by ECRP Consulting using the FHWA Roadway Noise Construction Model (FHWA 2006). Refer to Attachment B for Model Data Outputs.

Notes: The nearest residence is located approximately 1,342 feet from the Project boundary.

L_{eq} = The equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

As shown in Table 5-1, no individual or cumulative pieces of construction equipment would exceed the 75 dBA County construction noise standard during any phase of construction at the nearby noise-sensitive receptors.

Offsite Construction Worker Traffic Noise

Project construction would result in additional traffic on adjacent roadways over the time period that construction occurs. As previously stated, the number of on-site construction workers for the solar project facilities is not expected to exceed 150 workers at any one time. The number of on-site construction workers for the battery storage facility and the substation is not expected to exceed 100 workers at any one time. Onsite parking would be provided for all construction workers. According to KOA Corporation (2020), a maximum of 510 daily automobile trips would be generated during Project construction, accounting for construction worker commutes and equipment deliveries. The majority of these trips are expected to be accommodated on SR 98, SR 7, and Interstate 8. According to the California Department of Transportation (Caltrans) *Technical Noise Supplement to the Traffic Noise Analysis Protocol* (2013), doubling of traffic on a roadway is required to result in an increase of 3 dB (outside of the laboratory, a 3-dBA change is considered a just-perceivable difference). According to the Caltrans Traffic Census Program (2018), SR 98 currently accommodates 2,400 average daily traffic trips, while SR 7 and Interstate 8 accommodate 6,700 average daily trips and 14,000 average daily trips, respectively. Thus, the estimated 510 daily trips during Project construction would not result in a doubling of traffic on these facilities, and its contribution to existing traffic noise would not be perceptible. Bonds Corner Road and W. Heber Road are also projected to accommodate construction-related traffic with an estimated 69 daily trips on Bonds Corner Road and 5 daily trips on W. Heber Road over the course of construction. These two facilities are classified as "minor arterial" roads by the County General Plan Circulation and Scenic Highways Element (2008) which are expected to accommodate approximately 14,800 daily trips. While the Circulation and Scenic Highways Element does not identify specific traffic counts for Bonds Corner Road, it estimates between 2,020 and 16,700 average daily trips on W. Heber Road.

The Project construction would not result in a doubling of traffic, and therefore its contribution to existing traffic noise would not be perceptible.

5.3.2 Project Operational Noise

Would the Project Result in a Substantial Permanent Increase in Ambient Noise Levels in Excess of County or City Standards During Operations?

As previously described, noise-sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas would each be considered noise-sensitive and may warrant unique measures for protection from intruding noise. The nearest existing noise-sensitive land use to the Project site is a single-family residential unit located approximately 1,342 feet north of the proposed Project site boundary, across the Aqueduct.

Operational Offsite Traffic Noise

Project operations would result in minimal additional traffic on adjacent roadways. The only visitors to the site would be that of repair or maintenance workers, whose presence at the site would be necessary infrequently and inconsistently. According to the California Department of Transportation (Caltrans) *Technical Noise Supplement to the Traffic Noise Analysis Protocol* (2013), doubling of traffic on a roadway

is required to result in an increase of 3 dB (outside of the laboratory, a 3-dBA change is considered a just-perceivable difference). The proposed Project would not result in a doubling of traffic, and therefore its contribution to existing traffic noise would not be perceptible.

Project Land Use Compatibility

The County uses the land use compatibility standards presented in the General Plan Noise Element that provides the County with a tool to gauge the compatibility of new land uses relative to existing noise levels. This table, presented as Table 4-2, identifies acceptable noise levels for various land uses. In the case that the noise levels identified at the proposed Project site fall within the “acceptable” levels presented in the General Plan, the Project is considered compatible with the existing noise environment.

As previously stated, the Project site is proposing to develop a 100 MWAC PV solar energy generation and storage facility. The proposed Project site is zoned A-3-RE (Heavy Agriculture with a Renewable Energy Overlay). As shown in Table 4-2, a normally acceptable noise standard for agricultural land uses is 69 dBA CNEL or under. In order to quantify existing ambient noise levels in the Project area, ECORP conducted three short-term noise measurements on January 12th, 2021. The noise measurement sites were representative of typical existing noise exposure in the Project vicinity and are considered representative of the noise levels throughout the day. As shown in Table 3-1, the ambient noise level recorded in the vicinity of the Project site ranges from 65.4 dBA to 68.7 dBA. However, it is noted that these short-term measurements were each conducted over 1,000 feet from the Project site and adjacent to SR 98, a substantial noise source. Thus, the ambient noise levels experienced on the actual Project site would most likely be less.

Additionally, according to Table 4 of the County General Plan Noise Element (2015), the segment of SR 98 traversing the Project site currently experiences noise levels of 60 dBA CNEL at 33 feet. Since the site is over 1,000 feet south of SR 98 and there are no consistent sources of noise in between the Project site and SR 98, it can be assumed that noise levels on the Project site are less than 60 dBA CNEL. SR 98 is the dominate source of noise in the Project vicinity. This General Plan Noise Element data is reported in the noise metric, CNEL, which is the same noise metric promulgated by County noise compatibility guidelines contained in Table 4-2. As these noise levels fall below the noise standard, the Project site is considered an appropriate noise environment to locate the proposed land use.

Project Operations-Onsite Noise Sources

As previously stated, noise sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas would each be considered noise-sensitive and may warrant unique measures for protection from intruding noise. The nearest existing noise-sensitive land use to the Project site consists of a single-family residence located 1,342 feet from the proposed Project site boundary, to the north and across the Aqueduct.

The main stationary operational noise associated with the Project would be from the proposed transformers, inverters, substation, and transmission lines. Onsite Project operations have been calculated using the SoundPLAN 3D noise model. As previously stated, a noise level of 47.1 dBA was employed as

the reference noise level in the SoundPLAN 3D noise model to determine noise-level propagation associated with the Project operations. The results of this model can be found in Appendix C. Table 5-2 shows the predicted Project noise levels at the nearest noise-sensitive land use in the Project vicinity, as predicted by SoundPLAN. Also see Figure 3.

Location	Modeled Operational Noise Attributed to Project (L_{eq} dBA)	County Daytime Standard (L_{eq} dB)	County Nighttime Standard (L_{eq} dB)	Exceed Standard?
Property line of the nearest residence	32.4	50.0	45.0	No

Source: Stationary source noise levels were modeled by ECORP using SoundPLAN 3D noise model. Refer to Appendix C for noise modeling assumptions and results.

Note: Reference noise measurement used to calculate Project onsite noise propagation identified at 47.1 dBA, per 30-minute measurements taken at a VEGA SES 4 solar generation facility in Imperial County.

As shown in Table 5-2, Project operational noise would not exceed County daytime or nighttime standards.

5.3.3 Project Construction Groundborne Vibration

Would the Project Expose Structures to Substantial Groundborne Vibration During Construction?

Excessive groundborne vibration impacts result from continuously occurring vibration levels. Increases in groundborne vibration levels attributable to the Project would be primarily associated with short-term construction-related activities. Construction on the Project site would have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and the operations involved. Ground vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance.

Construction-related ground vibration is normally associated with impact equipment such as pile drivers, jackhammers, and the operation of some heavy-duty construction equipment, such as dozers and trucks. It is noted that pile drivers would not be necessary during Project construction. Vibration decreases rapidly with distance and it is acknowledged that construction activities would occur throughout the Project site and would not be concentrated at the point closest to sensitive receptors. Groundborne vibration levels associated with typical construction equipment at 25 feet distant are summarized in Table 5-3.

Table 5-3. Representative Vibration Source Levels for Construction Equipment	
Equipment Type	Peak Particle Velocity at 25 Feet (inches per second)
Large Bulldozer	0.089
Caisson Drilling	0.089
Loaded Trucks	0.076
Hoe Ram	0.089
Jackhammer	0.035
Small Bulldozer/Tractor	0.003
Vibratory Roller	0.210

Source: FTA 2018; Caltrans 2020b

The County of Imperial does not regulate vibrations associated with construction. However, a discussion of construction vibration is included for full disclosure purposes. For comparison purposes, the Caltrans (2020b) recommended standard of 0.2 inch per second PPV with respect to the prevention of structural damage for older residential buildings is used as a threshold. This is also the level at which vibrations may begin to annoy people in buildings. Consistent with FTA recommendations for calculating construction vibration, construction vibration was measured from the center of the Project site (FTA 2018). The nearest structure of concern to the construction site, with regard to groundborne vibrations, is the Aqueduct located 100 feet from the proposed Project site boundary.

Based on the representative vibration levels presented for various construction equipment types in Table 5-3 and the construction vibration assessment methodology published by the FTA (2018), it is possible to estimate the potential project construction vibration levels. The FTA provides the following equation:

$$[PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}]$$

Table 5-4 presents the expected Project related vibration levels at a distance of 100 feet.

Table 5-4. Construction Vibration Levels at 100 Feet							
Receiver PPV Levels (in/sec) ¹					Peak Vibration	Threshold	Exceed Threshold
Large Bulldozer, Caisson Drilling, & Hoe Ram	Loaded Trucks	Jackhammer	Small Bulldozer	Vibratory Roller			
0.011	0.009	0.004	0.000	0.026	0.026	0.2	No

Notes: ¹Based on the Vibration Source Levels of Construction Equipment included on Table 5-5 (FTA 2018). Distance to the nearest structure of concern is approximately 100 feet measured from project site boundary.

As shown in Table 5-4, vibration as a result of construction activities would not exceed 0.2 PPV at the nearest structure. Thus, project construction would not exceed the recommended threshold.

5.3.4 Project Operational Groundborne Vibration

Would the Project Expose Structures to Substantial Groundborne Vibration During Operations?

Project operations would not include the use of any large-scale stationary equipment that would result in excessive vibration levels. Therefore, the project would not result groundborne vibration impacts during operations.

5.3.5 Excess Airport Noise

Would the Project Expose People Residing or Working in the Project area to Excessive Airport Noise?

The Project site is located approximately 12 miles east from the Calexico International Airport in Unincorporated lands of Imperial County and 8.69 miles from Calexico city limits. The Imperial County Airport Land Use Commission has established a set of land use compatibility criteria for lands surrounding the airports in Imperial County in the Imperial County Airport Land Use Compatibility Plan (1996). As identified in Figure 3-B of the Imperial County Airport Land Use Compatibility Maps, the proposed Project site lays outside of the noise contours of the Calexico International Airport. Thus, the Project would not expose residents to excessive airport noise.

5.3.6 Cumulative Noise

Would the Project Contribute to Cumulatively Considerable Noise During Construction?

Construction activities associated with the proposed Project and other construction projects in the area may overlap, resulting in construction noise in the area. However, construction noise impacts primarily affect the areas adjacent to the construction site. Construction noise for the proposed Project was determined to be less than significant following compliance with County noise standards. Cumulative development in the vicinity of the Project site could result in elevated construction noise levels at sensitive receptors in the Project area. However, each project would be required to comply with the applicable noise limitations on construction. Therefore, the Project would not contribute to cumulative impacts during construction.

Would the Project Contribute to Cumulatively Considerable Noise from Offsite Traffic?

As described previously, Project operations would result in extremely minimal additional traffic on adjacent roadways. The only visitors to the site would be that of repair or maintenance work that would be done very infrequently. Thus, any cumulative noise impacts from project-related traffic would be minimal. Therefore, the Project's contribution to cumulative noise impacts from traffic would be less than significant.

Would the Project Contribute to Cumulatively Considerable Noise from Stationary Sources?

Cumulative noise impacts would primarily be associated with the transformers, inverters, substation, and transmission lines from the solar facility. Long-term noise sources associated with development at the Project, combined with other cumulative projects, could cause local noise-level increases. Noise levels associated with the proposed Project and related cumulative projects together could result in higher noise levels than considered separately. However, noise increase as a result of the Project would not be perceivable and would not exceed County standards.

6.0 REFERENCES

- Caltrans. 2020a. IS/EA Annotated Outline. <http://www.dot.ca.gov/ser/vol1/sec4/ch31ea/chap31ea.htm>.
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- KOA Corporation. 2020. Scoping Memorandum for the Traffic Impact Study.
- OPR. 2003. State of California General Plan Guidelines.
- WEAL. 2000. Sound Transmission Sound Test Laboratory Report No. TL 96-186.

LIST OF ATTACHMENTS

Attachment A - Baseline (Existing) Noise Measurements – Project Site and Vicinity

Attachment B - Federal Highway Administration Highway Roadway Construction Noise Outputs
– Project Construction Noise

Attachment C - SoundPLAN 3-D Noise Model Outputs – Project Onsite Noise

Baseline (Existing) Noise Measurements – Project Site and Vicinity



Google Earth

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Map Date: 12/14/2020
Photo (or Base) Source: Google Earth Pro

Site Number: V4-1			
Recorded By: Jessie Beckman			
Job Number: 2020 - 142			
Date: 1/12/21			
Time: 14:30 – 14:45			
Location: CA-98, East of Bonds Corner Rd			
Source of Peak Noise: Vehicular traffic on CA-98			
Noise Data			
Leq (dB)	Lmin (dB)	Lmax (dB)	Peak (dB)
65.4	36.3	79.8	104.3

Equipment						
Category	Type	Vendor	Model	Serial No.	Cert. Date	Note
Sound	Sound Level Meter	Larson Davis	LxT SE	0005120	9/14/2020	
	Microphone	Larson Davis	377B02	174464	9/14/2020	
	Preamp	Larson Davis	PRMLxT1L	042852	9/14/2020	
	Calibrator	Larson Davis	CAL200	14105	9/10/2020	
Weather Data						
Est.	Duration: 15 minutes			Sky: 50%cc		
	Note: Cal Offset = 0.26			Sensor Height (ft): 3.5		
	Wind Ave Speed (mph)		Temperature (degrees Fahrenheit)		Barometer Pressure (hPa)	
	0-2		70		30.25Hg	

Photo of Measurement Location



Measurement Report

Report Summary

Meter's File Name	LxT_Data.356	Computer's File Name	SLM_0005120_LxT_Data_356.00.ldbin
Meter	LxT SE		
Firmware	2.404		
User	Lindsay Liegler	Location	
Description			
Note			
Start Time	2021-01-12 13:51:20	Duration	0:15:00.0
End Time	2021-01-12 14:06:20	Run Time	0:15:00.0
		Pause Time	0:00:00.0

Results

Overall Metrics

LA _{eq}	65.4 dB		
LAE	95.0 dB	SEA	--- dB
EA	349.6 μPa²h		
LZ _{peak}	104.3 dB	2021-01-12 13:55:26	
LAS _{max}	79.8 dB	2021-01-12 13:55:26	
LAS _{min}	36.3 dB	2021-01-12 13:58:17	
LA _{eq}	65.4 dB		
LC _{eq}	72.8 dB	LC _{eq} - LA _{eq}	7.4 dB
LAI _{eq}	68.4 dB	LAI _{eq} - LA _{eq}	3.0 dB

Exceedances

	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LZ _{peak} > 135.0 dB	0	0:00:00.0
LZ _{peak} > 137.0 dB	0	0:00:00.0
LZ _{peak} > 140.0 dB	0	0:00:00.0

Community Noise

LDN	LDay	LNight	
65.4 dB	65.4 dB	0.0 dB	
LDEN	LDay	LEve	LNight
65.4 dB	65.4 dB	--- dB	--- dB

Any Data

	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L _{eq}	65.4 dB		72.8 dB		--- dB	
LS _(max)	79.8 dB	2021-01-12 13:55:26	--- dB		--- dB	
LS _(min)	36.3 dB	2021-01-12 13:58:17	--- dB		--- dB	
L _{Peak(max)}	--- dB		--- dB		104.3 dB	2021-01-12 13:55:26

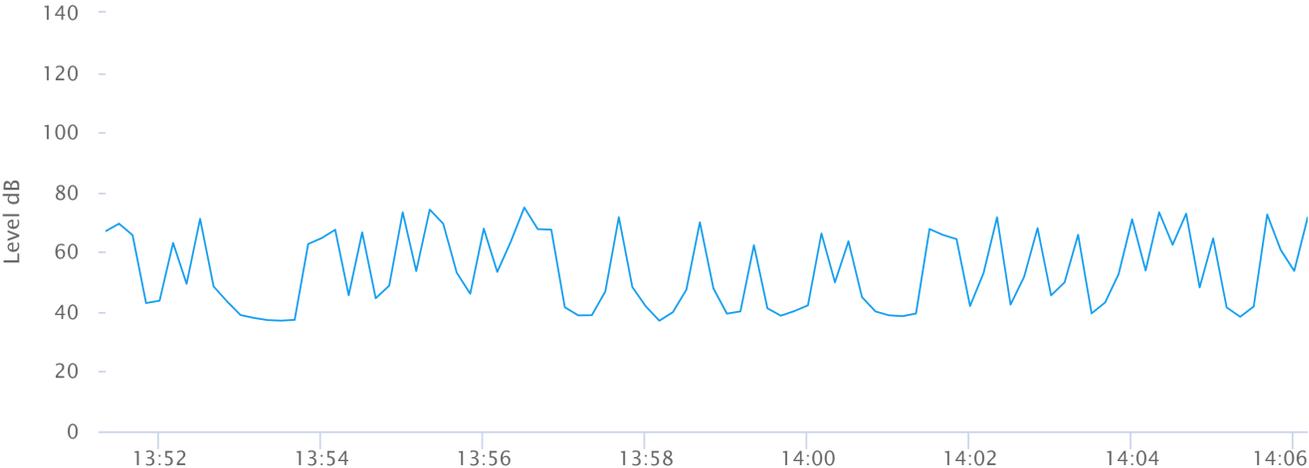
Overloads

Count	Duration	OBA Count	OBA Duration
0	0:00:00.0	20	0:01:04.10

Statistics

LAS 5.0	73.3 dB
LAS 10.0	70.1 dB
LAS 33.3	55.2 dB
LAS 50.0	48.2 dB
LAS 66.6	43.3 dB
LAS 90.0	38.6 dB

Time History



— LAeq: 0.0 dB



Site Number: V4-2			
Recorded By: Jessie Beckman			
Job Number: 2020 - 142			
Date: 1/12/21			
Time: 14:10 – 14:25			
Location: CA-98, East of Bonesteel Rd			
Source of Peak Noise: Vehicular traffic on CA-98			
Noise Data			
Leq (dB)	Lmin (dB)	Lmax (dB)	Peak (dB)
68.7	25.2	86.2	106.8

Equipment						
Category	Type	Vendor	Model	Serial No.	Cert. Date	Note
Sound	Sound Level Meter	Larson Davis	LxT SE	0005120	9/14/2020	
	Microphone	Larson Davis	377B02	174464	9/14/2020	
	Preamp	Larson Davis	PRMLxT1L	042852	9/14/2020	
	Calibrator	Larson Davis	CAL200	14105	9/10/2020	
Weather Data						
Est.	Duration: 15 minutes			Sky: 50%cc		
	Note: Cal Offset = 0.26			Sensor Height (ft): 3.5		
	Wind Ave Speed (mph)		Temperature (degrees Fahrenheit)		Barometer Pressure (hPa)	
	0-2		70		30.25Hg	

Photo of Measurement Location



Measurement Report

Report Summary

Meter's File Name	LxT_Data.357	Computer's File Name	SLM_0005120_LxT_Data_357.00.ldbin
Meter	LxT SE		
Firmware	2.404		
User	Lindsay Liegler	Location	
Description			
Note			
Start Time	2021-01-12 14:10:16	Duration	0:15:00.0
End Time	2021-01-12 14:25:16	Run Time	0:15:00.0
		Pause Time	0:00:00.0

Results

Overall Metrics

LA _{eq}	68.7 dB		
LAE	98.2 dB	SEA	--- dB
EA	742.4 μPa²h		
LZ _{peak}	106.8 dB	2021-01-12 14:23:46	
LAS _{max}	86.2 dB	2021-01-12 14:23:46	
LAS _{min}	25.2 dB	2021-01-12 14:21:16	
LA _{eq}	68.7 dB		
LC _{eq}	75.5 dB	LC _{eq} - LA _{eq}	6.8 dB
LAI _{eq}	72.4 dB	LAI _{eq} - LA _{eq}	3.7 dB

Exceedances

	Count	Duration
LAS > 85.0 dB	1	0:00:01.5
LAS > 115.0 dB	0	0:00:00.0
LZ _{peak} > 135.0 dB	0	0:00:00.0
LZ _{peak} > 137.0 dB	0	0:00:00.0
LZ _{peak} > 140.0 dB	0	0:00:00.0

Community Noise

LDN	LDay	LNight	
68.7 dB	68.7 dB	0.0 dB	
LDEN	LDay	LEve	LNight
68.7 dB	68.7 dB	--- dB	--- dB

Any Data

	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L _{eq}	68.7 dB		75.5 dB		--- dB	
LS _(max)	86.2 dB	2021-01-12 14:23:46	--- dB		--- dB	
LS _(min)	25.2 dB	2021-01-12 14:21:16	--- dB		--- dB	
L _{Peak(max)}	--- dB		--- dB		106.8 dB	2021-01-12 14:23:46

Overloads

Count	Duration	OBA Count	OBA Duration
0	0:00:00.0	32	0:01:38.2

Statistics

LAS 5.0	76.8 dB
LAS 10.0	72.9 dB
LAS 33.3	53.2 dB
LAS 50.0	46.9 dB
LAS 66.6	42.5 dB
LAS 90.0	35.9 dB

Site Number: V4 - 3			
Recorded By: Jessie Beckman			
Job Number: 2020 - 142			
Date: 1/12/2021			
Time: 13:51 – 14:06			
Location: CA-98, Southeastern Extent			
Source of Peak Noise: Vehicular Traffic on CA-98			
Noise Data			
Leq (dB)	Lmin (dB)	Lmax (dB)	Peak (dB)
66.1	40.8	81.5	103.8

Equipment						
Category	Type	Vendor	Model	Serial No.	Cert. Date	Note
Sound	Sound Level Meter	Larson Davis	LxT SE	0005120	9/14/2020	
	Microphone	Larson Davis	377B02	174464	9/14/2020	
	Preamp	Larson Davis	PRMLxT1L	042852	9/14/2020	
	Calibrator	Larson Davis	CAL200	14105	9/10/2020	
Weather Data						
Est.	Duration: 15 minutes			Sky: 40% cc		
	Note: dBA Offset = 0.01 Cal Offset = 0.26			Sensor Height (ft): 3.5		
	Wind Ave Speed (mph)		Temperature (degrees Fahrenheit)		Barometer Pressure (hPa)	
	0-2		70		30.25 Hg	

Photo of Measurement Location



Measurement Report

Report Summary

Meter's File Name	LxT_Data.358	Computer's File Name	SLM_0005120_LxT_Data_358.00.ldbin
Meter	LxT SE		
Firmware	2.404		
User	Lindsay Liegler	Location	
Description			
Note			
Start Time	2021-01-12 14:29:25	Duration	0:15:00.0
End Time	2021-01-12 14:44:25	Run Time	0:15:00.0
		Pause Time	0:00:00.0

Results

Overall Metrics

LA _{eq}	66.1 dB		
LAE	95.7 dB	SEA	--- dB
EA	411.7 μPa²h		
LZ _{peak}	103.8 dB	2021-01-12 14:31:03	
LAS _{max}	81.5 dB	2021-01-12 14:29:25	
LAS _{min}	40.8 dB	2021-01-12 14:43:50	
LA _{eq}	66.1 dB		
LC _{eq}	73.5 dB	LC _{eq} - LA _{eq}	7.4 dB
LAI _{eq}	69.5 dB	LAI _{eq} - LA _{eq}	3.3 dB

Exceedances

	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LZ _{peak} > 135.0 dB	0	0:00:00.0
LZ _{peak} > 137.0 dB	0	0:00:00.0
LZ _{peak} > 140.0 dB	0	0:00:00.0

Community Noise

LDN	LDay	LNight	
66.1 dB	66.1 dB	0.0 dB	
LDEN	LDay	LEve	LNight
66.1 dB	66.1 dB	--- dB	--- dB

Any Data

	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L _{eq}	66.1 dB		73.5 dB		--- dB	
LS _(max)	81.5 dB	2021-01-12 14:29:25	--- dB		--- dB	
LS _(min)	40.8 dB	2021-01-12 14:43:50	--- dB		--- dB	
L _{Peak(max)}	--- dB		--- dB		103.8 dB	2021-01-12 14:31:03

Overloads

Count	Duration	OBA Count	OBA Duration
0	0:00:00.0	23	0:01:11.1

Statistics

LAS 5.0	74.0 dB
LAS 10.0	70.9 dB
LAS 33.3	56.4 dB
LAS 50.0	50.4 dB
LAS 66.6	46.6 dB
LAS 90.0	42.5 dB

Federal Highway Administration Highway Roadway Construction Noise Outputs – Project
Construction Noise

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 1/25/2021
 Case Description: Site Prep

Description Affected Land Use
 Site Prep Residential

Description	Impact Device	Usage(%)	Equipment		Receptor Distance (feet)
			Spec Lmax (dBA)	Actual Lmax (dBA)	
Rubber Tired Loader	No	40		79.1	1342
Rubber Tired Loader	No	40		79.1	1342
Tractor	No	40	84		1342
Tractor	No	40	84		1342

Calculated (dBA)

Equipment	*Lmax	Leq
Rubber Tired Loader	50.5	46.6
Rubber Tired Loader	50.5	46.6
Tractor	55.4	51.4
Tractor	55.4	51.4
Total	55.4	55.7

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 1/25/2021
 Case Description: Grading

Description Affected Land Use
 Grading Residential

Description	Impact Device	Usage(%)	Equipment		Receptor Distance (feet)
			Spec Lmax (dBA)	Actual Lmax (dBA)	
Excavator	No	40		80.7	1342
Excavator	No	40		80.7	1342
Excavator	No	40		80.7	1342
Excavator	No	40		80.7	1342
Grader	No	40	85		1342
Grader	No	40	85		1342
Grader	No	40	85		1342
Rubber Tired Dozer	No	40		81.7	1342
Rubber Tired Dozer	No	40		81.7	1342
Scraper	No	40		83.6	1342
Scraper	No	40		83.6	1342
Tractor/Loader/Backhoe	No	40	84		1342
Tractor/Loader/Backhoe	No	40	84		1342
Tractor/Loader/Backhoe	No	40	84		1342
Tractor/Loader/Backhoe	No	40	84		1342

Calculated (dBA)

Equipment	*Lmax	Leq
Excavator	52.1	48.2
Grader	56.4	52.4
Grader	56.4	52.4
Grader	56.4	52.4
Rubber Tired Dozer	53.1	49.1
Rubber Tired Dozer	53.1	49.1
Scraper	55	51
Scraper	55	51
Tractor/Loader/Backhoe	55.4	51.4
Total	56.4	62.5

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 1/25/2021
 Case Description: Construction

Description Affected Land Use
 Construction Residential

Description	Impact Device	Usage(%)	Equipment		Receptor Distance (feet)
			Spec Lmax (dBA)	Actual Lmax (dBA)	
Crane	No	16		80.6	1342
Paver	No	50		77.2	1342
Paveing Equipment	No	20		89.5	1342
Paveing Equipment	No	20		89.5	1342
Pile Driver	Yes	20		101.3	1342
Pile Driver	Yes	20		101.3	1342
Pile Driver	Yes	20		101.3	1342
Pile Driver	Yes	20		101.3	1342
Roller	No	20		80	1342
Roller	No	20		80	1342
Rough Terrain Forklift	No	40		83.4	1342
Rough Terrain Forklift	No	40		83.4	1342
Rough Terrain Forklift	No	40		83.4	1342
Rough Terrain Forklift	No	40		83.4	1342
Tractor/Loader/Backhoe	No	40	84		1342
Tractor/Loader/Backhoe	No	40	84		1342
Tractor/Loader/Backhoe	No	40	84		1342
Tractor/Loader/Backhoe	No	40	84		1342
Trencher	No	50		80.4	1342

Calculated (dBA)

Equipment	*Lmax	Leq
Crane	52	44
Paver	48.6	45.6
Paveing Equipment	60.9	53.9
Paveing Equipment	60.9	53.9
Pile Driver	72.7	65.7
Roller	51.4	44.4
Roller	51.4	44.4
Rough Terrain Forklift	54.8	50.8
Rough Terrain Forklift	54.8	50.8
Rough Terrain Forklift	54.8	50.8
Rough Terrain Forklift	54.8	50.8
Tractor/Loader/Backhoe	55.4	51.4
Trencher	51.8	48.8
Total	72.7	72.2

*Calculated Lmax is the Loudest value.

SoundPLAN 3-D Noise Model Outputs – Project Onsite Noise

SoundPLAN
Output Source Information

Number	Receiver Name	Floor	Level at Receiver
1	Residence to the north	Ground Floor	32.4 dBA
2	Residence to the north	Ground Floor	32.0 dBA
3	Residence to the north	Ground Floor	29.5 dBA
4	Residence to the north	Ground Floor	27.3 dBA

Number	Noise Source Information	Citation	Level at Source
1	Noise Activity at Solar Facility	ECORP Consulting	47.1 dBA

