Noise Impact Assessment
for the
VEGA SES 6 Solar and Battery Storage Project

County of Imperial, California

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ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
AF	Acre Feet
ANSI	American National Standards Institute
APN	Assessor's Parcel Number
Aqueduct	Imperial Irrigation District Aqueduct
BESS	Battery Electric Storage System
BLM	Bureau of Land Management
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
County	Imperial County
CNEL	Community Noise Equivalent Level
CUP	Conditional Use Permit
dB	Decibel
dBA	Decibel is A-weighted
DC	Direct Current
FHWA	Federal Highway Administration
FICON	Federal Interagency Commission on Noise
FTA	Federal Transit Administration
HMMH	Harris Miller, Miller & Hanson Inc
HSAT	Horizontal Single Axis Tracker
Hz	Hertz
ICAPCD	Imperial County Air Pollution Control District
IID	Imperial Irrigation District
kV	Kilovolt
L_{eq}	Measure of ambient noise
L_{dn}	a 24-hour average L_{eq} with a 10-dBA "weighting" added to noise during the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the nighttime
L_{max}	The maximum A-weighted noise level during the measurement period
L_{min}	The maximum and minimum A-weighted noise level during the measurement period
MWAC	Mega Watt Alternating Current
MWH	Mega Watts Per Hour
OPR	Office of Planning and Research
OSHA	Federal Occupational Safety and Health Administration
OSHPD	Office of State Health Planning and Development
PPA	Purchasing Power Agreement
PPV	Peak particle velocity
PV	Photovoltaic
Project	VEGA SES 6 Project
RE Overlay Zone	Renewable Energy and Transmission Overlay Zone
RMS	Root mean square
S-2	Open Space/Preservation
SR	State Route
STC	Sound Transmission Class

VdB	Vibration Velocity Level
WEAL	Western Electro-Acoustic Laboratory, Inc.

1.0 INTRODUCTION

This report documents the results of a Noise Impact Assessment completed for the VEGA SES 6 Solar and Battery Storage Project (Project) in Imperial County (County), California, which includes the construction of an 80 megawatt (MW) solar energy generation facility and a 160 MW battery energy storage system (BESS). The Project also proposes an electrical generator intertie (gen-tie) transmission line to connect to the Imperial Irrigation District's (IID) 161 kilovolt (kV) "L" Line. 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 Location

The Proposed Project Site is located on approximately 320 acres of privately-owned vacant land on a single parcel (Assessor Parcel Number (APN) 034-160-002) in the unincorporated Imperial County, California (Figure 1-1. *Project Location Map*). The site is located approximately 6 miles south of the southern-most edge of the Salton Sea; 10 miles west of the City of Brawley; and approximately 5 miles southwest of the community of Westmorland. The solar energy facility site is located directly south of Andre Road and 0.50 mile west of the Westside Main Canal (Figure 1-2. *Project Vicinity Map*). The proposed BESS would be located in the northwest portion of the Project Site. The proposed gen-tie transmission line would span approximately four miles to connect to the IID's existing 161 kV "L" Line. The entire gen-tie route would be on federal lands managed by the Bureau of Land Management (BLM) within the California Desert Conservation Area planning area. The gen-tie route would begin at the northwest corner of the solar facility site, head west approximately 0.5 miles on BLM land, then north for approximately 1.0 mile, and then west for 2.5 miles along Garvey Road where it would connect to the IID 161 kV "L" Line.

The topography of the Project Site is relatively flat, with elevations ranging between -39 meters (-129 feet) and -6 meters (-21 feet). The solar energy facility site is bound by undeveloped Open Space/BLM land immediately to the west and south, and active agricultural land to the north and east. The Westside Main Canal travels southeast to northwest and is located northeast and east of the solar energy facility site.

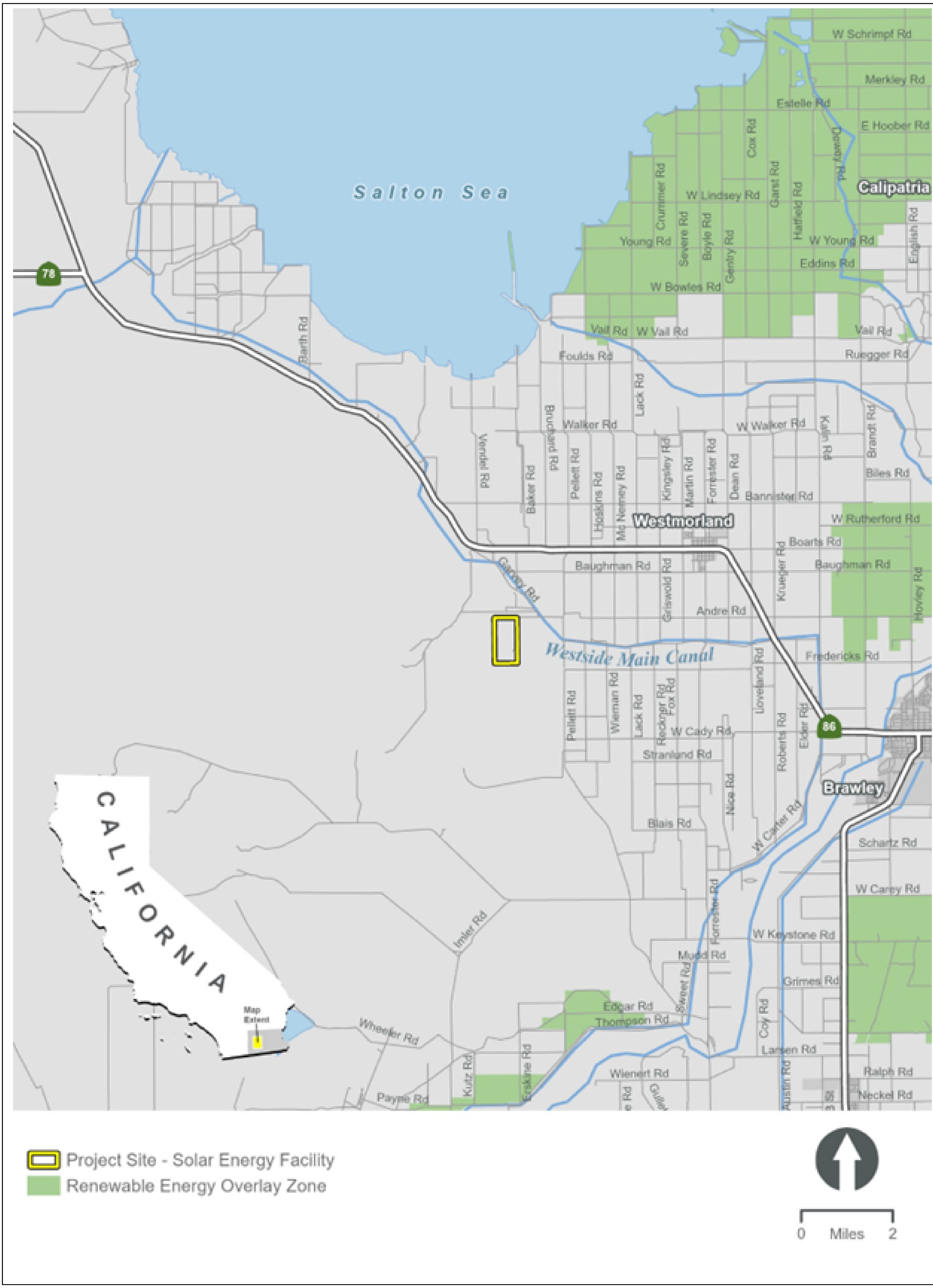

Figure 1-1. Project Location Map

2020-144 VEGA 6 SES Solar & Battery Storage Project

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Figure 1-2. Project Vicinity Map

2020-144 VEGA 6 SES Solar & Battery Storage Project

1.2 Project Overview

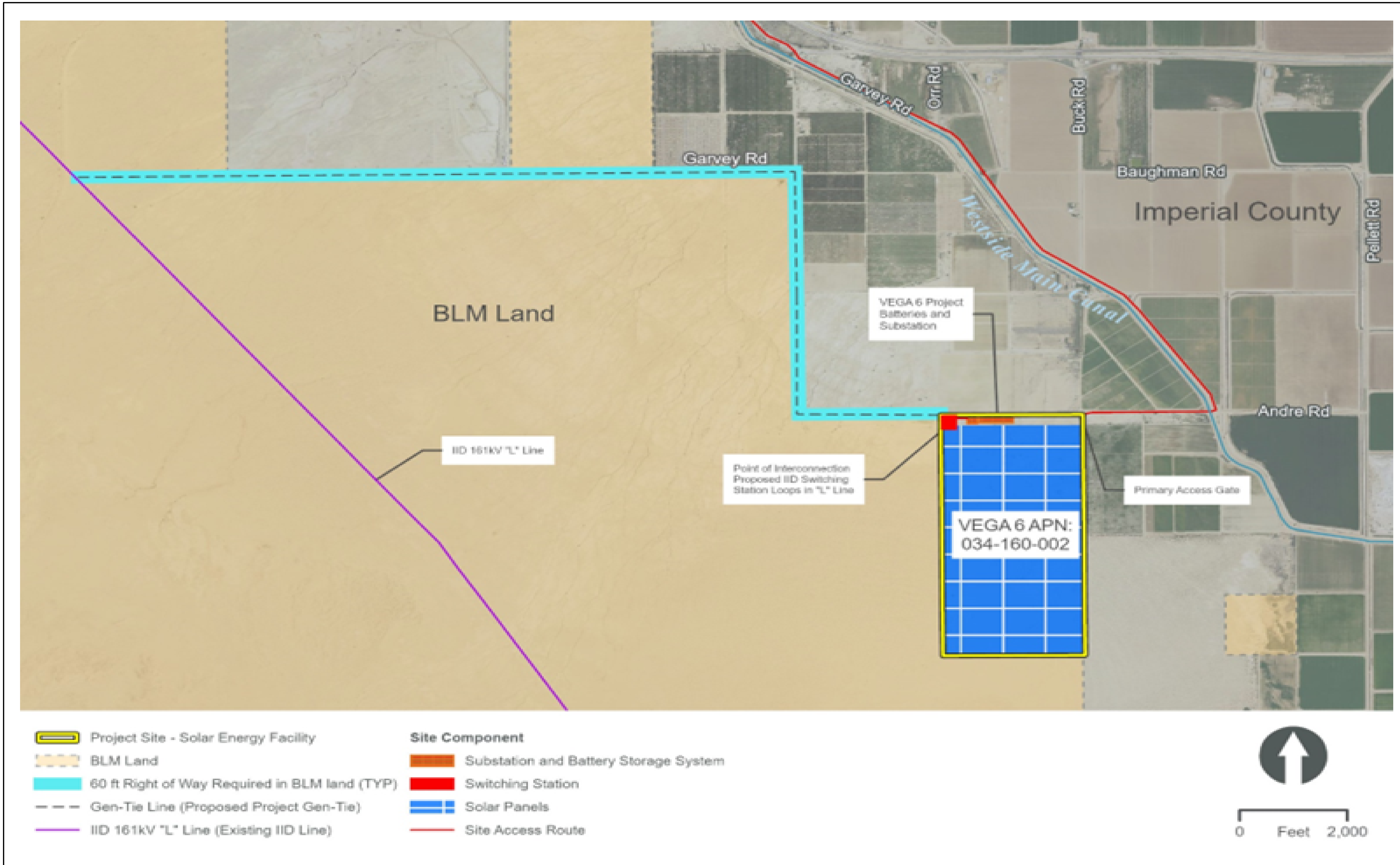
In 2016, the County adopted the Imperial County Renewable Energy and Transmission Element, which includes a Renewable Energy (RE) Zone (RE Overlay Map). This General Plan element was created as part of the California Energy Commission Renewable Energy Grant Program to amend and update the County's General Plan to facilitate future development of renewable energy projects.

The County Land Use Ordinance, Division 17, includes the RE Overlay Zone, which authorizes the development and operation of renewable energy projects with an approved conditional use permit (CUP). The RE Overlay Zone is concentrated in areas determined to be the most suitable for the development of renewable energy facilities while minimizing the impact on other established uses. CUP applications proposed for specific renewable energy projects not located in the RE Overlay Zone would not be allowed without an amendment to the RE Overlay Zone.

As shown on Figure 1-1, the entire Project Site is located outside of the RE Overlay Zone. Therefore, the applicant is requesting a General Plan Amendment to include/classify the Project Site (APN No. 034-160-002) into the RE Overlay Zone. No change in the underlying General Plan land use (Agriculture) is proposed.

1.3 Project Description

As previously described, the Proposed Project involves the construction and operation of an 80 MW PV solar facility with an integrated 160 MW BESS on approximately 320 acres of privately-owned land. The Project would be comprised of solar PV arrays panels, an on-site substation, BESS, gen-tie line, inverters, transformers, underground electrical cables, and access roads. These Project components are described in detail below and depicted in Figure 1-3. *Site Plan*.



Map Date: *1/5/2023*
Photo (or Base) Source: *HDR 2022*

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Figure 1-3. Project Site Plan

Photovoltaic Panels/Solar Arrays

The Project proposes to use 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 fixed-frame racks would be secured at a fixed tilt of 20 to 30 degrees from horizontal facing a southerly direction. As proposed, individual PV modules would be mounted two high on a fixed frame, providing 12 to 24 inches of ground clearance and resulting in the tops of the panels at approximately 7.5 feet above the ground. The fixed PV modules would be arranged in arrays spaced approximately 15 to 25 feet apart (pile-to-pile) to maximize performance and to allow access for panel cleaning. These arrays would be separated from each other and the perimeter security fence by up to 30-foot-wide interior roads.

If HSAT technology is used, the PV modules would rotate around the north-south HSAT axis so that the PV modules would continue to face the sun as the sun moves across the sky throughout the day. The PV modules would reach their maximum height (up to 9 feet above the ground, depending on the final design) at both sunrise and sunset, when the HSAT is rotated to point the modules at the rising or setting sun. At noon, or when stowed during high winds, when the HSAT system is rotated so that the PV modules are horizontal, the nominal height would be about six feet above the ground, depending on the final design. The individual PV systems would be arranged in large arrays by placing them in columns spaced approximately 10 feet apart to maximize operational performance and to allow access for panel cleaning and maintenance. Individual HSAT PV modules, each approximately two feet wide by four feet long (depending on the specific PV technology selected), would be mounted on a frame which is attached to an HSAT system. These HSAT arrays would be separated from each other and the perimeter security fence by up to 30-foot-wide roads, consistent with County emergency access requirements.

Battery Energy Storage System

The proposed BESS would be constructed adjacent to the Project's substation and would consist of either lithium ion or flow batteries. The batteries will either be housed in storage containers or buildings fitted with heating, ventilation, and air conditioning and fire suppression systems. Inside the housing, the batteries would be placed on racks, the orientation of which depends on the type of housing. Underground trenches with conduits will be used to connect the batteries to the control and monitoring systems, and inverters to convert the PV-produced direct current (DC) power to alternating current (AC) power. The BESS would be capable of storing up to 160 MW.

Substation and Interconnection Switching Station

As shown in Figure 1-3, a new substation would be constructed in the northwest portion of the solar energy facility site. The inverters would be connected to pad-mounted transformers. This system collects the energy from all the inverters and then transmits it through a generator step-up transformer, which steps up the voltage level to the 161 kV of the existing IID "L" line.

A new interconnection switching station would be constructed in the northwest corner of the solar energy facility site, immediately adjacent to the substation. The switching station would include circuit breakers, switches, overhead bus work, protective relay equipment and an electrical control building. The switching station would operate at 161 kV and be equipped with two circuit breakers, allowing for looping in of the IID 161 kV "L" transmission line as well as connection to the Project's gen-tie line. The substation and switching station would be connected via a single overhead 161 kV line. The switching station would be enclosed within its own fence.

The medium voltage power produced by the Project would be conveyed underground, or aboveground where necessary to cross over any sensitive site features, to connect to the Project's interconnection facilities. The Project's interconnection facilities design would meet all necessary utility standards and requirements. As required, surge arrestors would be used to protect facilities and auxiliary equipment from lightning strikes or other disturbances. Distribution from the site would be via an overhead connection.

Electrical Generator Intertie (Gen-Tie) Transmission Line

As previously stated, the Proposed Project includes an approximately 4-mile gen-tie transmission line that would connect to the IID's existing 161 kV "L" Line. The 4-mile gen-tie line would include a total of 78 pole structures, with a combination of tangent double circuit wood pole structures, dead-end double circuit wood pole structures, and double circuit steel poles. At the interconnection point, three wood pole structures and dead-end wood structures would be used. The height of the proposed gen-tie transmission structures would be 75 feet. The electrical energy produced by the Project would be conducted through the project substation to the proposed 161 kV gen-tie line and delivered to the existing IID-approved point of interconnection at the IID 161 kV "L" line. Construction of the gen-tie line would result in approximately 24.5 acres of disturbed area.

Site Access

The solar energy facility site would include one primary access driveway, proposed via State Route (SR) 78 from the north and west, and across the Westside Main Canal, via county roadways (Garvey Road and Andre Road). This driveway would be provided with a minimum of 30-foot double swing gates with "Knox Box" for keyed entry. Internal to the solar energy facility site, up to 30-foot-wide roads would be provided between the PV arrays, as well as around the perimeter of the solar energy facility site yet inside the perimeter security fence to provide access to all areas of the site for maintenance and emergency vehicles.

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; the installation of solar equipment and security fencing; and the offsite infrastructure work required for the IID gen-tie transmission line route. Stormwater management facilities would be constructed internally within the Project Site and would consist of basins and infiltration areas. Construction is estimated to take 12 to 18 months and would begin in 2023. 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.

Dust generated during construction would be controlled by watering and, as necessary, the use of other dust suppression methods and materials accepted by the Imperial County Air Pollution Control District (ICAPCD). The Proposed Project would require approximately 550-acre feet (AF) of water for dust suppression and site grading during construction of the arrays, BESS area, and onsite substation. Water for construction (primarily dust control) would be obtained from local IID irrigation canals or laterals in conformance with IID construction water acquisition requirements. Water would be picked up from a nearby lateral canal and delivered to the construction location by a water truck that would be capable of carrying approximately 4,000 gallons per load.

The number of on-site construction workers for the solar energy facility is not expected to exceed 150 workers at any one time. The number of on-site construction workers for the BESS and the substation is not expected to exceed 100 workers at any one time.

Project Operations

Once construction is completed, the facility would be remotely operated, controlled and monitored and with no requirement for daily on-site employees. Security personnel may conduct unscheduled security rounds and would be dispatched to the Project Site in response to a fence breach or other alarm.

Up to two to three people would be contracted (part-time) to perform all routine and emergency operational and maintenance activities. Such activities include inspections, equipment servicing, site and landscape clearing, and periodic washing of the PV modules if needed (up to two times per year) to maintain power generation efficiency. Vegetation growing on the Project Site would periodically (approximately every 3 months) be removed manually and/or treated with herbicides.

Periodic washing of the PV modules is not expected to be necessary but could be needed to remove dust to maintain power generation efficiency. The amount of water needed for this purpose is conservatively estimated at 10 AF per washing, with up to two washings per year, or a total of up to 20 AF per year. This water would be water purchased from the IID.

Electricity generated by the facility could be sold under the terms of a purchasing power agreement (PPA) with a power purchaser (i.e., utility service provider). At the end of the PPA term, the owner of the facility may choose to enter into a subsequent PPA, update technology and re-commission, or decommission and remove the generating facility and its components. Upon decommissioning, the site could be converted to other uses in accordance with applicable land use regulations in effect at that time. A collection and recycling program will be executed to promote recycling of project components and minimize disposal in landfills. All permits related to decommissioning would be obtained, where required.

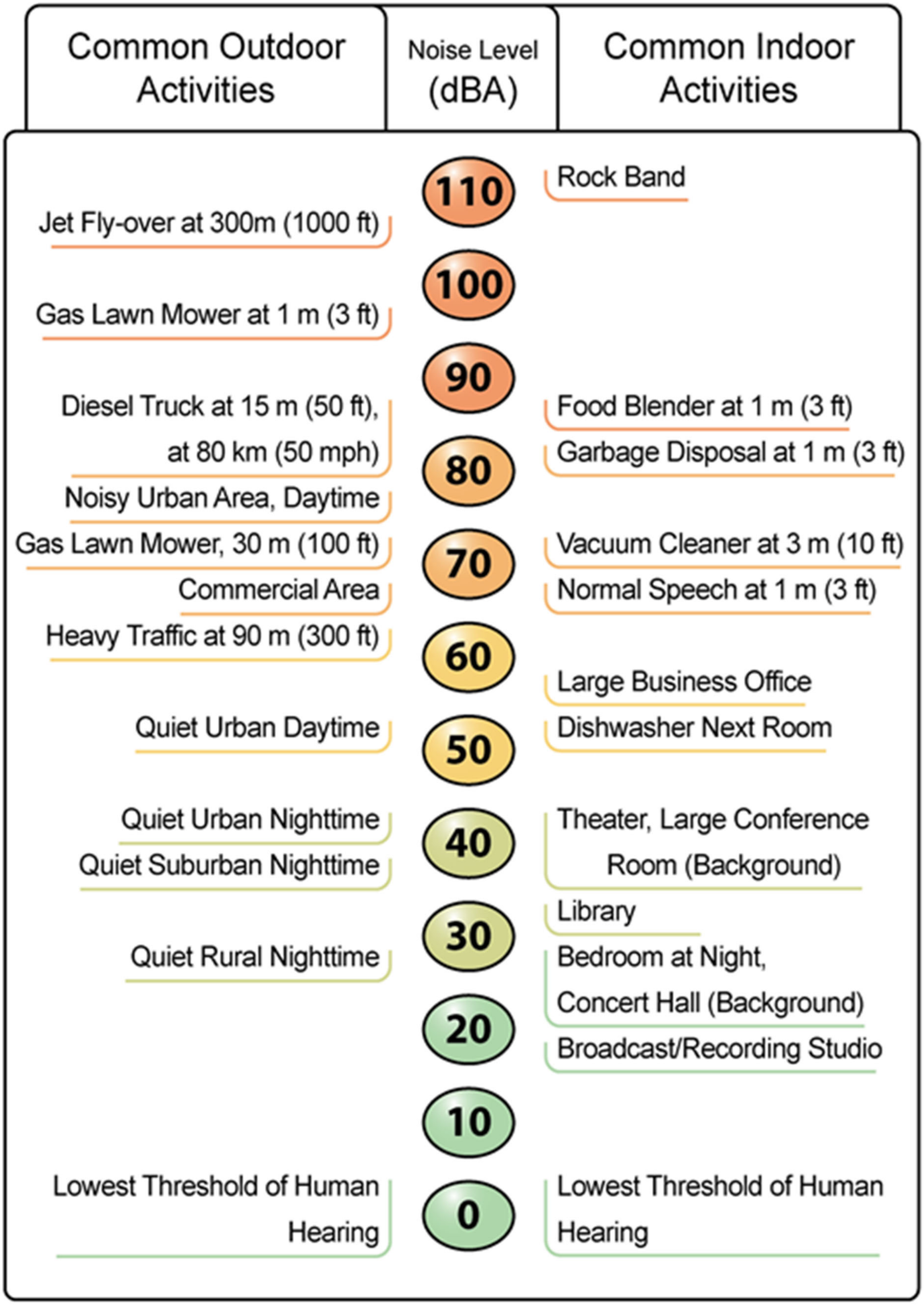
2.0 ENVIRONMENTAL NOISE AND GROUNDBORNE VIBRATION ANALYSIS

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 2-1. *Common Noise Levels*



Source: California Department of Transportation (Caltrans) 2020a

Figure 2-1. Common Noise Levels

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 6 dB (dBA) for each doubling of distance from a stationary or point source (FHWA 2017). 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 3 dBA for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics (Federal Highway Administration [FHWA] 2017). 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 dBA 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 typical 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 noise descriptors most often encountered when dealing with traffic, community, and environmental noise include the average hourly noise level (in L_{eq}) and the average daily noise levels/community noise equivalent level (in L_{dn}/CNEL). The L_{eq} is a measure of ambient noise, while the L_{dn} and CNEL are measures of community noise. Each is applicable to this analysis and defined as follows:

- **Equivalent Noise Level (L_{eq})** 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.
- **Day-Night Average (L_{dn})** is a 24-hour average L_{eq} with a 10-dBA "weighting" added to noise during the hours of 10:00 pm to 7:00 am 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)** is a 24-hour average L_{eq} with a 5-dBA weighting during the hours of 7:00 pm to 10:00 pm and a 10-dBA weighting added to noise during the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the evening and nighttime, respectively.

Table 2-1 provides a list of other common acoustical descriptors.

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 sounds 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

2.1.5.1 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.

2.1.5.2 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.

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.

Table 2-2. Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels

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 2,725 feet from the northeastern corner of Project Site. During construction occurring offsite along the gentie transmission line route to the IID electrical grid line, the nearest sensitive receptors would be 970 feet distant.

3.2 Existing Ambient Noise Environment

The Project Site consists of flat undeveloped land and is bound by agricultural land to the north and east, with various county roads and the IID aqueduct beyond; and vacant undisturbed land to the south and east. The gentie transmission line route connecting to the IID grid transmission line meanders through a mix of agricultural and undeveloped land. The most common noise in the Project vicinity is produced by automotive vehicles (e.g., cars, trucks, buses, motorcycles) traversing SR 78 and the various noises associated with agricultural equipment and vehicles traversing the various county paved and unpaved roadways. 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.

In order to quantify existing ambient noise levels in the Project area, ECORP Consulting, Inc. conducted four short-term noise measurements on July 14^{th}, 2021. The noise measurement sites were representative of typical existing noise exposure within the Project vicinity during the daytime. The 15-minute measurements were taken between 10:00 a.m. and 11:40 a.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 39.6 to 53.3 dBA L_{eq}.

Table 3-1. Existing (Baseline) Noise Measurements					
Location Number	Location	L_{eq} dBA	L_{min} dBA	L_{max} dBA	Time
1	Intersection of Garvey Road and Baughman Road	**53.3**	30.5	73.8	10:56 a.m. - 11:11 a.m.
2	North of Garvey Road and Orr Road Intersection	**39.6**	32.7	51.1	10:30 a.m. – 10:45 a.m.
3	Northwest Corner of Garvey Road and Buck Road Intersection	**50.1**	39.3	64.3	11:25 a.m. – 11:40 a.m.
4	West of Garvey Road on Shoulder, 0.5 Mile South of SR 78	**45.4**	30.6	58.4	10:00 a.m. – 10:15 a.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.

For the remainder of the Project vicinity, the American National Standards Institute (ANSI) Standard 12.9-2013/Part 3 "Quantities and Procedures for Description and Measurement of Environmental Sound – Part 3: Short-Term Measurements with an Observer Present" provides a table of approximate background sound levels in L_{dn}, daytime L_{eq}, and nighttime L_{eq}, based on land use and population density. The ANSI standard estimation divides land uses into six distinct categories. Descriptions of these land use categories, along with the typical daytime and nighttime levels, are provided in Table 3-2. At times, one could reasonably expect the occurrence of periods that are both louder and quieter than the levels listed in the table. ANSI notes, "*95% prediction interval [confidence interval] is on the order of +/- 10 dB*." The majority of the Project vicinity would be considered ambient noise Category 5 or 6.

Table 3-2. ANSI Standard 12.9-2013/Part 3 A-weighted Sound Levels Corresponding to Land Use and Population Density

Category	Land Use	Description	People per Square Mile	Typical L_{dn}	Daytime L_{eq}	Nighttime L_{eq}
1	Noisy Commercial & Industrial Areas and Very Noisy Residential Areas	Very heavy traffic conditions, such as in busy, downtown commercial areas; at intersections for mass transportation or other vehicles, including elevated trains, heavy motor trucks, and other heavy traffic; and at street corners where many motor buses and heavy trucks accelerate.	63,840	67 dBA	66 dBA	58 dBA
2	Moderate Commercial & Industrial Areas and Noisy Residential Areas	Heavy traffic areas with conditions similar to Category 1, but with somewhat less traffic; routes of relatively heavy or fast automobile traffic, but where heavy truck traffic is not extremely dense.	20,000	62 dBA	61 dBA	54 dBA
3	Quiet Commercial, Industrial Areas and Normal Urban & Noisy Suburban Residential Areas	Light traffic conditions where no mass-transportation vehicles and relatively few automobiles and trucks pass, and where these vehicles generally travel at moderate speeds; residential areas and commercial streets, and intersections, with little traffic, compose this category.	6,384	57 dBA	55 dBA	49 dBA
4	Quiet Urban & Normal Suburban Residential Areas	These areas are similar to Category 3, but for this group, the background is either distant traffic or is unidentifiable; typically, the population density is one-third the density of Category 3.	2,000	52 dBA	50 dBA	44 dBA
5	Quiet Residential Areas	These areas are isolated, far from significant sources of sound, and may be situated in shielded areas, such as a small wooded valley.	638	47 dBA	45 dBA	39 dBA
6	Very Quiet Sparse Suburban or rural Residential Areas	These areas are similar to Category 4 but are usually in sparse suburban or rural areas; and, for this group, there are few if any nearby sources of sound.	200	42 dBA	40 dBA	34 dBA

Source: The American National Standards Institute (ANSI) 2013

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.

4.2.2 Federal Interagency Commission on Noise

The 2000 Federal Interagency Commission on Noise (FICON) findings provide guidance as to the significance of changes in ambient noise levels due to transportation noise sources. FICON recommendations are based on studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. FICON's measure of substantial increase for transportation noise exposure is as follows:

- If the existing ambient noise levels at existing noise-sensitive land uses (e.g. residential, etc.) are less than 60 dBA CNEL and the Project creates a readily perceptible 5 dBA CNEL or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels range from 60 to 65 dBA CNEL and the Project creates a barely perceptible 3 dBA CNEL or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels already exceed 65 dBA CNEL, and the Project creates a community noise level increase of greater than 1.5 dBA CNEL.

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.

4.2.3 California Department of Transportation

In 2020, the California Department of Transportation (Caltrans) published the Transportation and Construction Vibration Manual (Caltrans 2020b). The manual provides general guidance on vibration issues associated with the construction and operation of projects concerning human perception and structural damage. Table 2-2 above presents recommendations for levels of vibration that could result in damage to structures exposed to continuous vibration.

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.

Table 4-1 County of Imperial Property Line Noise Standards		
Land Use Zone	**Time Period**	**Average-Hourly Noise Level (dBA L_{eq})**
Residential	7 a.m. - 10 p.m. 10 p.m. - 7 a.m.	50 45
Multi-residential	7 a.m. - 10 p.m. 10 p.m. - 7 a.m.	55 50
Commercial	7 a.m. -10 p.m. 10 p.m. - 7 a.m.	60 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}.

4.3.1.1 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 operations 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.

4.3.1.2 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.

4.3.1.3 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.

In order to evaluate the potential health-related effects (physical damage to the ear and mental damage from lack of sleep or focus) from construction noise, such noise generated by the Project is compared against the construction-related noise level threshold established by the County. 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-hour period and measured at the nearest sensitive receptor. The increase in transportation-related noise is compared to the FICON recommendation for evaluating the impact of increased traffic noise. 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 Noise 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 Would the Project Result in Short-Term Construction-Generated Noise in Excess of County Standards?

Onsite Solar and Battery Storage Facilities 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, pile drivers, 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 one mile of the Project Site boundary to the north; the closest being located 2,725 feet from the northeastern corner of the Project Site Boundary. 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-hour period, and measured at the nearest sensitive receptor. This standard, established by the County to prevent physical and mental damage consistent with exposure to excessive noise, assumes a construction period, relative to an individual sensitive receptor of days or weeks.

The anticipated short-term construction noise levels generated for the necessary construction equipment during the onsite solar and battery storage facility component of the Proposed Project are presented in Table 5-1.

Table 5-1. Construction Average (dBA) Noise Levels at Nearest Receptor – Solar/Battery Storage Facility Component			
Combined Equipment	**Estimated Exterior Construction Noise Level at Existing Residences (dBA L_{eq})**	**Construction Noise Standards (dBA L_{eq})**	**Exceeds Standards?**
Site Preparation	52.9	*75*	**No**
Grading	53.5	*75*	**No**
Construction	53.4	*75*	**No**
Paving	51.8	*75*	**No**

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

Notes: Construction equipment was provided by CalEEMod version 2020.4.0 default values. CalEEMod is designed to calculate air pollutant emissions from construction activity and contains default construction equipment and usage parameters for typical construction projects based on several construction surveys conducted in order to identify such parameters. The nearest residence is located approximately 2,725 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.

Transmission Line Construction Noise

Construction noise associated with the Proposed Project gentie transmission line route 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 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., grading, pole erecting). Noise generated by construction equipment, including earth movers, material handlers, and air compressors, 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 north and east of the transmission line route, with the closest residence located along Garvey Road, approximately

970 feet north of the proposed path. As previously described, the County's General Plan Noise Element states construction equipment operation must 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, must not exceed 75 dB L_{eq}, when averaged over an eight (8) hour period, and measured at the nearest sensitive receptor.

The anticipated short-term construction noise levels generated for the necessary construction equipment during the transmission line gentie route component of the Proposed Project are presented in Table 5-2.

Table 5-2. Construction Average (dBA) Noise Levels at Nearest Receptor – Gentie Transmission Line Component

Combined Equipment	Estimated Exterior Construction Noise Level at Existing Residences (970 feet)	Construction Noise Standards (dBA L_{eq})	Exceeds Standards?
Grading	55.1	*75*	**No**
Construction	65.4	*75*	**No**

Source: Construction noise levels were calculated by ECORP 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 970 distant from the gentie transmission line route.
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 5-2, Project construction will not exceed the significance threshold of 75 dBA at the nearest sensitive receptors during the gentie transmission line route construction. It is noted that the noise levels shown in Table 5-2 are based on a worst-case scenario in which all pieces of construction equipment are operating at the same time, at the highest level of intensity.

5.3.2 Would the Project Result in a Substantial Permanent Increase in Ambient Noise Levels in Excess of County 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.

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 water deliveries, repair or maintenance workers, whose presence at the site would be required 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 on vicinity roadways, 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 an 80 MW solar energy generation and storage facility, with a gentie transmission line route connecting to the IID electrical grid transmission line west of the Project Site. The Proposed Project Site is zoned S-2 (Open Space/Preservation) and bound by agricultural land to the north and east, with further agricultural land beyond. As shown in Table 4-2, a normally acceptable noise standard for agricultural land uses is 69 dBA L_{dn}/CNEL or under. In order to quantify existing ambient noise levels in the Project vicinity, ECORP Consulting, Inc. conducted four baseline noise measurements in the Project vicinity on July 14th, 2021. The noise measurement sites were representative of typical existing noise exposure in the vicinity and were considered representative of the noise levels throughout the day. The ambient noise levels recorded in the vicinity of the Site ranged from 39.6 L_{eq} dBA to 53.3 L_{eq} dBA. However, it is noted that the baseline measurements taken were short-term (15 minutes) and therefore measured in L_{eq}, defined as the average acoustic energy content of noise for a stated period of time, while the compatibility standard listed in Table 4-2 are in L_{dn}/CNEL. As previously described, L_{dn} and CNEL are community exposure noise metrics that are defined as 24-hour average L_{eq} noise measurements with weighting added during the certain nighttime hours to account for the increase noise sensitivity during nighttime. For a comparable representation of the ambient noise levels in the Project vicinity using a community exposure noise metric, the ANSI Standard 12.9-2013/Part 3 "Quantities and Procedures for Description and Measurement of Environmental Sound – Part 3: Short-Term Measurements with an Observer Present" provides a table of approximate background sound levels in L_{dn}, daytime L_{eq}, and nighttime L_{eq}, based on land use and population density (see Table 3-2 above). As previously discussed, the Project vicinity falls within either category 5 or 6 for the ANSI standards, with a typical noise level between 42 dBA and 47 dBA L_{dn}. As these noise levels fall below the noise standard of 69 dBA L_{dn}/CNEL, the Project Site is considered an appropriate noise environment to locate the proposed land use.

Operational Onsite Noise

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 is a single-family residence located 2,725 feet from the northeastern corner of Project Site.

During construction occurring offsite along the gentie transmission line route to the IID electrical grid line, the nearest sensitive receptors would be 970 feet distant.

The Project proposed the construction of an 80 MW solar energy generation facility which would include a 160 MW BESS as well as an electrical gen-tie transmission line. The main stationary operational noise associated with the Project would be from the proposed transformers, inverters, substation, and transmission lines. The main stationary operational noise associated with the offsite gentie transmission lines would be Corona Discharge. Corona is the electrical breakdown of the air into charged particles, which may result in audible noise. During Corona activity, the transmission lines sometimes generate a small amount of sound energy. Audible noise generated by Corona discharge is typically described as a crackling or humming sound. Audible Corona noise levels for a typical 230-kV line are approximately 25 dBA at locations within approximately 25 feet of the power line corridor, or 51.1 dBA at the source (Imperial County 2014). 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 D. Table 5-3 shows the predicted Project noise levels at the nearest noise-sensitive land uses in the Project vicinity, as predicted by SoundPLAN. Also see Figure 3 *SoundPLAN Noise Map*.

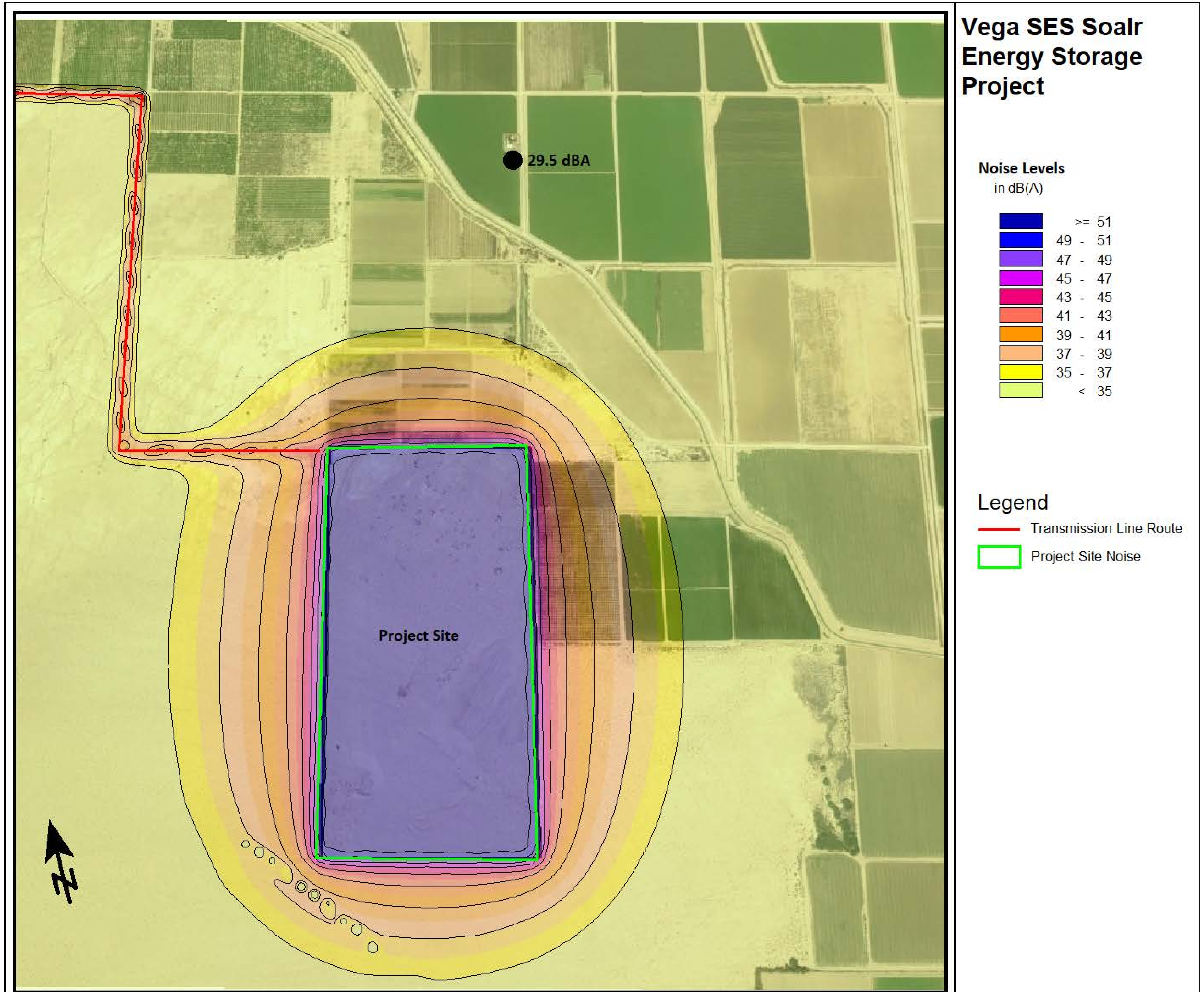
Table 5-3. Modeled Operational Noise Levels at Nearest Sensitive Receptor

Location	Modeled Operational Noise Attributed to Project (L_{eq} dBA)	County Daytime Standard (L_{eq} dB)	County Nighttime Standard (L_{eq} dB)	Exceed Standard?
1) Nearest Residence to Project Site off Buck Road	**29.5**	*50.0*	*45.0*	**No**

Source: Stationary source noise levels were modeled by ECORP using SoundPLAN 3D noise model. Refer to Appendix D 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 solar generation facility in Imperial County. Additionally, a reference measurement of 25 dBA at 25ft, was applied for Corona discharge.

As shown in Table 5-3, Project operational noise would not exceed County daytime or nighttime standards.



Map Date: 1/11/2023
Photo (or Base) Source: *SoundPLAN*

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 5-1. Modeled Operational Noise Levels

2020-145

5.3.3 *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 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 5-4.

Table 5-4. Representative Vibration Source Levels for Construction Equipment

Equipment Type	Peak Particle Velocity at 25 Feet (inches per second)
Large Bulldozer	0.089
Pile Driver	0.170
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 an abandoned building located 1,282 feet from the Proposed Project Site boundary.

Based on the representative vibration levels presented for various construction equipment types in Table 5-4 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:

$$[PPVequip = PPVref \times (25/D)^{1.5}]$$

Table 5-5 presents the expected Project related vibration levels at a distance of 1,282.

Table 5-5. Construction Vibration Levels at 1,282 Feet							
Receiver PPV Levels (in/sec)[1]					**Peak Vibration**	**Threshold**	**Exceed Threshold**
Large Bulldozer, Caisson Drilling, & Hoe Ram	**Loaded Trucks**	**Jackhammer**	**Pile Driver**	**Vibratory Roller**			
0.0002	0.0002	0.0001	0.0004	0.0006	**0.0006**	*0.2*	**No**

Notes: [1]Based on the Vibration Source Levels of Construction Equipment included on Table 5-3 (FTA 2018). Distance to the nearest structure of concern is approximately 1,282 feet measured from Project Site boundary.

As shown in Table 5-5, 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 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 Would the Project Expose People Residing or Working in the Project area to Excessive Airport Noise?

The Project Site is located approximately 12 miles north of the El Centro Airport in El Centro; 10 miles northwest of the O'Connell Brothers Airport in Brawley; and 13 miles southwest of the Calipatria Municipal Airport in Calipatria. 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 the Imperial County Airport Land Use Compatibility Maps, the Proposed Project Site lays outside of the noise contours of all three airports. Thus, the Project would not expose Project workers 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 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 vicinity. 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 water deliveries, repair or maintenance work that would be done 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

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LIST OF ATTACHMENTS

ATTACHMENT A

Baseline Noise Measurements

Site Number: 1			
Recorded By: Lindsay Liegler			
Job Number: 2020-145 Vega SES 6			
Date: 07/14/21			
Time: 10:56 a.m. – 11:11 a.m.			
Location: Intersection of Garvey Road and Baughman Road			
Source of Peak Noise: Dog barking, birds, wind, jet far overhead around 11:03			
Noise Data			
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**	**Peak (dB)**
53.3	30.5	73.8	103.6

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Larson Davis**	**LxT SE**	**0006133**	**02/24/2020**	
	Microphone	**Larson Davis**	**377B02**	**315201**	**02/24/2020**	
	Preamp	**Larson Davis**	**PRMLxT1L**	**069947**	**02/24/2020**	
	Calibrator	**Larson Davis**	**CAL200**	**17325**	**02/25/2020**	

Weather Data			
Est.	**Duration:** 15 minutes		**Sky:** Clear
	Note: dBA Offset = -0.16		**Sensor Height (ft):** 4.5
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**
	10 mph	103	29.85

Photo of Measurement Location

Measurement Report

Report Summary

Meter's File Name	LxT_Data.381.s	Computer's File Name	LxTse_0005120-20210714 105656-LxT_Data.381.ldbin
Meter	LxT SE 0005120		
Firmware	2.404		
User		Location	
Job Description			
Note			

Start Time	2021-07-14 10:56:56	Duration	0:15:00.1		
End Time	2021-07-14 11:11:56	Run Time	0:15:00.1	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	53.3 dB		
LAE	82.8 dB	SEA	--- dB
EA	21.4 µPa²h		
LZ_{peak}	103.6 dB	2021-07-14 11:09:22	
LAS_{max}	73.8 dB	2021-07-14 11:06:04	
LAS_{min}	30.5 dB	2021-07-14 11:02:52	
LA_{eq}	53.3 dB		
LC_{eq}	65.1 dB	LC_{eq} - LA_{eq}	11.8 dB
LAI_{eq}	55.5 dB	LAI_{eq} - LA_{eq}	2.2 dB

Exceedances	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight	
	53.3 dB	53.3 dB	0.0 dB	
	LDEN	LDay	LEve	LNight
	53.3 dB	53.3 dB	--- dB	--- dB

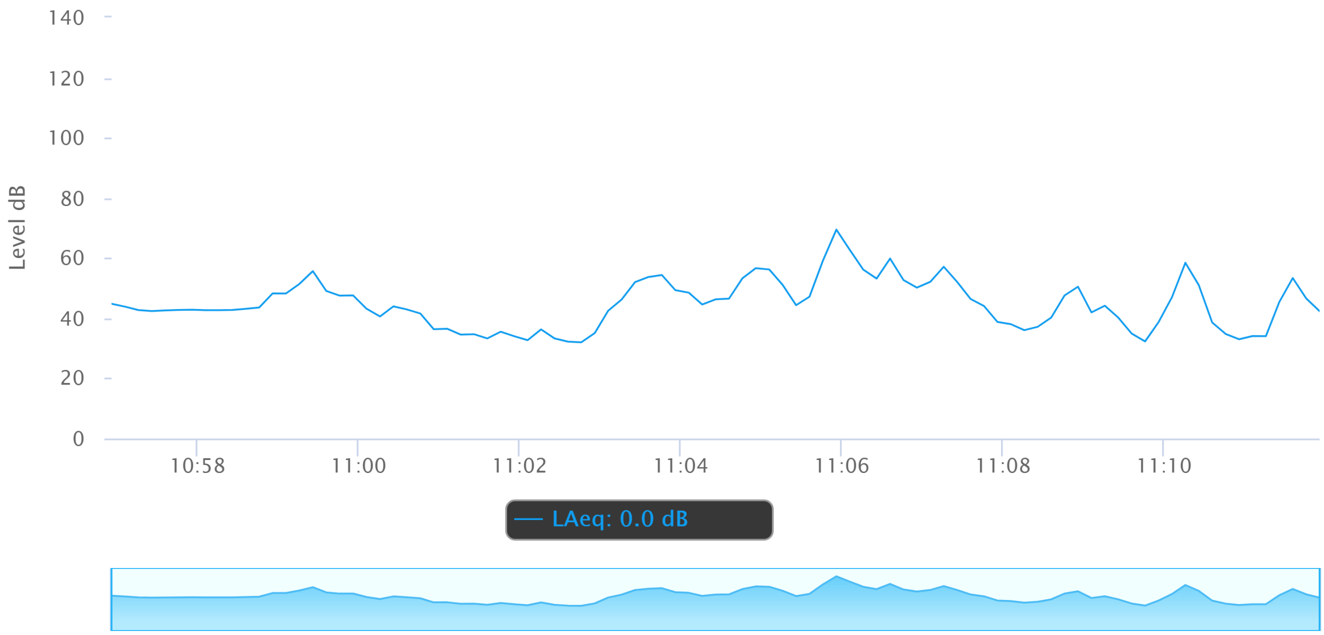
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	53.3 dB		65.1 dB		--- dB	
$Ls_{(max)}$	73.8 dB	2021-07-14 11:06:04	--- dB		--- dB	
$LS_{(min)}$	30.5 dB	2021-07-14 11:02:52	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		103.6 dB	2021-07-14 11:09:22

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	1	0:00:02.4

Statistics

LAS 5.0	58.0 dB
LAS 10.0	55.0 dB
LAS 33.3	47.7 dB
LAS 50.0	43.3 dB
LAS 66.6	41.1 dB
LAS 90.0	33.5 dB

Time History



Site Number: 2			
Recorded By: Lindsay Liegler			
Job Number: 2020-145 Vega SES 6			
Date: 07/14/21			
Time: 10:29 a.m. – 10:44 a.m.			
Location: North of Garvey Road/Orr Road intersection, West shoulder of Garvey Road			
Source of Peak Noise: Birds, insects, wind, jet flying overhead around 10:35			
Noise Data			
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**	**Peak (dB)**
39.6	32.7	51.1	95.9

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Larson Davis**	**LxT SE**	**0006133**	**02/24/2020**	
	Microphone	**Larson Davis**	**377B02**	**315201**	**02/24/2020**	
	Preamp	**Larson Davis**	**PRMLxT1L**	**069947**	**02/24/2020**	
	Calibrator	**Larson Davis**	**CAL200**	**17325**	**02/25/2020**	

Weather Data			
Est.	**Duration:** 15 minutes		**Sky:** Clear
	Note: dBA Offset = -0.16		**Sensor Height (ft):** 4.5
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**
	9 mph	103	29.85

Photo of Measurement Location

Measurement Report

Report Summary

Meter's File Name	LxT_Data.380.s	Computer's File Name	LxTse_0005120-20210714 102953-LxT_Data.380.ldbin
Meter	LxT SE 0005120		
Firmware	2.404		
User		Location	
Job Description			
Note			

Start Time	2021-07-14 10:29:53	Duration	0:16:09.1		
End Time	2021-07-14 10:46:03	Run Time	0:16:09.1	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	39.6 dB		
LAE	69.5 dB	SEA	--- dB
EA	1.0 µPa²h		
LZ_{peak}	95.9 dB	2021-07-14 10:36:59	
LAS_{max}	51.1 dB	2021-07-14 10:29:53	
LAS_{min}	32.7 dB	2021-07-14 10:41:15	
LA_{eq}	39.6 dB		
LC_{eq}	54.0 dB	LC_{eq} - LA_{eq}	14.4 dB
LAI_{eq}	41.5 dB	LAI_{eq} - LA_{eq}	1.8 dB

Exceedances	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight	
	39.6 dB	39.6 dB	0.0 dB	
	LDEN	LDay	LEve	LNight
	39.6 dB	39.6 dB	--- dB	--- dB

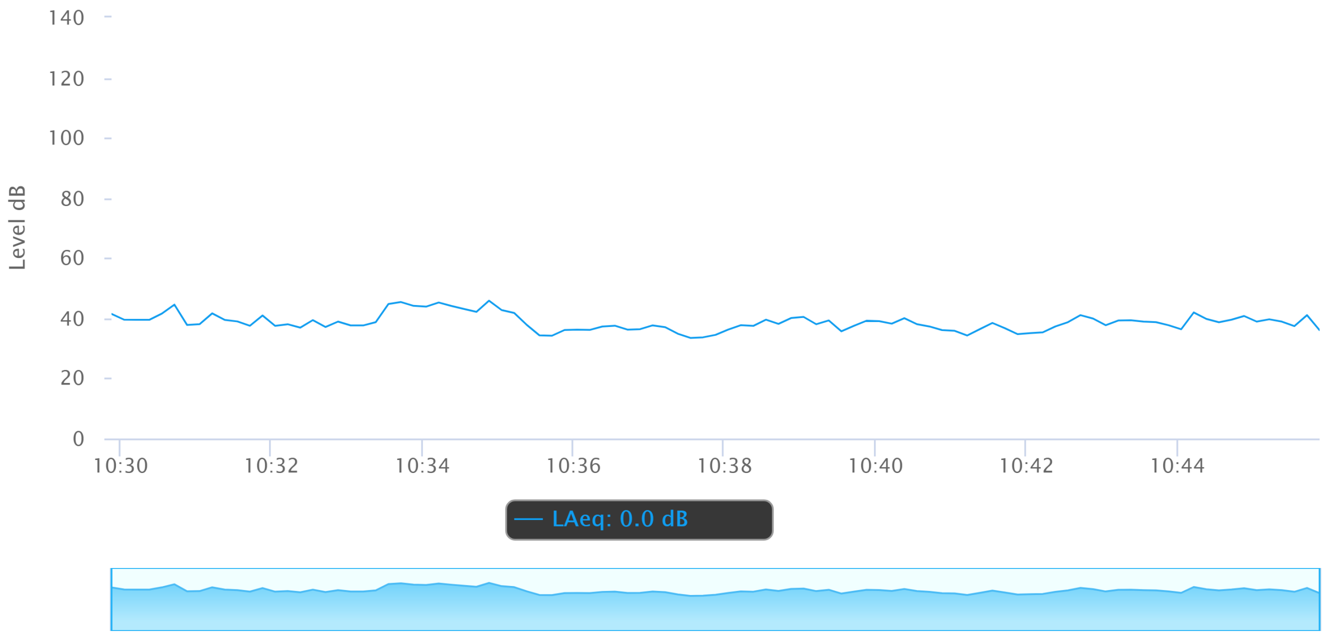
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	39.6 dB		54.0 dB		--- dB	
$Ls_{(max)}$	51.1 dB	2021-07-14 10:29:53	--- dB		--- dB	
$LS_{(min)}$	32.7 dB	2021-07-14 10:41:15	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		95.9 dB	2021-07-14 10:36:59

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

Statistics

LAS 5.0	44.1 dB
LAS 10.0	42.9 dB
LAS 33.3	39.2 dB
LAS 50.0	38.2 dB
LAS 66.6	37.2 dB
LAS 90.0	35.1 dB

Time History



Site Number: 3			
Recorded By: Lindsay Liegler			
Job Number: 2020-145 Vega SES 6			
Date: 07/14/21			
Time: 11:24 a.m. – 11:39 a.m.			
Location: Northwest intersection of Garvey Road and Buck Road			
Source of Peak Noise: Wind, jet flying overhead			
Noise Data			
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**	**Peak (dB)**
50.1	39.3	64.3	100.8

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Larson Davis**	**LxT SE**	**0006133**	**02/24/2020**	
	Microphone	**Larson Davis**	**377B02**	**315201**	**02/24/2020**	
	Preamp	**Larson Davis**	**PRMLxT1L**	**069947**	**02/24/2020**	
	Calibrator	**Larson Davis**	**CAL200**	**17325**	**02/25/2020**	
Weather Data						
Est.	**Duration:** 15 minutes		**Sky:** Clear			
	Note: dBA Offset = -0.16		**Sensor Height (ft):** 4.5			
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**			
	10 mph	103	29.85			

Photo of Measurement Location

Measurement Report

Report Summary

Meter's File Name	LxT_Data.382.s	Computer's File Name	LxTse_0005120-20210714 112506-LxT_Data.382.ldbin
Meter	LxT SE 0005120		
Firmware	2.404		
User		Location	
Job Description			
Note			

Start Time	2021-07-14 11:25:06	Duration	0:15:06.3		
End Time	2021-07-14 11:40:13	Run Time	0:15:06.3	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	50.1 dB		
LAE	79.7 dB	SEA	--- dB
EA	10.3 µPa²h		
LZ_{peak}	100.8 dB	2021-07-14 11:38:46	
LAS_{max}	64.3 dB	2021-07-14 11:30:54	
LAS_{min}	39.3 dB	2021-07-14 11:32:20	
LA_{eq}	50.1 dB		
LC_{eq}	67.2 dB	LC_{eq} - LA_{eq}	17.1 dB
LAI_{eq}	52.7 dB	LAI_{eq} - LA_{eq}	2.6 dB

Exceedances

Exceedances	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise

	LDN	LDay	LNight	
	50.1 dB	50.1 dB	0.0 dB	
	LDEN	**LDay**	**LEve**	**LNight**
	50.1 dB	50.1 dB	--- dB	--- dB

Any Data

Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	50.1 dB		67.2 dB		--- dB	
$Ls_{(max)}$	64.3 dB	2021-07-14 11:30:54	--- dB		--- dB	
$LS_{(min)}$	39.3 dB	2021-07-14 11:32:20	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		100.8 dB	2021-07-14 11:38:46

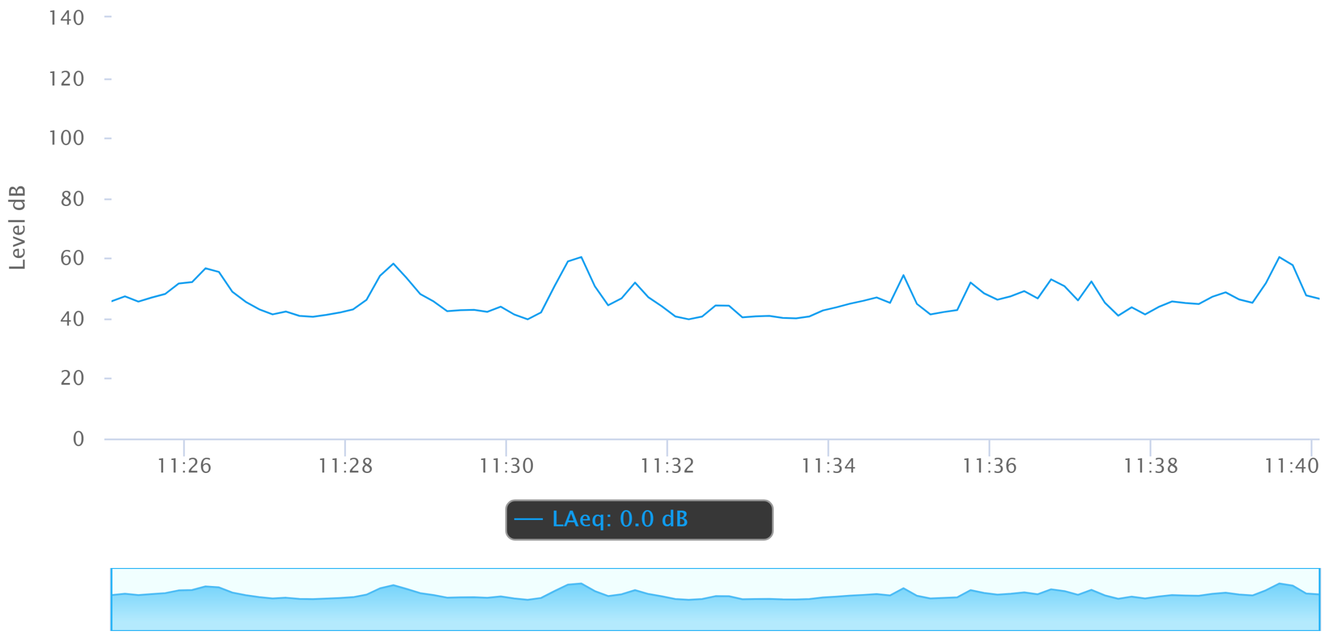
Overloads

Count	Duration	OBA Count	OBA Duration
0	0:00:00.0	3	0:00:06.2

Statistics

LAS 5.0	57.1 dB
LAS 10.0	53.8 dB
LAS 33.3	46.9 dB
LAS 50.0	44.8 dB
LAS 66.6	42.7 dB
LAS 90.0	40.5 dB

Time History



Site Number: 4			
Recorded By: Lindsay Liegler			
Job Number: 2020-145 Vega SES 6			
Date: 07/14/21			
Time: 10:01 a.m. – 10:16 a.m.			
Location: West of Garvey Road on shoulder; 0.5 miles south of SR 78/86			
Source of Peak Noise: Birds, insects, farm workers talking in distance			
Noise Data			
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**	**Peak (dB)**
45.4	30.6	58.4	91.4

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Larson Davis**	**LxT SE**	**0006133**	**02/24/2020**	
	Microphone	**Larson Davis**	**377B02**	**315201**	**02/24/2020**	
	Preamp	**Larson Davis**	**PRMLxT1L**	**069947**	**02/24/2020**	
	Calibrator	**Larson Davis**	**CAL200**	**17325**	**02/25/2020**	

Weather Data			
Est.	**Duration:** 15 minutes		**Sky:** Clear
	Note: dBA Offset = -0.16		**Sensor Height (ft):** 4.5
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**
	9 mph	103	29.85

Photo of Measurement Location

Measurement Report

Report Summary

Meter's File Name	LxT_Data.379.s	Computer's File Name	LxTse_0005120-20210714 100012-LxT_Data.379.ldbin
Meter	LxT SE 0005120		
Firmware	2.404		
User		Location	
Job Description			
Note			

Start Time	2021-07-14 10:00:12	Duration	0:15:00.4		
End Time	2021-07-14 10:15:13	Run Time	0:15:00.4	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	45.4 dB		
LAE	75.0 dB	SEA	--- dB
EA	3.5 µPa²h		
LZ_{peak}	91.4 dB	2021-07-14 10:14:05	
LAS_{max}	58.4 dB	2021-07-14 10:07:17	
LAS_{min}	30.6 dB	2021-07-14 10:03:04	
LA_{eq}	45.4 dB		
LC_{eq}	55.5 dB	LC_{eq} - LA_{eq}	10.1 dB
LAI_{eq}	48.6 dB	LAI_{eq} - LA_{eq}	3.2 dB

Exceedances

Exceedances	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise

LDN	LDay	LNight	
45.4 dB	45.4 dB	0.0 dB	
LDEN	**LDay**	**LEve**	**LNight**
45.4 dB	45.4 dB	--- dB	--- dB

Any Data

	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	45.4 dB		55.5 dB		--- dB	
$Ls_{(max)}$	58.4 dB	2021-07-14 10:07:17	--- dB		--- dB	
$LS_{(min)}$	30.6 dB	2021-07-14 10:03:04	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		91.4 dB	2021-07-14 10:14:05

Overloads

Count	Duration	OBA Count	OBA Duration
0	0:00:00.0	0	0:00:00.0

Statistics

LAS 5.0	52.1 dB
LAS 10.0	51.3 dB
LAS 33.3	40.3 dB
LAS 50.0	37.7 dB
LAS 66.6	35.7 dB
LAS 90.0	33.9 dB

ATTACHMENT B

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

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 1/12/2023
Case Description: VEGA SES 6 - Site Prep

Description	**Land Use**
Residential	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Dozer	No	40		81.7	2725
Dozer	No	40		81.7	2725
Dozer	No	40		81.7	2725
Tractor	No	40	84		2725
Tractor	No	40	84		2725
Tractor	No	40	84		2725
Tractor	No	40	84		2725

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Dozer		46.9	43
Dozer		46.9	43
Dozer		46.9	43
Tractor		49.3	45.3
Tractor		49.3	45.3
Tractor		49.3	45.3
Tractor		49.3	45.3
	Total	**49.3**	**52.9**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 1/12/2023
Case Description: VEGA SES 6 - Grading

Description	**Land Use**
Project Site Grading	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Excavator	No	40		80.7	2725
Excavator	No	40		80.7	2725
Grader	No	40	85		2725
Dozer	No	40		81.7	2725
Tractor	No	40	84		2725
Tractor	No	40	84		2725
Scraper	No	40		83.6	2725
Scraper	No	40		83.6	2725

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Excavator		46	42
Excavator		46	42
Grader		50.3	46.3
Dozer		46.9	43
Tractor		49.3	45.3
Tractor		49.3	45.3
Scraper		48.9	44.9
Scraper		48.9	44.9
	Total	**50.3**	**53.5**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 1/12/2023
Case Description: VEGA SES 6 - Building Construction

Description	**Land Use**
Project Site Building Construction	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Crane	No	16		80.6	2725
Gradall	No	40		83.4	2725
Gradall	No	40		83.4	2725
Gradall	No	40		83.4	2725
Generator	No	50		80.6	2725
Tractor	No	40	84		2725
Tractor	No	40	84		2725
Tractor	No	40	84		2725
Welder / Torch	No	40		74	2725

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Crane		45.8	37.9
Gradall		48.7	44.7
Gradall		48.7	44.7
Gradall		48.7	44.7
Generator		45.9	42.9
Tractor		49.3	45.3
Tractor		49.3	45.3
Tractor		49.3	45.3
Welder / Torch		39.3	35.3
	Total	**49.3**	**53.4**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 1/12/2023
Case Description: VEGA SES 6 - Paving

Description	Land Use
Residential	Residential

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)
Paver	No	50		77.2	2725
Paver	No	50		77.2	2725
Pavement Scarafier	No	20		89.5	2725
Pavement Scarafier	No	20		89.5	2725
Roller	No	20		80	2725
Roller	No	20		80	2725

Calculated (dBA)

Equipment	*Lmax	Leq
Paver	42.5	39.5
Paver	42.5	39.5
Pavement Scarafier	54.8	47.8
Pavement Scarafier	54.8	47.8
Roller	45.3	38.3
Roller	45.3	38.3
Total	**54.8**	**51.8**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/30/2022
Case Description: Vega SES 6 - Gentie Grading

Description	**Land Use**
Grading	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Flat Bed Truck	No	40		74.3	970
Flat Bed Truck	No	40		74.3	970
Drill Rig Truck	No	20		79.1	970
Crane	No	16		80.6	970
Front End Loader	No	40		79.1	970
Front End Loader	No	40		79.1	970

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Flat Bed Truck		48.5	44.5
Flat Bed Truck		48.5	44.5
Drill Rig Truck		53.4	46.4
Crane		54.8	46.8
Front End Loader		53.4	49.4
Front End Loader		53.4	49.4
	Total	**54.8**	**55.1**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/30/2022
Case Description: Vega SES 6 - Gentie Construction

Description	**Land Use**
Construction	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Compressor (air)	No	40		77.7	970
Compressor (air)	No	40		77.7	970
Drill Rig Truck	No	20		79.1	970
Flat Bed Truck	No	40		74.3	970
Flat Bed Truck	No	40		74.3	970
Flat Bed Truck	No	40		74.3	970
Flat Bed Truck	No	40		74.3	970
Flat Bed Truck	No	40		74.3	970
Flat Bed Truck	No	40		74.3	970
Flat Bed Truck	No	40		74.3	970
Flat Bed Truck	No	40		74.3	970
Flat Bed Truck	No	40		74.3	970
Crane	No	16		80.6	970
All Other Equipment > 5 HP	No	50	85		970
All Other Equipment > 5 HP	No	50	85		970
All Other Equipment > 5 HP	No	50	85		970
All Other Equipment > 5 HP	No	50	85		970
Gradall	No	40		83.4	970
Front End Loader	No	40		79.1	970
Tractor	No	40	84		970
Tractor	No	40	84		970

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Compressor (air)	51.9	47.9
Compressor (air)	51.9	47.9
Drill Rig Truck	53.4	46.4
Flat Bed Truck	48.5	44.5
Flat Bed Truck	48.5	44.5
Flat Bed Truck	48.5	44.5
Flat Bed Truck	48.5	44.5
Flat Bed Truck	48.5	44.5

Flat Bed Truck	48.5	44.5
Flat Bed Truck	48.5	44.5
Flat Bed Truck	48.5	44.5
Flat Bed Truck	48.5	44.5
Crane	54.8	46.8
All Other Equipment > 5 HP	59.2	56.2
All Other Equipment > 5 HP	59.2	56.2
All Other Equipment > 5 HP	59.2	56.2
All Other Equipment > 5 HP	59.2	56.2
Gradall	57.6	53.7
Front End Loader	53.4	49.4
Tractor	58.2	54.3
Tractor	58.2	54.3
Total	**59.2**	**65.4**

*Calculated Lmax is the Loudest value.

ATTACHMENT C

SoundPLAN 3-D Model Outputs – Onsite Project Noise

SoundPLAN
Output Source Information

Project Operational Noise levels

Number	Reciever Name	Floor	Level at Receiver
1	Nearest Residence to Project Site off Buck Road	Ground Floor	29.5 dBA
Number	**Noise Source Information**	**Citation**	**Level at Source**
1	Project Site Solar Facility	ECORP reference noise measurement	47.1
2	Corona Discharge	Seville Solar Farm Complex Draft Environmental Impact Report	25 dBA @ 25ft distant