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Appendix 3.7A
Noise Technical Report

Noise Technical Report

Potentia-Viridi Battery Energy Storage System Project

Alameda County, CA

JULY 2024

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
ADT	Average Daily Traffic
AN	audible noise
APN	Assessor Parcel Number
BESS	Battery Energy Storage System
Caltrans	California Department of Transportation
CEC	California Energy Commission
CEQA	California Environmental Quality Act
County	Alameda County
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
FICON	Federal Interagency Committee on Noise
FTA	Federal Transit Administration
gen-tie	generation-tie lines
ips	inches per second
ISO	International Organization for Standardization
L_{dn}	day–night average noise level
L_{eq}	equivalent noise level
L_{eq}(h)	equivalent noise level during a 1-hour period
L_{max}	maximum sound level
L_{min}	minimum sound level
L_{90}	sound level exceeded 90% of the time during measurement
LA_{eq}	A-weighted equivalent noise level
LT	long-term
MW	megawatt
OCBF	octave-band center frequency
OPR	California Governor's Office of Planning and Research
PCE	Passenger Car Equivalent
PCS	power conversion systems
POCO	Point of Change of Ownership
PPV	peak particle velocity
PWL	sound power level
RCNM	Roadway Construction Noise Model
RMS	root mean square
Potentia-Viridi Battery Energy Storage Project	Proposed Project
SLM	sound level meter
SPL	sound pressure level
ST	short-term
U.S. DOT	United States Department of Transportation

1 Introduction

1.1 Report Purpose and Scope

The purpose of this technical report is to assess potential noise and vibration impacts associated with construction and operation of the Potentia Viridi Energy Storage Project (Project). This analysis uses the significance thresholds in Appendix G of the California Environmental Quality Act (CEQA) Guidelines (14 CCR 15000 et seq.) and other applicable thresholds of significance.

1.2 Regional and Local Setting

The proposed Project is located in Alameda County, California and has been sited within Assessor Parcel Number (APN) 99B-7890-002-04 located at 17257 Patterson Pass Road, southwest of Interstate 580 and Interstate 205 (Figure 1 – Project Location). Development of the BESS facility would occur on about 70 acres of APN 99B-7890-002-04, which is currently comprised of fallowed annual grasslands suitable for grazing. The gen-tie line would extend southeast from the Project substation, crossing Patterson Pass Rd, and then proceed east to the Point of Interconnection (POI) at the Tesla Substation. The Project's gen-tie line would be sited on APNs 99B-7890-2-4, 99B-7890-2-6, and 99B-7885-12. Land uses in the immediate vicinity of the Project include undeveloped rural agricultural lands, multiple high-voltage transmission lines and electrical substations, rural roads, and railroad lines. The nearest municipality to the Project site is the City of Tracy approximately 2.5 miles to the northeast. There are a few single-family residences near the Tesla Substation's southern and eastern boundaries. The nearest residence is about 1,500 feet southeast of the Project site and 560 feet south of the proposed gen-tie line; it is owned by the same landowner leasing the lands for the Project. (Figure 2 – Project Area). The next closest residence is approximately 3,500 feet east of the project site and 2,300 feet east of the proposed gen-tie line.

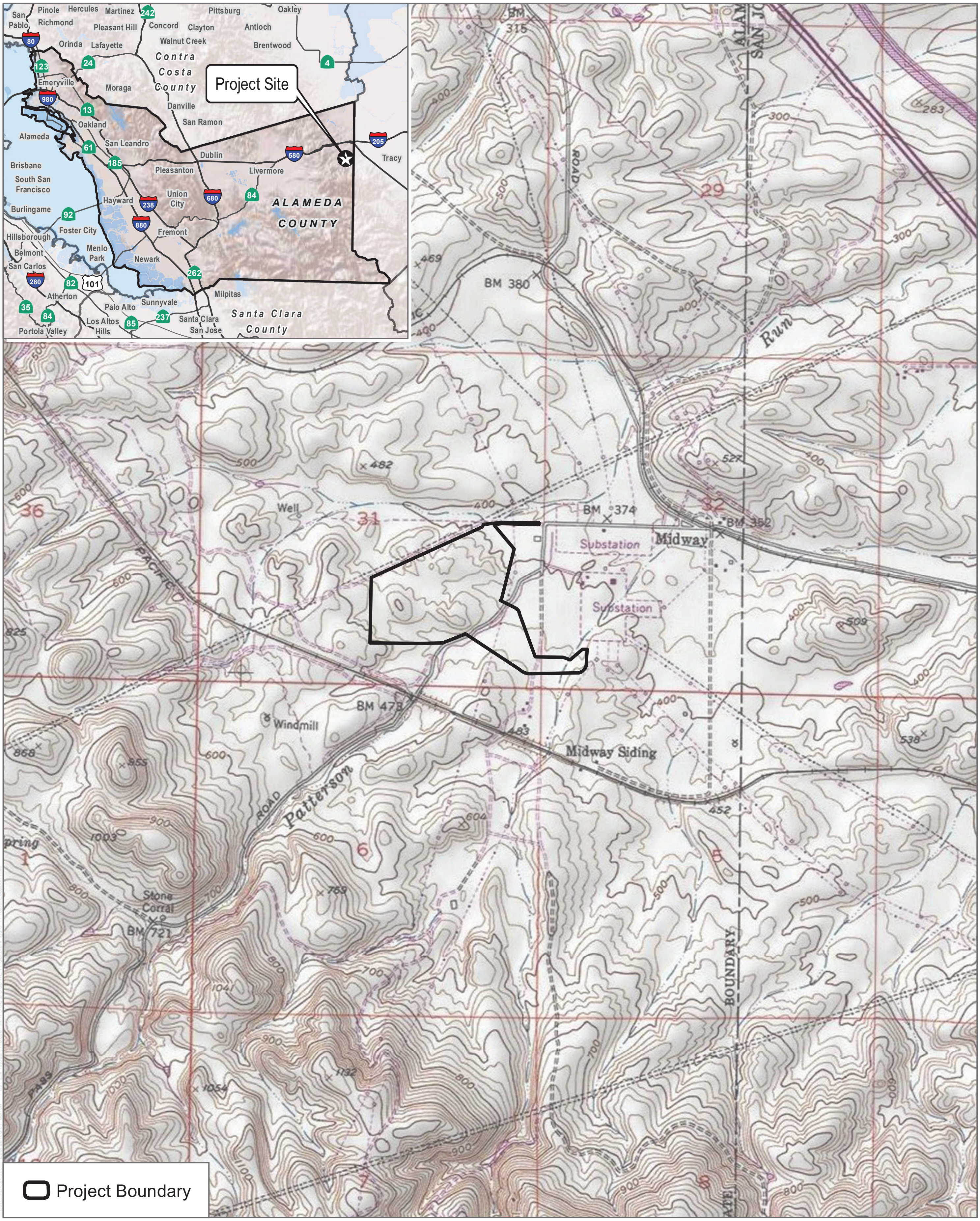
The Project location was selected due to it being large enough to support development of the Project, its close proximity to existing electrical infrastructure and the Tesla Substation, thereby minimizing length of the proposed gen-tie line to the POI, and because it is located immediately adjacent to existing roadways for construction and O&M access.

1.3 Project Description

The Project would include construction, O&M, and eventual decommissioning of a 400 MW BESS with an energy storage capacity up to 3,200 MWhs. Charging from or discharging to the electrical grid would be a 500kV gen-tie connecting the project substation to the POI within the existing PG&E Tesla Substation. The BESS Facility would include the following components:

- Battery Energy Storage System (BESS) Enclosures
- Power Conversion Systems (PCS)
- Medium voltage (MV) Collection System
- Project Substation, Control Building, and Telecommunications Facilities

- Access Roads
- Laydown Yards
- Stormwater Facilities and Outfall
- Site Security and Fencing, including fire detection system
- Operations and Maintenance Building



SOURCE: USGS 7.5 min Midway Quadrangle

FIGURE 1

Project Location

Potentia-Viridi BESS Project

DUDEK

0 1,000 2,000 Feet

SOURCE: Bing Maps (accessed 2023); Open Streets Map 2019

DUDEK

0 200 400 Feet

FIGURE 2

Project Area

Potentia-Viridi BESS Project

2 Environmental Setting

Due to the technical nature of noise and vibration impact assessment, a brief overview of basic noise principles and descriptors is provided below.

2.1 Fundamentals of Noise and Vibration

The following is a brief discussion of fundamental noise concepts and terminology.

2.1.1 Sound, Noise, and Acoustics

Sound is a process that consists of three components: the sound source, sound path, and sound receiver. All three components must be present for sound to exist. Without a source to produce sound, there is no sound. Similarly, without a medium to transmit sound pressure waves, there is no sound. Finally, sound must be received; a hearing organ, sensor, or object must be present to perceive, register, or be affected by sound or noise. In most situations, there are many different sound sources, paths, and receptors rather than just one of each. Acoustics is the field of science that deals with the production, propagation, reception, effects, and control of sound. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired.

2.1.2 Sound Pressure Levels and Decibels

The amplitude of a sound determines its loudness. Loudness of sound increases with increasing amplitude. Sound pressure amplitude is measured in units of micronewton per square meter, also called micropascal. One micropascal is approximately one-hundred billionth (0.00000000001) of normal atmospheric pressure. The pressure of a very loud sound may be 200 million micropascals, or 10 million times the pressure of the weakest audible sound. Because expressing sound levels in terms of micropascal would be very cumbersome, sound pressure level in logarithmic units is used instead to describe the ratio of actual sound pressure to a reference pressure squared. These units are called Bels. To provide a finer resolution, a Bel is subdivided into 10 decibels (dB).

2.1.3 A-Weighted Sound Level

Sound pressure level alone is not a reliable indicator of loudness. The frequency, or pitch, of a sound also has a substantial effect on how humans will respond. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness, or human response, is determined by the characteristics of the human ear.

Human hearing is limited not only in the range of audible frequencies, but also in the way it perceives the sound in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 and 5,000 hertz, and it perceives a sound within that range as more intense than a sound of higher or lower frequency with the same magnitude. To approximate the frequency response of the human ear, a series of sound level adjustments is usually applied to the sound measured by a sound level meter. The adjustments (referred to as a weighting network) are frequency dependent.

The A-scale weighting network approximates the frequency response of the average young ear when listening to ordinary sounds. When people make judgments about the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special situations (e.g., B-scale, C-scale, D-scale), but these scales are rarely used in conjunction with most environmental noise. Noise levels are typically reported in terms of A-weighted sound levels. All sound levels discussed in this report are A-weighted decibels (dBA). Examples of typical noise levels for common indoor and outdoor activities are depicted in Table 1.

Table 1. Typical Sound Levels in the Environment and Industry

Common Outdoor Activities	Noise Level (dB)	Common Indoor Activities
Diesel truck at 15 meters (50 feet), at 80 kilometers per hour (50 miles per hour)	80	Food blender at 1 meter (3 feet); garbage disposal at 1 meter (3 feet)
Noisy urban area, daytime; gas lawn mower at 30 meters (100 feet)	70	Vacuum cleaner at 3 meters (10 feet)
Commercial area; heavy traffic at 90 meters (300 feet)	60	Normal speech at 1 meter (3 feet)
Quiet urban, daytime	50	Large business office; dishwasher next room
Quiet urban, nighttime	40	Theater; large conference room (background)
Quiet suburban, nighttime	30	Library
Quiet rural, nighttime	20	Bedroom at night; concert hall (background)
Lowest threshold of human hearing	0	Lowest threshold of human hearing

Source: Caltrans 2013.

2.1.4 Human Response to Changes in Noise Levels

Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern changes in sound levels of 1 dBA when exposed to steady, single-frequency signals in the mid-frequency range. But for outdoor conditions, a change of 3 dB is considered “barely perceptible” (Caltrans 2013). Since a doubling of sound energy results in a 3 dB increase in sound, this means that a doubling of sound energy (e.g., doubling the volume of traffic on a road) would result in a barely perceptible change in sound level. A change of 5 dBA is readily perceptible, and a change of 10 dBA is perceived as twice (if a gain) or half (if a loss) as loud (Caltrans 2013).

2.1.5 Noise Descriptors

Units of measure have been developed to evaluate the long-term characteristics of sound. The energy-equivalent sound level (L_{eq}) is also referred to as the time-average sound level. It is the equivalent steady-state or constant sound level that in a stated period of time would contain the same acoustical energy as the time-varying sound level during the same time period. For instance, the 1-hour A-weighted equivalent sound level, L_{eq}(h), is the energy average of the A-weighted sound levels occurring during a 1-hour period.

People are generally more sensitive to and thus potentially more annoyed by noise occurring during the evening and nighttime hours. Hence, another noise descriptor used in community noise assessments—the community noise equivalent level (CNEL)—represents a time-weighted, 24-hour average noise level based on the A-weighted sound level. However, unlike an unmodified 24-hour L_{eq} value, the CNEL descriptor accounts for increased noise sensitivity during the evening (7 p.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) by adding 5 dBA and 10 dBA, respectively, to the average sound levels occurring during these defined hours within a 24-hour period.

2.1.6 Sound Propagation

Sound propagation (i.e., the traverse of sound from a noise emission source position to a receiver location) is influenced by multiple factors that include geometric spreading, ground absorption, atmospheric effects, and occlusion by natural terrain and/or features of the built environment.

Sound levels attenuate (or diminish) geometrically at a rate of approximately 6 dBA per doubling of distance from an outdoor point-type source due to the spherical spreading of sound energy with increasing distance travelled. The effects of atmospheric conditions such as humidity, temperature, and wind gradients are typically distance-dependent and can also temporarily either increase or decrease sound levels measured or perceived at a receptor location. In general, the greater the distance the receiver is from the source of sound emission, the greater the potential for variation in sound levels at the receptor due to these atmospheric effects. Additional attenuation can result from sound path occlusion and diffraction due to intervention of natural (ridgelines, dense forests, etc.) and built features (such as solid walls, buildings and other structures).

2.1.7 Groundborne Vibration Fundamentals

Groundborne vibration is fluctuating or oscillatory motion transmitted through the ground mass (i.e., soils, clays, and rock strata). The strength of groundborne vibration attenuates rapidly over distance. Some soil types transmit vibration quite efficiently; other types (primarily sandy soils) do not. Several basic measurement units are commonly used to describe the intensity of ground vibration. The descriptors used by the Federal Transit Administration (FTA) include peak particle velocity (PPV) that is in units of inches per second (ips). The calculation to determine PPV at a given distance is as follows:

$$PPV_{distance} = PPV_{ref}*(25/D)^{1.1}$$

Where:

$PPV_{distance}$ = the peak particle velocity in inches per second of the equipment adjusted for distance

PPV_{ref} = the reference vibration level in inches per second at 25 feet

D = the distance from the equipment to the receiver

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3 Regulatory Setting

3.1 Federal

3.1.1 Federal Transit Administration

In its Transit Noise and Vibration Impact Assessment guidance manual, the Federal Transit Administration (FTA) recommends a daytime construction noise level threshold of 80 dBA L_{eq} over an 8-hour period (FTA 2018) when detailed construction noise assessments are performed to evaluate potential impacts to community residences surrounding a project. Although this FTA guidance is not a regulation, it can serve as a quantified standard in the absence of such noise limits at the state and local jurisdictional levels.

3.1.2 Federal Interagency Committee on Noise

Some guidance regarding the determination of a substantial permanent increase in ambient noise levels in the project vicinity above existing levels is provided by the 1992 findings of the Federal Interagency Committee on Noise (FICON 1992), which assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The FICON recommendations are based upon studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a qualitative measure of the adverse reaction of people to noise that generates speech interference, sleep disturbance, or interference with the desire for a tranquil environment.

The rationale for the FICON recommendations is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of L_{dn}. The changes in noise exposure that are shown below are expected to result in equal changes in annoyance at sensitive land uses. Although the FICON recommendations were specifically developed to address aircraft noise impacts, they are used in this analysis to define a substantial increase in community noise levels related to all transportation noise sources and permanent non-transportation noise sources.

- Outdoor ambient sound level without the project is less than 60 dBA L_{dn}, then a project-attributed increase of 5 dBA or more would be considered significant;

- Outdoor ambient sound level without the project is between 60 and 65 dBA L_{dn}, project-attributed increase of 3 dBA or more would be considered significant; and

- Outdoor ambient sound level without the project is greater than 65 dBA L_{dn}, then project-attributed increase of 1.5 dBA or more would be considered significant.

3.2 State

3.2.1 California Department of Health Services Guidelines

The California Department of Health Services has developed guidelines of community noise acceptability for use by local agencies (OPR 2017). Selected relevant levels are listed here:

- Below 60 dBA CNEL: normally acceptable for low-density residential use
- 50 to 70 dBA: conditionally acceptable for low-density residential use
- Below 65 dBA CNEL: normally acceptable for high-density residential use and transient lodging
- 60 to 70 dBA CNEL: conditionally acceptable for high-density residential, transient lodging, churches, educational, and medical facilities.

3.2.2 California Department of Transportation

In its Transportation and Construction Vibration Guidance Manual (Caltrans 2013), the California Department of Transportation (Caltrans) recommends 0.5 ips PPV as a threshold for the avoidance of structural damage to typical newer residential buildings exposed to continuous or frequent intermittent sources of groundborne vibration. For transient vibration events, such as blasting, the damage risk threshold would be 1.0 ips PPV (Caltrans 2013) at the same type of newer residential structures. For older structures, these guidance thresholds would be more stringent: 0.3 ips PPV for continuous/intermittent vibration sources, and 0.5 ips PPV for transient vibration events. With respect to human annoyance, Caltrans guidance indicates that building occupants exposed to continuous groundborne vibration above 0.2 ips PPV would find it “annoying” and thus a likely significant impact. Although these Caltrans guidance thresholds are not regulations, they can serve as quantified standards in the absence of such limits at the local jurisdictional level.

3.2.3 California Energy Commission

In its California Code of Regulations, Title 20. Public Utilities and Energy, Division 2. State Energy Resources Conservation and Development Commission Appendix B Information Requirements for an Application (g) (4) Noise (CEC July 2021), the California Energy Commission (CEC) requires the following information be submitted for noise when an energy project is being proposed:

> (A) A land use map which identifies residences, hospitals, libraries, schools, places of worship, or other facilities where quiet is an important attribute of the environment within the area impacted by the proposed project. The area potentially impacted by the proposed project is that area where, during either construction or operation, there is a potential increase of 5 dB(A) or more, over existing background levels.
>
> (B) A description of the ambient noise levels at those sites identified under subsection (g)(4)(A) which the applicant believes provide a representative characterization of the ambient noise levels in the project vicinity, and a discussion of the general atmospheric conditions, including temperature, humidity, and the presence of wind and rain at the time of the measurements. The existing noise levels shall be determined by taking noise measurements for a minimum of 25 consecutive hours at a minimum of one site. Other sites may be monitored for a lesser duration at the applicant's discretion, preferably during the same 25-hour period. The results of the noise level measurements shall be reported as hourly averages in L_{eq}

(equivalent sound or noise level), L_{dn} (day-night sound or noise level) or CNEL (Community Noise Equivalent Level) in units of dB(A). The L_{10}, L_{50}, and L_{90} values (noise levels exceeded 10 percent, 50 percent, and 90 percent of the time, respectively) shall also be reported in units of dB(A).

(C) A description of the major noise sources of the project, including the range of noise levels and the tonal and frequency characteristics of the noise emitted.

(D) An estimate of the project noise levels, during both construction and operation, at residences, hospitals, libraries, schools, places of worship, or other facilities where quiet is an important attribute of the environment, within the area impacted by the proposed project.

(E) An estimate of the project noise levels within the project site boundary during both construction and operation and the impact to the workers at the site due to the estimated noise levels.

(F) The audible noise from existing switchyards and overhead transmission lines that would be affected by the project, and estimates of the future audible noise levels that would result from existing and proposed switchyards and transmission lines. Noise levels shall be calculated at the property boundary for switchyards and at the edge of the rights-of-way for transmission lines.

3.3 Local

3.3.1 County of Alameda

3.3.1.1 Alameda County General Plan – East County Area Plan

The County's General Plan contains an East County-specific Area Plan that contains a goal and policies related to noise control, establishes noise and land use compatibility standards, and outlines goals and policies to achieve these standards. The following excerpts from the East County Area Plan are relevant to the project:

Goal: To minimize East County residents' and workers' exposure to excessive noise.

Policy 288: The County shall endeavor to maintain acceptable noise levels throughout East County.

3.3.1.2 Alameda County, Noise Ordinance

Chapter 6.60, Noise, of the County Code of Ordinances establishes prohibitions for disturbing, excessive, or offensive noise as well as provisions such as sound level limits for the purpose of securing and promoting the public health, comfort, safety, peace, and quiet for its citizens. Planned compliance with sound level limits and other specific parts of the ordinance allows presumption that the noise is not disturbing, excessive, or offensive. Limits are specified depending on the zoning placed on a property (e.g., varying densities and intensities of residential, industrial, and commercial zones).

The following excerpts summarized from the Noise Ordinance are relevant to the project:

Section 6.60.040 – Exterior noise level standards.

A. It is unlawful for any person at any location within the unincorporated area of the county to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the exterior noise level when measured at any single- or multiple-family residential, school, hospital, church, public library… situated in either the incorporated or unincorporated area to exceed the noise level standards as set forth in Table 2 below:

Table 2. Alameda County Noise Level Standards

Receiving Land Use – Single or Multiple-Family Residential, School, Hospital, Church or Public Library Properties (dBA)			
Category	Cumulative Number of Minutes in any one hour time period	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
1	30	50	45
2	15	55	50
3	5	60	55
4	1	65	60
5	0	70	65

Source: Alameda County (2023)

Section 6.60.070 – Special provisions or exceptions.

E. Construction. The provisions of this chapter shall not apply to noise sources associated with construction, provided said activities do not take place before seven a.m. or after seven p.m. on any day except Saturday or Sunday, or before eight a.m. or after five p.m. on Saturday or Sunday.

4 Existing Conditions

4.1 Noise Measurements

Field measurements of sound pressure level (SPL) were conducted near the Proposed Project site on February 13, 2024, to quantify and characterize the existing outdoor ambient sound levels. Table 3 provides the location and time period at which these baseline noise level measurements were performed by an attending Dudek field investigator using a Soft dB Piccolo II sound level meter (SLM) equipped with a 0.5 inch, pre-polarized condenser microphone with pre-amplifier. The SLM meets the current American National Standards Institute standard for a Type 2 (General Grade) sound level meter. The accuracy of the SLM was verified using a field calibrator before and after the measurements, and the measurements were conducted with the microphone positioned approximately 5 feet above the ground.

One (1) short-term (ST) noise level measurement location (ST1) that represents existing noise-sensitive receptors along Patterson Pass Road was selected near the Proposed Project site. This location is depicted as receiver ST1 on Figure 3, Noise Measurement Locations, and was selected to characterize the baseline outdoor ambient sound levels for receptors dominated by traffic noise adjacent to the Project site. The measured L_{eq} and L_{max} noise levels are provided in Table 3. The primary noise sources at the sites identified in Table 3 consisted of traffic along adjacent roadways and distant light aircraft. As shown in Table 3, the measured SPL was approximately 67 dBA L_{eq} at ST1. Beyond the summarized information presented in Table 3, detailed noise measurement data and photographs are included in Appendix A, Baseline Noise Measurement Field Data.

Table 3. Measured Baseline Outdoor Ambient Noise Levels

Site	Location/Address	Time	L_{eq} (dBA)	L_{max} (dBA)
ST1	East of the Project site, north of Patterson Pass Road	12:57 p.m. to 1:17 p.m.	66.7	86.0

Source: Appendix A.
Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); L_{max} = maximum sound level during the measurement interval; dBA = A-weighted decibels; ST = short-term noise measurement location.

Generally, the measured samples of daytime L_{eq} agree with expectations: at ST1, L_{eq} values are above 65 dBA due largely to being within proximity to an active roadway.

Two (2) long-term (LT) noise level measurement locations (LT1-LT2) that represent existing noise-sensitive receptors were also selected near the Proposed Project site. The long-term noise measurements at locations LT1 and LT2 spanned a minimum of 25 consecutive hours at each location. L_{eq} L_{max}, L_{min}, L_{10}, L_{50}, and L_{90} metrics were measured. While L_{eq} provides insight into the overall noise exposure level detected by a sound level meter, as introduced in Appendix A, the L_{90} value is a good indicator of the background sound environment, offering a perspective clear of short-lived disturbances. Exhibit A shows the L_{eq}, L_{max}, L_{min}, L_{10}, L_{50}, and L_{90} time history plots derived from the LT1 measurement data and Exhibit B shows the L_{eq} and L_{90} time history plots derived from the LT2 measurement data.

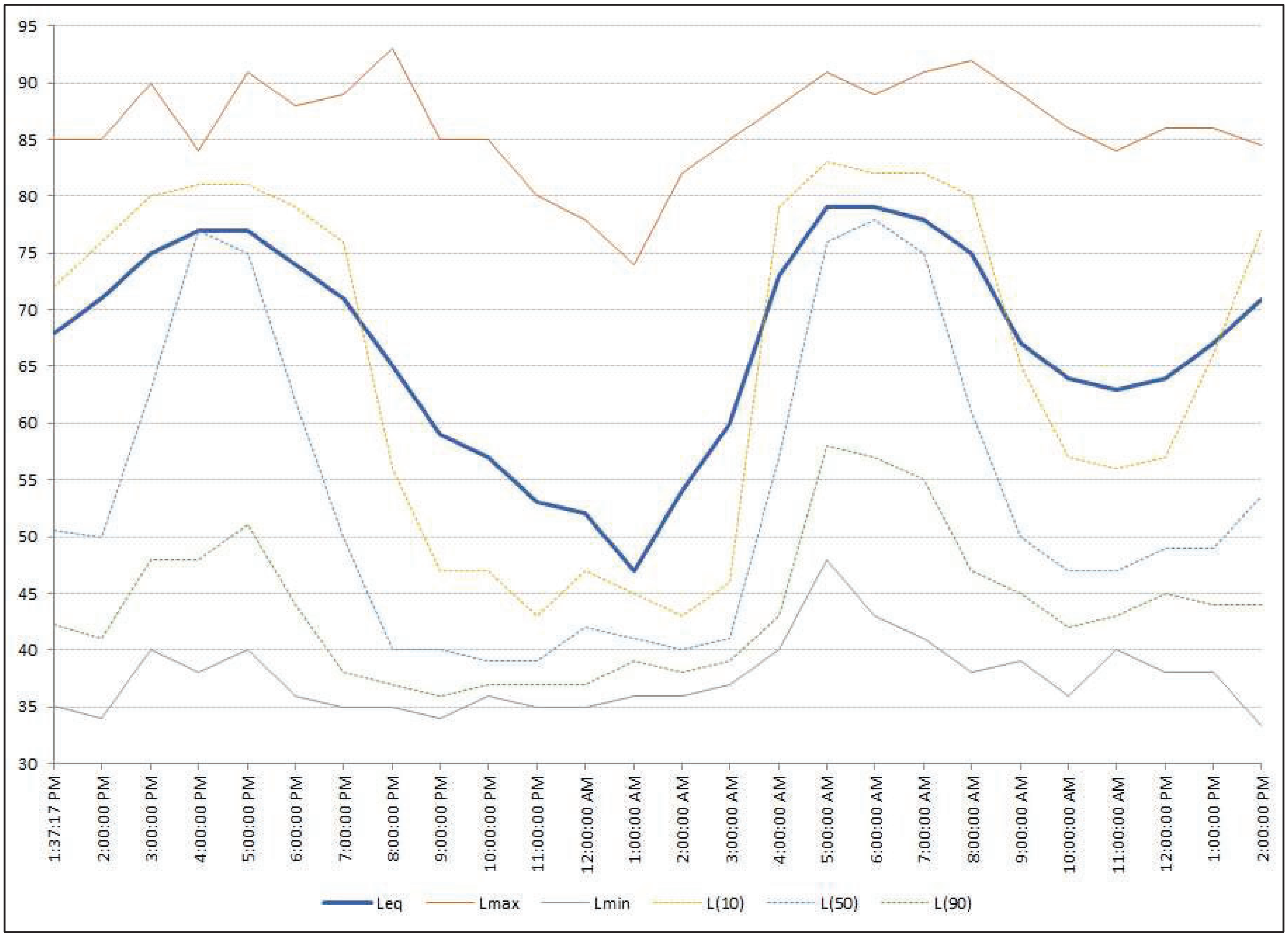


Exhibit A – LT1 Noise Measurement Chart

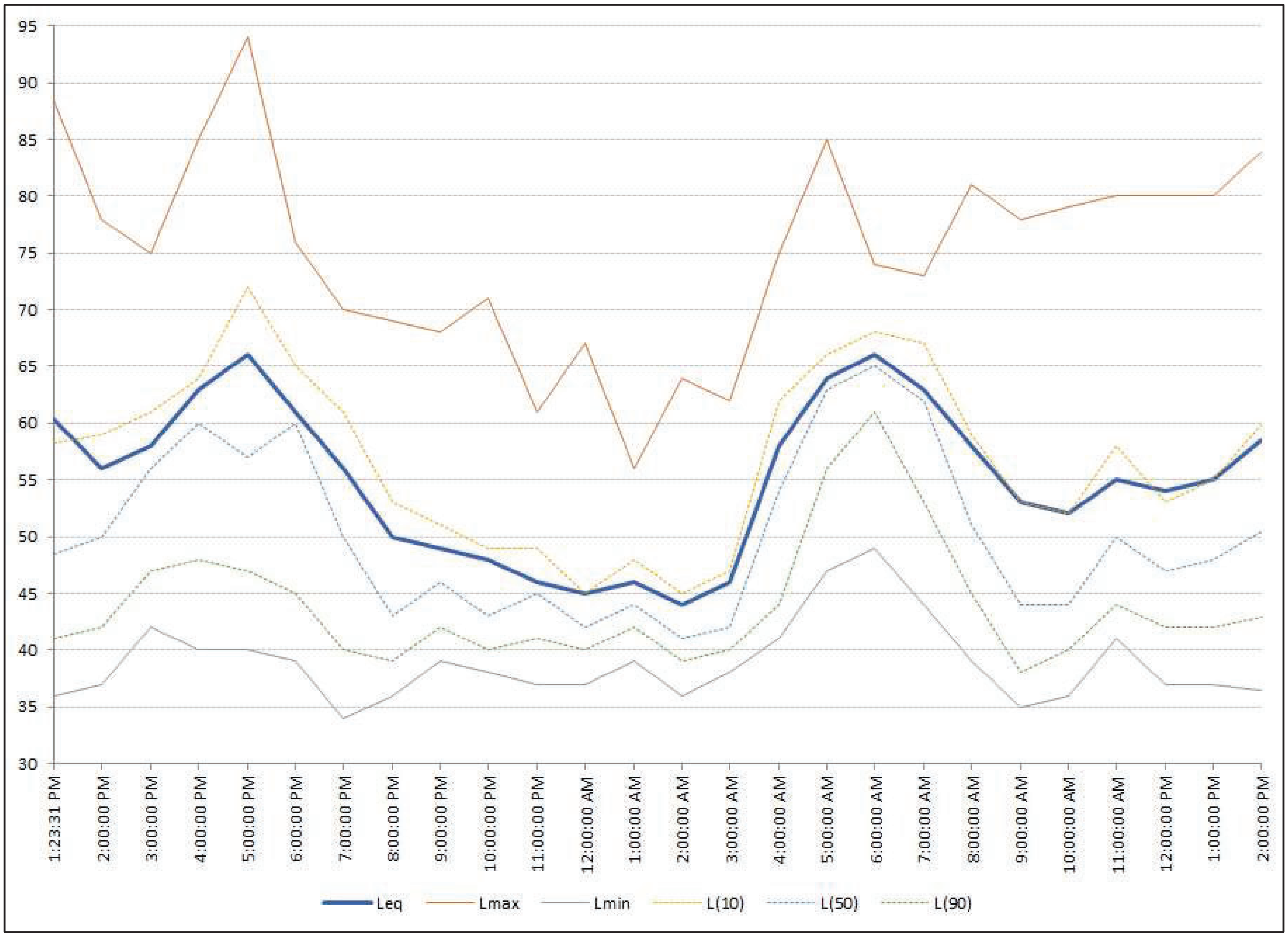


Exhibit B – LT2 Noise Measurement Chart

Throughout the day, while the general ambient outdoor sound environment could be characterized as relatively quiet, akin to a rural setting with rising L_{90} that trends with anticipated traditional "rush hour" roadway traffic in the early morning and late afternoon periods, there are regular occurrences of intermittent noises. This becomes evident when observing the A-weighted L_{eq} values that are often elevated by brief, but relatively high contributions. Such noise patterns are consistent with transient roadway vehicle noise.

4.2 Sensitive Receptors

Noise- and vibration-sensitive land uses are typically 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 be considered noise and vibration sensitive and may warrant unique measures for protection from intruding noise. Existing sensitive receptors in the vicinity of the project site consist of residential single-family uses located to the south and to the east of the Project site. At such residentially zoned land uses, the FTA's construction noise standard (80 dBA L_{eq} over an 8-hour period) would apply; and the County's non-construction exterior noise level thresholds are the most stringent. Hence, these nearby residential sensitive receptors represent those studied herein and have the greatest potential to be impacted by construction and/or operation of the project. Only the nearby residential receptors would be considered noise-sensitive and potentially impacted by noise generated by the project.

While the project site is surrounded by other land uses, such as agricultural and substation land uses, they do not have the same noise sensitivity as residentially zoned spaces, at which above-mentioned construction noise limits and non-construction exterior noise thresholds would apply. Additionally, because project noise emission attenuates naturally as it propagates away from sound sources, offsite receptors that are more distant from the nearest noise-sensitive residences would be exposed to lower project-attributed noise levels, and agricultural and industrial type land uses have less stringent noise thresholds. For these reasons, project noise exposures found to be compliant with County standards (with or without application of noise reduction measures) at the nearest residences studied herein would support a logical inference that compliance could thus also be expected at more distant offsite receptors and where such receptors have higher noise thresholds for compliance and impact significance assessment.

SOURCE: Google 2024; Dudek 2024

DUDEK

FIGURE 3

Noise Measurement Locations

Potentia-Viridi Battery Energy Storage System Project

5 Thresholds of Significance

The following significance criteria are based on Appendix G of the CEQA Guidelines (14 CCR 15000 et seq.) and the County's Guidelines for Determining Significance (Alameda County 2023) and will be used to determine the significance of potential noise impacts. Such potential noise and vibration impacts to the community would be considered significant if the Proposed Project would result in the following:

a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
b. Generation of excessive groundborne vibration or groundborne noise levels; or,
c. Expose people residing or working in the project area to excessive noise levels (for a project located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within 2 miles of a public airport or public use airport).

In light of these above significance criteria, this analysis uses the following standards to evaluate potential noise and vibration impacts.

- Construction noise – The County regulates construction noise by restricting the allowable hours of construction. Section 6.60.070 of the County Municipal Code exempts construction noise from the stationary noise standards, provided that construction occurs between 7:00 a.m. and 7:00 p.m., Monday through Friday or 8:00 a.m. and 5:00 p.m. on Saturday and Sunday. The apparent proximity of existing residential receptors located southeast suggests that source-to-receiver distances are a minimum of approximately 550 feet. Additionally, most construction equipment and vehicles on a project site do not operate continuously. Therefore, consistent with the FTA guidance mentioned in Section 3.1 (Federal Regulatory Setting), this analysis will use 80 dBA L_{eq} over an 8-hour period as the construction noise impact criterion during daytime hours (7:00 a.m. to 7:00 p.m.).
- Off-site Project-attributed transportation noise – For purposes of this analysis, a noise impact due to transportation noise would be considered significant if predicted noise levels exceeded the FICON thresholds noted in Section 3.1.2. More specifically, an impact due to the project contribution to existing and future predicted ambient noise levels would be considered significant if it meets the following criteria:
  - Outdoor ambient sound level without the project is less than 60 dBA L_{dn}, then a project-attributed increase of 5 dBA or more would be considered significant;
  - Outdoor ambient sound level without the project is between 60 and 65 dBA L_{dn}, project-attributed increase of 3 dBA or more would be considered significant; and
  - Outdoor ambient sound level without the project is greater than 65 dBA L_{dn}, then project-attributed increase of 1.5 dBA or more would be considered significant.
- Off-site Project-attributed stationary noise – For purposes of this analysis, a noise impact would be considered significant if noise from typical operation of heating, ventilation, and air conditioning, inverters, transmission lines, substations, and other electro-mechanical systems associated with the Proposed Project exceeded 50 dBA hourly L_{eq} at the property line from 7:00 a.m. to 10:00 p.m., and 45 dBA hourly L_{eq} from 10:00 p.m. to 7:00 a.m.

- Construction vibration – Guidance from Caltrans indicates that a vibration velocity level of 0.2 ips PPV received at a structure would be considered annoying by occupants within (Caltrans 2013). As for the receiving structure itself, aforementioned Caltrans guidance from Section 3 recommends that a vibration level of 0.3 ips PPV would represent the threshold for building damage risk.

6 Impact Discussion

Potential noise and vibration impacts attributed to Project construction and operation are studied in the following subsections that are categorized by the CEQA Guidelines Appendix G significance for noise.

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

Short-Term Construction

Construction noise and vibration are temporary phenomena, with emission levels varying from hour to hour and day to day, depending on the equipment in use, the operations performed, and the distance between the source and receptor. Equipment that would be in use during construction would include, in part, graders, backhoes, rubber-tired dozers, loaders, cranes, forklifts, pavers, rollers, and air compressors. The typical maximum noise levels at a distance of 50 feet from various pieces of construction equipment and activities anticipated for use on the Proposed Project site are presented in Table 4. Note that the equipment noise levels presented in Table 4 are maximum noise levels. Usually, construction equipment operates in alternating cycles of full power and low power, producing average noise levels over time that are less than the maximum noise level. The average sound level of construction activity also depends on the amount of time that the equipment operates and the intensity of construction activities during that time.

Table 4. Typical Construction Equipment Maximum Noise Levels

Equipment Type	Typical Equipment (L_{max}, dBA at 50 Feet)
All Other Equipment > 5 HP	85
Backhoe	78
Compressor (air)	78
Concrete Saw	90
Crane	81
Dozer	82
Excavator	81
Flat Bed Truck	74
Front End Loader	79
Generator	72
Grader	85
Man Lift	75
Paver	77
Roller	80
Welder / Torch	73

Source: DOT 2006.
Note: L_{max} = maximum sound level; dBA = A-weighted decibels.

Aggregate noise emission from Proposed Project construction activities, broken down by sequential phase, was predicted at the nearest existing noise-sensitive receptor from the nearest position of the construction site boundary for a given phase. The intent of the "nearest receptor" methodology is to help evaluate anticipated construction noise from all construction equipment or vehicle activity expected to be at the boundary for some period of time, which would be most appropriate for phases such as site preparation, grading, and paving. Table 5 summarizes the distances to the closest noise-sensitive receptor for each of the twelve sequential construction phases. At the site boundary, this analysis conservatively assumes that all pieces of equipment for the listed phase will be involved in construction activity for the 8-hour period.

Table 5. Estimated Distances between Construction Activities and the Nearest Noise-sensitive Receptors

Construction Phase (and RCNM-Comparable Equipment Types Involved)	Distance from Nearest Noise-Sensitive Receptor to Construction Source (Feet)
Site Preparation (Graders, Front End Loaders, Backhoes)	1,780
Site Grading and Civil Work (Graders, Rollers, Front End Loaders, Backhoes, Paver, All Other Equipment > 5 hp, Ground Compactor, Concrete Mixer Truck, Rock Drill)	1,780
Foundation & Underground Equipment Installation (All Other Equipment > 5 hp, Rollers, Ground Compactor, Concrete Mixer Truck, Drill Rig Trucks, Backhoes, Excavators, Dozers, Front End Loaders)	1,880
BESS Installation (Cranes, Generators, Man-Lifts, Air Compressors, Front End Loaders)	1,880
Project Substation Installation (Air Compressors, Cranes, Generators, Man-Lifts)	1,920
PG&E Interconnection Facility Upgrades (Air Compressors, Cranes, Excavators, Generators, Man-Lifts, Front End Loaders, Tractors, All Other Equipment > 5 hp)	1,920
Gen-Tie Foundation and Tower Erection (Drill Rig Trucks, Cranes, Man-Lifts, Pickup Trucks, Concrete Mixer Truck)	550
Gen-Tie Stringing and Pulling (Grapples, Man-Lifts, Generators, Backhoes, Drill Rig Truck, All Other Equipment > 5 hp)	550
Testing and Commissioning (Man-Lift, Pickup Trucks)	1,780
Decommissioning (Concrete Saws, Cranes, Dozers, Tractors, Backhoes)	1,780

Source: Appendix B

A Microsoft Excel–based noise prediction model emulating and using reference data from the Federal Highway Administration Roadway Construction Noise Model (RCNM) (FHWA 2008) was used to estimate construction noise levels at the nearest occupied noise-sensitive land use. Input variables for the predictive modeling consist of the equipment type and number of each (e.g., two graders, a loader, a tractor), the duty cycle for each piece of equipment (e.g., percentage of time within a specific time period, such as an hour, when the equipment is expected to operate at full power or capacity and thus make noise at a level comparable to what is presented in Table 4), and the distance from the noise-sensitive receiver. The predictive model also considers how many hours that equipment may be on site and operating (or idling) within an established work shift. Conservatively, no topographical or structural shielding was assumed in the modeling. The RCNM has default duty-cycle values for the various pieces of equipment, which were derived from an extensive study of typical construction activity patterns. Those default duty-cycle values were used for this noise analysis, which is detailed in Appendix B, Construction Noise Modeling Input and Output, and produce the predicted results displayed in Table 6.

Table 6. Predicted Construction Noise Levels per Activity Phase

Construction Phase (and Equipment Types Involved)	8-Hour L_{eq} at Nearest Noise-Sensitive Receptor to Construction Site Boundary (dBA)
Site Preparation (Graders, Front End Loaders, Backhoes)	49
Site Grading and Civil Work (Graders, Rollers, Front End Loaders, Backhoes, Paver, All Other Equipment > 5 hp, Ground Compactor, Concrete Mixer Truck, Rock Drill)	54
Foundation & Underground Equipment Installation (All Other Equipment > 5 hp, Rollers, Ground Compactor, Concrete Mixer Truck, Drill Rig Trucks, Backhoes, Excavators, Dozers, Front End Loaders)	54
BESS Installation (Cranes, Generators, Man-Lifts, Air Compressors, Front End Loaders)	45
Project Substation Installation (Air Compressors, Cranes, Generators, Man-Lifts)	44
PG&E Interconnection Facility Upgrades (Air Compressors, Cranes, Excavators, Generators, Man-Lifts, Front End Loaders, Tractors, All Other Equipment > 5 hp)	50
Gen-Tie Foundation and Tower Erection (Drill Rig Trucks, Cranes, Man-Lifts, Pickup Trucks, Concrete Mixer Truck)	55
Gen-Tie Stringing and Pulling (Grapples, Man-Lifts, Generators, Backhoes, Drill Rig Truck, All Other Equipment > 5 hp)	61
Testing and Commissioning (Man-Lift, Pickup Trucks)	31
Decommissioning (Concrete Saws, Cranes, Dozers, Tractors, Backhoes)	52

Notes: L_{eq} = equivalent noise level; dBA = A-weighted decibels.

As presented in Table 6, the estimated construction noise levels are predicted to be as high as 61 dBA 8-hour L_{eq} at the nearest existing residences (as close as 550 feet away) when gen-tie construction activities take place on the eastern portion of the Project site, which is below the FTA's 8-hour 80 dBA L_{eq} threshold. Note that these estimated noise levels would occur when noted pieces of heavy equipment would simultaneously operate for a full 8 hours at a boundary-to-receiver distance of 550 feet. On an average construction workday, heavy equipment will be operating sporadically throughout the Project site and more frequently will be located away from the closest Project boundary to the nearest sensitive receptor. Additionally, while some phases are expected to be constructed concurrently, the sum of these concurrent construction phases were predicted to be as high as 63 dBA 8-hour L_{eq} during April and May of 2027, which is also below the FTA's 8-hour 80 dBA L_{eq} threshold. Appendix B contains the construction noise calculation worksheets used to predict potential construction noise impacts.

In summary, impacts due to noise generated by construction of the Project would be considered less than significant.

Construction traffic noise was estimated using trip generation data and average daily traffic (ADT) volumes from the Project Transportation analysis. Patterson Pass Road, the main roadway adjacent to the Project site, is characterized by existing (2021) ADT volumes of approximately 7,000 passenger equivalent vehicles (PCE) per day (Dudek 2024). The estimated trip generation during a peak month of Project construction is predicted to add 916 total trips, including PCE trips. Noise levels were predicted using the formula as follows:

10 * LOG (7,916/7,000) = 0.53 dB

Thus, because Project-related construction traffic noise would increase existing roadway traffic noise levels by less than the lowest FICON threshold of 1.5 dBA, impacts would be considered less than significant.

Long-Term Operational

Off-Site Traffic Noise Exposure

The Project is expected to generate 5 daily trips to the roadway system. As such, the Project would not result in a doubling of trips on any road segment. Typically, a doubling of the energy of a noise source, such as a doubling of traffic volume, would increase noise levels by 3 dBA. Under normal circumstances (i.e., outside of a controlled setting such as a listening laboratory), a 3 dBA increase in noise levels is the smallest increase that is audible to the human ear, whereas a less than 3 dBA increase in noise levels is a barely or non- audible increase. Given that Project operations would result in only a modest increase in traffic on local and regional roadways, the Project would not result in an increase of 3 dBA or greater on roadways in the study area. Hence, the change in noise level due to the Project would not be audible, and impacts would be less than significant.

Stationary Noise Sources

Dudek received site plan information that provided facility equipment locations that were used to help derive reference sound power levels for expected Project on-site operating noise-producing system components and features as summarized in the preceding paragraphs, specifically battery modules and battery containers. Dudek has modeled the propagation of sound from a combination of these Project battery energy storage and substation transformer noise sources with commercially available Datakustik CadnaA software, that has algorithms based on the International Organization of Standardization (ISO) Standard 9613-2, "Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation" (ISO 1996). Based on client-provided information and similar prior Dudek project noise study experience, expected sources of noise emission from within the boundary of the Proposed Project include consideration of the following two types of on-site electro-mechanical equipment:

- Battery enclosure cooling systems – Project site plans and other client information indicate that there is a total of 1,000 battery containers, most of which are grouped in pairs in a triple array configuration (i.e. a line of three pairs of battery containers), each array served by a single power conversion system. Augmented pairs are also shown in the Project site plan. Each such grouping of battery containers has been modeled so that the east and west/north and south ends or cabinet facades are where the external chillers are located.

- Power conversion systems (PCS, a.k.a. "inverter") – Each of the 140 inverters, which are located on the west side of each battery pair trio, is an unknown unit. Manufacturer sound data was not readily discovered; hence, sound data from a comparable inverter model (and for which Dudek has sound data from the other manufacturer) has been utilized for this operation noise assessment, with octave-band center frequency (OCBF) sound power levels (PWL) presented in Table 7.

Table 7. Sound Power Levels for Modeled Sources of Outdoor Noise Emission

Source	Reference Source Sound Power Level (PWL, dB) per Octave Band Center Frequency (OBCF, Hz)									Overall Sound Level (dBA)
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Battery Container (chiller side, long end) A	37.8	50.4	60.4	75.4	80.0	83.5	82.6	78.2	69.0	87.9
Battery Container (chiller side, short end) A	38.1	57.1	61.6	71.8	79.2	82.7	81.8	76.1	68.1	86.9
Inverter A	36.1	50.7	59.7	69.4	73.9	78.7	75.6	70.0	60.0	81.9
Substation Transformer	80.0	86.0	88.0	83.0	83.0	77.0	72.0	67.0	60.0	83.4

Notes: dB = decibels; dBA = A-weighted dB; Hz = hertz. A = battery container and inverter PWL values are A-weighted.

These above-listed PWL values were used to define sources of sound emission in the CadnaA computer model space with respect to an arrangement of rendered “building” blocks that depict the battery enclosure and inverter arrays on the Project site plan. In addition to the above sound source inputs, the following assumptions, features, and parameters are included in this CadnaA-supported stationary noise source assessment:

- Acoustical ground absorption coefficient is estimated to be 0.7, which represents absorptive ground cover (e.g., grassy landscaping and natural terrain) surrounding the Project site.
- Acoustical reflection order is set at one (1), to account for up to one sound path reflection when contact is made with a modeled building surface.
- Climate conditions are 68 degrees Fahrenheit, 50% relative humidity.
- Topography for the Project site and immediately adjacent area was included in the model.

Sensitive receivers in the area include single--family residences approximately 1,520 feet from the Project Boundary. Predicted noise levels from the Project’s mechanical operations are shown in Table 8, and noise level contours and receiver locations are shown in Figure 4, Predicted Stationary Source Operation Noise Contours. The CadnaA model files are digitally archived and available upon request.

Table 8. Operational Noise Levels at Nearest Sensitive Receptors

Receiver	Receiver Distance from Project Boundary	dBA L_{eq}	Exceed Limit? (45 dBA L_{eq})
M1 – Nearest Sensitive Receptor	~1,520	42.6	No
PL-N1	Northern Property Line	54.3	No
PL-N2	Northern Property Line	49.6	No
PL-E1	Eastern Property Line	56.1	No
PL-E2	Eastern Property Line	46.0	No
PL-S1	Southern Property Line	47.3	No
PL-S2	Southern Property Line	48.7	No
PL-W1	Western Property Line	60.3	No
PL-W2	Western Property Line	55.8	No

Source: Dudek 2024

As shown in Table 8, operational noise levels from the Project site at the nearest sensitive receptor would reach up to 42.6 dBA L_{eq}. These noise levels would comply with the County standards of a maximum of 45 dBA L_{eq} over 30 cumulative minutes during nighttime hours (10:00 p.m. to 7:00 a.m.) for exterior noise.

Additionally, predicted noise levels would comply with the County's 45 dBA CNEL interior noise threshold for occupied buildings. The FHWA estimates a 10 dB attenuation for exterior to interior noise levels with windows open (for the worst case), and because the highest predicted exterior noise level at the nearest sensitive receptor would be 42.6 dBA L_{eq}, interior noise levels would not exceed 33 dBA CNEL (FHWA 2011). Therefore, the predicted noise impacts associated with operation of on-site equipment, including the inverter/transformer platforms, battery storage container cooling units, and the collector substation, are anticipated to be less than significant if the Proposed Project's equipment and layout remains as designed and studied within this Noise Technical Report. This would be a less than significant impact.

Corona Noise

Audible noise (AN) produced by the corona effect along transmission line conductors (such as the proposed gen-tie approximately 550 feet from the nearest sensitive receptor) conveying electrical current is largely attributed to dust or moisture on the conductor surfaces. While such corona effect sound emission may be generated during dry "fair weather" conditions, it is louder during "rainy" or "foul" weather conditions but still has audibility dependent upon the outdoor ambient sound environment in the proximity of the listener.

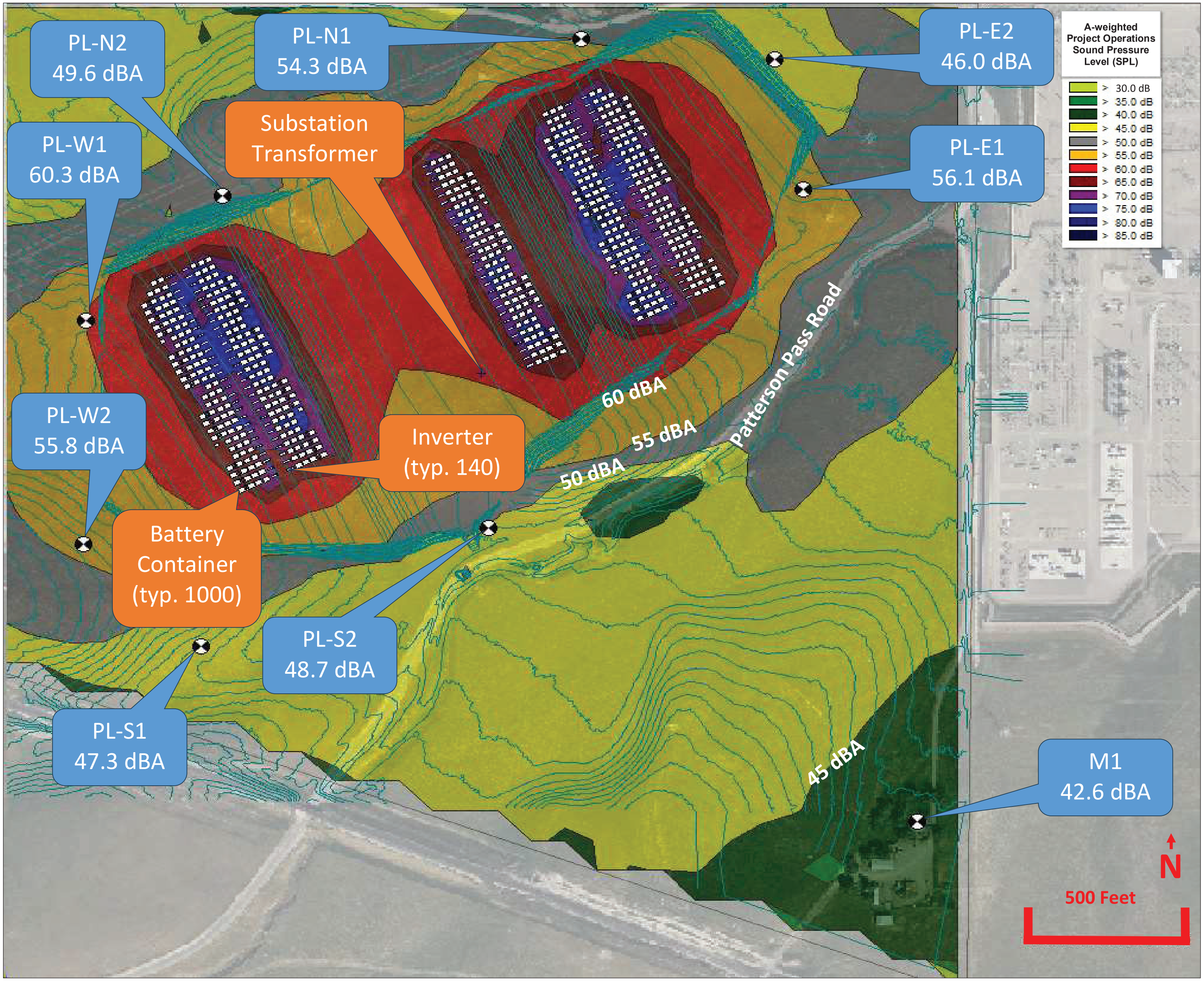
For illustration purposes, if the Project collector substation sends electricity to the proposed offsite substation site as a single circuit with three conductor wires (one per each of three phases) on steel pole structures up to a maximum of 44 feet in height above grade, and assuming these alternating current (AC) conductors are aluminum conductor steel reinforced (ACSR) "Bluebird" type (i.e., 1.762" outer diameter) and have a maximum surface voltage gradient ("E") of 19 kilovolts root-mean-square per centimeter (kVrms/cm), it is possible for them to emit audible noise under rainy conditions.

The L_{50} (a.k.a., median sound level) for audible corona can be predicted with algorithms and reference information found in the U.S. Department of Interior, Bonneville Power Administration (BPA), Technical Report No. ERJ-77-168.

The mathematical expression for estimating an A-weighted SPL under rainy weather conditions and based on surface voltage gradient (E), conductor equivalent diameter (“d” in millimeters [mm]), and distance from a receiver position (“r” in meters [m]) is as follows:

$$SPL = 120*LOG(E) + 55*LOG(d) - 11.4*LOG(r) - 170.5$$

At a distance of 25 feet from either side of the power line conductors, the expected SPL is less than 32 dBA at a listener standing at grade. Under “fair weather” conditions, and according to the same BPA report, the estimated median sound level would be 25 dB less than the predicted value associate with “rainy” or “foul” weather conditions. Therefore, although the overhead gen-tie line could produce audible noise, its audibility would depend on the weather conditions, the proximity of the listener, and the background sound level. Because the measured outdoor ambient sound environment is higher than these predicted results, corona AN would represent a negligible increase to the pre-existing sound level and would be a less than significant impact.



SOURCE: Google 2024; Dudek 2024

DUDEK

FIGURE 4

Predicted Stationary Source Operation Noise Contours

Potentia-Viridi Battery Energy Storage System Project

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b) *Would the project result in generation of excessive groundborne vibration or groundborne noise levels?*

Less Than Significant Impact. Construction activities may expose persons to excessive groundborne vibration or groundborne noise, causing a potentially significant impact. Caltrans has collected groundborne vibration information related to construction activities (Caltrans 2020). Information from Caltrans indicates that continuous vibrations with a PPV of approximately 0.2 ips is considered annoying. For context, heavier pieces of construction equipment, such as a bulldozer that may be expected on the Project site, have peak particle velocities of approximately 0.089 ips or less at a reference distance of 25 feet (DOT 2006).

Groundborne vibration attenuates rapidly, even over short distances. The attenuation of groundborne vibration as it propagates from source to receptor through intervening soils and rock strata can be estimated with expressions found in FTA and Caltrans guidance. By way of example, for a bulldozer operating on site and as close as the eastern Project boundary (i.e., ~1,520 feet from the nearest occupied property) the estimated vibration velocity level would be 0.00097 ips per the equation as follows (FTA 2006):

$$PPV_{rcvr} = PPV_{ref} * (25/D)^{1.1} = 0.00097 = 0.089 * (25/1520)^{1.1}$$

In the above equation, PPV_{rcvr} is the predicted vibration velocity at the receiver position, PPV_{ref} is the reference value at 25 feet from the vibration source (the bulldozer), and D is the actual horizontal distance to the receiver. Therefore, at this predicted PPV, the impact of vibration-induced annoyance to occupants of nearby existing homes would be less than significant.

Construction vibration, at sufficiently high levels, can also present a building damage risk. However, maximum anticipated construction vibration associated with the proposed Project would yield levels of 0.00097 ips, which do not surpass the guidance limit of 0.3 ips PPV for building damage risk to older residential structures or the 0.04 ips limit for Category 2 land uses. Because the predicted vibration level at 1,520 feet is less than this guidance limit, the risk of vibration damage to nearby structures is considered less than significant.

Once operational, the Proposed Project would not be expected to feature major producers of groundborne vibration. Anticipated mechanical systems like heating, ventilation, and air-conditioning units are designed and manufactured to feature rotating (fans, motors) and reciprocating (compressors) components that are well-balanced with isolated vibration within or external to the equipment casings. On this basis, potential vibration impacts due to Proposed Project operation would be less than significant.

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

There are no private airstrips within the vicinity of the Project site. The closest airport to the Project site is the Tracy Municipal Airport, approximately 7.5 miles east of the site. There would be no impact from aviation overflight noise exposure.

7 Cumulative Impact Discussion

7.1 Construction

While there are a number of existing and planned development projects, as listed in Table 4-2 (Cumulative – Reasonably Foreseeable, Approved, and Pending Projects) of the PEA, in the shared vicinity of the Project, noise emission attributed to Proposed Project construction propagating towards the surrounding community is predicted to attenuate to sound exposure levels that are compliant with FTA standards. Because operations noise from other projects in the studied vicinity would similarly diminish with distance and other environmental effects (e.g., intervening terrain and/or structures, as well as acoustical absorption from porous ground surfaces and the atmosphere), the opportunity for a "cumulatively considerable" effect would be very unlikely.

Furthermore, potential construction noise associated with one or more of these other projects from the Table 4-2 cumulative list would be temporary and, on that basis, correspondingly exhibit a low likelihood of a cumulatively considerable effect at a noise-sensitive receiving land use near the Proposed Project. Additionally, such construction activities for these other projects in the vicinity, if and when they occur, would be held to the same applicable County and/or City standards with respect to construction noise thresholds; and, like operation noise emanating from an active land use, such construction noise attenuates rapidly with distance and due to intervening natural or artificial topography and related effects.

For both above reasons, cumulative construction noise impacts for the Proposed Project would not be cumulatively considerable.

7.2 Operation

While there are a number of existing and planned projects, as listed in Table 4-2 (Cumulative – Reasonably Foreseeable, Approved, and Pending Projects) of the PEA, in the shared vicinity of the Project, aggregate noise from operating Proposed Project features (e.g., inverter/transformers, battery storage container cooling systems, and the collector substation) propagating towards the surrounding community is predicted to attenuate to a sound level that is compliant with County standards at the nearest sensitive receptor and beyond. Because operations noise from other projects would similarly diminish with distance and other environmental effects (e.g., intervening terrain and/or structures, as well as acoustical absorption from porous ground surfaces and the atmosphere), the opportunity for a "cumulatively considerable" effect as received by a noise-sensitive land use common to one or more of these projects and the Project would be very unlikely.

For the above reasons, cumulative noise impacts for the Proposed Project would not be cumulatively considerable.

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8 Mitigation Measures

No mitigation measures are recommended for the Proposed Project at this time.

9 Summary of Findings

This noise report was conducted to predictively quantify construction and operation noise and vibration attributed to the Proposed Project. The results indicate that potential noise and vibration impacts associated with the construction and operation of the Project would be less than significant. No further mitigation is required.

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Appendix A

Baseline Noise Measurement Field Data

DUDEK

FIELD NOISE MEASUREMENT DATA

PROJECT: Potentia - Viridi BESS PROJECT #: 13584.07
SITE ID: ST1
SITE ADDRESS: Patterson Pass Road OBSERVER(S): JVL
START DATE: 2/13/2024 END DATE: 2/13/2024
START TIME: 12:56 END TIME: 1:18

METEOROLOGICAL CONDITIONS

TEMP: 58 F HUMIDITY: 78 % R.H. WIND: CALM (LIGHT) MODERATE
WINDSPD: 3 MPH DIR.: N NE S (SE) S SW W NW (VARIABLE) STEADY GUSTY
SKY: SUNNY CLEAR (OVRCAST) PRTLY CLDY FOG RAIN

ACOUSTIC MEASUREMENTS

MEAS. INSTRUMENT: SoftdB Piccolo II TYPE 1 (2) SERIAL #: 3105
CALIBRATOR: Reed R8090 SERIAL #: 6321
CALIBRATION CHECK: PRE-TEST 94.0 dBA SPL POST-TEST 94.0 dBA SPL WINDSCRN: X

SETTINGS: A-WTD SLOW FAST FRONTAL RANDOM ANSI OTHER: ______

REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC
1	12:56								
↓		See Data Logs for Piccolo #3105							
22	1:18								

COMMENTS:

SOURCE INFO AND TRAFFIC COUNTS

PRIMARY NOISE SOURCE: (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL OTHER: ______
ROADWAY TYPE: 2-Lane Highway DIST. TO RDWY C/L OR (EOP): 8 FT
TRAFFIC COUNT DURATION: ____ MIN SPEED 60 ____ MIN SPEED

COUNT 1 (OR RDWY 1):

DIRECTION	NB/EB	SB/WB	NB/EB	SB/WB
AUTOS	21			
MED TRKS	4			
HVY TRKS	1			
BUSES	0			
MOTRCLS	0			

IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE: X

COUNT 2 (OR RDWY 2):

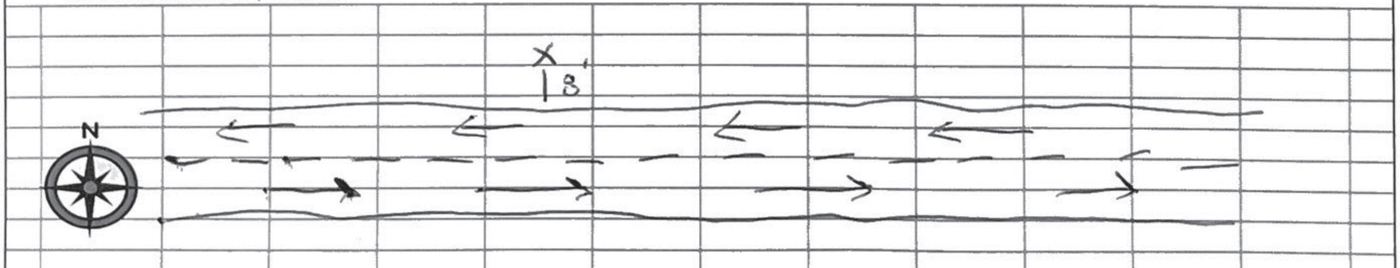
DIRECTION	NB/EB	SB/WB	NB/EB	SB/WB
AUTOS				
MED TRKS				
HVY TRKS				
BUSES				
MOTRCLS				

SPEEDS ESTIMATED BY: RADAR / (DRIVING THE PACE)
POSTED SPEED LIMIT SIGNS SAY: 55

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
OTHER: Distant Light Aircraft

DESCRIPTION / SKETCH

TERRAIN: (HARD) SOFT MIXED FLAT OTHER: ______
PHOTOS: ST1_1, ST1_2, ST1_3
OTHER COMMENTS / SKETCH



Noise Measurement Location ST1

Located north of Patterson Pass Road, east of the Project site

SLM pointed south; Camera pointed west

Noise Measurement Location ST1

Located north of Patterson Pass Road, east of the Project site

SLM pointed south; Camera pointed south

Noise Measurement Location ST1

Located north of Patterson Pass Road, east of the Project site

SLM pointed south; Camera pointed east

Noise Measurement Location LT1

Located west of Patterson Pass Road, in the southern portion of the Project site

Camera pointed west

Noise Measurement Location LT1

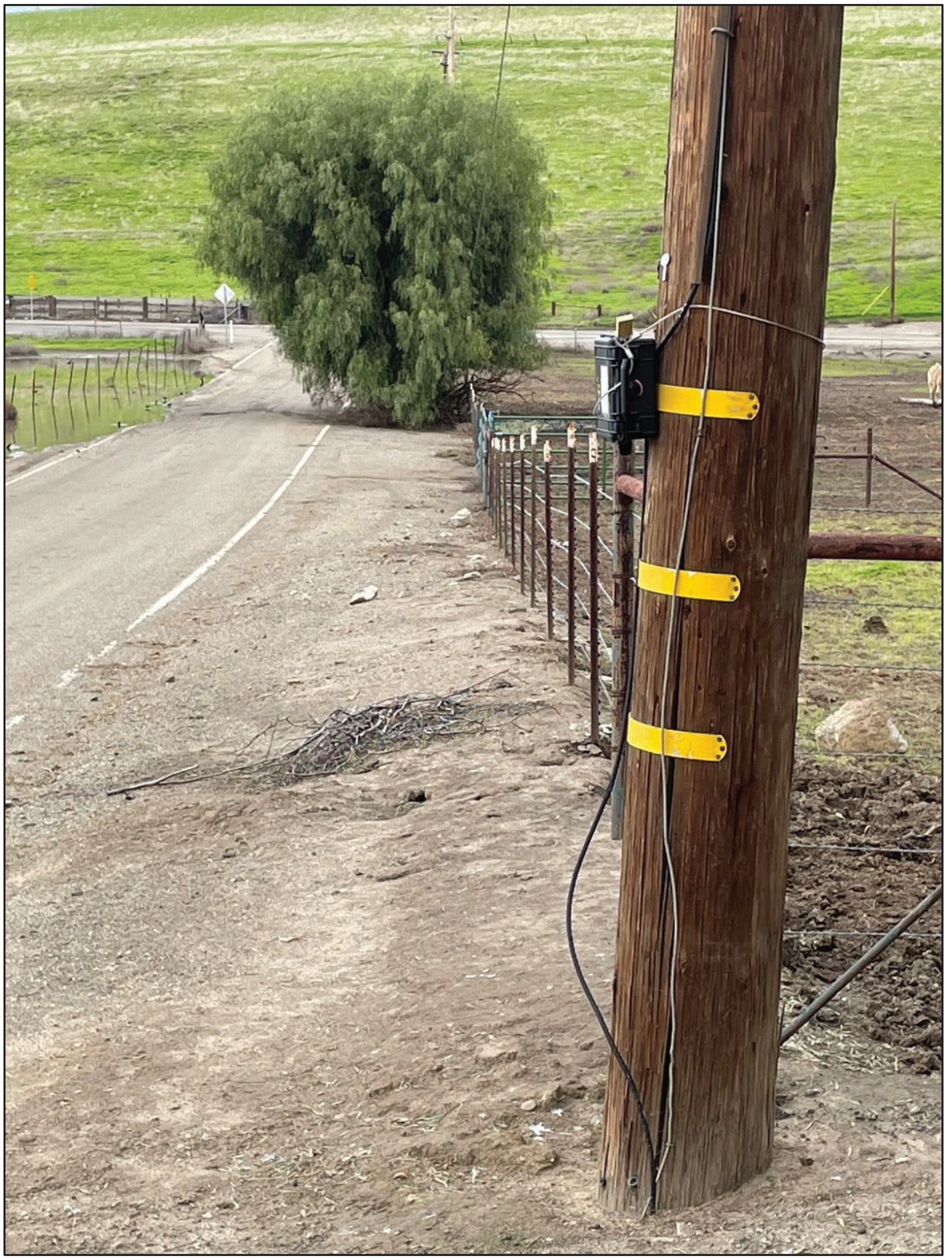
Located west of Patterson Pass Road, in the southern portion of the Project site

Camera pointed south

Noise Measurement Location LT1

Located west of Patterson Pass Road, in the southern portion of the Project site

Camera pointed north



Noise Measurement Location LT2

Located south of Patterson Pass Road and east of Midway Road, east of the Project site

Camera pointed north

Noise Measurement Location LT2

Located south of Patterson Pass Road and east of Midway Road, east of the Project site

Camera pointed east

Noise Measurement Location LT2

Located south of Patterson Pass Road and east of Midway Road, east of the Project site

Camera pointed east

Appendix B
Construction Noise Modeling Input and Output

noise level limit for construction phase received at residentially-zoned land use, per City of San Diego = 80
allowable hours over which Leq is to be averaged = 8

Source, receptor, and barrier all share same reference grade elevation; unless otherwise noted)
= Barrier of input height inserted between source and receptor

Comparable FHWA RCNM Construction Equipment Type	Quantity	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Source to NSR Distance (ft.)	*Temporary Barrier Insertion Loss (dB)*	*Additional Noise Reduction*	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
Grader	2	40	85	1780	0		47.4	8	480	46	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Front End Loader	2	40	79	1780	0		41.4	8	480	40	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Front End Loader	2	40	79	1780	0		41.4	8	480	40	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Backhoe	2	40	78	1780	0		40.4	8	480	39	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total Aggregate Noise Exposure from Site Preparation Phase										**49**																
Grader	4	40	85	1780	0		47.4	8	480	49	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Roller	4	20	80	1780	0		42.4	8	480	41	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Front End Loader	4	40	79	1780	0		41.4	8	480	43	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Front End Loader	4	40	79	1780	0		41.4	8	480	43	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Backhoe	4	40	78	1780	0		40.4	8	480	42	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Paver	2	50	77	1780	0		39.4	8	480	39	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
All Other Equipment > 5 hp	2	50	85	1780	0		47.4	8	480	47	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Roller	2	20	80	1780	0		42.4	8	480	38	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Compactor (ground)	1	20	80	1780	0		42.4	8	480	35	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
concrete mixer truck	1	40	79	1780	0		41.4	4	240	34	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Rock drill	4	20	81	1780	0		43.4	8	480	42	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total Aggregate Noise Exposure from Site Grading and Civil Work Phase										**54**																
All Other Equipment > 5 hp	2	50	85	1880	0		46.8	8	480	47	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Roller	2	20	80	1880	0		41.8	8	480	38	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Compactor (ground)	2	20	80	1880	0		41.8	8	480	38	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
concrete mixer truck	2	40	79	1880	0		40.8	8	480	40	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
drill rig truck	3	20	79	1880	0		40.8	8	480	39	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Backhoe	6	40	78	1880	0		39.8	8	480	44	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
excavator	2	40	81	1880	0		42.8	8	480	42	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
dozer	2	40	82	1880	0		43.8	8	480	43	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
All Other Equipment > 5 hp	4	50	85	1880	0		46.8	8	480	50	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
front end loader	2	40	79	1880	0		40.8	8	480	40	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total Aggregate Noise Exposure from Foundations & Underground Equipment Installation Phase										**54**																
compressor (air)	2	40	78	1880	0		39.8	8	480	39	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
crane	3	16	81	1880	0		42.8	8	480	40	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
generator	4	50	72	1880	0		33.8	8	480	37	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
man lift	2	20	75	1880	0		36.8	8	480	33	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
front end loader	2	40	79	1880	0		40.8	8	480	40	5	5	0	5	1875	1880	7.1	1875.0	1880.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total Aggregate Noise Exposure from BESS Installation Phase										**45**																
Compressor (Air)	2	40	78	1920	0		39.6	8	480	39	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
man lift	6	20	75	1920	0		36.6	8	480	37	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
crane	2	16	81	1920	0		42.6	8	480	38	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
generator	2	50	72	1920	0		33.6	8	480	34	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
man lift	2	20	75	1920	0		36.6	8	480	33	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total Aggregate Noise Exposure from Project Substation Installation Phase										**44**																
Drill Rig Truck	1	20	79	550	0		53.1	8	480	46	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Crane	2	16	81	550	0		55.1	8	480	50	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
man lift	2	20	75	550	0		49.1	8	480	45	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Drill Rig Truck	1	20	79	550	0		53.1	8	480	46	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Pickup truck	1	40	55	550	0		29.1	8	480	25	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
concrete mixer truck	1	40	79	550	0		53.1	8	480	49	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
pickup truck	1	40	55	550	0		29.1	8	480	25	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total Aggregate Noise Exposure from Gen-Tie Foundation and Tower Erection Phase										**55**																
Grapple (on backhoe)	1	40	85	550	0		59.1	8	480	55	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Grapple (on backhoe)	1	40	85	550	0		59.1	8	480	55	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
man lift	2	20	75	550	0		49.1	8	480	45	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
generator	2	50	72	550	0		46.1	8	480	46	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
backhoe	2	40	78	550	0		52.1	8	480	51	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Drill rig Truck	1	20	79	550	0		53.1	8	480	46	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
All Other Equipment > 5 hp	1	50	85	550	0		59.1	8	480	56	5	5	0	5	545	550	7.1	545.0	550.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total Aggregate Noise Exposure from Gen-Tie Stringing and Pulling Phase										**61**																
Compressor (Air)	4	40	78	1920	0		39.6	8	480	42	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Crane	2	16	81	1920	0		42.6	8	480	38	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
excavator	2	40	81	1920	0		42.6	8	480	42	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
generator	4	50	72	1920	0		33.6	8	480	37	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
man lift	2	20	75	1920	0		36.6	8	480	33	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
front end loader	2	40	79	1920	0		40.6	8	480	40	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
tractor	2	40	84	1920	0		45.6	8	480	45	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
All Other Equipment > 5 hp	1	50	85	1920	0		46.6	8	480	44	5	5	0	5	1915	1920	7.1	1915.0	1920.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total Aggregate Noise Exposure from PG&E Interconnection Facility Upgrades Phase										**50**																
man lift	1	20	75	1780	0		37.4	8	480	30	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
pickup truck	3	40	55	1780	0		17.4	8	480	18	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total Aggregate Noise Exposure from Testing and Commisioning Phase										**31**																
concrete saw	2	20	90	1780	0		52.4	8	480	48	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
crane	2	16	81	1780	0		43.4	8	480	38	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
dozer	2	40	82	1780	0		44.4	8	480	43	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
tractor	2	40	84	1780	0		46.4	8	480	45	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Backhoe	2	40	78	1780	0		40.4	8	480	39	5	5	0	5	1775	1780	7.1	1775.0	1780.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total Aggregate Noise Exposure from Decomissioning Phase										**52**																

Schedule

Year	2027												2028				2053			
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Jan	Feb	Mar	Apr
Phase																				
Site Preparation		✓	✓																	
Site Grading and Civil Work			✓	✓	✓	✓	✓	✓												
oundations & Underground Equipment Installation			✓	✓	✓	✓														
BESS Installation						✓	✓	✓	✓	✓										
Project Substation Installation							✓	✓	✓	✓	✓	✓	✓	✓	✓					
Gen-Tie Foundation and Tower Erection			✓	✓																
Gen-Tie Stringing and Pulling				✓	✓															
PG &E Interconnection Facility Upgrades											✓	✓	✓	✓	✓					
Testing and Commisioning											✓	✓	✓	✓	✓	✓				
Decomissioning																	✓	✓	✓	✓
nstruction Noise at Nearest Offsite Receptor:																				
Site Preparation	0.0	48.8	48.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site Grading and Civil Work	0.0	0.0	54.1	54.1	54.1	54.1	54.1	54.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
oundations & Underground Equipment Installation	0.0	0.0	53.8	53.8	53.8	53.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BESS Installation	0.0	0.0	0.0	0.0	0.0	45.2	45.2	45.2	45.2	45.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Project Substation Installation	0.0	0.0	0.0	0.0	0.0	0.0	43.6	43.6	43.6	43.6	43.6	43.6	43.6	43.6	43.6	0.0	0.0	0.0	0.0	0.0
Gen-Tie Foundation and Tower Erection	0.0	0.0	54.8	54.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gen-Tie Stringing and Pulling	0.0	0.0	0.0	61.1	61.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PG &E Interconnection Facility Upgrades	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.1	50.1	50.1	50.1	50.1	0.0	0.0	0.0	0.0	0.0
Testing and Commisioning	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.7	30.7	30.7	30.7	30.7	30.7	0.0	0.0	0.0	0.0
Decomissioning	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.6	51.6	51.6	51.6
Concurrent Total (dBA)	**0**	**49**	**59**	**63**	**63**	**57**	**55**	**55**	**48**	**48**	**51**	**51**	**51**	**51**	**51**	**31**	**52**	**52**	**52**	**52**