LS Power Grid California, LLC

Noise and Vibration Impact Assessment Report

Collinsville 500/230 Kilovolt Substation Project

Solano, Sacramento, and Contra Costa Counties, California

Revision 7

September 24, 2024

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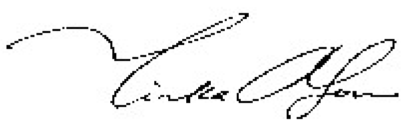

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Acronyms and Abbreviations

ANSI	American National Standards Institute
BPA	Bonneville Power Administration
Cadna/A	Computer Aided Noise Abatement
CAISO	California Independent System Operator
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
CPUC	California Public Utilities Commission
dB	Decibel (Unweighted)
dBA	Decibel (A-weighted)
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
Gal	Gallon
GIS	Gas-Insulated Switchgear
HP	Horsepower
HVAC	Heating, Ventilation, and Air Conditioning
Hz	Hertz
ID	Identification
ISO	International Organization for Standardization
kV	Kilovolt
Lb	Pound
L_{dn} or DNL	Day-Night Sound Level
L_{eq}	Equivalent Sound Level
$L_{eq(day)}$	Continuous Equivalent Sound Level Between 07:00 AM and 10:00 PM
$L_{eq(night)}$	Continuous Equivalent Sound Level Between 10:00 PM and 07:00 AM
L_{max}	Maximum Sound Level
L_{PA}	Sound Pressure Level
L_{WA}	Sound Power Level
L_x	Sound Level Exceed x Percent of a Specified Time Period
LSPGC	LS Power Grid California, LLC
MVA	Mega Volt Ampere
NM1, NM2	Noise Measurement Location 1, Noise Measurement Location 2
NVIA	Noise and Vibration Impact Assessment
ONAN	Oil Natural Air Natural
ONAF	Oil Natural Air Forced (First Stage Cooling)
ONAF2	Oil Natural Air Forced (Second Stage Cooling)
PG&E	Pacific Gas and Electric Company
PPV	Peak Particle Velocity
R	Receptor
RCNM	Roadway Construction Noise Model
ROW	Right-of-Way
SLM	Sound Level Meter
USEPA	United States Environmental Protection Agency
WSDOT	Washington State Department of Transportation
Yd	Yard

Executive Summary

Arcadis Inc. (Arcadis), on behalf of LS Power Grid California, LLC (LSPGC), a wholly owned subsidiary of LS Power, has prepared this noise and vibration impact assessment (NVIA) report to evaluate noise and vibration impacts for the Collinsville 500/230 Kilovolt (kV) Substation Project (Proposed Project) in portions of Solano, Sacramento, and Contra Costa Counties, California. The Proposed Project involves the construction of a substation and transmission lines to address the California Independent System Operator (CAISO)-identified overloads in the Greater Bay Area by increasing transmission reliability for the area and advancing additional renewable generation.

The Collinsville Substation would occupy approximately 11 acres of land. This NVIA report provides an evaluation of the potential noise and vibration impacts from the Proposed Project during construction, operation, and maintenance based on standards of impact significance derived from Appendix G of the California Environmental Quality Act (CEQA) Noise Guidelines.

Arcadis identified locations of sensitive receptors using aerial maps and geographic information systems. Four (4) sensitive receptors (a cultural resource site, two residential areas and one cemetery) were identified within one mile (5,280 feet) radius from the new substation boundary and one (1) sensitive receptor (the cultural resource site) was identified within a quarter mile (1,320 feet) of the new overhead transmission lines. The cemetery is also approximately 590 feet northwest of a new 12 kV distribution extension to the proposed LSPGC Collinsville Substation. Additionally, one (1) sensitive receptor (residential area with multiple single-family homes) was identified within a half-mile (2,640 feet) of the southern edge of the Sacramento River and San Joaquin confluence where open trenching methods of construction would be used to connect the submarine cables to an onshore underground utility vault. The residential area is also 20 to 50 feet east of telecommunication line extension and approximately 2,000 feet from PG&E's existing Pittsburg Substation modifications (i.e., in the vicinity of the interconnections with new lines).

The Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) User's Guide was used to calculate the Proposed Project construction noise levels. Input variables for the RCNM consist of the receptor/land use types, the equipment type, number of units operating concurrently, the acoustical usage factor for each piece of equipment, and the distance between the construction activity and sensitive receptor. The California Department of Transportation's (Caltrans) Transportation and Construction Vibration Guidance Manual was used to calculate construction vibration from the Proposed Project.

A three-dimensional industrial noise model, Computer Aided Noise Abatement (Cadna/A), was built for the new Collinsville Substation combining digital elevation data with the sound source specifications and coordinates, sensitive receptor coordinates, and sound propagation parameters to generate a sound model for the Proposed Project. The resulting model was then used to perform sound emission calculations using International Organization for Standardization (ISO) 9613-2 method. Corona-generated audible noise from the new 230 kV overhead transmission and 500 kV overhead interconnection lines was predicted using methods and equations developed by the Bonneville Power Administration (BPA). The BPA audible noise calculation method is an empirical method developed from long-term statistical measurements on a number of full-scale operating or test transmission lines.

The findings of this NVIA report are that under CEQA, the noise impact associated with the construction, operation, and maintenance of the Proposed Project would be less than significant. Similarly, vibration impact associated with construction of the Proposed Project would be less than significant; however, vibration from the Proposed Project's operation and maintenance would result in no impact.

1 Introduction

LS Power Grid California, LLC (LSPGC), a wholly owned subsidiary of LS Power established to own and operate transmission projects in California, is proposing the Collinsville 500/230 kilovolt (kV) Substation Project (Proposed Project) to be located in portions of Solano, Sacramento, and Contra Costa Counties, California. The Proposed Project involves the construction of a substation and transmission lines to address the California Independent System Operator (CAISO)-identified overloads in the Greater Bay Area by increasing transmission reliability for the area and advancing additional renewable generation.

The main components of the Proposed Project include:

- A new approximately 11-acre 500/230 kV substation (LSPGC Collinsville Substation);
- Two approximately 1.5-mile-long single-circuit 500 kV transmission line segments that would extend Pacific Gas and Electric Company's (PG&E's) existing Vaca Dixon-Tesla 500 kV Transmission Line to the proposed LSPGC Collinsville Substation; [1]
- A new approximately 6-mile-long double-circuit 230 kV transmission line connecting the proposed LSPGC Collinsville Substation to PG&E's existing Pittsburg Substation. The new 230 kV transmission line would include:
  - An approximately 1- to 2-mile-long overhead transmission line segment, that would connect the proposed LSPGC Collinsville Substation to the in-river transition structure (north side of the Sacramento River),
  - One steel in-river transition structure to transition the overhead conductors to submarine cables on the northern edge of the Sacramento River,
  - Six approximately 4.5-mile-long submarine cables installed approximately 6 to 15 feet below the sediment surface, and
  - An onshore underground utility vault near PG&E's existing Pittsburg Substation to connect the submarine cables to underground cables that would terminate at approximately two new riser poles adjacent to PG&E's existing Pittsburg Substation; and
- A new 12 kV distribution line, connecting an existing PG&E distribution line to the proposed LSPGC Collinsville Substation; and
- A telecommunications line extension, connecting existing 3rd party fiber to the proposed LSPGC Collinsville Substation.

This noise and vibration impact assessment (NVIA) report focuses on the Proposed Project's impact on airborne noise and groundborne vibration in the surrounding community. The NVIA report does not include the Proposed Project's impacts on underwater sound and its effect on aquatic species during in-river construction of the submarine cables.

For the purpose of this report, the proposed LSPGC Collinsville 500/230 kV Substation is referred to as Collinsville Substation or new substation. The proposed LSPGC new 230 kV overhead transmission line is referred to as the proposed LSPGC 230 kV Overhead Segment. The proposed PG&E 500 kV overhead

[1] PG&E would be responsible for the final configuration of the northern tie in of the 500 kV loop-in between the proposed Collinsville Substation and the existing Vaca Dixon-Tesla 500 kV Transmission Line. LS Power would be responsible for the installation of dead-end structures near the Collinsville Substation to facilitate looping in the 500 kV lines.

interconnecting line is referred to as the proposed PG&E 500 kV Interconnection. The underground portion is referred to as the proposed LSPGC 230 kV Underground Segment or 230 kV Southern Construction.

Arcadis was retained by LSPGC to prepare a NVIA report for the Proposed Project as part of the Proponent's Environmental Assessment that would be submitted to the California Public Utilities Commission (CPUC). The Collinsville Substation would include seven single phase 500/230 kV autotransformers (six operating, one spare), one 500 kV series capacitors bank, one control enclosure, 500 kV gas-insulated switchgear (GIS) enclosure, 230 kV GIS enclosure, and two 10-ohm series reactors per 230 kV line (triangle arrangement). The Collinsville Substation would be surrounded by a prefabricated interlocking security wall that would be 10 feet tall with 1 foot of barbed wire on top. The access gate would have an opening of 16 feet in width.

The Collinsville Substation construction would require the entire approximately 11-acre substation site to be cleared of all vegetation and graded to create a generally flat area for the substation components. In addition, a new access road to the substation would be constructed. Next, the ground grid, equipment foundations, and cable trenches would be installed. Once the below-grade construction is complete, the above ground substation components would be installed. Finally, testing and commissioning would be conducted once the transmission lines are terminated at the substation prior to energization.

The overhead transmission lines would be constructed on land within an approximately 120-foot-wide right-of-way and would require new temporary access roads and work areas to be established at each structure location. This process would involve vegetation clearing and blading, as required to create a flat area to facilitate construction. For the overhead structures, one or more foundations for each structure would be constructed prior to the erection of lattice steel structures or self-supporting, steel monopoles. Typically, 230 kV transmission structures range from 160 to 180 feet in height and could be up to 199 feet tall when crossing other infrastructure. The 500 kV structures for the Proposed Project would typically be larger than the 230 kV structures, ranging between 100 and 199 feet in height. The 500 kV structures would typically utilize a horizontal conductor configuration and the 230 kV poles would use a vertical conductor configuration. Finally, the conductors and two optical ground wires would be strung along the proposed LSPGC 230 kV Overhead Segment alignment. Following construction, an approximately 20-foot radius around the new structures would remain cleared to facilitate future operation and maintenance.

In-water work for the submarine cables would include the construction of an in-river transition structure mounted on a pier supported concrete cap on the northern side of the Sacramento River. The submarine cables would be trenched under the riverbed using a hydroplow and water jetting or vertical injector methods with no backfilling required. Near the southern edge of the Sacramento River and San Joaquin River confluence, open trenching methods of construction would be used to connect the submarine cables to an onshore underground utility vault (i.e., the proposed LSPGC 230 kV Underground Segment). The cables would then continue in an underground configuration to designated locations near the fence of PG&E's existing Pittsburg Substation. The Proposed Project also includes construction of a 12 kV distribution extension to the Collinsville Substation, a telecommunications line extension that goes through the underground utility vault onto the LSPGC Collinsville Substation, and modifications to the Pittsburg Substation.

The Proposed Project would also require the establishment of temporary staging areas, stringing sites, access roads, and construction areas to utilize during construction. All temporarily impacted areas would be restored to near pre-construction conditions after work is complete.

The current land uses around the proposed Collinsville Substation site include natural resource land areas (including Suisun Marsh and the Sacramento River and San Joaquin River waterways), utility operations, residences, wind farms, and agricultural lands. The Proposed Project would connect to PG&E's existing Pittsburg Substation, which is surrounded by industrial land uses; bordered by recreational areas and parks (including Pittsburg Marina, Pittsburg Riverview Park, and Marina Walk Park), St. Peter Martyr School, downtown low-density and medium-density residential uses, and marine commercial land uses to the east; and bordered by service commercial, mixed use, business commercial, and low-density residential to the south. The areas surrounding the proposed submarine cable and in-river transition structure include tidal marsh, open water, and benthic habitats.

A Project Overview map showing the location of the Collinsville Substation site, new transmission lines, and interconnection lines is included in **Figure 1**. The Proposed Project components are depicted in more detail in **Figure 2**.

The nearest sensitive receptors to the Collinsville Substation site and new transmission and interconnection lines are shown in **Figure 3**. The noise and vibration study area for the Proposed Project covers one mile (5,280 feet) radius of the new substation; a quarter mile (1,320 feet) of the proposed LSPGC 230 kV Overhead Segment, proposed PG&E 500 kV Interconnection, telecommunication line extension, and distribution line extension; and one-half mile (2,640 feet) of the proposed LSPGC 230 kV Underground Segment where open trenching methods of construction would be used to connect the submarine cables to an onshore underground utility vault. The nearest sensitive receptors to the center of the Collinsville Substation site include one cultural resource site called Hastings Adobe (nominated to the National Register of Historic Places in 1972; depicted as R1 in **Figure 3**), two residential areas (depicted as R2 and R3 in **Figure 3**), and one cemetery (depicted as R4 in **Figure 3**). The distance and direction of the nearest receptors to the center of the new substation are listed below:

- R1 (Hastings Adobe, a cultural resource site) is approximately 1,790 feet southeast of the new substation center.
- R2 (single-family residences along Latin Road) is approximately 4,175 feet southwest of the new substation center.
- R3 (single-family residences along Collinsville Road) is approximately 4,280 feet west-southwest of the new substation center.
- R4 (St. Charles Borromeo Catholic Cemetery along Abruzzini Hill Road, off Collinsville Road) is approximately 4,700 feet west-northwest of the substation center. The cemetery is also approximately 590 feet northwest of a new 12 kV distribution extension to the Collinsville Substation.

The nearest receptor to the proposed LSPGC 230 kV Overhead Segment and the proposed PG&E 500 kV Interconnection is approximately 555 feet south and 1,950 feet south, respectively (R1 in **Figure 3**). The nearest receptor to the proposed LSPGC 230 kV Underground Segment or 230 kV southern construction (open trench method) is a residential area with multiple single-family residences on Halsey Court/Halsey Way, approximately 1,370 feet east-southeast (R5 in **Figure 3**). The residential area (R5) is also 20 to 50 feet east of the telecommunication line extension construction activities and 2,000 feet southeast of the Pittsburg Substation modifications.

The objectives of this NVIA report are as follows:

- Identify applicable noise and vibration regulations.
- Estimate Project-related noise and vibration levels at nearest sensitive receptors during construction, operation, and maintenance.

- Determine whether the Proposed Project can operate in compliance with the applicable noise and vibration regulatory standards and CEQA impact significance thresholds and recommend mitigation measures if needed.

This NVIA report includes a description of the Proposed Project site, noise and vibration fundamentals, applicable regulations and standards, existing noise and vibration conditions, modeling and impact significance analysis for construction, operations and maintenance, and concluding comments.

2 Fundamentals of Noise and Vibration

2.1 Basic Noise Concepts

The terms ‘sound’ and ‘noise’ tend to be used interchangeably, but noise can be defined as unwanted sound, whereas sound is a normal and desirable part of life. However, when noise is imposed on people it can lead to disturbance, annoyance, and other undesirable effects. Sound is physically characterized by amplitude and frequency. The amplitude of sound is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 micro-Pascals). The reference sound pressure corresponds to the typical threshold of human hearing. To the average listener, a 3-dB change in a continuous broadband sound is considered “just barely perceptible”; a 5-dB change is considered “clearly noticeable”; and a 10-dB change is considered a doubling (or halving if the sound is decreasing) of the apparent loudness and can cause an adverse response. Sound waves can occur at different frequencies, which correspond to the sound’s wavelength. Frequency is measured in Hertz (Hz), which is the number of wave cycles per second that occur. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the lower and higher frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels, or dBA. Sound levels and relative loudness of common noise sources are presented for reference in **Table 2-1**.

Table 2-1. Sound Levels of Common Noise Sources

Common Noise Source	Noise Levels, dBA
Threshold of pain	140
Jet taking off (200 feet away)	130
Operating heavy equipment	120
Night club (with music)	110
Construction site	100
Boiler room	90
Freight train (100 feet away)	80
Classroom chatter	70
Conversation (3 feet away)	60
Urban residence	50
Soft whisper (5 feet away)	40
North Rim of Grand Canyon	30
Silent study room	20
Threshold of human hearing (1,000 Hertz)	0

Notes:
dBA = A-weighted decibel
Source: U.S. Department of Labor, Occupational Safety and Health Administration 2013

Sound can be characterized in terms of sound power level and sound pressure level. The sound power level is a measure of the total power radiated by a source. The sound power level is a fundamental property of the source and is independent of the surrounding environment. The sound pressure level is the level of sound pressure, as measured at a distance by a standard sound level meter with a microphone. This differs from the sound power level in that it is the received sound as opposed to the sound intensity at the source.

A given level of noise may be more or less tolerable depending on the sound level, duration of exposure, character of the noise sources, time of day during which the noise is experienced, and activity affected by the noise. For example, noise that occurs at night tends to be more disturbing than that which occurs during the day because sleep could potentially be disturbed.

Since sound in the environment often varies over time, statistical noise descriptors have been developed to quantify fluctuating environmental sound levels. The most commonly used indices for measuring community noise levels include the following:

- **L_{eq}**: The equivalent sound level is used to describe noise over a specified period of time, in terms of a single numerical value. The L_{eq} is the constant sound level, which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).
- **L_{dn} or DNL**: The day-night noise level or the energy average of the A-weighted sound levels occurring during a 24-hour period, which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to consider the greater annoyance of nighttime noises.
- **CNEL**: The Community Noise Equivalent Level, which is similar to the L_{dn}, adds a 5-dBA penalty for the evening hours between 7:00 p.m. and 10:00 p.m. in addition to the 10-dBA penalty between the hours of 10:00 p.m. and 7:00 a.m.[2]
- **L_x**: The sound level that is equaled or exceeded x percent of a specified time period. The L_{50} represents the median sound level (i.e., the noise level exceeded 50 percent of the time, or 30 minutes out of an hour).
- **L_{max}**: The instantaneous maximum noise level measured during the measurement period of interest.

2.2 Basic Vibration Concepts

Vibration is defined as any oscillatory motion induced in a structure or mechanical device as a direct result of some type of input excitation such as forces, moments, or pressure fields. Vibration is transmitted through solid material such as the ground by wave motion, giving rise to the terminology of "groundborne" vibration. Consequently, the term "vibration" and groundborne vibration" are the same and are therefore, used interchangeably in this NVIA report. Groundborne vibration propagates from sources such as railways and impact pile driving through the ground into nearby structures and buildings. Soil properties affect the propagation of groundborne vibration. The vibration energy spreads out as it travels through the ground, causing the vibration amplitude to decrease with distance away from the source. When groundborne vibration interacts with a building there is usually a ground-to-foundation coupling loss, but the vibration can also be amplified by the structural resonances of the walls and floors. Vibration in buildings is typically perceived as the rattling of windows or items

[2] For typical community noise environments, the CNEL and L_{dn} levels are nearly always within 1 dB of each other and, therefore, are commonly used interchangeably (as would be the case in this NVIA report).

on shelves or the motion of building surfaces. Vibration of building surfaces can also be radiated as sound and heard as a low-frequency rumbling noise, known as groundborne noise.

Groundborne vibrations transmitted from site activities to the neighborhood can cause anxiety as well as annoyance, and can disturb sleep, work, or leisure activities. Groundborne vibration can be expressed in terms of the peak particle velocity (PPV) of the soil particles resulting from a disturbance in inches per second. Agencies such as California Department of Transportation (Caltrans) use the PPV descriptor because it correlates well with damage and complaints due to vibration.

3 Regulatory Setting

Federal, state, and local noise and vibration regulations were reviewed to determine the applicable sound level limits for the Proposed Project.

3.1 Federal Regulations

There are no federal noise standards that directly regulate noise from the operation of electrical transmission lines and substation facilities. However, in 1974 the United States Environmental Protection Agency (USEPA) established guidelines for noise levels, defined to protect public health and welfare with an adequate margin of safety. The USEPA established criteria for protecting public health and wellbeing. The USEPA guideline recommends a L_{dn} of 55 dBA to protect the public from the effect of broadband environmental noise outdoors in residential areas and farms, and other outdoor areas where people spend widely varying amounts of time, and other places in which quiet is a basis for use (USEPA, 1974). However, these criteria do not constitute enforceable Federal regulations or standards. The USEPA has since delegated regulatory authority to local entities. Therefore, no Federal noise regulations apply to the Proposed Project.

3.2 State Regulations

3.2.1 California Public Utilities Commission

The CPUC General Order 131-D, (GO 131-D), Section XIV.B states: “Local jurisdictions acting pursuant to local authority are preempted from regulating electric power line projects, distribution lines, substations, or electric facilities constructed by public utilities subject to the Commission’s jurisdiction. However, in locating such projects, the public utilities shall consult with local agencies regarding land use matters.” Therefore, public utilities are directed to consider local regulations and consult with local agencies.

3.2.2 California Government Code Section 65302

California Government Code Section 65302 encourages counties and cities to implement a noise element as part of the general plan. In addition, the California Governor’s Office of Planning and Research has developed guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure.

3.2.3 California Department of Transportation and Construction-Induced Vibration Guidance

Caltrans provides practical guidance to engineers, planners, and consultants who must address vibration issues associated with the construction, operation, and maintenance of Caltrans-related projects. The guideline vibration criteria in Caltrans’ Transportation and Construction Vibration Guidance Manual (Caltrans 2020) have been used to assess the effects of vibration during the Proposed Project construction. Vibration was assessed for two potential effects:

1. human annoyance (disturbance or discomfort); and
2. cosmetic or structural damage.

Vibration also has the potential to disrupt the operation of vibration-sensitive research and advanced technology equipment such as optical microscopes, cell probing devices, magnetic resonance imaging machines, scanning electron microscopes, photolithography equipment, micro-lathes, and precision milling equipment (Caltrans 2020).

However, there is no known vibration-sensitive research and advanced technology equipment within the Proposed Project vicinity; therefore, vibration criteria and effects on such receptors are not discussed further.

Table 3-1 presents guideline vibration criteria to assess cosmetic or structural damage potential from ground vibration induced by construction equipment. In terms of human perception (i.e., annoyance), **Table 3-2** provides guidance on the effects of ground vibration levels due to use of heavy equipment. The guideline vibration criteria in **Tables 3-1** and **3-2** are applicable to continuous and frequent intermittent sources such as construction equipment and passing heavy vehicles that would be used during the Proposed Project construction. For the purpose of this NVIA, continuous or frequent intermittent vibration sources are significant when their PPV exceeds the vibration damage criterion of 0.3 inch per second for older residential structures and/or when it exceeds the vibration annoyance criterion of 0.01 inch per second for a barely perceptible human response.

Table 3-1. Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV for Continuous/ Frequent Intermittent Sources (inches per second)
Extremely fragile historic buildings, ruins, ancient monuments	0.08
Fragile buildings	0.1
Historic and some old buildings	0.25
Older residential structures	0.3
New residential structures	0.5
Modern industrial/commercial buildings	0.5

Notes:
PPV = peak particle velocity
Source: Caltrans 2020

Table 3-2. Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV for Continuous/ Frequent Intermittent Sources (inches per second)
Barely perceptible	0.01
Distinctly perceptible	0.04
Strongly perceptible	0.10
Severe	0.4

Notes:
PPV = peak particle velocity
Source: Caltrans 2020

3.3 Local Regulations

The Proposed Project is located in portions of Solano, Sacramento, and Contra Costa Counties, California. Relevant noise standards and policies for three counties are described below.

3.3.1 Solano County General Plan Noise Element

The County of Solano General Plan Noise Element Table HS-5 (listed in **Table 3-3** below) establishes an acceptable outdoor area noise level of 55 dBA L_{eq} for daytime (7:00 a.m. to 10:00 p.m.) and 50 dBA L_{eq} for nighttime (10:00 p.m. to 7:00 a.m.) for non-transportation noise sources. The standards shall be reduced by 5 dB for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds the standards, then the noise level standards shall be increased at 5 dBA increments to encompass the ambient.

Table 3-3. Solano County Noise Element - Non-Transportation Noise Standards (Average [L_{eq}, dBA] / Maximum [L_{max}, dBA])

Receiving Land Use	Outdoor Area[1]		Interior[1,2]	
	Daytime	Nighttime	Interior Day and Night	Notes
All Residential	55 / 70	50 / 70	35 / 55	
Transient Lodging	55 / 75	---	35 / 55	3
Hospitals & Nursing Homes	55 / 75	---	35 / 55	4,5
Theaters & Auditoriums	---	---	30 / 50	5
Churches, Meeting Halls, Schools, Libraries, etc.	55 / 75	---	35 / 60	5
Office Buildings	60 / 75	---	45 / 65	5
Commercial Buildings	55 / 75	---	45 / 65	5
Playgrounds, Parks, etc.	60 / 75	---	---	5
Industry	60 / 80	---	50 / 70	5

Notes:
Source: Solano County 2015.
L_{eq} = equivalent or energy-average sound level; L_{max} = Highest root-mean-square sound level measured over a given period of time.

1. The noise standards shall be reduced by 5 dBA for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds the noise standards, then the noise level standards shall be increased at 5-dBA increments to encompass the ambient.
2. Interior noise level standards are applied within noise-sensitive areas of the various land uses, with windows and doors in closed positions.
3. Outdoor activity areas of transient lodging facilities are not commonly used during nighttime hours.
4. Hospitals are often noise-generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
5. The outdoor activity areas of these uses (if any) are not typically utilized during nighttime hours.

3.3.2 Solano County Noise Ordinance

The Solano County Noise, Section 28.1-40, provides an exterior noise level standard of 55 dBA Leq between 7:00 a.m. and 7:00 p.m. and an exterior noise level standard of 50 dBA Leq between 7:00 p.m. and 7:00 a.m. for residential and agricultural zoning districts (Solano County, 2017). If the measured ambient noise level at the time of complaint investigation exceeds the identified permissible noise for that zone, the allowable noise standard shall be the ambient noise level. Section 28.1-30 of the noise ordinance provides an interior noise level standard of 55 dBA Leq between 7:00 a.m. and 7:00 p.m. and an interior noise level standard of 45 dBA between 7:00 p.m. and 7:00 a.m. for residential land use. According to Section 28.1-50(a) of the noise ordinance, construction and demolition activities within a residential district or within a radius of 500 feet are allowed only between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and Saturday between 8:00 a.m. and 5:00 p.m.; construction and demolition activities are not allowed on Sundays and Federal holidays.

3.3.3 Sacramento County General Plan Noise Element

The County of Sacramento General Plan Noise Element Table 2 (listed in **Table 3-4** below) establishes an acceptable outdoor area noise level of 55 dBA L_{50} for daytime (7:00 a.m. to 10:00 p.m.) and 50 dBA L_{50} for nighttime (10:00 p.m. to 7:00 a.m.) for non-transportation noise sources. The standards are reduced by 5 dB for sounds consisting primarily of speech or music, such as a speaker in a drive-through. Where median (L_{50}) noise level data is not available for a particular noise source, average (L_{eq}) values may be substituted for the standards shown in **Table 3-4** provided the noise source in question operates for at least 30 minutes of an hour. If the source in question operates less than 30 minutes per hour, then the maximum noise level standards shown in the table would apply.

Table 3-4. Sacramento County Noise Element - Non-Transportation Noise Standards (Median [L_{50}, dBA] / Maximum [L_{max}, dBA])

Receiving Land Use	Outdoor Area[1]		Interior[1,2]	
	Daytime	Nighttime	Interior Day & Night	Notes
All Residential	55 / 75	50 / 70	35 / 55	
Transient Lodging	55 / 75	---	35 / 55	3
Hospitals & Nursing Home	55 / 75	---	35 / 55	4,5
Theaters & Auditoriums	---	---	30 / 50	5
Churches, Meeting Halls, Schools, Libraries, etc.	55 / 75	---	35 / 60	5
Office Buildings	60 / 75	---	45 / 65	5
Commercial Buildings	---	---	45 / 65	5
Playgrounds, Parks, etc.	60 / 75	---	---	5
Industry	60 / 80	---	50 / 70	5

Notes:
Source: Sacramento County, 2017.
L_{50} = median noise level or level exceeded 50 percent of time; L_{max} = Highest root-mean-square sound level measured over a given period of time.

1. The noise standards shall be reduced by 5 dB for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds the noise standards, then the noise level standards shall be increased at 5 dB increments to encompass the ambient.
2. Interior noise level standards are applied within noise-sensitive areas of the various land uses, with windows and doors in the closed positions.
3. Outdoor activity areas of transient lodging facilities are not commonly used during nighttime hours.
4. Hospitals are often noise-generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
5. The outdoor activity areas of these uses (if any) are not typically utilized during nighttime hours.

3.3.4 Sacramento County Noise Ordinance

The Sacramento County Municipal Code, Section 6.68.070, provides an exterior noise level standard of 55 dBA L_{eq} for daytime (7:00 a.m. to 10:00 p.m.) and an exterior noise level standard of 50 dBA L_{eq} for nighttime (10:00 p.m. to 7:00 a.m.) for residential zoning districts (Sacramento County, 2023). According to Section 6.68.090 of the Code, noise sources associated with construction, repair, remodeling, demotion, paving or grading of any real property are exempt provided said activities do not take place between the hours of 8:00 p.m. and 6:00 a.m. on weekdays and Friday commencing at 8:00 p.m. through and including 7:00 a.m. on Saturday; Saturdays commencing at 8:00 p.m. through and including 7:00 a.m. on the next following Sunday and on each Sunday after the hour of 8:00 p.m.

3.3.5 Contra Costa County General Plan Noise Element

The objectives and policies of the Contra costa County noise element are aimed at protecting the citizens of Contra Costa County from excessive noise levels that interfere with daily routine and comfort. Noise from construction activities in Contra Costa County is exempt from applicable standards during daytime hours. Applicable policies are summarized below (Contra Costa County 2010):

- Policy 11-1: New projects shall be required to meet acceptable exterior noise level standards as established in the Noise and Land Use Compatibility Guidelines contained in Figure 11-6 (shown in this NVIA report as **Figure 4**). These guidelines, along with future noise levels should be used by the county as a guide for evaluating the compatibility of "noise sensitive" projects in potentially noisy areas.
- Policy 11-2: The standard for outdoor noise levels in residential areas is a DNL of 60 dB. However, a DNL of 60 dB or less may not be achievable in all residential areas due to economic or aesthetic constraints. One example is small balconies associated with multi-family housing. In this case, second and third story balconies may be difficult to control to the goal. A common outdoor use area that meets the goal can be provided as an alternative.

3.3.6 Contra Costa County Ordinance Code

Contra Costa County does not have a noise ordinance code.

3.3.7 City of Pittsburg General Plan Noise Element

The following Policy of the city of Pittsburg (City) General Plan (City of Pittsburg, 2001) is relevant to the Proposed Project:

- Policy 12-P-9 establishes that generation of loud noises on construction sites adjacent to existing development should be limited to normal business hours between 8 a.m. and 5 p.m.
- Policy 12-P-10 establishes that the impact of truck traffic noise on residential areas should be reduced by limiting such traffic to appropriate truck routes, and that consideration is given to restrict truck travel times in sensitive areas.

The City's General Plan Noise Element also generally describes a range of changes in ambient (existing) noise levels and how these changes would be perceived by the community, such as a residential receptor, in terms of significance of impact:

- Except under special conditions, a change in sound level of 1 dB cannot be perceived.
- A 3 dB change is considered a "just noticeable" difference.
- A 5 dB change is required before any noticeable change in community response would be expected. A 5 dB change is often considered a "significant impact".
- A 10 dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response.

3.3.8 City of Pittsburg Ordinance Code

The City's Municipal Code (City of Pittsburg, 2007) Noise Ordinance (Section 9.44.010) does not establish numerical noise-level limits related to construction noise but makes it unlawful for any person to make, continue or cause to be made, or continue any noise which either unreasonably annoys, disturbs, injures, or endangers the comfort, repose, health, peace, or safety of others, within the limits of the City. Unreasonable noise sources listed in the ordinance, and potentially relevant to the Proposed Project, include unmuffled vehicle exhaust (9.44.010.H) and pile drivers, hammers, and similar equipment (9.44.010.J). The City's Municipal Code (City of Pittsburg, 2007) Building and Construction Ordinance (Section 15.88.060.A.5) prohibits grading noise, including warming up equipment motors, within 1,000 feet of a residence between the hours of 5:30 p.m. and 7 a.m. weekdays, unless otherwise approved by the City Engineer.

3.3.9 Summary of Relevant Noise Level Criteria

The Proposed Project is in portions of Solano, Sacramento, and Contra Costa, counties. All three counties have similar noise standards for non-transportation (stationary) noise sources. The Proposed Project, which shall be considered a non-transportation noise source, shall not be permitted to generate noise levels exceeding:

- 55 dBA L_{50} or L_{eq} during daytime (7:00 a.m. to 10:00 p.m.) hours,
- 50 dBA L_{50} or L_{eq} during nighttime (10:00 p.m. to 7:00 a.m.) hours, and
- 60 dBA L_{dn} or CNEL (day-night) hours at the adjacent residential uses.

4 Existing Noise and Vibration Conditions

4.1 Existing Noise Conditions

Arcadis personnel conducted sound level measurements on September 25 and 26, 2023, to establish existing ambient environment at key locations of the Proposed Project area, including the Collinsville Substation site and the proposed LSPGC 230 kV Overhead Segment. Unattended long-term noise measurements (NM2) were conducted for 24 hours (started at 8:00 a.m. on Monday September 25 and ended 8:00 a.m. on Tuesday September 26) along Collinsville Road near residential receptor, R3, and approximately 4,300 feet west-southwest of the Collinsville Substation site (see **Figure 3**). Attended short-term measurements (NM1) were conducted for one hour during the day (10:57 a.m. to 11:57 a.m. on Monday, September 25) and one hour at night (11:04 p.m. to 12:04 a.m. on Monday, September 25 and Tuesday, September 26) near residential receptor, R5 on Halsey Court (near Pittsburg Substation) and approximately 2,200 feet southeast of the proposed LSPGC 230 kV Underground Segment (**Figure 3**). The attended short-term measurements were conducted near the Pittsburg Substation instead of unattended long-term measurement due to the risk of theft. The ambient noise recorded at both measurement locations are expected to be representative of the existing ambient noise levels at the nearest sensitive receptors to the Collinsville Substation site, along the new transmission line corridor, and near the proposed LSPGC telecommunications extension.

Measurements were taken with a fully calibrated Casella CEL-633C Type 1 Sound Level Meter (SLM), equipped with a microphone/pre-amplifier and a windscreen to reduce wind induced sound. The SLM and the microphone was setup at a height of approximately 5 feet above ground level. The SLM was setup to measure average A-weighted equivalent sound levels (L_{eq}) and was field calibrated prior to and following the noise measurement to ensure accuracy. All sound level measurements conducted and presented in this NVIA report were made with a SLM that conforms to the American National Standards Institute (ANSI) specifications for sound level meters (ANSI S1.4 1983 (R2006)). All instruments are maintained with National Bureau of Standards traceable calibrations, per the manufacturers' standards. A copy of the calibration certificate for the SLM is provided in **Appendix A**. A photograph log of the SLM set-up is provided in **Appendix B**.

The primary audible noise sources contributing to the short-term ambient sound levels at NM1 were infrequent vehicle traffic from nearby roads, construction noises in the neighborhood, dogs barking, leaves rustling, and noise from a nearby power generating plant. The primary audible noise sources contributing to the long-term ambient sound levels at NM2 were infrequent vehicle traffic from nearby roads and birds chirping.

Weather conditions were calm and conducive for noise measurements with sunny conditions during the day and partly cloudy skies at night. Ambient temperatures ranged from 59 to 78 degrees Fahrenheit during the day and 63 to 64 degrees Fahrenheit at night. Relative humidity ranged from 43 to 83 percent during the day and 75 to 84 percent at night. Average wind speed during the day ranged from 4 to 9 miles per hour, primarily in a northeast direction. At night, average wind speed was 5 miles per hour, primarily in a northeast direction. No precipitation occurred during the survey.

A summary of the 24-hour L_{eq} noise levels measured near the new substation site and the one-hour L_{eq} noise levels measured near the new transmission line corridor are presented in **Table 4-1** and **Table 4-2**, respectively. **Table 4-3** summarizes the measured daytime ambient sound levels ($L_{eq(day)}$) and nighttime ambient sound levels ($L_{eq(night)}$) for the two measurement locations, along with the calculated day-night sound levels (L_{dn}). As defined in Section 3, the L_{dn} is the A-weighted equivalent noise level for a 24-hour period with a 10-dB adjustment added to sound levels occurring during nighttime hours (10:00 p.m. to 07:00 a.m.).

The L_{dn} is calculated using the following formula:

$$L_{dn} = 10\log_{10}\left(\frac{15}{24}10^{\frac{L_{eq(day)}}{10}} + \frac{9}{24}10^{\frac{(L_{eq(night)}+10)}{10}}\right)$$

Where $L_{eq(day)}$ is the continuous equivalent A-weighted daytime level between 07:00 a.m. and 10:00 p.m., and $L_{eq(night)}$ is the continuous equivalent A-weighted nighttime level between 10:00 p.m. and 07:00 a.m. the following day. Based on the above summaries, the calculated L_{dn} (or CNEL) noise level at sensitive receptors near the new substation and near the new transmission line corridor are 46 and 50 dBA, respectively (**Table 4-3**).

Table 4-1. Long-term Noise Measurement Results Near Collinsville Substation Site and New Transmission Line Corridor

Measurement Date	Measurement Time	Measured Noise Levels, One-Hour L_{eq} (dBA)
Monday, September 25, 2023	08:00 a.m. - 09:00 a.m.	41
	09:00 a.m. - 10:00 a.m.	47
	10:00 a.m. - 11:00 a.m.	43
	11:00 a.m. - 12:00 p.m.	47
	12:00 p.m. - 01:00 p.m.	40
	01:00 p.m. - 02:00 p.m.	51
	02:00 p.m. - 03:00 p.m.	54
	03:00 p.m. - 04:00 p.m.	44
	04:00 p.m. - 05:00 p.m.	47
	05:00 p.m. - 06:00 p.m.	49
	06:00 p.m. - 07:00 p.m.	42
	07:00 p.m. - 08:00 p.m.	49
	08:00 p.m. - 09:00 p.m.	51
	09:00 p.m. - 10:00 p.m.	49
	10:00 p.m. - 11:00 p.m.	37
	11:00 p.m. - 12:00 a.m.	41
Tuesday, September 26, 2023	12:00 a.m. - 01:00 a.m.	41
	01:00 a.m. - 02:00 a.m.	40
	02:00 a.m. - 03:00 a.m.	44
	03:00 a.m. - 04:00 a.m.	45
	04:00 a.m. - 05:00 a.m.	44
	05:00 a.m. - 06:00 a.m.	40
	06:00 a.m. - 07:00 a.m.	38
	07:00 a.m. - 08:00 a.m.	45

Notes:

L_{eq} = average equivalent sound level; dBA = A-weighted sound level

Table 4-2. Short-term Noise Measurement Results Near Existing PG&E Pittsburg Substation

Measurement Date	Measurement Time	Measured Noise Levels, One-Hour L_{eq} (dBA)
Monday, September 25, 2023, to Tuesday, September 26, 2023	10:57 a.m. - 11:57 a.m.	46
	11:04 p.m. - 12:04 a.m.	40

Notes:
L_{eq} = average equivalent sound level; dBA = A-weighted sound level

Table 4-3. Summary of Measured Ambient Daytime and Nighttime Noise Levels and Calculated Day-Night Ambient Noise Levels

Noise Measurement Location ID	Measurement Location Description	Measured Ambient $L_{eq(day)}$, dBA	Measured Ambient $L_{eq(night)}$, dBA	Calculated Ambient L_{dn}, dBA
NM2	Long-term measurement location near residential receptor, R3, and approximately 4,300 feet west-southwest of the Collinsville Substation site (**Figure 3**).	48	42	50
NM1	Short-term noise measurement location near residential receptor, R5 on Halsey Court and approximately 2,200 feet southeast of the southern edge of the Sacramento River and San Joaquin River confluence (**Figure 3**).	46	40	48

Notes:
$L_{eq(day)}$ = average equivalent sound level during daytime (7:00 a.m. to 10:00 p.m.)
$L_{eq(night)}$ = average equivalent sound level during nighttime (7:00 a.m. to 10:00 p.m.)
L_{dn} = A-weighted equivalent sound level for a 24-hour period with a 10-dB adjustment added to sound levels occurring during nighttime hours (10:00 p.m. to 07:00 a.m.)
dBA = A-weighted sound level
ID = identification

4.2 Existing Vibration Conditions

Currently, no ground or air-vibrating sources or activities (i.e., mine blasting, pile driving, locomotives, etc.) are present at or near the Collinsville Substation site or along the new transmission/interconnection line corridor. In addition, rubber-tired vehicles such as those on nearby public roads and highways, do not generate any significant amount of groundborne vibration (FTA 2018). Like noise emissions, ground and air vibration effects diminish with distance from the source, so baseline levels of vibration at the Proposed Project site and surrounding areas are expected to be negligible.

5 Modeling

5.1 Construction Noise

5.1.1 Substation Construction Noise

The Collinsville Substation construction noise levels were estimated using the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) User's Guide (FHWA 2006). Although the model was developed by the FHWA, RCNM is often used for non-roadway projects, because the same types of construction equipment used for roadway projects are also used to construct other project types. Input variables for the RCNM consist of the receptor/land use types, the equipment type, the acoustical usage factor for each piece of equipment (e.g., percentage of time during a construction noise operation that a piece of construction equipment is operating at full power), and the distance between the construction activity and sensitive receptor. No topographical or structural shielding was assumed in the modeling of construction noise (i.e., the receptors are modeled with no obstacles to the propagation of sound between the construction activity and receptor location, a worst-case assumption). For construction equipment where measured noise levels were unavailable, noise level information for similar equipment types was assumed. Specifically, construction noise levels were calculated using the equation below:

$L_{eq(h)} = L_{max} – 20 \log (D/D_0) + 10 \log (U.F.) + 10 \log (\text{number of units operating concurrently})$

Where:

$L_{eq(h)}$ = A-weighted, equivalent sound level at a receptor resulting from operation of a piece of equipment over a 1-hour time period;

L_{max} = Maximum noise emission level of equipment based on its work cycle at distance D_0;

U.F. = Usage Factor, which accounts for the percent time that equipment is in use over the time period of interest (1 hour). For example, a U.F. of 1.0 applies for equipment in use over 1 entire hour, while a U.F. of 0.40 applies for equipment in use for 24 minutes per hour;

D = Distance from the equipment to the receptor of interest; and

D_o = Reference distance at which the L_{max} was measured for the piece of equipment of interest.

The four noise sensitive receptors within one mile (5,280 feet) radius of the Collinsville Substation site comprise of one cultural resource site, two residential areas, and one cemetery (**Figure 3**).

The result of the Collinsville Substation construction noise analysis is summarized in **Table 5-1**. The table includes a list of equipment typically used for construction of substation facilities by phase and the calculated A-weighted L_{eq} noise levels for each phase of construction based on the individual equipment's maximum noise levels (L_{max}), the equipment usage factor, number of units operating concurrently, and the distances between the work sites and the nearest receptor location. The new substation construction noise levels at nearest receptor, R1 (1,790 feet away) range from 43 dBA during survey to 62 dBA during below grade construction and commissioning and testing. Construction noise levels at the other sensitive receptors (R2, R3, and R4) located further away would be lower.

Table 5-1. New Substation Construction Noise Levels by Phase

Construction Equipment Type	FHWA RCNM Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Residence), 1,790 feet from Center of New Substation Site, L_{eq} (dBA)
Survey (26 Days)				
Pickup Truck (1/2-Ton, 395 HP)	75	40%	2	43
Site Development (102 Days)				
Water Truck (4,000 Gal, 300 HP)	72	40%	4	43
Loader (4-5 Yd, 230 HP)	79	40%	2	47
Dump Truck (10-12 Yd, 415 HP)	76	40%	3	46
Motor Grader (250 HP)	85	40%	2	53
Scrapper (410 HP)	84	40%	4	55
Vibratory Roller (157 HP)	80	20%	2	45
Pickup Truck (1/2-Ton, 395 HP)	75	40%	4	46
Generator (36 HP)	81	50%	2	50
Forklift (15,000 Lb Reach, 130 HP)	88	20%	4	56
Pickup Truck (1-Ton, 410 HP)	75	40%	4	46
844 Loader (417 HP)	79	40%	1	44
Semi-Truck (500 HP)[1]	74	40%	2	42
Subtotal (Logarithmic Sum)				**61**
Below Grade Construction (123 Days)				
Water Truck (4,000 Gal, 300 HP)	72	40%	4	43
Excavator (108 HP)	81	40%	2	49
Forklift (15,000 Lb Reach, 130 HP)	88	20%	3	55
Backhoe (2x4, 68 HP)	78	40%	2	46
Pickup Truck (1/2-Ton, 395 HP)	75	40%	4	46
Pickup Truck (1-Ton, 410 HP)	75	40%	4	46
Excavator - Mini (170 HP)	81	40%	1	46
Generator (36 HP)	81	50%	1	47
Concrete Mixer Truck (425 HP)	79	40%	4	50
Loader (4-5 Yd, 230 HP)	79	40%	2	47
Pressure Digger - Lo-Drill (Tracked, 275 HP)[2]	84	20%	1	46
Excavator (275 HP)	81	40%	1	46
Dump Truck (10-12 Yd, 415 HP)	76	40%	3	46
Tool - Van/Conex 20-foot[3]	85	50%	6	59
Trencher (75 HP)[4]	80	50%	2	49
Skid Steer Loader (74 HP)	79	40%	2	47
Subtotal (Logarithmic Sum)				**62**
Above Grade Construction (274 Days)				

Construction Equipment Type	FHWA RCNM Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Residence), 1,790 feet from Center of New Substation Site, L_{eq} (dBA)
Wire Trailer/ Tensioner (175 HP)[5]	85	50%	1	51
Wire Puller (175 HP)[5]	85	50%	1	51
Crane (200 Ton, 275 HP)	81	16%	1	42
Pickup Truck (1/2-Ton, 395 HP)	75	40%	4	46
Pickup Truck (1-Ton, 410 HP)	75	40%	4	46
Welding Truck (395 HP)	74	40%	2	42
Generator (36 HP)	81	50%	2	50
Crane (35 Ton, 250 HP)	81	16%	1	42
Forklift (10,000 Lb Reach, 130 HP)	88	20%	2	53
Forklift (15,000 Lb Reach, 130 HP)	88	20%	1	50
Loader (4-5 Yd, 74 HP)	79	40%	2	47
Man Lift (120-foot, 74 HP)	75	20%	2	40
Subtotal (Logarithmic Sum)				**59**
Commissioning and Testing (174 Days)				
Pickup Truck (1/2-Ton, 395 HP)	75	40%	4	46
Pickup Truck (1-Ton, 410 HP)	75	40%	4	46
Man Lift (40-foot, 49 HP)	75	20%	3	42
Water Truck (4,000 Gal, 300 HP)	72	40%	6	45
Tool - Van/Conex 20-foot[3]	85	50%	6	59
Deck Barge (not a noise source)	N/A	N/A	1	N/A
Tugboat (3,300 HP)[6]	87	50%	2	56
Support Vessel (200 HP)[6]	81	50%	2	50
Deck Generator (170 HP)	81	50%	1	47
Crane (35 Ton, 250 HP)	81	16%	2	45
Subtotal (Logarithmic Sum)				**62**
Cleanup and Restoration (140 Days)				
Pickup Truck (1-Ton, 410 HP)	75	40%	4	46
Motor Grader (250 HP)	85	40%	2	53
Backhoe (2x4, 68 HP)	78	40%	2	46
Water Truck (4,000 Gal, 300 HP)	72	40%	2	40
Skid Steer Loader (74 HP)	79	40%	1	44
Excavator (250 HP)	81	40%	1	46
Dozer (D6 Type, 250 HP)	82	40%	1	47
Pickup Truck (1/2-Ton, 395 HP)	75	40%	4	46
Dump Truck (10-12 Yd, 415 HP)	76	40%	2	44
Subtotal (Logarithmic Sum)				**57**

Notes:
[1] Assumed noise level for a flatbed truck.
[2] Assumed noise level for an auger drill rig.
[3] Assumed noise level for a pneumatic tool.
[4] Assumed noise level for a slurry trenching machine.
[5] Assumed noise level for all other equipment greater than 5 HP per FHWA 2006.
[6] Noise level for tugboat and support vessel (crew boat) obtained from Epsilon Associates, Inc. 2006.

FHWA RCNM = Federal Highway Administration Roadway Construction Noise Model
L_{eq} = average equivalent sound level
HP = horsepower
Lb = pound
Source: FHWA 2006, WSDOT 2020, and Epsilon Associates, Inc. 2006

L_{max} = maximum sound level
dBA = A-weighted decibel
Yd = yard
Gal = gallon
N/A = not applicable

5.1.2 Transmission Line Construction Noise

Similar to the new substation construction noise, the proposed 500 kV Interconnection and the proposed LSPGC 230 kV Overhead Segment construction noise levels were estimated based on the FHWA RCNM User's Guide (FHWA 2006). Input variables for the RCNM consist of the receptor/land use types, the equipment type, number of units operating concurrently, the acoustical usage factor for each piece of equipment, and the distance between the construction activity and sensitive receptor. No topographical or structural shielding was assumed in the construction noise analysis. For construction equipment where measured noise levels were unavailable, noise level information for similar equipment types was assumed. One cultural resource site (Hastings Adobe, depicted as R1 in **Figure 3**) is within one-quarter mile (1,320 feet) of the proposed LSPGC 230 kV Overhead Segment. R1 is approximately 555 feet south of the proposed LSPGC 230 kV Overhead Segment (**Figure 3**). There are no sensitive noise receptors within one-quarter mile (1,320 feet) of the proposed PG&E 500 kV Interconnection. The closest receptor, R1, to the interconnection line is approximately 1,950 feet south. For purposes of this analysis, the interconnection line construction impacts at 1,950 feet away was also evaluated.

The result of the construction noise analysis for the proposed PG&E 500 kV Interconnection and the proposed LSPGC 230 kV Overhead Segment are summarized in **Table 5-2** and **Table 5-3**, respectively. The table includes a list of equipment typically used for construction of interconnection/transmission lines by phase and the calculated A-weighted L_{eq} noise levels for each phase of construction based on the individual equipment's maximum noise levels, the equipment usage factor, and the distances between the work sites and the nearest receptor locations. LSPGC plan to use a Kaman K-Max (or similar model) for PG&E 500 kV Structure Installation and a Hughes 500 (or similar model) for PG&E 500 kV Conductor Installation and the LSPGC 230 kV Conductor Installation. The proposed PG&E 500 kV Interconnection construction noise levels at nearest receptor (1,950 feet away) range from 58 dBA during foundation installation to 72 dBA during structure installation. The proposed LSPGC 230 kV Overhead Segment construction noise levels at nearest receptor, R1 (555 feet away) range from 64 dBA during structure installation to 78 dBA during conductor installation. The primary source of noise during construction of the interconnection/transmission lines are helicopters used for structure installation and conductor installation.

Table 5-2. Proposed PG&E 500 kV Interconnection Construction Noise Levels by Phase

Construction Equipment Type	FHWA RCNM Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Residence), 1,950 feet from Construction Site, L_{eq} (dBA)
Foundation Installation (48 Days)				
Pressure Digger - Lo-Drill (Tracked, 275 HP)[1]	84	20%	1	45
Concrete Mixer Truck (425 HP)	79	40%	4	49
Pickup Truck (1-Ton, 410 HP)	75	40%	4	45
Water Truck (4,000 Gal, 300 HP)	72	40%	2	39
Dump Truck (10-12 Yd, 415 HP)	76	40%	2	43
Skid Steer Loader (74 HP)	79	40%	1	43
Forklift (10,000 Lb Reach, 130 HP)	88	20%	2	52
Crane (35 Ton, 250 HP)	81	16%	1	41
Loader (4-5 Yd, 230 HP)	79	40%	1	43
Rough Terrain Crane (185 HP)	81	16%	1	41
Motor Grader (250 HP)	85	40%	1	49
Dozer (D6 Type, 250 HP)	82	40%	1	46
Excavator (250 HP)	81	40%	1	45
Vibratory Roller (125 HP)	80	20%	1	41
Subtotal (Logarithmic Sum)				**58**
Structure Installation (21 Days)				
Crane (35 Ton, 250 HP)	81	16%	2	44
Helicopter – Heavy Duty (3,200 HP)[2]	106	50%	1	72
Jet Fuel Truck (300 HP)[3]	72	40%	1	36
Pickup Truck (1/2-Ton, 395 HP)	75	40%	2	42
Forklift (15,000 Lb Reach, 130 HP)	88	20%	1	49
Pickup Truck (1-Ton, 410 HP)	75	40%	2	42
Crane (200 Ton, 275 HP)	81	16%	1	41
844 Loader (417 HP)	79	40%	1	43
Water Truck (4,000 Gal, 300 HP)	72	40%	2	39
Subtotal (Logarithmic Sum)				**72**
Conductor Installation (20 Days)				
Helicopter – Light Duty (700 HP)[4]	101	50%	1	66
Jet Fuel Truck (300 HP)[3]	72	40%	1	36
Crane (35 Ton, 250 HP)	81	16%	6	49
Pickup Truck (1/2-Ton, 395 HP)	75	40%	4	45
Pickup Truck (1-Ton, 410 HP)	75	40%	4	45
Dozer (D8 Type, 200 HP)	82	40%	3	51

Construction Equipment Type	FHWA RCNM Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Residence), 1,950 feet from Construction Site, L_{eq} (dBA)
Wire Puller (175 HP)[5]	85	50%	1	50
Water Truck (4,000 Gal, 300 HP)	72	40%	2	39
Wire Trailer/ Tensioner (175 HP)[5]	85	50%	1	50
Subtotal (Logarithmic Sum)				**66**

Notes:
[1] Assumed noise level for an auger drill.
[2] Based on noise level (90 dBA) of a CH-47D helicopter flying at 100 feet aboveground level (Schomer et al 1988); adjusted to noise levels at 50 feet and assumed a 50 percent usage factor.
[3] Assumed noise level for a water truck.
[3] Based on noise level (94.5 dBA) of a MD900 helicopter flying at 100 feet aboveground level during landing (Falzarano S., and Levy L., 2007); adjusted to noise levels at 50 feet and assumed a 50 percent usage factor. Noise levels for MD500 model[4] Assumed noise level for a water truck.
[5] Assumed noise level for all other equipment greater than 5 horsepower per FHWA 2006
FHWA RCNM = Federal Highway Administration Roadway Construction Noise Model
L_{max} = maximum sound level
L_{eq} = average equivalent sound level
dBA = A-weighted decibel
HP = horsepower
Yd = yard
Lb = pound
Gal = Gallon
Source: FHWA 2006, WSDOT 2020, USDA 2024, Falzarano S., and Levy L., 2007.

Table 5-3. Proposed LSPGC 230 kV Overhead Segment Construction Noise Levels by Phase

Construction Equipment Type	FHWA RCNM Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Residence), 555 feet from Construction Site, L_{eq} (dBA)
Access Road Construction (16 Days)				
Pickup Truck (1/2-Ton, 395 HP)	75	40%	2	53
Pickup Truck (1-Ton, 410 HP)	75	40%	2	53
Motor Grader (250 HP)	85	40%	1	60
Dump Truck (10-12 Yd, 415 HP)	76	40%	2	54
Skid Steer Loader (74 HP)	79	40%	1	54
Water Truck (4,000 Gal, 300 HP)	72	40%	2	50
Dozer (D6 Type, 250 HP)	82	40%	1	57
Excavator (250 HP)	81	40%	1	56
Vibratory Roller (125 HP)	80	20%	1	52
Subtotal (Logarithmic Sum)				**65**
Foundation Installation (22 Days)				
Pressure Digger - Lo-Drill (Tracked, 275 HP)[1]	84	20%	1	56
Concrete Mixer Truck (425 HP)	79	40%	4	60
Pickup Truck (1-Ton, 410 HP)	75	40%	4	56
Water Truck (4,000 Gal, 300 HP)	72	40%	2	50
Dump Truck (10-12 Yd, 415 HP)	76	40%	2	54
Skid Steer Loader (74 HP)	79	40%	1	54
Forklift (10,000 Lb Reach, 130 HP)	88	20%	2	63
Crane (35 Ton, 250 HP)	81	16%	1	52
844 Loader (417 HP)	79	40%	1	54
Rough Terrain Crane (185 HP)	81	16%	1	52
Subtotal (Logarithmic Sum)				**67**
Structure Installation (24 Days)				
Crane (35 Ton, 250 HP)	81	16%	2	55
Pickup Truck (1/2-Ton, 395 HP)	75	40%	2	53
Forklift (15,000 Lb Reach, 130 HP)	88	20%	1	60
Pickup Truck (1-Ton, 410 HP)	75	40%	2	53
Crane (200 Ton, 275 HP)	81	16%	1	52
844 Loader (417 HP)	79	40%	1	54
Water Truck (4,000 Gal, 300 HP)	72	40%	2	50
Subtotal (Logarithmic Sum)				**64**
Conductor Installation (26 Days)				
Helicopter – Light Duty (700 HP)[2]	101	50%	1	77

Construction Equipment Type	FHWA RCNM Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Residence), 555 feet from Construction Site, L_{eq} (dBA)
Jet Fuel Truck (300 HP)[3]	72	40%	1	47
Crane (35 Ton, 250 HP)	81	16%	6	60
Pickup Truck (1/2-Ton, 395 HP)	75	40%	4	56
Pickup Truck (1-Ton, 410 HP)	75	40%	4	56
Dozer (D8 Type, 200 HP)	82	40%	3	62
Wire Puller (175 HP)[4]	85	50%	1	61
Water Truck (4,000 Gal, 300 HP)	72	40%	2	50
Wire Trailer/ Tensioner (175 HP)[4]	85	50%	1	61
Deck Barge (not a noise source)	N/A	N/A	1	0
Tugboat (3,300 HP)[5]	87	50%	2	66
Support Vessel (200 HP)[5]	81	50%	2	60
Deck Generator (170 HP)[5]	81	50%	1	57
Anchor Winches (100 HP)[4]	85	50%	4	67
Subtotal (Logarithmic Sum)				**78**

Notes:
[1] Assumed noise level for an auger drill.
[2] Based on noise level (94.5 dBA) of a MD900 helicopter flying at 100 feet aboveground level during landing (Falzarano S., and Levy L., 2007); adjusted to noise levels at 50 feet and assumed a 50 percent usage factor. Noise levels for MD500 model[3] Assumed noise level for a water truck.
[3] Assumed noise level for a water truck.
[4] Assumed noise level for all other equipment greater than 5 horsepower per FHWA 2006
[6] Noise level for tugboat and support vessel (crew boat) obtained from Epsilon Associates, Inc. 2006.

FHWA RCNM = Federal Highway Administration Roadway Construction Noise Model
L_{max} = maximum sound level
L_{eq} = average equivalent sound level
HP = horsepower
Yd = yard
Lb = pound
Gal = gallon
N/A = not applicable
dBA = A-weighted decibel
Source: FHWA 2006, WSDOT 2020, Falzarano S., and Levy L., 2007.

5.1.3 Construction Noise Levels from Other Land-based Components

The Proposed Project would generate construction noise levels from other land-based components such as:

- Proposed LSPGC 230 kV Underground Segment or 230 kV southern construction - open trenching methods of construction would be used to connect the submarine cables to an onshore utility vault. The cables would then continue in an underground configuration to designated locations near the fence of PG&E's existing Pittsburg Substation.
- Staging yard establishment and use.
- 12 kV distribution line extension to Collinsville Substation.
- Telecommunications line extension that goes through the underground utility vault and onto the LSPGC Collinsville Substation.

- Pittsburg Substation modifications – Vaca Dixon, Tesla, and Pittsburg Substation upgrades.

Construction noise levels for the components listed above were estimated based on the FHWA RCNM User's Guide (FHWA 2006). Input variables for the RCNM consist of the receptor/land use types, the equipment type, number of units operating concurrently, the acoustical usage factor for each piece of equipment, and the distance between the construction activity and sensitive receptor. No topographical or structural shielding was assumed in the construction noise analysis. For construction equipment where measured noise levels were unavailable, noise level information for similar equipment types was assumed. The proposed LSPGC 230 kV Underground Segment, telecommunications line extension, and Pittsburg Substation modifications are approximately 1,370 feet, 20 feet, and 2,000 feet, respectively from the nearest residential area on Halsey Court/Halsey Way (R5 in **Figure 3**). The 12 kV distribution line is approximately 590 feet from the nearest receptor, a cemetery along Abruzzini Hill Road, off Collinsville Road (R4 in **Figure 3**).

It is anticipated that approximately five staging areas would be used to support construction of the Collinsville Substation, new transmission lines, and interconnection lines. Three of the staging yards would be located north of Sacramento River in Solano County and would include use of helicopters; however, there are no human receptors within one-half mile of the staging areas. The other two staging yards are located south of the river, (adjacent to the Pittsburg Substation) in Contra Costa County and would not include use of helicopters. The staging yard directly west of the Pittsburg Substation is approximately 270 feet from the nearest residential area on Halsey Court. The staging yard directly east of the Pittsburg Substation is approximately 1,200 feet from the nearest residential area on Halsey Court.

The result of the construction noise analysis for the proposed LSPGC 230 kV Underground Segment, 12 kV distribution line, telecommunications line extension, Pittsburg Substation modifications, and staging yard establishment and use are summarized in **Tables 5-4** to **5-9**. The tables include a list of equipment typically used for each construction activity and the calculated A-weighted L_{eq} noise levels for the activity based on the individual equipment's maximum noise levels, the equipment usage factor, and the distances between the work site and the nearest receptor location. The predicted noise levels from the proposed LSPGC 230 kV Underground Segment, 12 kV distribution line extension construction, and the Pittsburg Substation modifications were all below 70 dBA at the nearest receptors (1,370 feet to 2,000 feet away). The noise level from construction of the telecommunications line extension was predicted to be 98 dBA at the nearest residential area located 20 feet away (single-family residences along Halsey Way and Marina Boulevard). The noise level from establishment and use of staging yards south of the river near the Pittsburg Station (without helicopters) is estimated to range from 61 dBA at residences 1,200 feet away to 74 dBA at residences 270 feet away. The noise level from establishment and use of staging yard north of the river (with helicopters) is estimated to be approximately 69 dBA at the nearest residential area located over one-half mile away.

In-water construction activities associated the LSPGC Submarine Segment would generate some noise in the immediate vicinity; however, there are no onshore human receptors within one-half mile of the LSPGC 230 kV Submarine Segment in the Sacramento River. Therefore, noise from in-water construction activities would result in no impact on onshore human receptors.

Table 5-4. Proposed LSPGC 230 kV Underground Segment Noise Levels by Phase

Construction Equipment Type	FHWA RCNM Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Residential Area), 1,370 feet from Construction Site, L_{eq} (dBA)
Southern Transition Approach (138 Days)				
Onshore Excavator (600 HP)	81	40%	1	48
Onshore End Loader (250 HP)	79	40%	1	46
Onshore Crane (180 HP)	81	16%	1	44
Onshore Crane (200 Ton, 275 HP)	81	16%	1	44
Onshore Vibratory Hammer (300 HP)	101	20%	1	65
Air Compressor (50 HP)	78	40%	1	45
Dump Truck (10-12 Yd, 415 HP)	76	40%	2	46
Onshore Dewatering Equipment (50 HP)[1]	85	50%	2	56
Onshore Trucks (300 HP)[2]	72	40%	2	42
Onshore Impact Pile Driver	101	20%	1	65
Subtotal (Logarithmic Sum)				**69**
Substation Getaways (70 Days)				
Pickup Truck (1/2-Ton, 395 HP)	75	40%	4	48
Pickup Truck (1-Ton, 410 HP)	75	40%	4	48
Welding Truck (395 HP)	74	40%	2	44
Generator (36 HP)	81	50%	2	52
Crane (35 Ton, 250 HP)	81	16%	2	47
Forklift (10,000 Lb Reach, 130 HP)	88	20%	2	55
Forklift (15,000 Lb Reach, 130 HP)	88	20%	1	52
Loader (4-5 Yd, 74 HP)	79	40%	2	49
Wire Trailer/ Tensioner (175 HP)[1]	85	50%	1	53
Wire Puller (175 HP)[1]	85	50%	1	53
Skid Steer Loader (74 HP)	79	40%	2	49
Backhoe (2x4, 68 HP)	78	40%	2	48
Subtotal (Logarithmic Sum)				**62**

Notes:
[1] Assumed noise level for all other equipment greater than 5 horsepower per FHWA 2006.
[2] Assumed noise level for a water truck.
FHWA RCNM = Federal Highway Administration Roadway Construction Noise Model
L_{max} = maximum sound level
L_{eq} = average equivalent sound level
dBA = A-weighted decibel
HP = horsepower
Yd = yard
Lb = pound
Source: FHWA 2006, WSDOT 2020.

Table 5-5. 12 kV Distribution Line Extension Construction Noise Levels by Phase

Construction Equipment Type	FHWA RCNM Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Cemetery), 590 feet from Construction Site, L_{eq} (dBA)
12 kV Distribution Extension to Collinsville Substation (51 Days)				
Pickup Truck (1/2-Ton, 395 HP)	75	40%	2	53
Wire Trailer/ Tensioner (175 HP)[1]	85	50%	1	61
Wire Puller (175 HP)[1]	85	50%	1	61
Crane (35 Ton, 250 HP)	81	16%	2	55
Pickup Truck (1-Ton, 410 HP)	75	40%	2	53
Forklift (15,000 Lb Reach, 130 HP)	88	20%	2	63
Pressure Digger - Lo-Drill (Tracked, 275 HP)[2]	84	20%	1	56
Dump Truck (10-12 Yd, 415 HP)	76	40%	2	54
Skid Steer Loader (74 HP)	79	40%	2	57
Concrete Mixer Truck (425 HP)	79	40%	4	60
Backhoe (2x4, 68 HP)	78	40%	1	53
Subtotal (Logarithmic Sum)				**68**

Notes:
[1] Assumed noise level for all other equipment greater than 5 horsepower per FHWA 2006.
[2] Assumed noise level for an auger drill.
FHWA RCNM = Federal Highway Administration Roadway Construction Noise Model
L_{max} = maximum sound level
L_{eq} = average equivalent sound level
dBA = A-weighted decibel
HP = horsepower
Yd = yard
Lb = pound
Source: FHWA 2006, WSDOT 2020.

Table 5-6. Telecommunications Line Extension Construction Noise Levels by Phase

Construction Equipment Type	FHWA RCNM Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Residential Area), 20 feet from Construction Site, L_{eq} (dBA)
Fiber Extension to Pittsburg Substation (103 Days)				
Crane (35 Ton, 250 HP)	81	16%	2	84
Forklift (10,000 Lb Reach, 130 HP)	88	20%	1	89
Excavator - Mini (170 HP)	81	40%	2	88
Dump Truck (10-12 Yd, 415 HP)	76	40%	3	85
Skid Steer Loader (74 HP)	79	40%	2	86
Trencher (75 HP)[1]	80	50%	2	88
Pickup Truck (1-Ton, 410 HP)	75	40%	3	84
Concrete Mixer Truck (425 HP)	79	40%	2	86
Wire Trailer/ Tensioner (175 HP)[2]	85	50%	1	90
Wire Puller (175 HP)[2]	85	50%	1	90
Water Truck (4,000 Gal, 300 HP)	72	40%	2	79
Subtotal (Logarithmic Sum)				**98**

Notes:
[1] Assumed noise level for a slurry trenching machine.
[2] Assumed noise level for all other equipment greater than 5 horsepower per FHWA 2006.
FHWA RCNM = Federal Highway Administration Roadway Construction Noise Model
L_{max} = maximum sound level
L_{eq} = average equivalent sound level
dBA = A-weighted decibel
HP = horsepower
Yd = yard
Lb = pound
Gal = gallon
Source: FHWA 2006, WSDOT 2020.

Table 5-7. Pittsburg Substation Modification Construction Noise Levels by Phase

Construction Equipment Type	FHWA RCNM Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Residential Area), 2,000 feet from Construction Site, L_{eq} (dBA)
Vaca Dixon, Tesla, and Pittsburg Substation Upgrades (78 Days)				
Pickup Truck (1/2-Ton, 395 HP)	75	40%	4	45
Pickup Truck (1-Ton, 410 HP)	75	40%	4	45
Welding Truck (395 HP)	74	40%	2	41
Crane (35 Ton, 250 HP)	81	16%	2	44
Forklift (15,000 Lb Reach, 130 HP)	88	20%	1	49
Man Lift (40-foot, 49 HP)	75	20%	3	41
Man Lift (120-foot, 74 HP)	75	20%	2	39
Subtotal (Logarithmic Sum)				**53**

Notes:
FHWA RCNM = Federal Highway Administration Roadway Construction Noise Model
L_{max} = maximum sound level
L_{eq} = average equivalent sound level
dBA = A-weighted decibel
HP = horsepower
Lb = pound
Source: FHWA 2006, WSDOT 2020.

Table 5-8. Staging Yard Establishment and Use Noise Levels without Helicopters – South of the River

Construction Equipment Type	Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Residential Area), 270 Feet from Construction Site, L_{eq} (dBA)	Calculated Noise Levels at Nearest Receptor (Residential Area), 1200 Feet from Construction Site, L_{eq} (dBA)
Staging Yard Establishment and Use (Duration of Project)					
Water Truck (4,000 Gal, 300 HP)	72	40%	1	53	40
Loader (4-5 Yd, 74 HP)	79	40%	1	60	47
Dump Truck (10-12 Yd, 415 HP)	76	40%	1	57	44
Motor Grader (250 HP)	85	40%	1	66	53
Scrapper (410 HP)	84	40%	1	65	52
Vibratory Roller (157 HP)	80	20%	1	58	45
Pickup Truck (1/2-Ton, 395 HP)	75	40%	2	59	46
Generator (36 HP)	81	50%	2	66	53
Forklift (15,000 Lb Reach, 130 HP)	88	20%	2	69	56
Pickup Truck (1-Ton, 410 HP)	75	40%	2	59	46
844 Loader (417 HP)	79	40%	1	60	47
Semi-Truck (500 HP)[1]	74	40%	2	58	45
Subtotal (Logarithmic Sum)				**74**	**61**

Notes:
[1] Assumed noise level for a flatbed truck.
FHWA RCNM = Federal Highway Administration Roadway Construction Noise Model
L_{max} = maximum sound level
L_{eq} = average equivalent sound level
dBA = A-weighted decibel
HP = horsepower
Lb = pound
Source: FHWA 2006, WSDOT 2020.

Table 5-9. Staging Yard Establishment and Use Noise Levels with Helicopters – North of the River

Construction Equipment Type	FHWA RCNM Construction Equipment L_{max} at 50 Feet (dBA)	Usage Factor	Estimated Number of Units	Calculated Noise Levels at Nearest Receptor (Residential Area), 0.5 Mile from Construction Site, L_{eq} (dBA)
Staging Yard Establishment and Use (Duration of Project)				
Water Truck (4,000 Gal, 300 HP)	72	40%	1	34
Loader (4-5 Yd, 74 HP)	79	40%	1	41
Dump Truck (10-12 Yd, 415 HP)	76	40%	1	38
Motor Grader (250 HP)	85	40%	1	47
Scrapper (410 HP)	84	40%	1	46
Vibratory Roller (157 HP)	80	20%	1	39
Pickup Truck (1/2-Ton, 395 HP)	75	40%	2	40
Generator (36 HP)	81	50%	2	47
Forklift (15,000 Lb Reach, 130 HP)	88	20%	2	50
Pickup Truck (1-Ton, 410 HP)	75	40%	2	40
844 Loader (417 HP)	79	40%	1	41
Semi-Truck (500 HP)[1]	74	40%	2	39
Helicopter – Heavy Duty (3,200 HP)[2]	106	50%	1	69
Subtotal (Logarithmic Sum)				**69**

Notes:
[1] Assumed noise level for a flatbed truck.
[2] Based on noise level (90 dBA) of a CH-47D helicopter flying at 100 feet aboveground level (Schomer et al 1988); adjusted to noise levels at 50 feet and assumed a 50 percent usage factor.
FHWA RCNM = Federal Highway Administration Roadway Construction Noise Model
L_{max} = maximum sound level
L_{eq} = average equivalent sound level
dBA = A-weighted decibel
HP = horsepower
Lb = pound
Source: FHWA 2006, WSDOT 2020.

5.2 Construction Vibration

Temporary sources of groundborne vibration during grading, trenching, and other activities associated with the construction of the Collinsville Substation, proposed LSPGC 230 kV Overhead Segment, proposed PG&E 500 kV Interconnection, and other land-based components would be produced by the operation of heavy construction equipment. The Proposed Project equipment types most likely to create vibration include a drill rig, large bulldozer, loaded truck, vibratory roller, vibratory hammer, and impact pile driver. Using reference vibration levels at 25 feet, vibration from each construction equipment, except impact pile driver, can be estimated using the following formula (Caltrans 2020):

$$PPV_{Equipment} = PPV_{Ref}\,(25/D)^{n} \text{ (inches per second)}$$

Where:

PPV_{Ref} = reference PPV at 25 feet

D = distance from equipment to the receiver in feet

n = is a scaling factor (unitless), which is related to the attenuation rate through ground and is based on the soil conditions at the site (soil class). The value generally ranges from 1 to 1.5; the suggested value for “n” is 1.5 for the Proposed Project, which corresponds to competent soils that can be dug with shovel (e.g., agricultural lands) (Caltrans 2020).

Using reference vibration levels at 25 feet, vibration from impact pile driver can be estimated using the following formula (Caltrans 2020):

$PPV_{Impact\ Pile\ Driver} = PPV_{Ref}\ (25/D)^{n} \times (E_{equip}/E_{Ref})^{0.5}$ (inches per second)

Where:

PPV_{Ref} = reference PPV of impact pile driver at 25 feet

D = distance from impact pile driver to the receiver in feet

n = is a scaling factor (unitless), which is related to the attenuation rate through ground and is based on the soil conditions at the site (soil class). The value generally ranges from 1 to 1.5; the suggested value for “n” is 1.5 for the Proposed Project, which corresponds to competent soils that can be dug with shovel (e.g., agricultural lands) (Caltrans 2020).

E_{Ref} = 36,000 foot-pound (rated energy of reference impact pile driver)

E_{equip} = rated energy of impact pile driver in foot-pound.

Groundborne vibration levels generated by these pieces of equipment at a reference distance of 25 feet are shown in **Table 5-10**. The table also shows the distance at which noise generated by these pieces of equipment attenuate to the Caltran’s thresholds for building damage and human annoyance at residential uses. The construction equipment with the highest vibration source level (i.e., vibratory hammer) generates vibration levels of 0.65 PPV inch per second at a distance of 25 feet.

Table 5-10. Construction Equipment Vibration Noise Levels

Construction Equipment	Type of Vibration Source	Caltrans Reference Vibration Level at 25 feet, PPV (inches per second)	Distance to Attenuate to Caltrans' Threshold for Damage to Older Residential Structures[1] (feet)	Distance to Attenuate to Caltrans' Threshold for a Barely Perceptible Human Response[2] (feet)
Large Bulldozer	Continuous/ Frequent Intermittent	0.089	11	107
Drill Rig	Continuous/ Frequent Intermittent	0.089	11	107
Loaded Trucks	Continuous/ Frequent Intermittent	0.076	10	97
Vibratory Roller[3]	Continuous/Frequent Intermittent	0.21	20	190
Vibratory Hammer[4]	Continuous/Frequent Intermittent	0.65	42	405
Impact Pile Driver[5]	Transient or Low-rate Repeated Impact	0.65	50	480

Notes:

[1] Caltrans threshold for damage to older structures is 0.3 inch per second, as provided in **Table 3-1**.

[2] Caltrans threshold for a barely perceptible human response is 0.01 inch per second, as provided in **Table 3-2**.

[3] Only used during site development phase of the new substation construction and access road phase of the 230 kV new transmission line construction.

[4] Only used during the southern transition approach phase of the 230 kV underground segment construction.

5 Assumed a 60,000-foot-pound impact pile driver; only used during the southern transition approach phase of the 230 kV underground segment construction.

Caltrans = California Department of Transportation

Source: Caltrans 2020

5.3 Operation and Maintenance Noise

5.3.1 Substation Operation and Maintenance Noise

The primary sources of noise associated with operation of the Collinsville Substation would be from six (6) single phase step-down autotransformers and their associated cooling fans (seventh autotransformer is a spare); two (2) heating, ventilation, and air conditioning (HVAC) units mounted on the sides of a control enclosure); eight (8) HVAC units mounted on the sides of two GIS halls (four HVAC units per GIS hall); and two 10-ohm series reactors per 230 kV line (triangle arrangement). The autotransformers shall be of mineral oil immersed type for ONAN/ONAF/ONAF2 (300/375/500 mega volt ampere [MVA]) multistage cooling.[3]

Sound emissions from each substation autotransformer and each series reactor were modeled as point sources located at a source height of 36 and 22 feet, respectively. Sound emissions from the control house HVAC and each GIS hall HVAC were modeled as vertical area sources located on the building walls at heights of 12.7 and 29.5 feet, respectively. The overall A-weighted sound power level for each substation equipment type was

[3] ONAN = Oil Natural Air Natural; ONAF = Oil Natural Air Forced (first stage cooling); ONAF2 = ONAF = Oil Natural Air Forced (second stage cooling)

provided by LSPGC based on vendor sound-specifications. The un-weighted octave band sound power levels of the autotransformers and HVACs were estimated using adjustment factors in Handbook of Noise and Vibration (Crocker M.J. 2007). The equipment sound power levels used for the acoustical modeling of the Collinsville Substation are summarized in **Table 5-11**.

Table 5-11. Equipment Sound Power Levels at Collinsville Substation (Per Unit)

Substation Equipment Description	Height (feet)	Unweighted Sound Power Level in dB per Octave Band Frequency (Hz)									Total Sound Power Level (dBA)
		31.5	63	125	250	500	1000	2000	4000	8000	
Step-down Autotransformer (6 units operating; one spare)	36.0	96.6	102.6	104.6	99.6	99.6	93.6	88.6	83.6	76.6	100
HVAC units for control house (2 units in total)	12.7	55.8	55.8	63.8	67.8	73.8	70.8	65.8	60.8	60.8	75.0
HVAC units for GIS hall (8 units in total; 4 units per GIS hall)	29.5	68.8	68.8	76.8	80.8	86.8	83.8	78.8	73.8	73.8	88.0
Series reactor (6 units in total)	22.0	--	--	--	--	--	--	--	--	--	86.0

Notes:
HVAC = heating, ventilation, and air conditioning
GIS = Gas Insulated Switchgear
dBA = A-weighted decibel
MVA – mega volt ampere
Hz = Hertz

Community noise levels associated with future operation of the Collinsville Substation were predicted using Cadna/A noise calculation software developed by DataKustik Gmbh. This software implements International Organization for Standardization (ISO) 9613-2 international standard for sound propagation (Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation) for environmental noise sources and outdoor sound propagation. It is a comprehensive three-dimensional, ray-tracing model in which noise sources are assembled from a point, line, area, and/or vertical area components each emitting L_{WA} in octave bands or broadband A-weighted format. Distance losses, ground attenuation, terrain effects, wind effects, building shielding, attenuation through walls, and barrier/berm effects are computed in the Cadna/A model, and the resulting L_{PA} are computed at any number of receptors of interest.

Cadna/A starts with a Google Earth® base map of the area extending out approximately a mile from the facility. The model is capable of importing topography data for consideration of terrain shielding where appropriate. Elevation contours for the modeling domain were directly imported into Cadna/A, which allowed for consideration of terrain shielding where appropriate. The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset developed by the United States Geological Survey. The model also accounts for the 10-foot-high prefabricated interlocking security wall that would be constructed around the Collinsville Substation site.

All calculations assumed favorable conditions for sound propagation per ISO 9613-2, corresponding to a moderate, well-developed ground-based temperature inversion, as might occur on a calm, clear night, or equivalently downwind propagation. Furthermore, the ISO 9613-2 standard assumes all receptors are downwind of every sound source simultaneously. In other words, the model assumes that each source propagates its maximum sound level in all directions at all times. This would likely overpredict upwind sound levels. Each receptor was modeled as a receiver at a height of 5.0 feet above ground level.

A temperature of 10 degrees Celsius (50 degrees Fahrenheit) and 70 percent relative humidity was used to calculate atmospheric absorption for the ISO 9613-2 model. These parameters were selected to minimize atmospheric attenuation in the 500 and 1000 Hz octave bands where the human ear is most sensitive, and thus provide conservative results. No meteorological correction was added to the results.

The land is primarily used for agricultural purposes and vegetation is mostly low-lying (i.e., little-to-no trees or foliage). All vegetation was excluded from the analysis to maintain conservativeness in the model. Ground attenuation is expected to be fairly high, due to the “soft ground” of surrounding areas but was assumed to be semi-reflective in the model for conservativeness. Ground absorption was set to a value of 0.5, where only half the available ground absorption is considered. Lastly, the model was programmed to include the sound contribution of two acoustical reflections off the Collinsville Substation buildings.

The Collinsville Substation layout, supplied by LSPGC, was used to establish relevant physical and positional characteristics of the substation equipment and buildings. Sound pressure levels were predicted for the identified receptors in the Cadna/A noise modeling program using source sound power levels at each octave-band frequency and the model input parameters and assumptions described above. Sound modeling was completed for the substation layout and the predicted daytime, nighttime, and day-night noise levels at each receptor (the logarithmic sum of sound levels from every source) are included in **Tables 5-12**, **5-13**, and **5-14**, respectively. **Figures 5**, **6**, and **7** contain graphical representations of the predicted daytime, nighttime, and day-night noise levels, respectively. Results of the modeled daytime, nighttime, and day-night noise levels from the operation of all substation equipment (excluding existing noise levels) at the nearest sensitive receptor (R1, cultural resource site) 1,790 feet away was estimated to be 38 dBA $L_{eq(day)}$, 38 dBA $L_{eq(night)}$, and 45 dBA L_{dn} (or CNEL), respectively.

Table 5-12. Daytime Substation Noise Modeling Results at Nearest Sensitive Receptor

Receptor ID	Receptor Type	Distance and Direction from Center of Collinsville Substation Facility	Predicted Daytime Noise Level at Sensitive Receptor, $L_{eq(day)}$ (dBA)	Predicted Daytime Noise Level Plus Existing Level of 48 dBA, $L_{eq(day)}$ (dBA)[1]	Daytime Noise Increase Above Existing Levels (dBA)
R1	Residential	1,790 feet southeast	38.2	48.4	0.4
R2	Residential	4,175 feet southwest	32.3	48.1	0.1
R3	Residential	4,280 feet west-southwest	32.4	48.1	0.1
R4	Cemetery	4,700 feet west-northwest	31.2	48.1	0.1

Notes:
[1] Summary of measured ambient (existing) daytime noise levels is provided in **Table 4-3**.
$L_{eq(day)}$ = average equivalent sound level during daytime (7:00 a.m. to 10:00 p.m.).
dBA = A-weighted sound level.
ID = Identification.

Table 5-13. Nighttime Substation Noise Modeling Results at Nearest Sensitive Receptor

Receptor ID	Receptor Type	Distance and Direction from Center of Collinsville Substation Facility	Predicted Nighttime Noise Level at Sensitive Receptor, $L_{eq(night)}$ (dBA)	Predicted Nighttime Noise Level Plus Existing Level of 42 dBA, $L_{eq(night)}$ (dBA)[1]	Nighttime Noise Increase Above Existing Levels (dBA)
R1	Residential	1,790 feet southeast	38.2	43.5	1.5
R2	Residential	4,175 feet southwest	32.3	42.4	0.4
R3	Residential	4,280 feet west-southwest	32.4	42.5	0.5
R4	Cemetery	4,700 feet west-northwest	31.2	42.3	0.3

Notes:
[1] Summary of measured ambient (existing) nighttime noise levels is provided in **Table 4-3**.
$L_{eq(night)}$ = average equivalent sound level during nighttime (10:00 p.m. to 7:00 a.m.).
dBA = A-weighted sound level.
ID = Identification.

Table 5-14. Day-Night Substation Noise Modeling Results at Nearest Sensitive Receptor

Receptor ID	Receptor Type	Distance and Direction from Center of Collinsville Substation Facility	Predicted Day-Night Noise Level at Sensitive Receptor, L_{dn} (dBA)	Predicted Day-Night Noise Level Plus Existing Level of 50 dBA, L_{dn} (dBA)[1]	Day-Night Noise Increase Above Existing Levels (dBA)
R1	Residential	1,790 feet southeast	44.6	51.1	1.1
R2	Residential	4,175 feet southwest	38.7	50.3	0.3
R3	Residential	4,280 feet west-southwest	38.8	50.3	0.3
R4	Cemetery	4,700 feet west-northwest	37.7	50.2	0.2

Notes:

[1] Summary of measured ambient (existing) day-night noise levels is provided in **Table 4-3**.

L_{dn} = A-weighted equivalent sound level for a 24-hour period with a 10-dB adjustment added to sound levels occurring during nighttime hours (10:00 p.m. to 07:00 a.m.).

dBA = A-weighted sound level.

ID = Identification.

5.3.2 Transmission Line Audible Noise During Operation and Maintenance

Corona-generated audible noise is the most common noise associated with transmission lines and is heard as a crackling or hissing sound. Corona is the breakdown of air into charged particles caused by electrical field at the surface of conductors. Once transmission lines are energized, the audible noise due to the line(s) would vary depending on weather conditions, with foul weather producing increased levels of audible noise over levels in fair weather. Corona-generated audible noise from the proposed LSPGC 230 kV Overhead Segment and the proposed PG&E 500 kV Interconnection was predicted using methods and equations developed by the Bonneville Power Administration (BPA) (Chartier and Larson 1977). The BPA audible noise calculation method (BPA method) is an empirical method developed from long-term statistical measurements on a number of full-scale operating or test transmission lines. It is specifically designed to calculate audible noise based on phase configuration, typical operating voltage, height above mean sea level, number of conductors in a bundle (if applicable), conductor diameter, and height above ground at maximum conductor sag. Information for the proposed PG&E 500 kV Interconnection was limited at the time this NVIA report was written. Therefore, a few assumptions were made based on physical and electrical characteristics of similar transmission lines. The physical and electrical characteristics (input data) used to calculate audible noise for the proposed LSPGC 230 kV Overhead Segment and the proposed PG&E 500 kV Interconnection are provided in **Table 5-15**.

Table 5-15. Physical and Electrical Characteristics of New Transmission and Interconnection Lines

Line Characteristics	Proposed LSPGC 230 kV Overhead Segment	Proposed PG&E 500 kV Interconnection	Unit
Average Voltage	230	500	Kilovolt
Circuit Configuration	Double	Single	--
Average Current	2,100	Data not available	Ampere
Frequency of AC Supply	60	60	Hertz
Electric Phasing	A C'	B	--
	B B'	A C	
	C A'		
Phase Spacing	39.4 to 45.9H, 26.2V	45.9H, 32.8V	feet
Horizontal Distance of Conductor Bundle from Center of Tower	A (-19.7) C'(19.7)	B (0.0)	feet
	B (-23.0) B'(23.0)	A (-29.5) C (29.5)	
	C (-19.7) A'(19.7)		
Height of Conductor Bundle at Tower	A (118.1) C' (118.1)	B (124.7)	feet
	B (91.9) B' (91.9)	A (91.9) C (91.9)	
	C (65.6) A' (65.6)		
Height of Conductor Bundle at Mid-span	A (85.3) C' (85.3)	B (65.6)	feet
	B (59.1) B'(59.1)	A (32.8) C (32.8)	
	C (32.8) A'(32.8)		
Sub-conductor Spacing	18	18	inches
Sub-conductor Diameter	1.16	1.16	inches
Number of Sub-conductors in Bundle	2	2	--
Centerline Distance to Edge of ROW	60.0	60.0	feet
Average Altitude	200	200	feet
Receptor Height	5	5	feet

Notes:
H = horizontal spacing between conductor bundles
V = vertical spacing between phases
kV = kilovolt
AC = alternating current
ROW = right-of-way

The audible noise profiles in fair and foul weather at midspan were calculated for the proposed LSPGC 230 kV Overhead Segment and the proposed PG&E 500 kV Interconnection using the BPA method. The analysis evaluates the L_{50} audible noise levels assuming a rain rate of 1 millimeter per hour (0.04 inch per hour), which is the default rate for the BPA audible noise calculations.

The audible noise level for the proposed LSPGC 230 kV Overhead Segment with a conductor ground clearance of at least 33 feet and at an average altitude of 200 feet above sea level were calculated and plotted in **Figure 8**. A lower voltage or lower altitude would result in lower audible noise. The audible noise level in fair weather at the edges of the right-of-way (ROW) is approximately 9 dBA increasing to approximately 11 dBA within the ROW under the line (**Figure 8** Fair Weather). In foul weather, the audible noise level from the line increase to approximately 34 dBA at the edges of the ROW and approximately 36 dBA under the line within the ROW (**Figure 8** Foul Weather). One isolated residence is within one-quarter mile (1,320 feet) of the proposed LSPGC 230 kV Overhead Segment (i.e., 555 feet south of the line) (**Figure 3**).

The audible noise level for the proposed PG&E 500 kV Interconnection with a conductor ground clearance of at least 33 feet and at an average altitude of 200 feet above sea level were calculated and plotted in **Figure 9**. The audible noise level in fair weather at the edges of the ROW is approximately 38 dBA increasing to approximately 41 dBA within the ROW under the line (**Figure 9** Fair Weather). In foul weather, the audible noise level from the line increases to approximately 63 dBA at the edges of the ROW and approximately 66 dBA under the line within the ROW (**Figure 9** Foul Weather). There are no sensitive noise receptors within one-quarter mile (1,320 feet) from the proposed PG&E 500 kV Interconnection (**Figure 3**). As shown in **Figures 8** and **9**, the proposed PG&E 500 kV Interconnection would be the primary source of possible audible noise from the lines involved in the Proposed Project since lower voltage lines such as the proposed LSPGC 230 kV Overhead Segment contribute little-to-no audible noise under fair weather conditions. Although the contribution of the proposed LSPGC 230 kV Overhead Segment may increase in foul weather, the audible noise in foul weather from the lower voltage line (i.e., the proposed LSPGC 230 kV Overhead Segment) is less than from the proposed PG&E 500 kV Interconnection.

6 Impacts Significance Analysis

The significance of noise and vibration impacts from the Proposed Project's construction, operation, and maintenance have been analyzed by using the CEQA guidelines, Appendix G (as amended in December 2019), Environmental Checklist. The impact questions related to noise (and vibration) in the CEQA Environmental Checklist are discussed below:

a) Would the project result in the generation of a substantial temporary or permanent increase in ambient noise level 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?

<u>Construction</u>

Less Than Significant Impact. Short-term noise level increases from construction activities would cause significant impacts if the activities would conflict with local policies or standards. Noise from the Proposed Project construction activities is exempt from applicable standards during daytime hours. Any construction activities taking place outside the daytime hours would be considered to result in a significant impact if resulting noise levels at the receptors would exceed the Sacramento County and Contra Costa County exterior noise standard of 50 dBA L_{eq} for nighttime. The noise ordinances in Solano County and City of Pittsburg do not establish numerical noise-level limits related to construction noise. Although there are no quantitative local noise level standards applicable to the Proposed Project construction, a quantitative analysis of its construction noise is included in this analysis for informational purposes.

Proposed Project construction is scheduled to begin in early 2026 and take approximately 24 to 30 months to complete. The Proposed Project includes construction occurring on land and in water. The construction of in-water transition structures is anticipated to take approximately 6 months and installation of the submarine cables is anticipated to take approximately 7 months. In-water work would be restricted to between July 1 and November 30 and may require up to 2 years to complete within the work windows. Land-based construction would occur year-round or as authorized by permits and authorizations. Per the CAISO technical specifications, the Proposed Project is required to be energized by June 1, 2028.

Construction of the Proposed Project would generate noise that would temporarily increase ambient noise levels. The Proposed Project construction noise would be generated by the operation of on-site construction equipment such as water trucks, graders, loaders, excavators, and drill rigs, as well as from on-road sources such as vehicle trips transporting workers, equipment, and materials to and from the Proposed Project site. The magnitude of the impact at receptors would depend on the type of construction activity, equipment being used, duration of the construction phase, distance between the noise source and receiver, the presence of intervening structures that enhance attenuation, and the existing ambient noise levels at the receptors. Construction noise levels generated by equipment would also vary depending on several factors such as the type and age of equipment, specific equipment manufacture and model, the operations being performed, and the overall condition of the equipment and exhaust system mufflers.

Construction of the Collinsville Substation would consist of several phases, including survey, site development, below grade construction, above grade construction, commissioning and testing, and cleanup and restoration. Construction of the new overhead transmission and interconnection lines would consist of several phases, including access road construction, foundation installation, structure installation, and conductor installation. Near the southern edge of the Sacramento River and San Joaquin River confluence, open trenching methods of construction would be used to connect the submarine cables to an onshore underground utility vault. Each construction phase would occur sequentially for a few months, and construction impacts were assessed for the nearest sensitive receptor to the work sites; impacts to sensitive receptors further away would be reduced. Details of the method and assumptions used to predict the Proposed Project construction noise, including the construction noise model (FHWA RCNM) and the reference L_{max} for each construction equipment at 50 feet, are discussed in Section 5.1. The result of the construction noise analysis by phase for the Collinsville Substation site, proposed PG&E 500 kV Interconnection, and the proposed LSPGC 230 kV Overhead Segment are summarized in **Tables 5-1, 5-2,** and **5-3**, respectively. The result of the construction noise analysis by phase for the other land-based components are summarized in **Tables 5-4** through **5-9**. The noise modeling conservatively assumed that all construction equipment within each phase would operate simultaneously for the duration of that phase; in reality, all construction equipment would not occur concurrently. The new substation construction noise levels at nearest receptor, R1 (a cultural resource site located1,790 feet away) range from 43 dBA during survey to 62 dBA during below grade construction and commissioning and testing. Construction noise levels at the other sensitive receptors (R2 [residential area], R3 [residential area], and R4 [cemetery]) located further away would be lower. The proposed PG&E 500 kV Interconnection construction noise levels at nearest receptor (1,950 feet away) range from 58 dBA during foundation installation to 72 dBA during structure installation. The proposed LSPGC 230 kV Overhead Segment construction noise levels at nearest receptor, R1 (555 feet away) range from 64 dBA during structure installation to 78 dBA during conductor installation. The predicted noise levels from the proposed LSGPC 230 kV Underground Segment, 12 kV distribution line extension construction, and the Pittsburg Substation modifications were all below 70 dBA at the nearest receptors (1,370 to 2,000 feet away). The primary source of noise during construction of the interconnection/transmission lines are helicopters used for structure installation and conductor installation. The noise level from construction of the telecommunications line extension was predicted to be 98 dBA at the nearest residential area located 20 feet away (single-family residences along Halsey Way and Marina Boulevard). The noise level from establishment and use of staging yards (without helicopters) south of the river near Pittsburg Substation is estimated to range from 61 dBA at residences 1,200 feet away to 74 dBA at residences 270 feet away. The noise level from establishment and use of staging yards (with helicopters) north of the river is estimated to be approximately 69 dBA at the nearest residential area located more than 0.5 mile away.

In-water construction activities associated the LSPGC Submarine Segment would generate some noise in the immediate vicinity; however, there are no onshore human receptors within one-half mile of the LSPGC 230 kV Submarine Segment in the Sacramento River. Therefore, noise from in-water construction activities would result in no impact on onshore human receptors.

Construction activities at the Proposed Project site would generally be scheduled to occur during daylight hours 6 days per week (Monday through Saturday). Night work is expected for submarine cable installation, which will occur 24 hours per day, 7 days per week until complete.

Although the Proposed Project construction would increase noise above existing ambient levels at the nearest receptors (particularly during construction of the telecommunications line extension in the city of Pittsburg), the increases would be temporary, intermittent, and occur only during daylight hours when elevated noise is more tolerable. Additionally, noise from construction activities in Sacramento, Solano, and Contra Costa counties and City of Pittsburg is exempt from applicable standards during daytime hours. Therefore, the Proposed Project construction noise would result in a less-than-significant impact.

In addition to noise generated by on-site construction equipment, construction-related vehicle trips would increase noise levels along roadways leading to the Proposed Project site. Access to the Collinsville Substation site for construction equipment, supplies, and workers would likely be from Sacramento via Highway 80. A permanent access road to the new substation would also be constructed. The peak vehicle trips would likely occur during the earthwork and grading of the Proposed Project (e.g., site development and below-grade construction activities) due to the removal or importation of fill. Peak vehicle round trips during the new substation construction period is expected to be approximately 100 per day. During the new transmission line and interconnection line construction period, peak vehicle round trips is expected to be approximately 156 per day.

Other periods of the Proposed Project construction would have lower daily vehicle trips, and therefore would have correspondingly lower noise levels. The addition of 216 construction-related daily vehicle trips on Highway 80 would increase ambient traffic noise levels along the highway, but any increase would be minimal, as these trips would be spread out throughout the day. Therefore, the Proposed Project construction traffic noise would result in a less-than-significant impact.

Operation and Maintenance

Less Than Significant Impact. Long-term operation and maintenance noise impacts would be considered significant if the Proposed Project-related noise would exceed the County (Solano, Sacramento, and Contra Costa) exterior noise standards of 55 dBA L_{eq} or L_{50} during daytime hours (i.e., 7:00 a.m. to 10:00 p.m.) or 50 dBA L_{eq} or L_{50} during nighttime hours (i.e., 10:00 p.m. to 7:00 a.m.). For most common noise sources, L_{50} can be interpreted as close to the L_{eq} metric. The General Plan for Solano County, Sacramento County and Contra Costa County specifies CNEL-based community noise exposure levels that consider the contributions of daytime and nighttime noise levels. The maximum allowable noise exposure level for residential land use is 60 dBA CNEL. For typical community noise environments, the CNEL and L_{dn} levels are nearly always within 1 dB of each other and, therefore, are commonly used interchangeably (as would be the case in this NVIA report). The General Plan for the City of Pittsburg considers a 3 dB increase in ambient noise to be just noticeable, a 5 dB increase as a significant impact, and a 10 dB increase to almost always cause an adverse community reaction.

The primary sources of noise associated with operation of the Collinsville Substation would be from six (6) single phase step-down autotransformers and their associated cooling fans (seventh autotransformer is a spare); two (2) HVAC units mounted on the sides of a control enclosure; eight (8) HVAC units mounted on the sides of two GIS halls (four HVAC units per GIS hall); and two 10-ohm series reactors per 230 kV line (triangle arrangement). Details of the method and assumptions used to predict the new substation operational noise, including the three-dimensional industrial noise model (Cadna/A) and the sound power level of each source type, are discussed in Section 5.3.1. The Collinsville Substation operational noise modeling results are presented in **Tables 5-12** to **5-14** and shown visually as noise contours in **Figures 5** to **7**. The results of the modeled daytime, nighttime, and day-night noise levels from the operation of all substation equipment (excluding existing noise levels) at the nearest sensitive receptor (R1, a cultural resource site) 1,790 feet away was estimated to be 38 dBA $L_{eq(day)}$, 38 dBA $L_{eq(night)}$, and 45 dBA L_{dn} (or CNEL), respectively. The results indicate that predicted noise levels for the Collinsville Substation would be below Solano, Sacramento, and Contra Costa County's exterior noise standards of 55 dBA L_{50} (or L_{eq}) and 50 dBA L_{50} (or L_{eq}) during daytime and nighttime hours, respectively. The predicted operational noise levels would also be below the Solano, Sacramento, and Contra Costa County General Plan allowable noise exposure level of 60 dBA CNEL (or L_{dn}) for residential land uses. **Tables 5-12** to **5-14** also show that noise increases above existing ambient levels at the nearest receptor, R1 (1,790 feet away) would range from 0.4 to 1.5 dB, which is not perceptible to the residential community as indicated in the General Plan for the City of Pittsburg. Therefore, noise associated with the Collinsville Substation operational equipment would result in a less-than-significant impact.

Corona-generated audible noise in fair and foul weather from the proposed LSPGC 230 kV Overhead Segment and the proposed 500 kV Interconnection was predicted using methods and equations developed by the BPA (Chartier and Larson 1977). The BPA method is specifically designed to calculate audible noise based on phase configuration, typical operating voltage, height above mean sea level, number of conductors in a bundle (if applicable), conductor diameter, and height above ground at maximum conductor sag. The predicted audible noise level for the new 230 kV transmission line in fair weather at the edges of the ROW is approximately 9 dBA increasing to 11 dBA within the ROW under the line (**Figure 8** Fair Weather). In foul weather, the audible noise level from the proposed LSPGC 230 kV Overhead Segment increases to approximately 34 dBA at the edges of the ROW and 36 dBA under the line within the ROW (**Figure 8** Foul Weather). The proposed LSPGC 230 kV Overheard Segment audible noise level at nearest receptor (555 feet away) is approximately 0 dBA in fair weather and 25 dBA in foul weather; both levels are below the existing daytime and nighttime noise levels of 48 dBA and 42 dBA, respectively. For the proposed PG&E 500 kV Interconnection, audible noise level in fair weather at the edges of the ROW is approximately 38 dBA increasing to 41 dBA within the ROW under the line (**Figure 9** Fair Weather). In foul weather, the audible noise level from the proposed PG&E 500 kV Interconnection increases to approximately 63 dBA at the edges of the ROW and 66 dBA under the line within the ROW (**Figure 9** Foul Weather). Although noise levels at the ROW of the proposed PG&E 500 kV Interconnection are much higher than that for the proposed LSPGC 230 kV Overhead Segment, there are no sensitive noise receptors within one-quarter mile (1,320 feet) from the proposed PG&E 500 kV Interconnection. Additionally, existing sound levels under foul (wet) weather conditions would be higher than the levels measured under fair (dry) weather conditions. Consequently, under foul weather conditions, the increased existing sound levels (i.e., from rainfall) are expected to mask most of the audible noise from the transmission and interconnection lines. Therefore, noise from the proposed LSPGC 230 kV Overhead Segment and the proposed PG&E 500 kV Interconnection would not be audible at the nearest sensitive receptors and as such, would result in no impact.

The proposed LSPGC Collinsville Substation would be unstaffed and operated remotely. System-wide assessments would be accomplished primarily through visual inspections, which would consist of monthly observations of the substation and related equipment. LSPGC would regularly inspect, maintain, and repair the Proposed Project following construction. Typical operations and maintenance activities would involve routine inspections and preventive maintenance to ensure service reliability, as well as emergency work to maintain or restore service. The routine on-site inspection and maintenance activities would be conducted by small, specialized teams at the Proposed Project site. Such activities would result in a negligible number of vehicle trips per year (light utility trucks) that would not be anticipated to have a substantive impact on traffic noise along roadways in the Proposed Project vicinity. PG&E would be responsible for maintaining and operating its respective portions of the Proposed Project. Considering the small number of infrequent trips associated with the Proposed Project's operation, inspection, and maintenance, the Proposed Project is anticipated to have a negligible impact on roadside traffic noise levels in the vicinity.

On-site activities are not anticipated to result in noise levels in excess of existing wind farms, agricultural lands, and electrical infrastructure operations on the Proposed Project site and surrounding properties. Therefore, on-site maintenance is not anticipated to result in a substantial increase in noise levels.

2. Would the project result in the generation of excessive groundborne vibration or groundborne noise levels?

<u>Construction</u>

Less Than Significant Impact. Groundborne vibration or noise levels from construction activities are considered significant if they cause damage to structures, or cause sleep disturbance if such activities occur at night near residential areas. There are no vibration sensitive structures identified in the Proposed Project's immediate vicinity. Construction activities would take place mostly during daylight hours, and the nearest noise sensitive receptor (R1, a cultural resource site) to the Collinsville Substation site, proposed LSPGC 230 kV Overhead Segment, and the proposed PG&E 500 kV Interconnection is 1,790 feet, 555 feet, and 1,950 feet away, respectively. The nearest receptors to the other land-based components range from 20 feet (telecommunications line extension construction) to 2,000 feet (Pittsburg Substation modifications).

The six pieces of equipment types most likely to create vibration during the Proposed Project construction include a drill rig, large bulldozer, loaded truck, vibratory roller, vibratory hammer, and impact pile driver. Details of the method and assumptions used to predict the Proposed Project construction vibration, including reference vibration levels at 25 feet for the six pieces of equipment, are discussed in Section 5.2. Vibration levels generated by the six pieces of equipment at a reference distance of 25 feet are shown in **Table 5-10**. The table also shows the distance at which noise generated by these pieces of equipment attenuate to the Caltrans' thresholds for building damage and human annoyance at residential uses.

As shown in **Table 5-10**, groundborne vibration attenuates rapidly with distance from the construction work sites. The Caltrans' vibration threshold for building damage (older residential structures) is 0.3 PPV inch per second; vibration from construction equipment would attenuate to below this level within 50 feet of the source and would not cause any cosmetic or structural damage to the nearest structure 555 feet away (except for single-family residences located 20 feet from telecommunications line extension construction). For the telecommunications line extension construction, the only piece of equipment most likely to create vibration is loaded trucks (i.e. there would be no bulldozer, drill rig, vibratory roller, vibratory hammer, or impact pile driver). **Table 5-10** shows that vibration from loaded trucks would attenuate to below the vibration damage criterion (0.3 PPV inch per second) within 10 feet of the source and would not cause any cosmetic or structural damage to the nearest structures 20 feet away.

The Caltrans' threshold for human annoyance at residential uses is 0.01 inch per second; vibration from construction equipment would attenuate to below this level within 480 feet of the source and would not be perceptible at the nearest sensitive receptor 555 feet away (except for single-family residences located 20 feet from telecommunications line extension construction). For the telecommunications line extension construction, the only piece of equipment most likely to create vibration is loaded trucks. **Table 5-10** shows that vibration from loaded trucks would attenuate to below the vibration annoyance criterion (0.01 PPV inch per second) within 97 feet of the source and could be strongly perceptible to people living in single-family residences 20 feet away. To minimize vibration annoyance impacts from loaded trucks, the telecommunications line extension work would be conducted during the daytime when most people are not in the area (e.g., at work). Consequently, the loaded trucks would not operate at night and as such, would not cause sleep disturbance near the residential area. Because of distance attenuation and prohibition of nighttime work, the Proposed Project construction would not have the potential to generate significant short-term groundborne vibration or groundborne noise at the nearest sensitive receptors. Therefore, construction-related vibration and groundborne noise associated with the Proposed Project would result in a less-than-significant impact.

Operation and Maintenance

No Impact. The Proposed Project would not include the use of any large rotating equipment during its operation that would introduce any new sources of perceivable groundborne vibration. In addition, operation and maintenance activities at the Proposed Project site would not require the use of heavy equipment that would generate high vibration levels. Therefore, the Proposed Project has no potential to generate groundborne vibration levels greater than the significance criteria for structural damage to older residential structure (0.3 inch per second) or for human annoyance (0.01 inch per second). Therefore, vibration from the Proposed Project's operation and maintenance would result in no impact.

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 2 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?

No Impact. The Proposed Project site is not located within the vicinity of a private airstrip or within 2 miles of a public airport or public use airport. Consequently, the Proposed Project would not expose people residing or working at the site to excessive noise levels from aircraft. Therefore, there would be no impact.

7 Conclusions

The findings of this NVIA report are that under CEQA, the noise impact associated with the construction, operation, and maintenance of the Proposed Project would be less than significant. Similarly, vibration impact associated with the construction of the Proposed Project would be less than significant; however, vibration from the Proposed Project's operation and maintenance would result in no impact.

8 References

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Figures

CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane California II FIPS 0402 Feet
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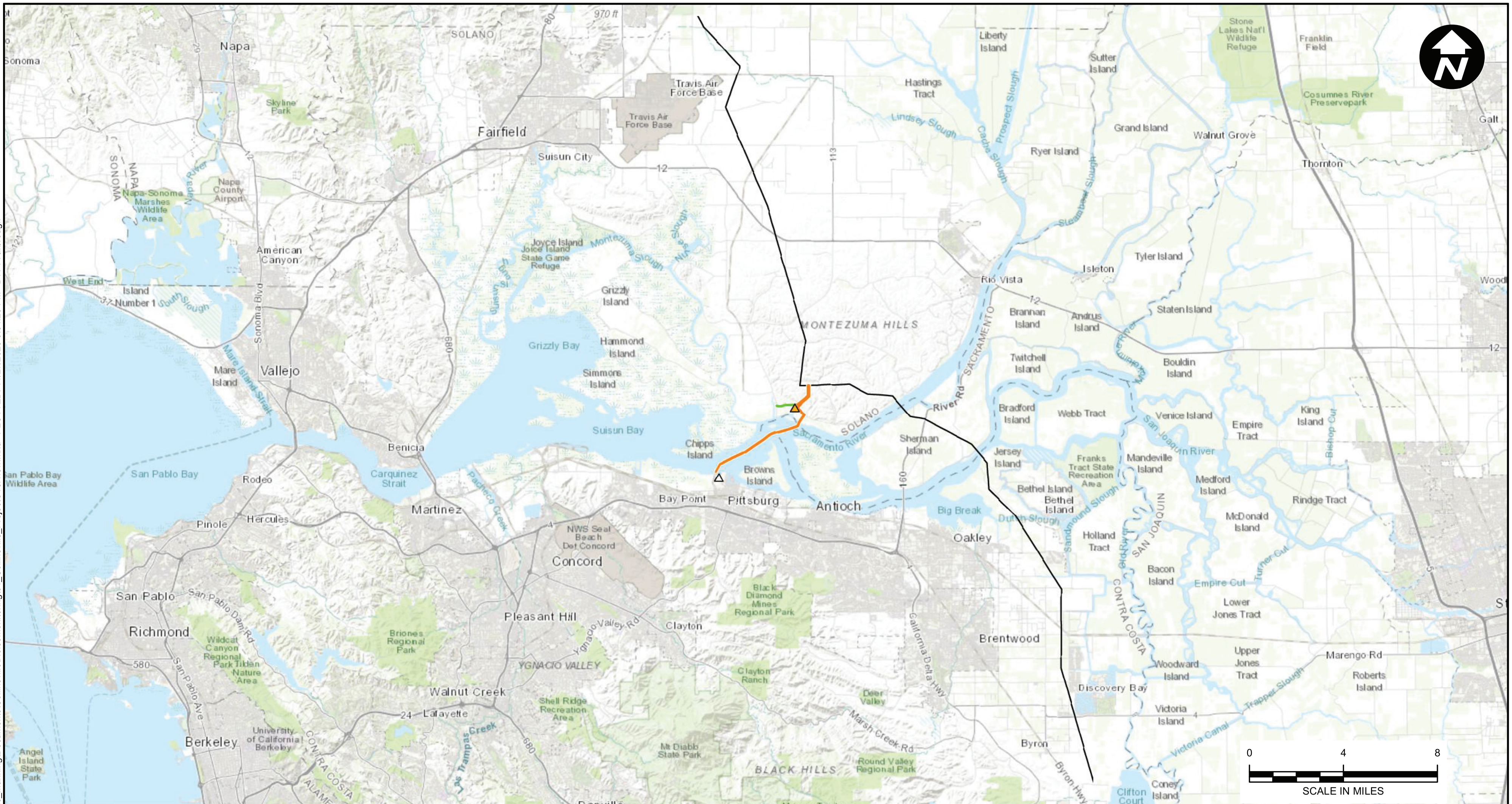


LEGEND

- Proposed LSPGC Collinsville Substation
- Existing PG&E Pittsburg Substation
- Proposed Project Transmission Lines
- Proposed PG&E 12 kV Overhead Distribution Line
- Existing PG&E Vaca Dixon-Tesla Transmission Line

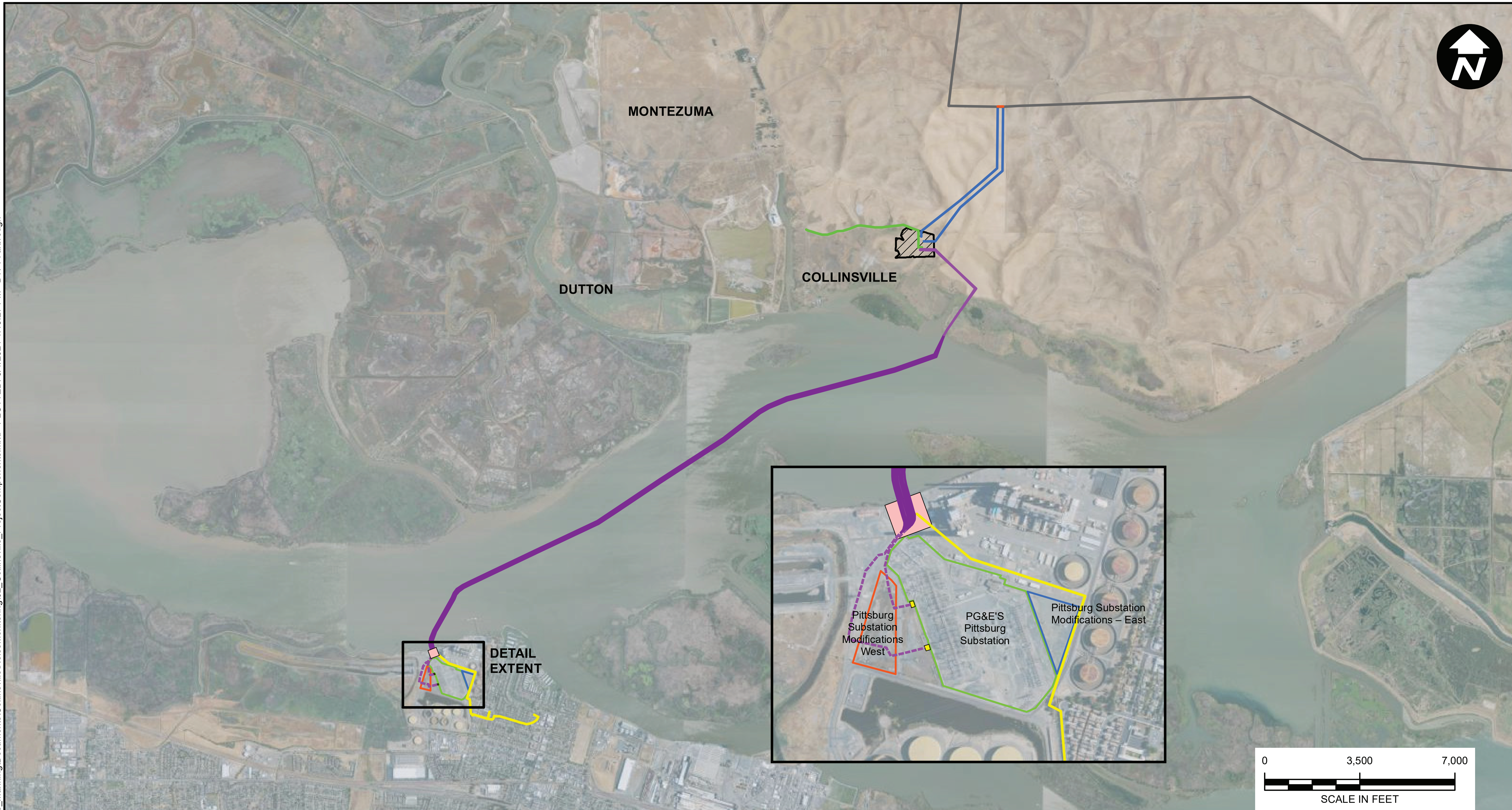
LS POWER GRID CALIFORNIA, LLC
COLLINSVILLE 500/230 KV SUBSTATION PROJECT

PROJECT OVERVIEW MAP

ARCADIS

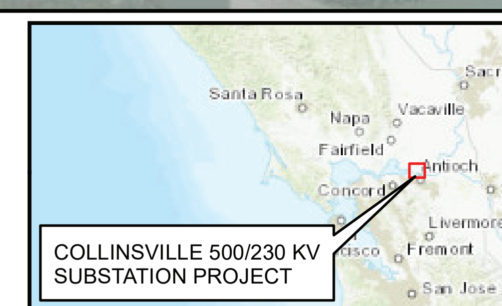
FIGURE
1

CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane California II FIPS 0402 Feet BY: TYarbrough
D:\GIS\Project Files\LS_Power\Collinsville_Manning\Documents\Collinsville\NoiseMonitoring\02_Collinsville_ProjectComponents.mxd PLOTTED: 3/1/2024 1:13:27 PM



LEGEND

- Proposed LSPGC Collinsville Substation Site
- Pittsburg Substation Modifications - East
- Pittsburg Substation Modifications - West
- PG E's Pittsburg Substation
- Existing PG E 500 kV Overhead Transmission Line
- Proposed LSPGC 230 kV Overhead Transmission Line
- Proposed LSPGC 230 kV Submarine Transmission Cable
- Proposed PG E 12 kV Overhead Distribution Line
- Proposed PG E 500 kV Overhead Interconnection
- Existing PG E 500kV Overhead Transmission Line To Be Removed
- Proposed LSPGC 230 kV Underground Transmission Cable
- Telecommunications Line
- Vault
- Riser



LS POWER GRID CALIFORNIA, LLC
COLLINSVILLE 500/230 KV SUBSTATION PROJECT

PROJECT COMPONENTS MAP

ARCADIS

FIGURE
2

LEGEND

- SENSITIVE NOISE RECEPTORS
- NOISE MEASUREMENT LOCATION
- TRANSMISSION LINE
- PROPOSED COLLINSVILLE SUBSTATION SITE
- EXISTING PG&E PITTSBURG SUBSTATION

LS POWER GRID CALIFORNIA, LLC
COLLINSVILLE 500/230 KV SUBSTATION PROJECT

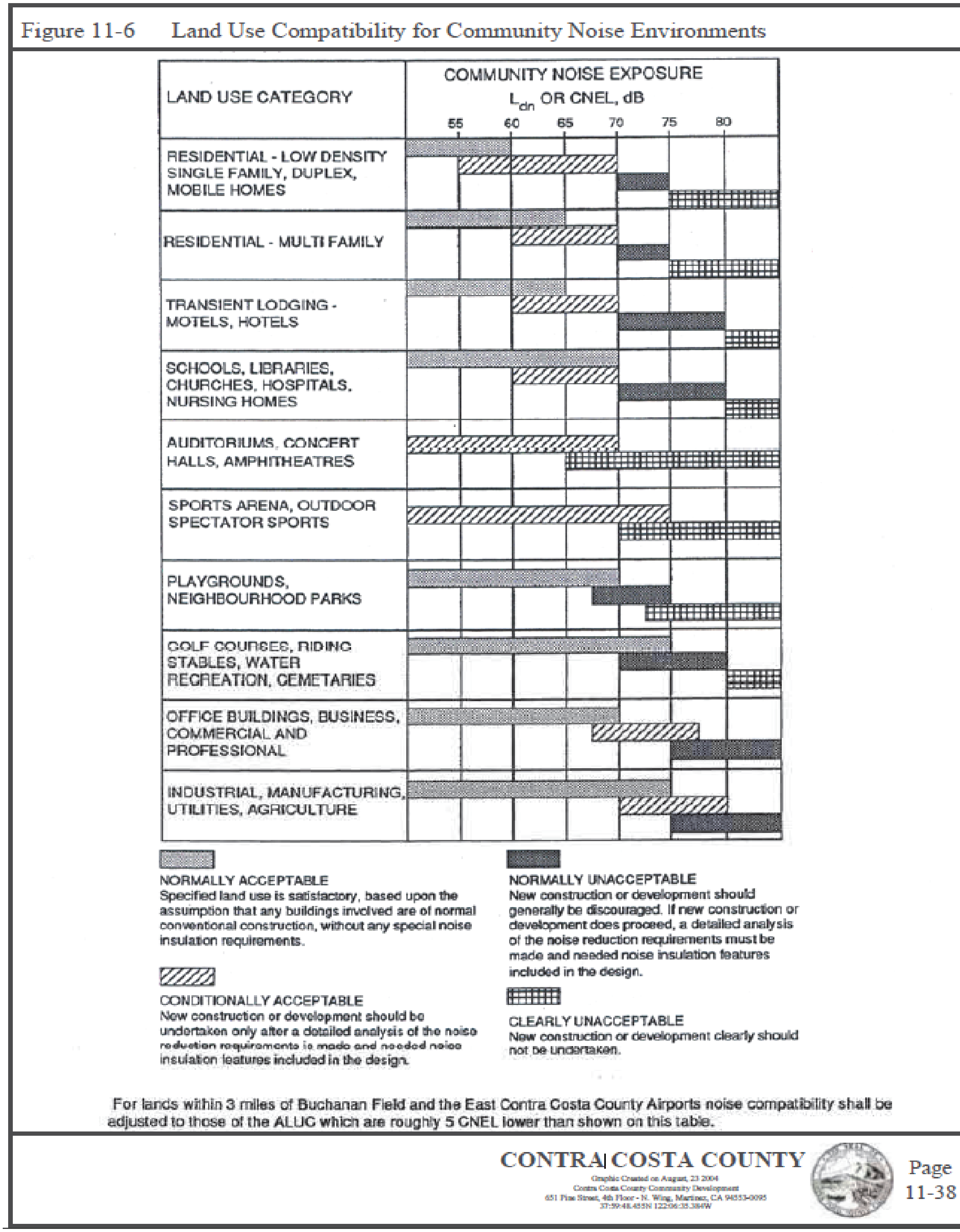
NOISE MEASUREMENT LOCATIONS AND NEAREST SENSITIVE RECEPTORS

ARCADIS

FIGURE
3

CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane California II FIPS 0402 Feet
D:\GIS\Project Files\LS_Power\Collinsville_Manning\Documents\Collinsville\NoiseMonitoring\03_Collinsville_NoiseMonitoringLayout.mxd PLOTTED: 11/27/2023 5:04:53 PM BY: TYarbrough

Figure 4: **Land Use Compatibility for Community Noise Environments**



Source: Contra Costa County 2010

LEGEND:

RECEPTOR

DAYTIME NOISE CONTOUR (dBA)

- 45
- 50
- 55
- 60
- 65

SITE BOUNDARY

NOTE:

1. BASEMAPPING IMAGERY OBTAINED FROM GOOGLE EARTH PRO DATED 8/30/2023.

LS POWER GRID CALIFORNIA LLC
COLLINSVILLE 500/230 KV SUBSTATION PROJECT

DAYTIME NOISE CONTOURS

ARCADIS

FIGURE 5

T:_ENV\LS_Power\GIS\Projects\Insignia_Pro\LSPower_Collinsville_NoiseContourFigures\LSPower_Collinsville_NoiseContourFigures.aprx 5/2/2024 3:15 PM Last Saved By: jrapp

LEGEND:

- RECEPTOR
- NIGHTTIME CONTOUR (dBA)
  - 45
  - 50
  - 55
  - 60
  - 65
- SITE BOUNDARY

0 700 1,400 Feet

GRAPHIC SCALE

NOTE:

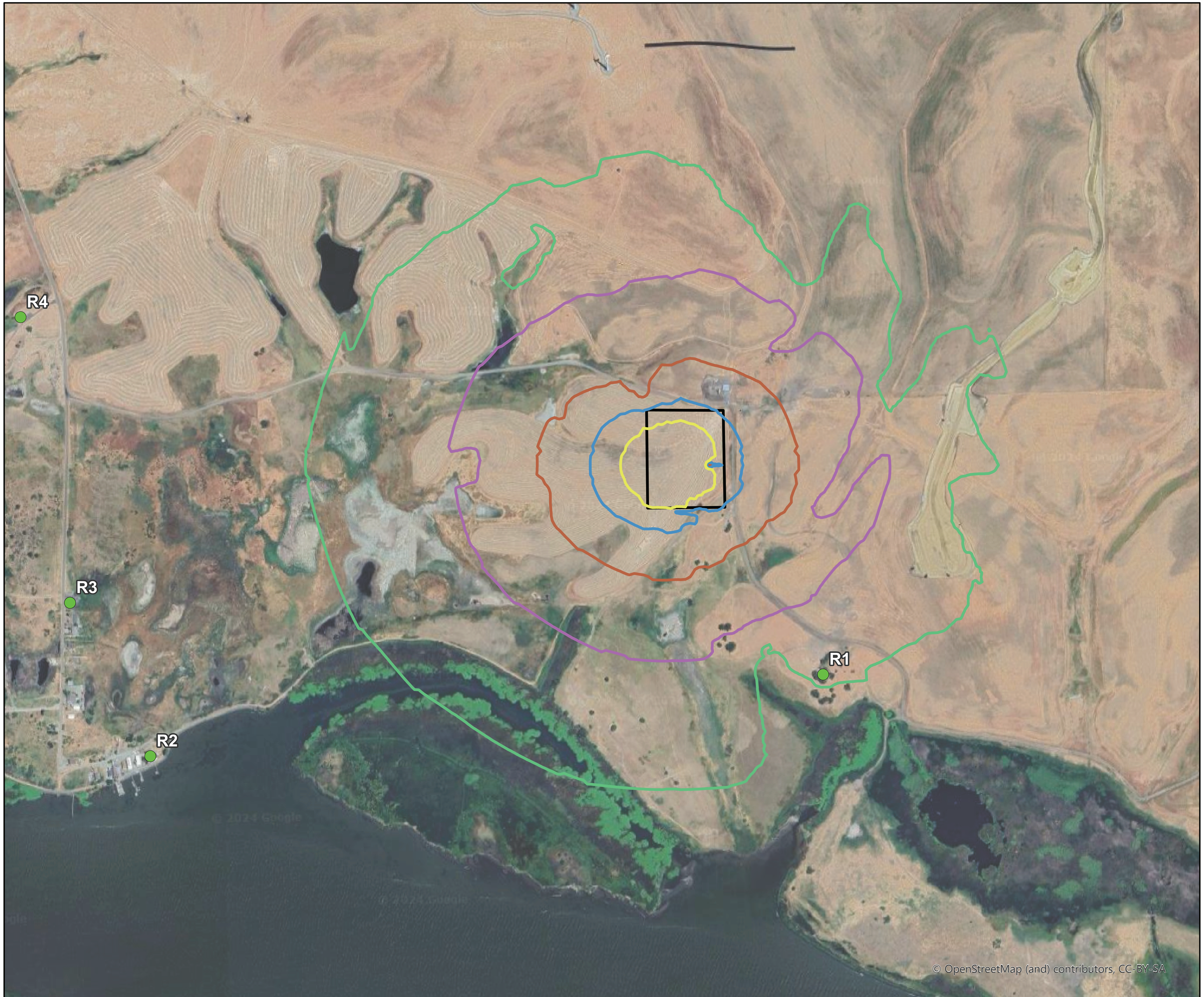
1. BASEMAPPING IMAGERY OBTAINED FROM GOOGLE EARTH PRO DATED 8/30/2023.

LS POWER GRID CALIFORNIA LLC
COLLINSVILLE 500/230 KV SUBSTATION PROJECT

NIGHTTIME NOISE CONTOURS

ARCADIS

FIGURE
6



LEGEND:

RECEPTOR

DAY/NIGHT CONTOUR (dBA)

45

50

55

60

65

SITE BOUNDARY

0 700 1,400 Feet

GRAPHIC SCALE

NOTE:

1. BASEMAPPING IMAGERY OBTAINED FROM GOOGLE EARTH PRO DATED 8/30/2023.

LS POWER GRID CALIFORNIA LLC
COLLINSVILLE 500/230 KV SUBSTATION PROJECT

DAY/NIGHT NOISE CONTOURS

ARCADIS

FIGURE 7

T:_ENV\LS_Power\GIS\Projects\Insignia_Pro\LSPower_Collinsville_NoiseContourFigures\LSPower_Collinsville_NoiseContourFigures.aprx 5/2/2024 3:15 PM Last Saved By: jrapp

Figure 8

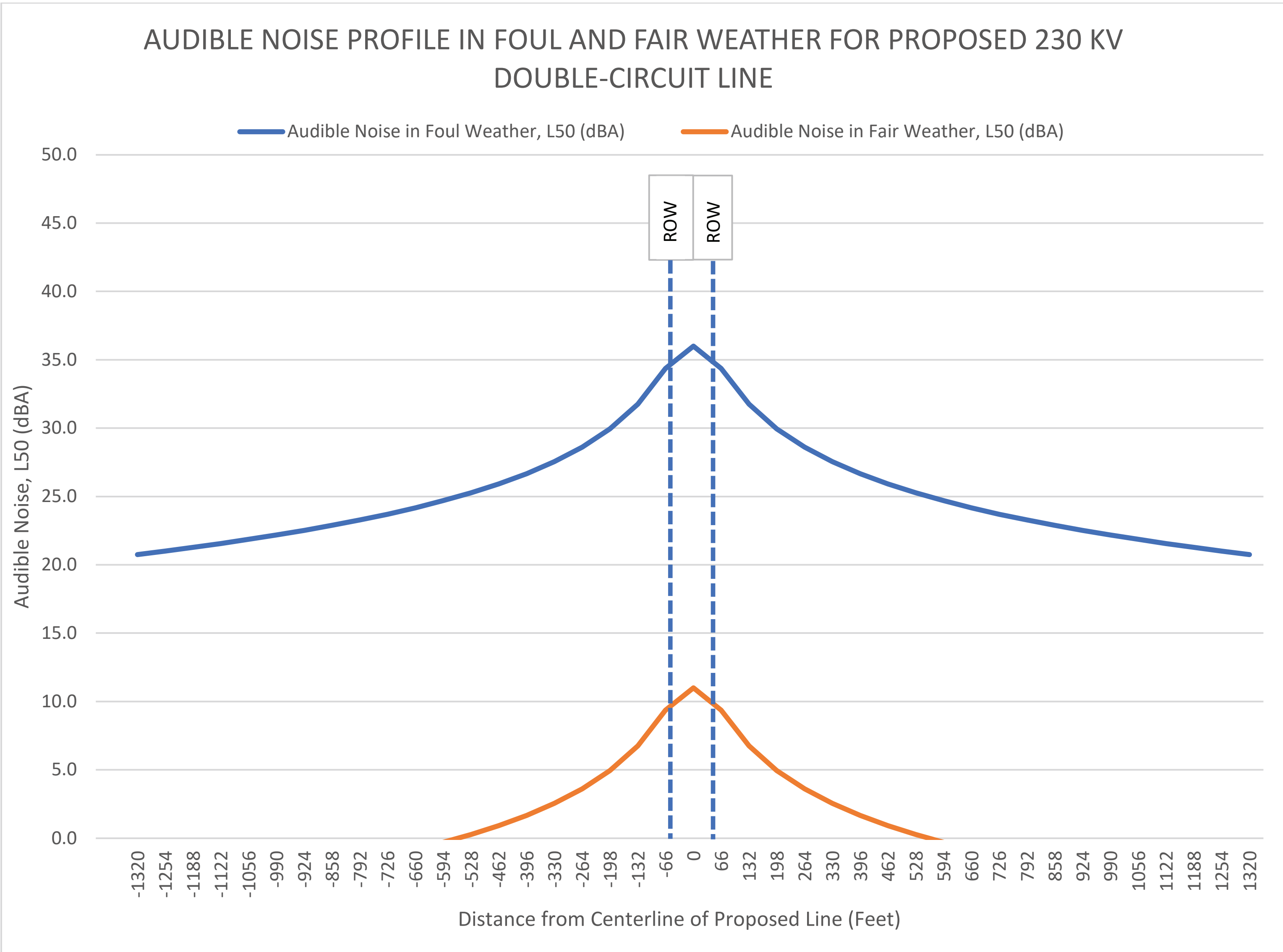
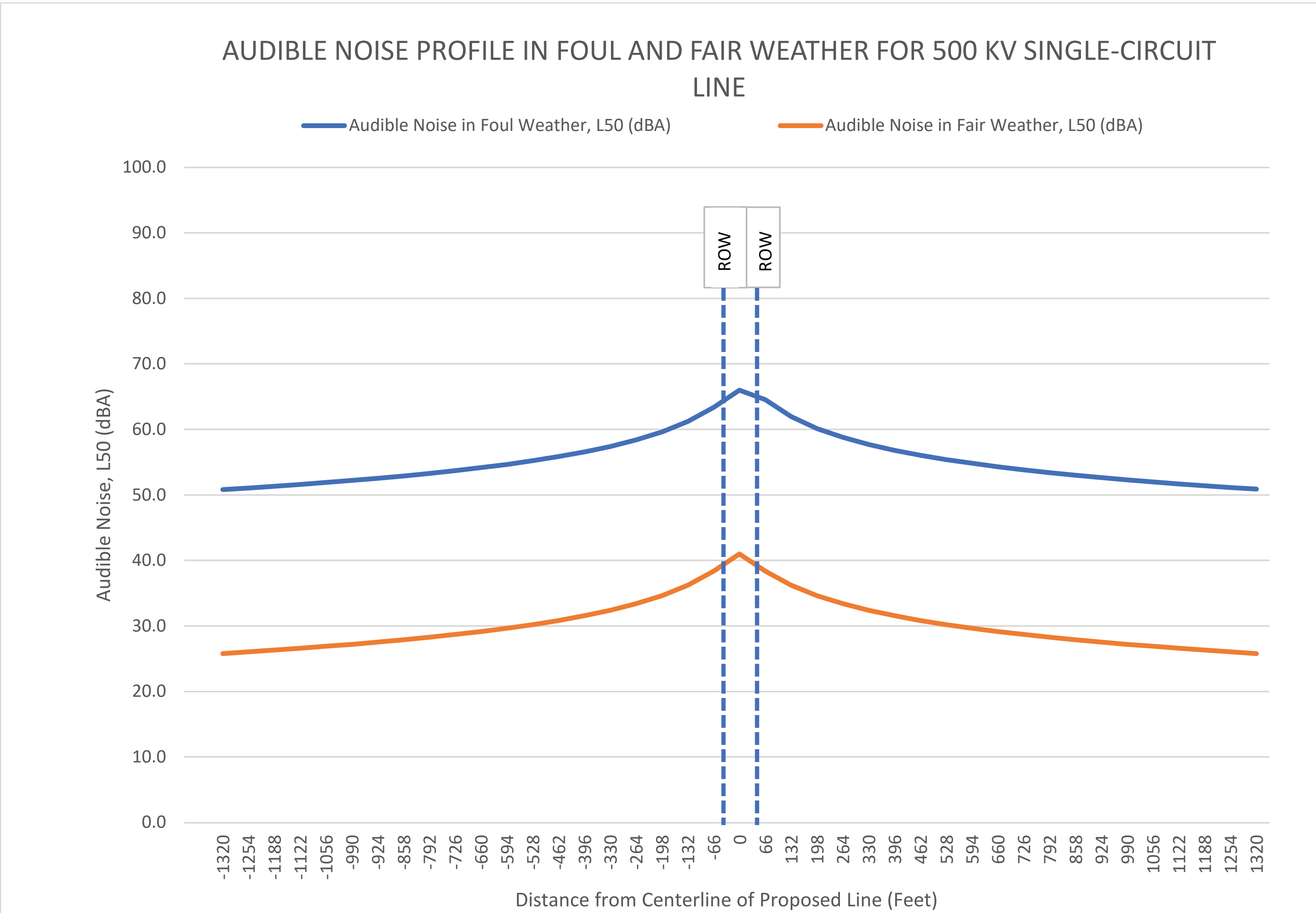

AUDIBLE NOISE PROFILE IN FOUL AND FAIR WEATHER FOR PROPOSED 230 KV DOUBLE-CIRCUIT LINE
Audible Noise in Foul Weather, L50 (dBA)
Audible Noise in Fair Weather, L50 (dBA)
ROW
ROW
Audible Noise, L50 (dBA)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-1320 -1254 -1188 -1122 -1056 -990 -924 -858 -792 -726 -660 -594 -528 -462 -396 -330 -264 -198 -132 -66 0 66 132 198 264 330 396 462 528 594 660 726 792 858 924 990 1056 1122 1188 1254 1320
Distance from Centerline of Proposed Line (Feet)

Figure 9



AUDIBLE NOISE PROFILE IN FOUL AND FAIR WEATHER FOR 500 KV SINGLE-CIRCUIT LINE
Audible Noise in Foul Weather, L50 (dBA)
Audible Noise in Fair Weather, L50 (dBA)
Audible Noise, L50 (dBA)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
ROW
ROW
-1320
-1254
-1188
-1122
-1056
-990
-924
-858
-792
-726
-660
-594
-528
-462
-396
-330
-264
-198
-132
-66
0
66
132
198
264
330
396
462
528
594
660
726
792
858
924
990
1056
1122
1188
1254
1320
Distance from Centerline of Proposed Line (Feet)

Appendix A

Instrument Certificate of Calibration

www.casellasolutions.com FA04179 CASELLA

Certificate of Conformity and Calibration

Instrument Model:-	CEL-633C		
Serial Number	0499599		
Firmware revision	V006-05		
Microphone Type:-	CEL-251	Preamplifier Type:-	CEL-495
Serial Number	2845	Serial Number	004704
Instrument Class/Type:-	1		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:- 21 °C, 33 %RH, 996 mBar

Test Engineer:- Stephen Adams
Date of Issue:- September 28, 2022

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

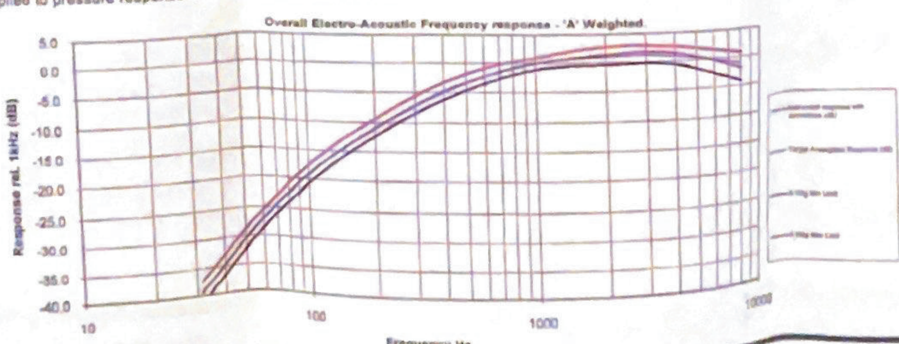
Test Summary:-

Self Generated Noise Test	All Tests Pass
Electrical Signal Test Of Frequency Weightings	All Tests Pass
Frequency & Time Weightings At 1 kHz	All Tests Pass
Level Linearity On The Reference Level Range	All Tests Pass
Toneburst Response Test	All Tests Pass
C-peak Sound Levels	All Tests Pass
Overload Indication	All Tests Pass
Acoustic Tests	All Tests Pass

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



Casella UK

Casella USA
415 Lawrence Bell Drive, Unit 4
Buffalo, NY 14221, USA

Casella India

Casella China

CASELLA

Certificate of Conformity and Calibration

Customer:	Eco-Rental Solutions
Instrument:	CEL-120/2
Serial Number:	4039312
Job Number:	26544
Date of Issue:	28-Sep-2022
Engineer:	S. Adams

Traceable Equipment:

Reference Calibrator	EQ11086
DVM type Fluke 45	EQ00023

Test Conditions:

Ambient Temperature	21.0	°C
Ambient Humidity	33.0	%RH
Ambient Pressure	996	mBar

Results:

	Level 1	Level 2	Frequency
Initial Reading	114.00 dB	N/A dB	1.0000 kHz
Final Reading	114.00 dB	N/A dB	1.0000 kHz

Uncertainty:

Level	±	0.15	dB
Frequency	±	0.5	Hz

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications.
Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9000:2015 quality procedures.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

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VIC 3170, Australia
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E: australia@casellasolutions.com

www.casellasolutions.com FA00044 CASELLA

Certificate of Conformity and Calibration

Instrument Model:-	CEL-633C		
Serial Number	2511397		
Firmware revision	V129-09		
Microphone Type:-	CEL-251	**Preamplifier Type:-**	CEL-495
Serial Number	1713	Serial Number	003768
Instrument Class/Type:-	1		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	23 °C 44 %RH 996 mBar	**Test Engineer:-** **Date of Issue:-**	Paul Blackwell October 24, 2022

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

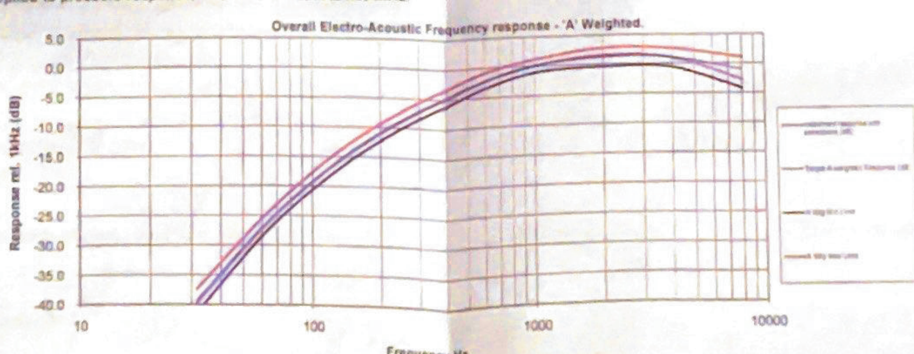
Test Summary:-

Self Generated Noise Test	All Tests Pass
Electrical Signal Test Of Frequency Weightings	All Tests Pass
Frequency & Time Weightings At 1 kHz	All Tests Pass
Level Linearity On The Reference Level Range	All Tests Pass
Toneburst Response Test	All Tests Pass
C-peak Sound Levels	All Tests Pass
Overload Indication	All Tests Pass
Acoustic Tests	All Tests Pass

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz



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Shanghai, China
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Fax: +86-21-61609906
Email: info@casellasolutions.cn

CASELLA

Certificate of Conformity and Calibration

Customer:	Eco-Rental Solutions
Instrument:	CEL-110/1
Serial Number:	301160
Job Number:	26739
Date of Issue:	24-Oct-2022
Engineer:	P Blackwell

Traceable Equipment:	Reference Calibrator	EQ11085
	DVM type Fluke 45	EQ00318

Test Conditions:

Ambient Temperature	23.0	°C
Ambient Humidity	44.0	%RH
Ambient Pressure	996	mBar

Results:

	Level 1	Level 2	Frequency
Initial Reading	113.95 dB	93.94 dB	1.0001 kHz
Final Reading	114.00 dB	94.05 dB	1.0001 kHz

Uncertainty:

Level	±	0.15	dB
Frequency	±	0.5	Hz

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications.
Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9000:2015 quality procedures.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

Appendix B

Photograph Log

Photograph Log

LS Power Grid California, LLC
Collinsville Substation
30193297

Photograph: 1

Description:
Collinsville 24HR
Monitoring Location

Location:
Collinsville, CA

Photograph taken by: Mary-Catherine Goddard

Date: 9/25/2023

Photograph Log

LS Power Grid California, LLC
Collinsville Substation
30193297

Photograph: 2

Description:
Collinsville Short Term Monitoring Location

Location:
Pittsburg, CA

Photograph taken by: Mary-Catherine Goddard

Date: 9/25/2023