

# ***2150 GENEVA AVENUE BATTERY STORAGE PROJECT NOISE AND VIBRATION ASSESSMENT***

***Daly City, California***

**September 6, 2024**

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Project: 23-016

## INTRODUCTION

The project proposes an approximate 6.9-acre battery-based energy storage facility and 0.71-acre substation at 2150 Geneva Avenue in Daly City, California. As part of the proposed project, approximately 0.9 miles of above and below ground transmission line, running from the proposed substation to the Pacific Gas & Electric (PG&E) Martin substation, would be installed. Specific components of the project include:

- *Battery Energy Storage System (BESS)* – a BESS facility would house lithium-ion batteries to store excess energy generated by the electrical grid during the day. No power would be generated on site. The batteries would be housed in purpose-built enclosures (approximately nine feet tall) and would be mounted on racks seismically anchored to the ground and constructed on nonflammable aluminum and steel. Inverters and medium-voltage transformers would be installed outside the battery enclosures. The BESS would be able to store up to 250 MW of electricity from the Pacific Gas and Electric (PG&E) Martin Substation. Intermittently, the need for additional storage augmentation may be required, and while these augmentations would not require additional construction site work, the additional battery augmentation may require several trips to deliver and install the units over a period of several weeks.
- *Substation* – the substation, which would be located adjacent to the BESS facility, would be required to transform the electricity voltage for storage and use, consistent with PG&E requirements. The substation building would include an open rack, air-insulated switchgear, a power transformer, and additional electrical equipment and would operate 24 hours per day, 365 days per year. Substation electrical equipment would be housed in National Electrical Manufacturers Association (NEMA) enclosures and screened from view, and the electrical cabling would be installed underground. The substation equipment would be approximately 65 feet in tall.
- *Transmission Line* – the BESS and substation would connect to the PG&E Martin Substation via a 115 kilovolt (kV) transmission line. The transmission line would follow one of three potential alignments to the PG&E Martin Substation. All three alignments would be entirely underground:
  - Alignment 1 is approximately 0.7 miles long and would leave the project site traveling northwest towards the Cow Palace. The transmission line would run along the northern border of the Cow Palace and then turn south once it reaches the eastern border of the Cow Palace property. The transmission line would then travel south for approximately 600 feet until it turns east and transitions along Ottilia Street to ultimately connect into the PG&E Martin Substation;
  - Alignment 2 is approximately 1.1 miles long and would leave the project site via the existing driveway along Carter Street. The transmission line would then travel south along Carter Street until it turns east along Martin Street. The transmission line would then travel east along Martin Street until it turns north along Schwerin Street to ultimately connect into the PG&E Martin Substation at the same location as Alignment 1; and

- Alignment 3 is approximately 1.2 miles long and would follow the same initial route as Alignment 2, except Alignment 3 would turn north along Oriente Street instead of Schwerin Street. The transmission line would run north along Oriente Street until it turns east onto Ottilia Street and ultimately connect into the PG&E Martin Substation at the same location as Alignment 1.

In order to connect the transmission line to the Martin Substation, all three alignments would connect to a Point of Change of Ownership (POCO) pole, up to 120 feet tall, prior to entering the Martin Substation. PG&E identified the following improvements to be completed by PG&E within the existing Martin Substation area:

- Install a line relay package, voltage transformers, dead-end, underground riser, line switch, and fiber terminations;
- Complete breaker and a half (BAAH) bay, install two circuit breakers;
- Construction of a 115 kV transmission line (0.25-mile above ground and 0.05-mile underground) from the POCO pole to the termination point within the substation.

This report evaluates the project's potential to result in significant noise and vibration impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into two sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory background, and describes the existing ambient noise environment at the project site; and 2) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the impacts of the project on sensitive receptors in the vicinity.

## **SETTING**

### **Fundamentals of Environmental Noise**

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is the intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more

intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA)*. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called  $L_{eq}$ . The most common averaging period is hourly, but  $L_{eq}$  can describe any series of noise events of arbitrary duration.

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

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level (CNEL)* is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level ( $L_{dn}$  or DNL)* is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

## **Effects of Noise**

### *Sleep and Speech Interference*

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA DNL. Typically, the highest steady traffic noise level during the daytime is about equal to the DNL and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA DNL with open windows and 65-70 dBA DNL if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a

typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed; those facing major roadways and freeways typically need special glass windows.

### *Annoyance*

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The DNL as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA DNL. At a DNL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the DNL increases to 70 dBA, the percentage of the population highly annoyed increases to about 25-30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a DNL of 60-70 dBA. Between a DNL of 70-80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the DNL is 60 dBA, approximately 30-35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

### **Fundamentals of Groundborne Vibration**

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from “Historic and some old buildings” to “Modern industrial/commercial buildings”. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

**TABLE 1 Definition of Acoustical Terms Used in this Report**

<b>Term</b>	<b>Definition</b>
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, $L_{eq}$	The average A-weighted noise level during the measurement period.
$L_{max}$ , $L_{min}$	The maximum and minimum A-weighted noise level during the measurement period.
$L_{01}$ , $L_{10}$ , $L_{50}$ , $L_{90}$	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, $L_{dn}$ or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

**TABLE 2 Typical Noise Levels in the Environment**

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Jet fly-over at 1,000 feet	110 dBA	Rock band
Gas lawn mower at 3 feet	100 dBA	
Diesel truck at 50 feet at 50 mph	90 dBA	Food blender at 3 feet
Noisy urban area, daytime	80 dBA	Garbage disposal at 3 feet
Gas lawn mower, 100 feet Commercial area	70 dBA	Vacuum cleaner at 10 feet Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime Quiet suburban nighttime	40 dBA	Theater, large conference room
Quiet rural nighttime	30 dBA	Library Bedroom at night, concert hall (background)
	20 dBA	Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

**TABLE 3 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels**

<b>Velocity Level, PPV (in/sec)</b>	<b>Human Reaction</b>	<b>Effect on Buildings</b>
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, May 2023.

### **Regulatory Background – Noise**

Federal Agencies, the State of California, and the City of Daly City have established noise and vibration criteria that are applicable in this assessment. The CEQA Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

#### **Federal Government**

***Federal Transit Administration.*** The Federal Transit Administration (FTA) has identified construction noise thresholds in the *Transit Noise and Vibration Impact Assessment Manual*,<sup>1</sup> which limit daytime construction noise to 80 dBA L<sub>eq</sub> at residential land uses, to 85 dBA L<sub>eq</sub> at commercial land uses, and to 90 dBA L<sub>eq</sub> at industrial land uses.

#### **State of California**

***State CEQA Guidelines.*** CEQA contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

<sup>1</sup> Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018.

- (a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;
- (b) Generation of excessive groundborne vibration or groundborne noise levels; or
- (c) For a project located within the vicinity of a private airstrip or an airport land use plan or where such a plan has not been adopted within two miles of a public airport or public use airport, if the project would expose people residing or working in the project area to excessive noise levels.

## **Local**

**Daly City 2030 General Plan.** The Noise Element in the Daly City 2030 General Plan states that construction noise is regulated in Daly City through the environmental review process by the Engineering and Planning Divisions. Typically, construction activities are limited to the daytime hours between 8:00 a.m. and 5:00 p.m. and are prohibited on weekends and holidays. Additionally, the Noise Element sets forth a noise goal and policies related to noise control in the City. The City's noise goal is:

*Promote a noise environment that reflects a balance of the various City objectives while providing an environment that maintains a healthy living environment; fosters relaxation and recreation; is conducive to the work environment; and provides pleasant living conditions.*

The following policies are applicable to the proposed project:

**Policy NE-2:** Use the State Office of Noise Control Guidelines as a guide to assess development that will need additional noise study and mitigations.

**Task NE-2.1:** Use the Noise Control Guidelines to assess the suitability of a site for new development in combination with the noise contours to accurately identify areas that may need additional noise study and mitigation. Noise mitigations include additional insulation, double glazing of windows and increasing building setbacks from the noise source. Mitigations should also be creative and attractive whenever possible and appropriate. Creative noise mitigation measures can include incorporation of fountains using water to mask freeway noise and noise walls of an appropriate scale painted with decorative murals.

**Policy NE-9:** Work to ensure that the expansion of or changes to existing land uses do not create additional noise impacts for sensitive receptors in the vicinity of the project from intensification or alteration of existing land uses by requiring applicants.

**Task NE-9.1:** Depending upon the hours of operation, intensity of use, and the location of sensitive receptors in the area, the expansion or change of use could cause noise impacts. Acoustical studies should be performed, at the applicant's expense, during the discretionary

and environmental review processes and conditions should be placed on the project accordingly.

**Policy NE-11:** Require that all future land use actions and/or associated development conforms to the relevant height, aircraft noise, and safety policies and compatibility criteria contained in the most recently adopted version of the Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport.

**Task NE-11.1:** Route any proposed land use policy actions, including new specific plans, zoning ordinances, general plan amendments, and rezoning involving land development to the Airport Land Use Commission in compliance with the Airport Land Use Plan.

**Task NE-11.4:** Ensure that all future development in Daly City complies with all relevant FAA standards and criteria for safety, regarding flashing lights, reflective building material, land uses that may attract large concentrations of birds, HVAC exhaust vents, thermal plumes, and uses that may generate electrical/electronic interference with aircraft communications and/or instrumentation.

**Daly City Municipal Code.** Chapter 9.22 of the City's Municipal Code discusses disturbing the peace. While noise level restrictions are not provided in the Municipal Code, the following sections establish qualitative noise disturbances and hours of sensitivity applicable to proposed project:

**9.22.010 – Disturbing the peace prohibited.** No person shall make in any place, nor allow to be made upon his premises, or premises within his control, any noise, disorder or tumult to the disturbance of the public peace.

**9.22.030 – Noise.** Between the hours of ten p.m. (10:00 p.m.) and six a.m. (6:00 a.m.) of the following day, no person shall cause, create or permit any noise, music, sound or other disturbance upon his property which may be heard by, or which noise disturbs or harasses, any other person beyond the confines of the property, quarters or apartment from which the noise, music, sound or disturbance emanates.

## **Regulatory Background – Vibration**

**California Department of Transportation.** To avoid damage to buildings, Caltrans recommends that construction vibration levels are limited to 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, to 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and to 0.08 in/sec PPV for ancient buildings or buildings that are documented to be structurally weakened (see Table 3).

## **Existing Noise Environment**

The project site is located southwest of Geneva Avenue and east of Carter Street in the City of Daly City. The site is currently a PG&E station adjoined to the north by the Bay Club South San Francisco, which is a tennis and pickleball club, and to the east by a vacant industrial lot. To the south and to the west, opposite Martin Street and Carter Street, are existing residences.

The noise environment at the site and in the surrounding areas results primarily from vehicular traffic along Carter Street and Geneva Avenue. Aircraft associated with San Francisco International Airport also contributes to the noise environment.

A noise monitoring survey, which included two long-term (LT-1 and LT-2) and three short-term (ST-1 through ST-3) noise measurements, was performed at the site beginning on Wednesday April 19, 2023, and concluding on Friday April 21, 2023. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was made along Geneva Avenue, approximately 65 feet north of the centerline of the roadway. Hourly average noise levels at LT-1 typically ranged from 65 to 72 dBA  $L_{eq}$  during daytime hours (between 7:00 a.m. and 10:00 p.m.) and from 59 to 68 dBA  $L_{eq}$  during nighttime hours (between 10:00 p.m. and 7:00 a.m.). The community noise equivalent level (CNEL) for the 24-hour period on Thursday April 20, 2023, was 72 dBA CNEL. The daily trends in noise levels at LT-1 are shown in Figures A1 through A3 in the Appendix of this report.

Long-term noise measurement LT-2 was made along Carter Street, approximately 25 feet east of the centerline of the roadway. Hourly average noise levels at LT-2 typically ranged from 64 to 70 dBA  $L_{eq}$  during the day and from 54 to 66 dBA  $L_{eq}$  at night. The CNEL was 70 dBA on Thursday, April 20, 2023. The daily trends in noise levels at LT-2 are shown in Figures A4 through A6 in the Appendix of this report.

Each short-term noise measurement was made on Thursday April 20, 2023, in 10-minute intervals between 10:00 a.m. and 10:50 a.m. Table 4 summarizes the measurements at each short-term location.

ST-1 was made northwest of the Carter Street/Saddleback Drive intersection. ST-1 was made approximately 90 feet from the centerline of Carter Street, which was the dominant noise source at this measurement location. During this 10-minute measurement, 55 passenger vehicles drove along Carter Street, generating noise levels ranging from 57 to 74 dBA. Additionally, three jet flyovers were observed during the measurement, producing noise levels ranging from 47 to 57 dBA. The 10-minute average noise level at ST-1 was 57 dBA  $L_{eq}$ .

ST-2 was made in front of 958 Martin Trail, approximately 25 feet from the centerline of the roadway. During this 10-minute measurement, two passenger vehicles drove along Martin Trail, generating noise levels ranging from 63 to 65 dBA. Nearby Carter Street traffic generated noise levels ranging from 40 to 55 dBA. Additionally, four jet flyovers observed during the measurement produced noise levels ranging from 48 to 53 dBA. The 10-minute average noise level at ST-2 was 49 dBA  $L_{eq}$ .

ST-3 was made along Martin Street, opposite 618 Alexis Circle. ST-3 was made approximately 40 feet from the centerline of Martin Street. During this 10-minute measurement, 10 passenger vehicles drove along Martin Street, generating noise levels ranging from 59 to 65 dBA. Nearby Carter Street traffic generated noise levels ranging from 42 to 53 dBA. Additionally, one jet flyover observed during the measurement produced noise levels up to 49 dBA. The 10-minute average noise level at ST-3 was 53 dBA  $L_{eq}$ .

**TABLE 4 Summary of Short-Term Noise Measurement Data (dBA)**

<b>Noise Measurement Location (Date, Time)</b>	<b>L<sub>max</sub></b>	<b>L<sub>(1)</sub></b>	<b>L<sub>(10)</sub></b>	<b>L<sub>(50)</sub></b>	<b>L<sub>(90)</sub></b>	<b>L<sub>eq(10)</sub></b>
ST-1: 90 feet from the Carter Street centerline (4/20/2023, 10:00-10:10 a.m.)	75	67	61	51	44	57
ST-2: 25 feet from the Martin Trail centerline (4/20/2023, 10:20-10:30 a.m.)	65	61	51	46	43	49
ST-3: 40 feet from the Martin Street centerline (4/20/2023, 10:40-10:50 a.m.)	65	62	57	48	44	53

**FIGURE 1** Aerial Image of the Project Site and Surrounding Area with Long- and Short-Term Measurement Locations Identified



Source: Google Earth, 2023.

## NOISE IMPACTS AND MITIGATION MEASURES

### Significance Criteria

The following criteria were used to evaluate the significance of environmental noise and vibration resulting from the project:

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

**Impact 1a: Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to temporary construction noise in excess of FTA limits. The temporary noise level increase due to project construction would result in a **significant impact**.

The total construction schedule for the proposed BESS and substation would take approximately 20 months, with an expected start date of early March 2025. The applicant is proposing weekday construction between 7:00 a.m. and 6:00 p.m. Construction phases would include demolition, site preparation, grading, building construction and equipment installation, and paving. The transmission line would take about three months to install and would occur primarily within the City's right-of-way (ROW). During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

The City's General Plan suggests construction activities be limited to the hours of 8:00 a.m. to 5:00 p.m. on weekdays and prohibits construction on weekends and holidays. Additionally, the City's Municipal Code prohibits noise disturbances between 10:00 p.m. and 6:00 a.m. Daly City does not establish noise level thresholds for construction activities. Project construction is expected to occur outside the City's allowable hours; therefore, the applicant shall be required to receive an exemption from the City to conduct construction outside the allowable hours.

While the City of Daly City does not establish noise level thresholds for construction activities, this analysis uses the noise limits established by the FTA to identify the potential for impacts due to substantial temporary construction noise. The FTA identifies construction noise limits in the *Transit Noise and Vibration Impact Assessment Manual*. During daytime hours, an exterior threshold of 80 dBA  $L_{eq}$  shall be applied at residential land uses, 85 dBA  $L_{eq}$  shall be applied at commercial uses, and 90 dBA  $L_{eq}$  shall be applied at industrial land uses.

Construction activities for individual projects are typically carried out in phases. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating. The typical range of maximum instantaneous noise levels for the proposed project would be 70 to 90 dBA  $L_{max}$  at a distance of 50 feet (see Table 5) from the equipment. Table 6 shows the hourly average noise level ranges, by construction phase, typical for various types of projects. Hourly average noise levels generated by construction are about 79 to 88 dBA  $L_{eq}$  for public works buildings and road work, measured at a distance of 50 feet from the center of a busy construction site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors.

Equipment expected to be used in each construction phase are summarized in Table 7, along with the quantity of each type of equipment and the reference noise level at 50 feet, assuming the operation of the two loudest pieces of construction equipment for each construction phase. The BESS Site Preparation phase through the Collector Substation Installation/Construction phase would occur on the project site and would involve the construction of the battery storage facility. The four Gen-Tie construction phases would involve the installation of the underground gen-tie lines. Three alternative alignments have been proposed for the gen-tie lines. Figure 2 shows the Alignment 1 option, and Figure 3 shows Alignments 2 and 3. The final phase includes equipment expected to be used for the proposed improvements at the Martin Substation. Figure 4 shows the on-site improvements at the Martin Substation.

Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming the two loudest pieces of equipment would operate simultaneously, as recommended by the FTA for construction noise evaluations. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power. Table 7 also summarizes the construction noise levels for the two loudest pieces of equipment propagated to the surrounding receiving land uses.

To assess construction noise impacts at the receiving property lines of existing noise-sensitive receptors, the worst-case hourly average noise levels, which would result in the combined noise level for all pieces of equipment per phase operating simultaneously, for construction of the BESS building and substation were propagated from the geometrical center of the project site to the

property lines of the receptors. These noise level estimates are shown in Table 8. Noise levels in Table 8 do not assume reductions due to intervening buildings or existing barriers.

**TABLE 5 Construction Equipment 50-Foot Noise Emission Limits**

<b>Equipment Category</b>	<b>L<sub>max</sub> Level (dBA)<sup>1,2</sup></b>	<b>Impact/Continuous</b>
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor <sup>3</sup>	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes:

<sup>1</sup> Measured at 50 feet from the construction equipment, with a “slow” (1 sec.) time constant.

<sup>2</sup> Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.

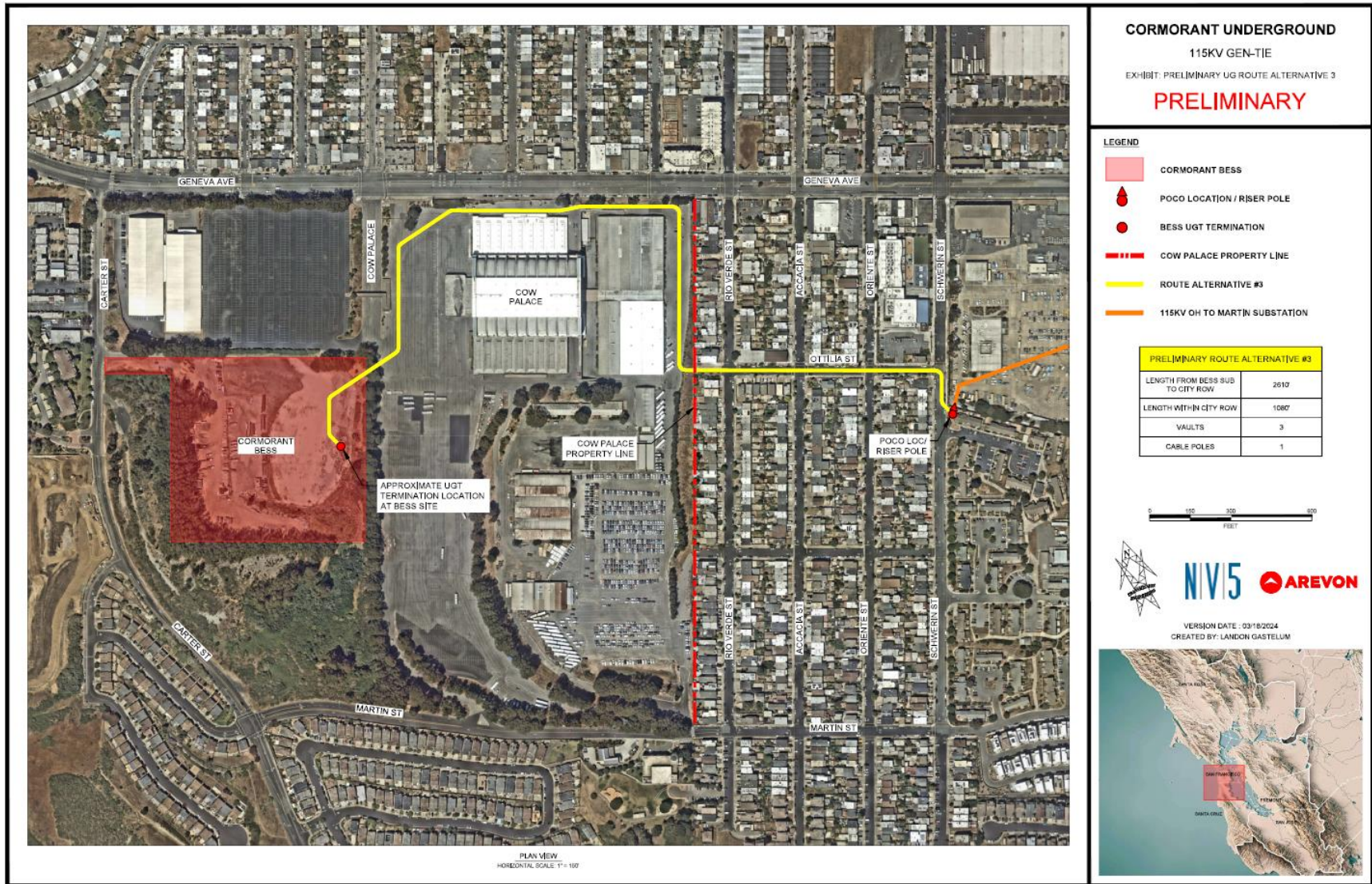
<sup>3</sup> Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

**TABLE 6 Typical Ranges of Construction Noise Levels at 50 Feet,  $L_{eq}$  (dBA)**

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II	I	II	I	II
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84
<b>I</b> – All pertinent equipment present at site. <b>II</b> – Minimum required equipment present at site.								

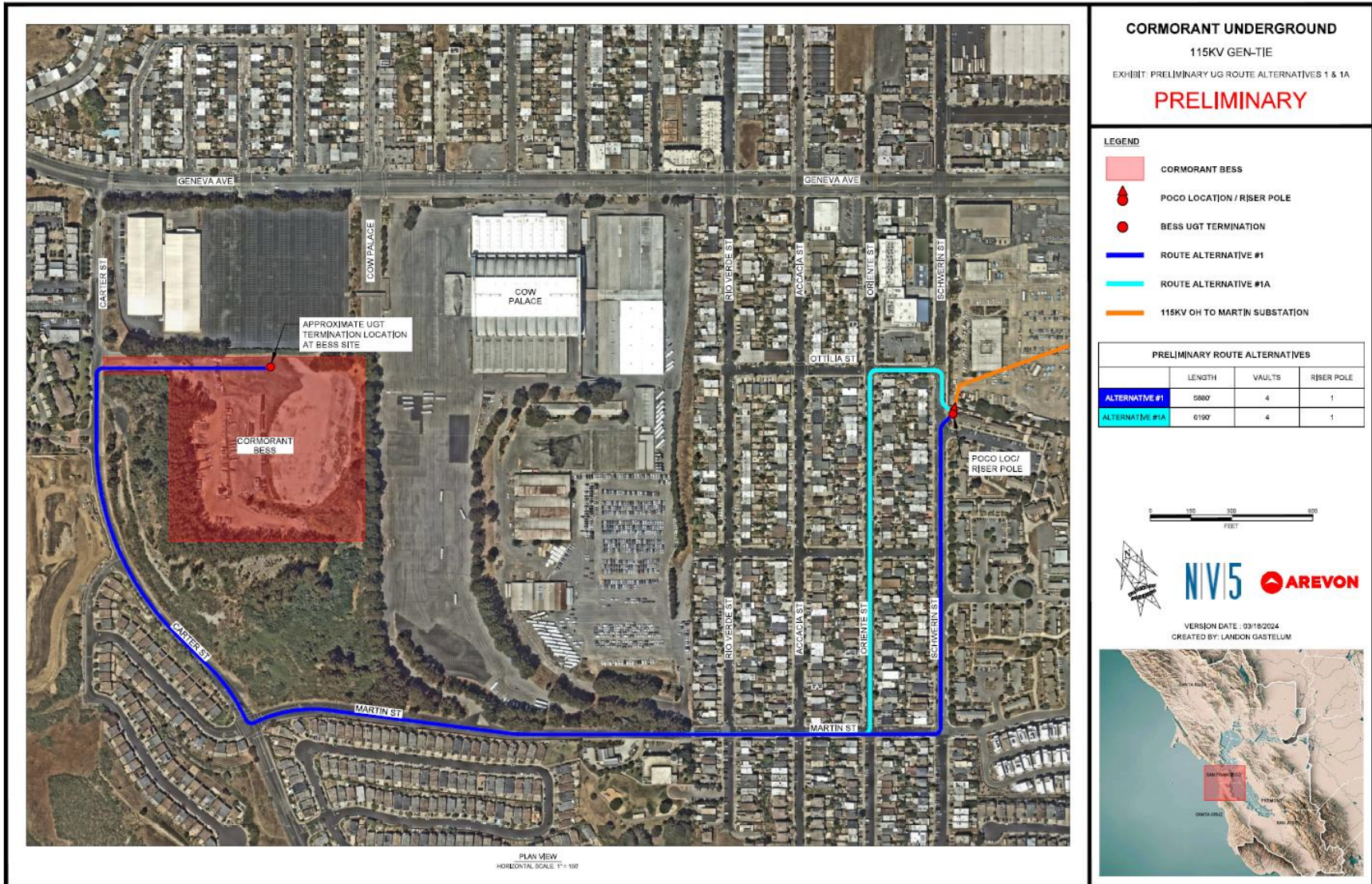
Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

**FIGURE 2 Proposed Alignment 1 for the Transmission Line from the Proposed BESS and Substation to the Existing PG&E Facility**



Source: Google Earth, 2024.

**FIGURE 3 Proposed Alignments 2 and 3 for the Transmission Line from the Proposed BESS and Substation to the Existing PG&E Facility**



Source: Google Earth, 2024.

**FIGURE 4 Proposed Improvements at the Existing Martin Substation**



**TABLE 7 Estimated Construction Noise Levels for the Proposed Project at a Distance of 50 feet**

<b>Phase of Construction</b>	<b>Total Workdays</b>	<b>Construction Equipment (Quantity)</b>	<b>Estimated Construction Noise Level at 50 feet, <math>L_{eq}</math> (dBA)</b>
BESS Site Preparation	10	Tractor/Loader/Backhoe (2) <sup>a</sup> Grader (2) <sup>a</sup> Rubber-Tired Loader (2) Skid Steer Loader (2)	84
Collector Substation Site preparation	10	Rubber-Tired Dozer (2) <sup>a</sup> Tractor/Loader/Backhoe (2) <sup>a</sup>	82
BESS Grading	44	Grader (2) <sup>a</sup> Tractor/Loader/Backhoe (2) <sup>a</sup> Plate Compactor (2) Roller (2) Rubber-Tired Loader (2) Skid Steer Loader (2)	84
Collector Substation Grading	22	Rubber-Tired Dozer (2) <sup>a</sup> Tractor/Loader/Backhoe (2) <sup>a</sup> Roller (2)	82
Battery/Container Installation/ Construction	154	Crane (2) Generator Set (2) Tractor/Loader/Backhoe (2) <sup>a</sup> Forklift (3) Air Compressor (2) Excavator (2) Grader (2) <sup>a</sup> Plate Compactor (2) Roller (2) Skid Steer Loader (2)	84
Collector Substation Installation/ Construction	88	Crane (2) Generator Set (2) Tractor/Loader/Backhoe (2) <sup>a</sup> Air Compressor (2) Aerial Lift (2) Bore/Drill Rig (2) Excavator (2) Grader (2) <sup>a</sup> Rubber-Tired Dozer (2) Roller (2) Skid Steer Loader (2) Trencher (2)	84
Gen-Tie Duct Bank & Vault Installation/ Construction <sup>b</sup>	66	Crane (2) Generator Set (2) <sup>a</sup> Tractor/Loader/Backhoe (2) <sup>a</sup>	82

Phase of Construction	Total Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet, $L_{eq}$ (dBA)
		Aerial Lift (2) Skid Steer Loader (2)	
Gen-Tie Road Resurface & Clean-up <sup>b</sup>	22	Paver (1) Roller (1) Skid Steer Loader (1) <sup>a</sup> Tractor/Loader/Backhoe (1) <sup>a</sup>	81
Gen-Tie Trenching <sup>b</sup>	66	Pump (2) <sup>a</sup> Skid Steer Loader (2) Tractor/Loader/Backhoe (2) <sup>a</sup> Trencher (2)	82
Gen-Tie Jack-and-Bore (Trenching) <sup>b</sup>	22	Other Construction Equipment (1) <sup>a</sup> Bore/Drill Rig (1) Skid Steer Loader (1) Tractor/Loader/Backhoe (1) <sup>a</sup> Welder (1)	84
Battery/Container Installation/ Construction at PG&E Facility	154	Crane (2) Tractor/Loader/Backhoe (2) <sup>a</sup> Off Highway Tractor (1) <sup>a</sup> Aerial Lift (1)	83

<sup>a</sup> Denotes two loudest pieces of construction equipment per phase.

<sup>b</sup> Underground transmission line installation (see Figures 2 and 3).

**TABLE 8 Estimated Construction Noise Levels at Nearby Land Uses during the Construction of BESS and Substation**

Phase of Construction	Calculated Hourly Average Noise Levels, $L_{eq}$ (dBA)			
	North Tennis & Pickleball Club (310ft <sup>a</sup> )	West Residences (610ft <sup>a</sup> )	East Cow Palace (540ft <sup>a</sup> )	South Residences (695ft <sup>a</sup> )
BESS Site Preparation	72	66	67	65
Collector Substation Site preparation	69	63	64	62
BESS Grading	73	67	68	66
Collector Substation Grading	70	64	65	63
Battery/Container Installation/ Construction	74	68	69	67
Collector Substation Installation/ Construction	74	68	69	67

<sup>a</sup> The distances shown in the table were measured from the center of the project site to the receiving property lines.

As shown in Table 8, construction noise levels generated by the construction and installation of the BESS facility and substation would intermittently range from 62 to 68 dBA  $L_{eq}$  at existing residential uses and from 64 to 74 dBA  $L_{eq}$  at existing commercial and light industrial uses

surrounding the site when activities are focused near the center of the project site. These construction noise levels are not expected to exceed the exterior threshold of 80 dBA  $L_{eq}$  at existing residential land uses, 85 dBA  $L_{eq}$  at commercial uses, or the 90 dBA  $L_{eq}$  threshold at light industrial land uses in the project vicinity. When construction occurs 50 feet from the adjoining property lines, which would include existing commercial uses only, construction noise levels would range from 82 to 84 dBA  $L_{eq}$ .

During the installation of the underground transmission line for Alignment 1, the receptors would include the Cow Palace to the east (25 to 275 feet from the alignment); the residences along Rio Verde Street (25 to 70 feet from the alignment); residences along Ottilia Street (30 to 50 feet from the alignment); and the Bayshore Elementary School (175 feet from the alignment). At these distances, noise levels due to construction activities would range from 68 to 90 dBA  $L_{eq}$  under worst-hour conditions.

During the installation of the underground transmission line for Alignment 2 (shown in Figure 3 by the dark blue line), the receptors would include the residences along Carter Street to the west (45 to 80 feet from the alignment); the residences, fire station, and community center along Martin Street to the south (25 to 120 feet from the alignment); and the residences along Schwerin Street (50 feet from the alignment). At these distances, construction noise levels would range from 71 to 90 dBA  $L_{eq}$  under worst-hour conditions.

During the installation of the underground transmission line for Alignment 3 (shown in Figure 3 by the light blue line), the receptors would include the residences along Carter Street to the west (45 to 80 feet from the alignment); the residences, fire station, and community center along Martin Street to the south (25 to 120 feet from the alignment); the residences along Oriente Street (40 to 50 feet from the alignment); residences along Ottilia Street (30 feet from the alignment); and the Bayshore Elementary School (175 feet from the alignment). At these distances, construction noise levels would range from 71 to 90 dBA  $L_{eq}$  under worst-hour conditions.

As the transmission line is installed, construction activities would move along the project corridor from the proposed BESS facility and substation to the existing PG&E substation. While multiple residences and other sensitive receptors located along the alignment would be exposed to construction noise at any given time, the total construction period would last for three months. Assuming an installation rate of about 100 feet per day, any single receptor along the corridor would be exposed to noisy construction activities exceeding FTA thresholds for no more than three to five days.

The improvements at the existing PG&E facility (i.e., Martin Substation) would include installation of equipment, utilities, and a transmission line. The receptors would include the residences along Schwerin Street to the west (80 to 775 feet from the improvements); the apartments adjoining the existing PG&E facility to the south (45 to 360 feet from the improvements); and the Bayshore Elementary School (350 to 660 feet from the improvements). At these distances, construction noise levels would range from 61 to 86 dBA  $L_{eq}$  under worst-hour conditions. This work would be completed in four to eight months.

Since the 80 dBA  $L_{eq}$  threshold would be exceeded at receiving residential property lines during construction of the proposed project, this would be considered a significant impact.

### **Mitigation Measure 1a:**

Modification, placement, and operation of construction equipment are possible means for minimizing the impact of construction noise on existing sensitive receptors. Construction equipment should be well-maintained and used judiciously to be as quiet as possible. Additionally, construction activities for the proposed project should include the following best management practices to reduce noise from construction activities near sensitive land uses:

- Limit construction hours to between 8:00 a.m. and 5:00 p.m., Monday through Friday, unless permission is granted with a development permit or other planning approval.
- Construct temporary noise barriers, where feasible, to screen stationary noise-generating equipment. Temporary noise barrier fences would provide a 5 dBA noise reduction if the noise barrier interrupts the line-of-sight between the noise source and receptor and if the barrier is constructed in a manner that eliminates any cracks or gaps.
- At a minimum, the construction contractor shall implement the following control measures: improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds.
- Equipment used for project construction shall be hydraulically or electrically powered impact tools (e.g., jack hammers) wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatically powered tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used. A muffler could lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible; this could achieve a reduction of 5 dBA. Quieter procedures shall be used (such as drilling rather than impact equipment) wherever feasible.
- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- The construction contractor shall not allow any construction equipment, trucks, or vehicles to idle.
- Locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as possible from sensitive receptors as feasible. If they must be located near receptors, adequate muffling (with enclosures where feasible and appropriate) shall be used to reduce noise levels at the adjacent sensitive receptors. Any enclosure openings or venting shall face away from sensitive receptors.
- Utilize “quiet” air compressors and other stationary noise sources where technology exists.
- Control noise from construction workers’ radios to a point where they are not audible at existing residences bordering the project site.

- Construction staging areas shall be established at locations that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.
- Locate material stockpiles, as well as maintenance/equipment staging and parking areas, as far as feasible from residential receptors.
- Route construction-related traffic along major roadways and as far as feasible from sensitive receptors.
- The contractor shall prepare a detailed construction schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent residential land uses so that construction activities can be scheduled to minimize noise disturbance.
- If complaints are received or excessive noise levels cannot be reduced using the measures above, erect a temporary noise control blanket barrier along surrounding building facades that face the construction sites.
- Designate a “disturbance coordinator” who shall be responsible for responding to any complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., bad muffler, etc.) and shall require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

Implementation of the above mitigation measures would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance. Implementation of these measures would reduce temporary construction noise levels 50 feet or more from project construction to below 80 dBA  $L_{eq}$  at existing residential uses or below 90 dBA  $L_{eq}$  at existing commercial uses surrounding the site. For the construction of the BESS facility and substation, the temporary construction impact would be reduced to a less-than-significant level.

For residences located as close as 25 feet from the installation of the underground transmission line, temporary barriers would not be practical, and it may not be possible to achieve temporary noise levels below 80 dBA  $L_{eq}$ . However, assuming an installation rate of about 100 feet per day for the transmission line, any single residence along Rio Verde Street, Otilia Street, Carter Street, Martin Street, Schwerin Street, or Oriente Street would be exposed to noise levels exceeding 80 dBA  $L_{eq}$  for no more than three to five days. Due to the limited number of days of exposure to construction noise levels exceeding 80 dBA  $L_{eq}$ , the temporary increase in ambient noise levels would be considered less-than-significant.

**Impact 1b: Permanent Noise Level Increase/Exceed Applicable Standards.** The proposed project would not result in a substantial permanent noise level increase, and operational noise generated by the proposed project would not exceed the ambient noise level conditions at the surrounding receptors. **This is a less-than-significant impact.**

A significant impact would occur if the permanent noise level increase due to project-generated operations was 3 dBA CNEL or greater for future ambient noise levels exceeding 60 dBA CNEL or was 5 dBA CNEL or greater for future ambient noise levels at or below 60 dBA CNEL. With existing ambient noise levels exceeding 60 dBA CNEL, it is assumed future noise levels would remain over 60 dBA CNEL. Therefore, a significant impact would occur if project-generated operations increased levels by 3 dBA CNEL or more.

The City of Daly City does not specify noise limits for operations, such as mechanical equipment, truck deliveries, noise-generating outdoor activities, etc. However, the City’s Municipal Code prohibits noise disturbances between 10:00 p.m. and 6:00 a.m. For purposes of this study, the average daytime and nighttime ambient noise levels summarized in Table 9 for each of the receptors surrounding the proposed BESS facility and substation shall be used as thresholds for hourly average operational noise generated by the project. Therefore, an increase in ambient noise levels, operational noise levels exceeding average ambient conditions, or maintenance activities occurring outside the City’s allowable hours would constitute a significant impact.

**TABLE 9 Summary of Ambient Noise Levels for Existing Receptors Surrounding the Project Site**

<b>Roadway</b>	<b>Range of Daytime Noise Levels (Average), dBA L<sub>eq</sub></b>	<b>Range of Nighttime Noise Levels (Average), dBA L<sub>eq</sub></b>	<b>CNEL, dBA</b>
North Tennis & Pickleball Club	65 to 72 (69)	59 to 68 (63)	72
West Residences	64 to 70 (68)	54 to 66 (60)	70
East Cow Palace	65 to 72 (69)	59 to 68 (63)	72
South Residences	64 to 70 (68)	54 to 66 (60)	70

*Project Traffic*

A traffic study was not required for the proposed project. The BESS facility would be monitored remotely with maintenance staff visiting the site periodically throughout the year. No permanent employees would occupy the project site. Remote access to battery status, meters, schedules, and other data would be available to off-site personnel.

In the event of an unforeseen emergency, including but not limited to, a change in battery temperature, the monitoring system would immediately notify local operations and maintenance personnel in the vicinity. If necessary, a temporary shutdown of the facility would be automatically triggered until the issue is diagnosed and resolved.

The proposed project would not result in a permanent noise level increase due to project-generated traffic. This would be a less-than-significant impact.

### *Mechanical Equipment Noise*

The proposed energy storage project would include lithium-ion batteries installed in racks, inverters, medium-voltage transformers, switchgear, a collector substation, and other associated equipment. The batteries would be installed in purpose-built enclosures, which would provide attenuation. Inverters, medium-voltage transformers, and additional electrical equipment would be installed outside the enclosures on a concrete pad. All outside electrical equipment would be housed in the appropriate NEMA rated enclosures and screened from view, to the extent possible, on all sides.

While noise level information for the specific equipment selected for the proposed project was not available at the time of this study, inverters typically generate noise levels of 80 dBA at a distance of 1 meter (3.28 feet). Compared to these noise levels, noise due to the batteries and medium-voltage transformers would be insignificant. The site plan shows a minimum of 150 units located on the site, which would result in 93 dBA at 1 meter, assuming a conservative 10 dBA attenuation from the enclosures.

The proposed substation would consist of switchgear, a main power transformer, and additional electrical equipment. The transmission line would be installed to connect this substation with the existing PG&E substation. The transmission line will be installed overhead from the proposed substation to just before Rio Verde Street (see Figure 2) and underground from just before Rio Verde Street to the PG&E facility. The most notable noise source at the substation would be the main power transformer. Based on similar units at substations, noise levels from these units could be up to 72 dBA at a distance of 6 feet during full load with fans and pumps running. The site plan shows the main power transformer in the southeast corner of the site.

Table 10 summarizes the estimated noise levels generated at the project site propagated to the surrounding land uses.

Based on the estimated noise levels in Table 10, the noise-generating equipment associated with the BESS and substation would not exceed the City's ambient daytime or nighttime noise levels at the surrounding receptors. For all existing receptors, the noise level increase due to project mechanical equipment would not be measurable or detectable (0 dBA CNEL increase). This would be a less-than-significant impact.

**Mitigation Measure 1b:     None required.**

**TABLE 10 Estimated Noise Levels for Proposed BESS Facility and Substation**

Receptor	Inverters		Main Power Transformer		Combined $L_{eq}$ , dBA	Combined CNEL, dBA	Noise Level Increase, dBA CNEL, dBA
	Distance from Center, feet	$L_{eq}$ , dBA	Distance from Center, feet	$L_{eq}$ , dBA			
North Tennis & Pickleball Club	230	56 <sup>a</sup>	540	33	56	62	0
West Residences	640	47 <sup>a</sup>	855	29	47	53	0
East Cow Palace	380	51 <sup>a</sup>	180	43	52	58	0
South Residences, Fire Station & Community Center	635	47 <sup>a</sup>	770	30	47	54	0

<sup>a</sup>Conservative 10 dBA attenuation assumed for all enclosures.

**Impact 2: Excessive Groundborne Vibration due to Construction.** Construction-related vibration levels resulting from activities at the project site would not exceed 0.3 in/sec PPV at the nearest residential or commercial land uses. **This is a less-than-significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include site preparation work, foundation work, and new building framing and finishing. According to the list of construction equipment provided for the proposed project, pile driving, which can cause excessive vibration, is not expected for the proposed project.

The California Department of Transportation (Caltrans) recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, which typically consist of buildings constructed since the 1990s. Conservative vibration limit of 0.3 in/sec PPV is used for buildings that are found to be structurally sound but where structural damage is a major concern (see Table 3 above for further explanation). For historical buildings or some older buildings, a vibration limit of 0.25 in/sec PPV would apply. No known historical buildings that are documented to be structurally weakened adjoin the project area. Therefore, conservatively, groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in a significant vibration impact.

Table 11 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 11 also summarizes the distances to the 0.2 in/sec PPV threshold for buildings of normal conventional construction.

**TABLE 11 Vibration Source Levels for Construction Equipment**

Equipment		PPV at 25 ft. (in/sec)	Minimum Distance to Meet 0.3 in/sec PPV (feet)
Clam shovel drop		0.202	18
Hydromill (slurry wall)	in soil	0.008	1
	in rock	0.017	2
Vibratory Roller		0.210	19
Hoe Ram		0.089	9
Large bulldozer		0.089	9
Caisson drilling		0.089	9
Loaded trucks		0.076	8
Jackhammer		0.035	4
Small bulldozer		0.003	<1

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., June 2023.

Table 12 summarizes the vibration levels at each of the surrounding buildings in the project vicinity. Vibration levels are highest close to the source and then attenuate with increasing distance at the rate  $\left(D_{ref}/D\right)^{1.1}$ , where  $D$  is the distance from the source in feet and  $D_{ref}$  is the reference distance of 25 feet. While construction noise levels increase based on the cumulative equipment in use simultaneously, construction vibration levels would be dependent on the location of individual pieces of equipment. That is, equipment scattered throughout the site would not generate a collective vibration level, but a vibratory roller, for instance, operating near the project site boundary would generate the worst-case vibration levels for the receptor sharing that property line. Further, construction vibration impacts are assessed based on damage to buildings on receiving land uses, not receptors at the nearest property lines. Therefore, the distances used to propagate construction vibration levels (as shown in Table 12), which are different than the distances used to propagate construction noise levels (as shown in Table 8), were estimated under the assumption that each piece of equipment from Table 11 was operating along the nearest boundary of the busy construction site, which would represent the worst-case scenario.

**TABLE 12 Estimated Vibration Levels for Construction Equipment at the Nearest Structures to Each Work Site**

Equipment	Estimated Vibration Levels, in/sec PPV							
	Underground Work				BESS & Substation Work			
	Carter Street & Schwerin Street Res. (55ft)	Martin Street Res. (30ft)	Rio Verde Street & Oriente Street Res. (40ft)	Ottilia Street Res. & Cow Palace (25ft)	North Tennis & Pickleball Club (115ft)	West Res. (295ft)	East Cow Palace (350ft)	South Res. (225ft)
Clam shovel drop	0.085	0.165	0.120	0.202	0.038	0.013	0.011	0.018
Hydromill (slurry wall)	in soil	0.003	0.007	0.005	0.008	0.001	0.001	0.000
	in rock	0.007	0.014	0.010	0.009	0.003	0.001	0.002
Vibratory Roller	0.088	0.172	0.125	0.210	0.039	0.014	0.012	0.019
Hoe Ram	0.037	0.073	0.053	0.089	0.017	0.006	0.005	0.008
Large bulldozer	0.037	0.073	0.053	0.089	0.017	0.006	0.005	0.008
Caisson drilling	0.037	0.073	0.053	0.089	0.017	0.006	0.005	0.008
Loaded trucks	0.032	0.062	0.045	0.076	0.014	0.005	0.004	0.007
Jackhammer	0.015	0.029	0.021	0.035	0.007	0.002	0.002	0.003
Small bulldozer	0.001	0.002	0.002	0.003	0.001	0.000	0.000	0.000

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., June 2023.

Project construction activities would potentially generate vibration levels up to 0.210 in/sec PPV at the nearest residence along Otilia Street and at the Cow Palace during the installation of the underground transmission line. All on-site activities would be at or below 0.039 in/sec PPV during construction activities.

Neither cosmetic, minor, or major damage would occur at historical or conventional buildings located 20 feet or more from the project site. At these locations, and in other surrounding areas where vibration would not be expected to cause cosmetic damage, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration (use of jackhammers and other high-power tools). By use of administrative controls, such as notifying neighbors of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration during hours with the least potential to affect nearby businesses, perceptible vibration can be kept to a minimum.

In summary, the construction of the project would not generate vibration levels exceeding the 0.3 in/sec PPV threshold at conventional properties adjoining the project site. This would be a less-than-significant impact.

**Mitigation Measure 2:       None required.**

**Impact 3:       Excessive Aircraft Noise.** The project site is located approximately 5.4 miles northwest of a public airport or public use airport and would not expose people working in the project area to excessive noise levels. **This is a less-than-significant impact.**

The San Francisco International Airport is a public-use airport located approximately 5.4 miles southeast of the project site. According to the *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport*,<sup>2</sup> the project site lies well outside the 65 dBA CNEL/L<sub>dn</sub> noise contour (see Figure 4), and the required safe and compatible threshold for exterior noise levels would be at or below 65 dBA CNEL for aircrafts. Therefore, aircraft noise at the site would be compatible with the proposed project, and this is a less-than-significant impact.

**Mitigation Measure 3:       None required.**

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<sup>2</sup> Ricondo & Associates, Inc. with Jacobs Consultancy and Clarion Associates, *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport*, November 2012.



## Cumulative Impacts

Cumulative noise impacts would include either cumulative traffic noise increases under future conditions or temporary construction noise from cumulative construction projects.

A significant cumulative traffic noise increase would occur if two criteria are met: 1) if the cumulative traffic noise level increase was 3 dBA CNEL or greater for future levels exceeding 60 dBA CNEL or was 5 dBA CNEL or greater for future levels at or below 60 dBA CNEL; and 2) if the project would make a “cumulatively considerable” contribution to the overall traffic noise increase. A “cumulatively considerable” contribution would be defined as an increase of 1 dBA CNEL or more attributable solely to the proposed project.

A traffic study was not required for the proposed project since the project would not result in a significant number of project trips. Therefore, the project would not result in a cumulatively considerable contribution to the overall noise increase. This would be a less-than-significant impact.

According to the current project list on Daly City’s planning website,<sup>3</sup> the following projects would be located within 1,000 feet of the proposed battery storage project site:

- **Point Martin (Phases 1 and 2)** – this project is across Carter Street from the project site and consists of housing developments. This project is currently under construction and would likely be completed before the battery storage facility starts construction. Therefore, a significant cumulative construction impact would not be assumed.

Since the Point Martin (Phases 1 and 2) Project would likely be completed before construction of the battery storage facility starts, the potential cumulative construction impact would be less-than-significant.

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<sup>3</sup> <https://www.dalycity.org/362/Current-Project-List>

APPENDIX

FIGURE A1 Daily Trend in Noise Levels at LT-1, Wednesday, April 19, 2023

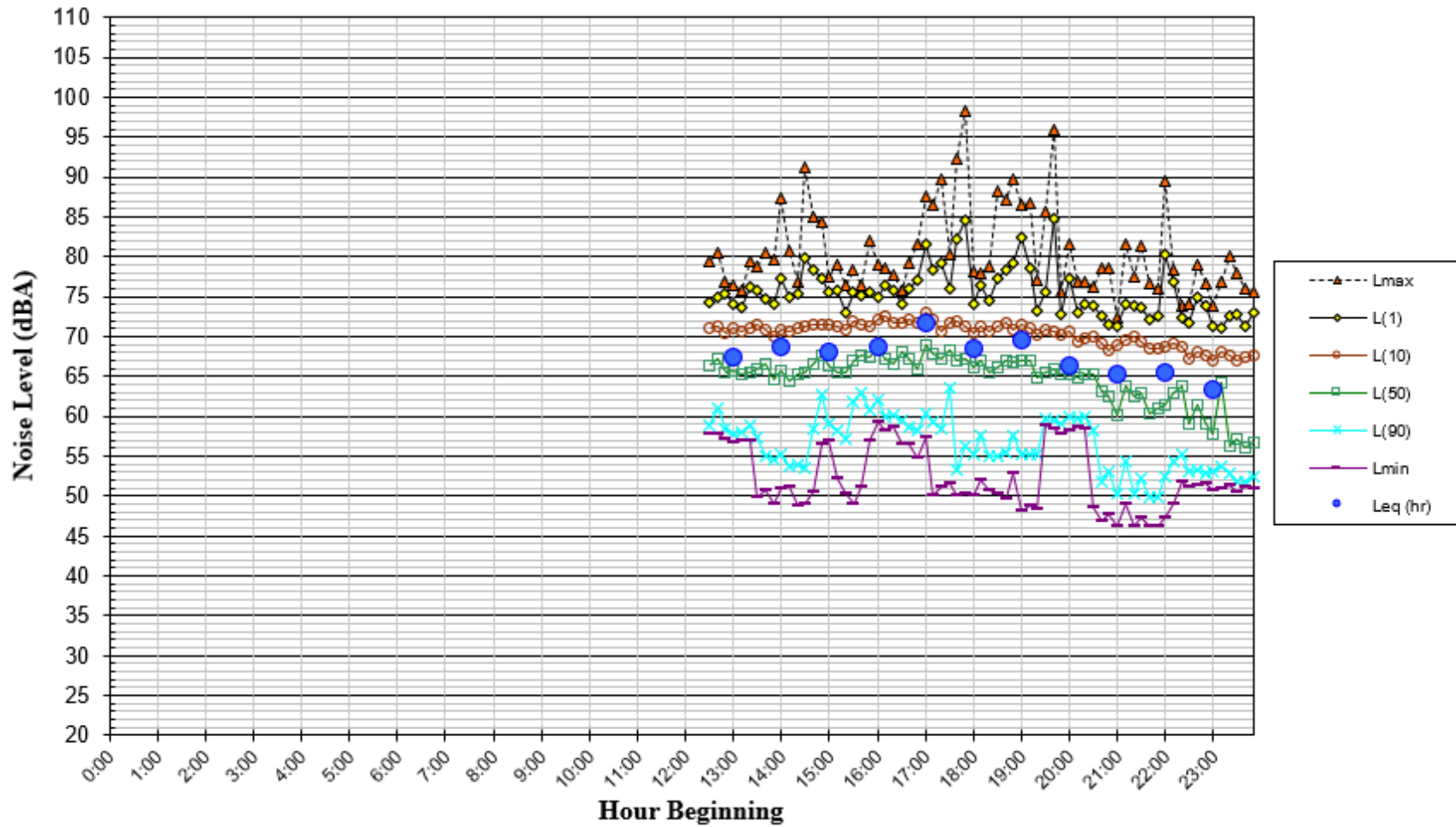
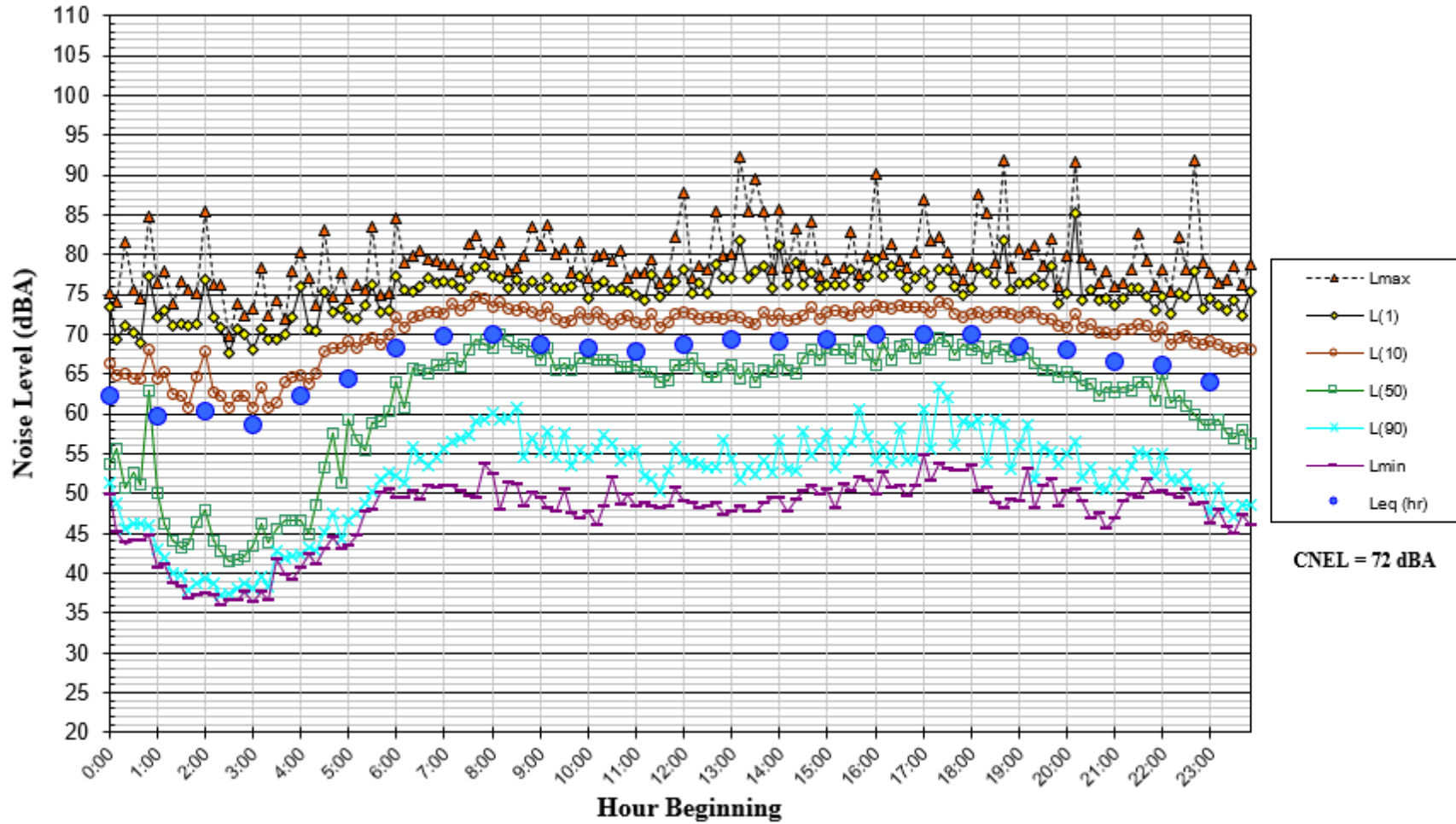


FIGURE A2 Daily Trend in Noise Levels at LT-1, Thursday, April 20, 2023



**FIGURE A3 Daily Trend in Noise Levels at LT-1, Friday, April 21, 2023**

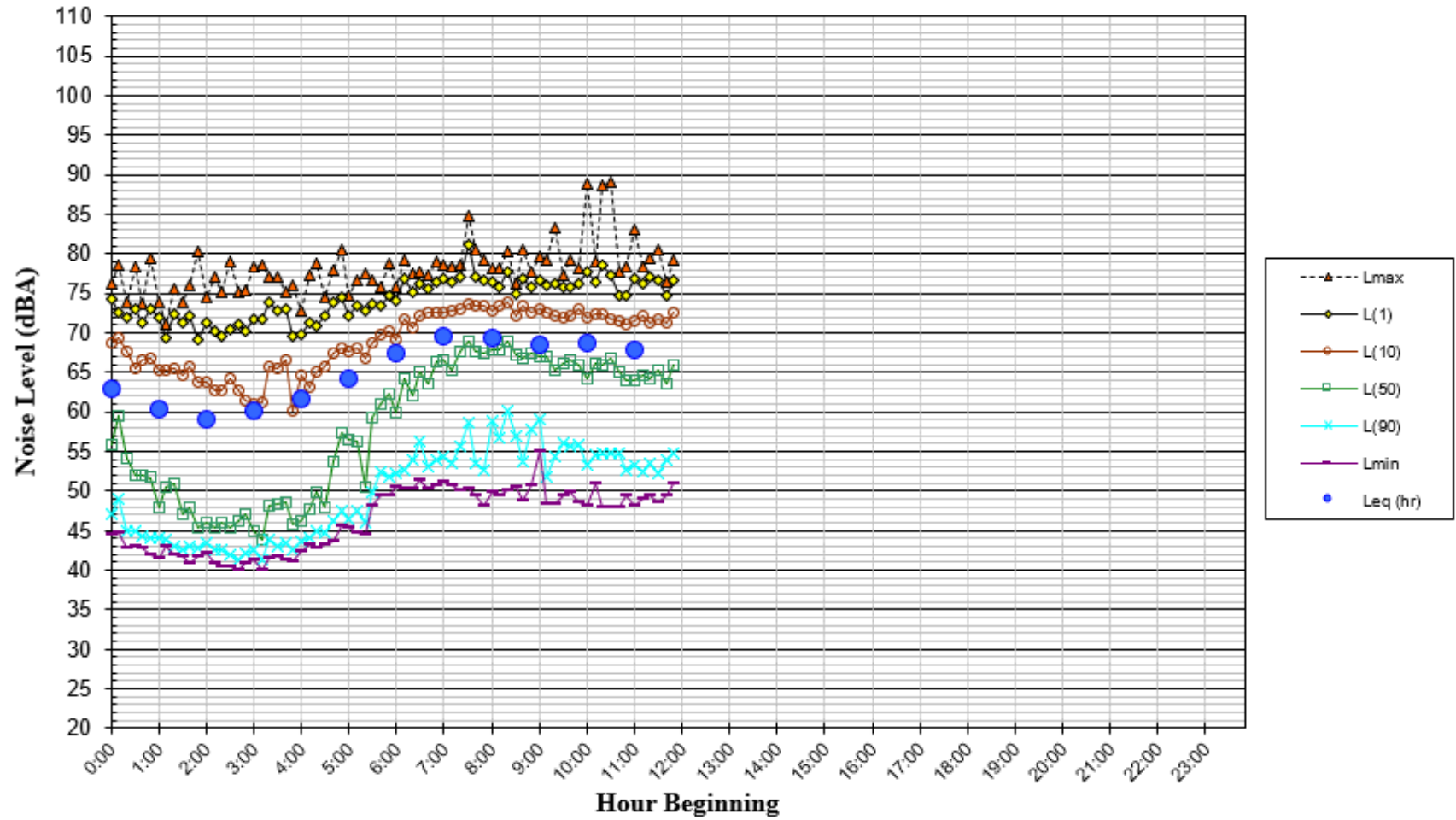


FIGURE A4 Daily Trend in Noise Levels at LT-2, Wednesday, April 19, 2023

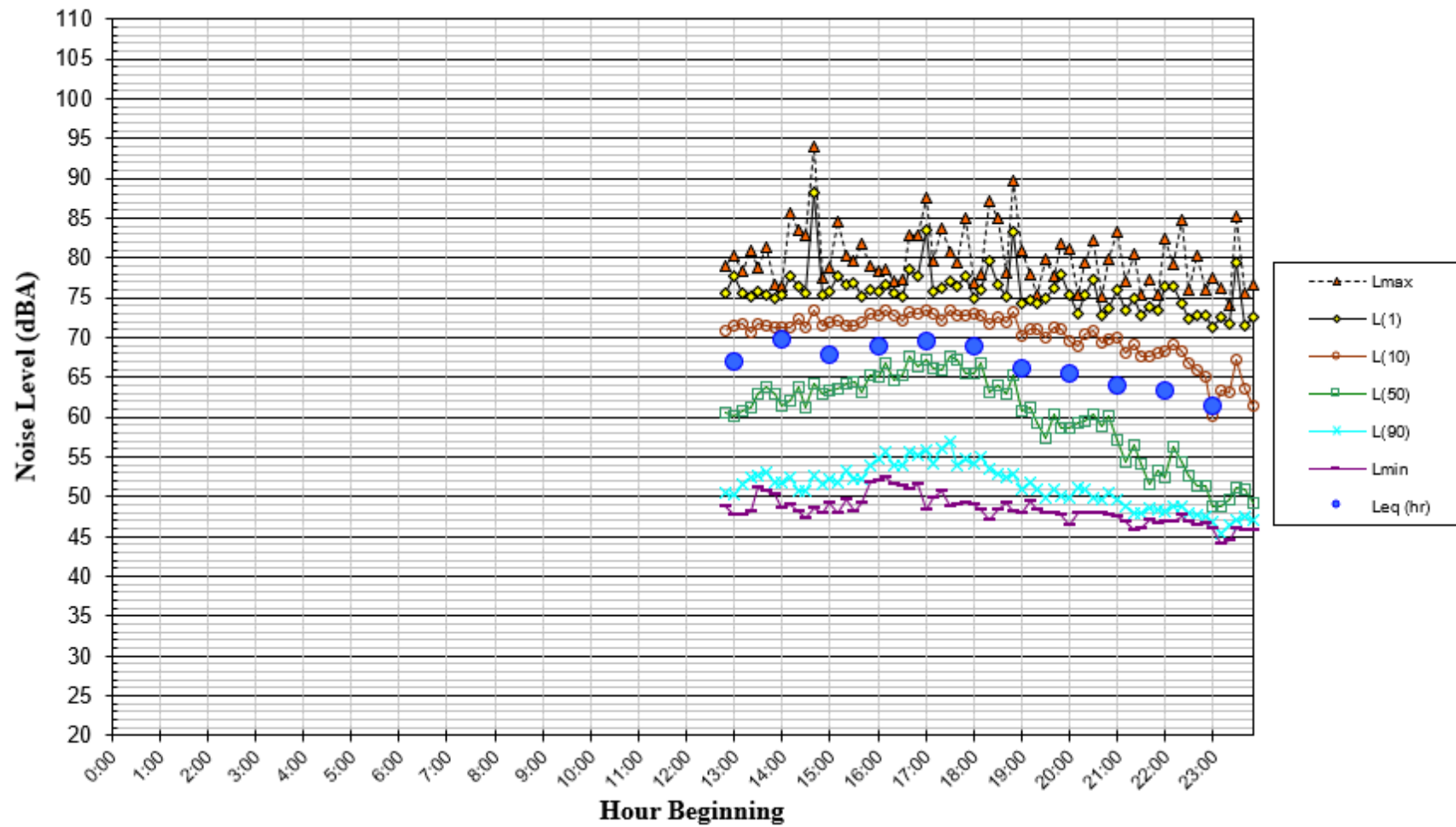


FIGURE A5 Daily Trend in Noise Levels at LT-2, Thursday, April 20, 2023

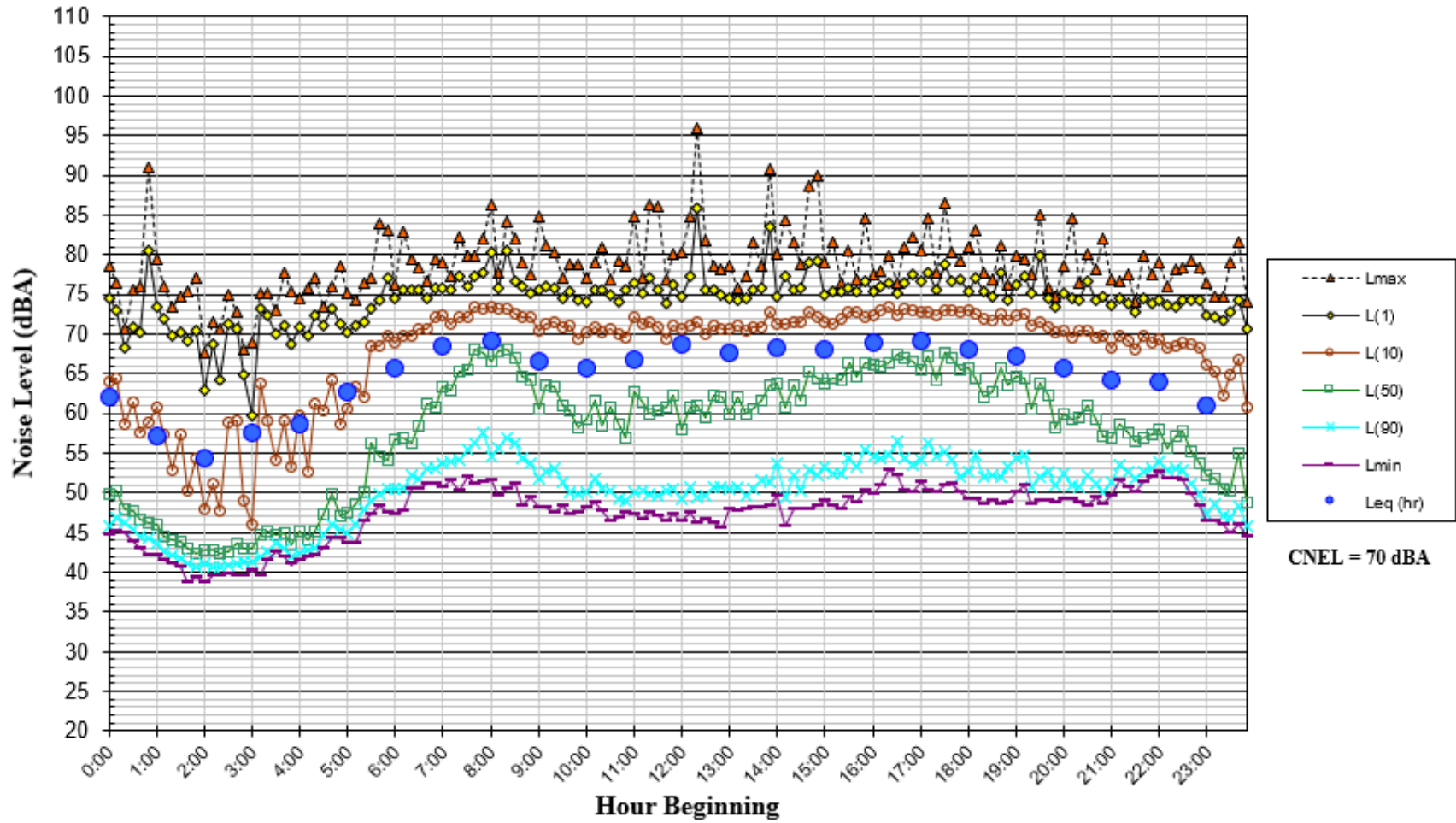


FIGURE A6 Daily Trend in Noise Levels at LT-2, Friday, April 21, 2023

