Sienna Solar and Storage Project

Noise Study

prepared for

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1 Project Description

1.1 Introduction

This study analyzes the potential noise impacts of the proposed Sienna Solar and Storage Project (Project) located in unincorporated San Bernardino County. Rincon Consultants, Inc. (Rincon) prepared this study under contract to 99MT 8me, LLC (applicant) for use by San Bernardino County, the lead agency. The study evaluates the short- and long-term impacts of the Project to noise-sensitive receivers.

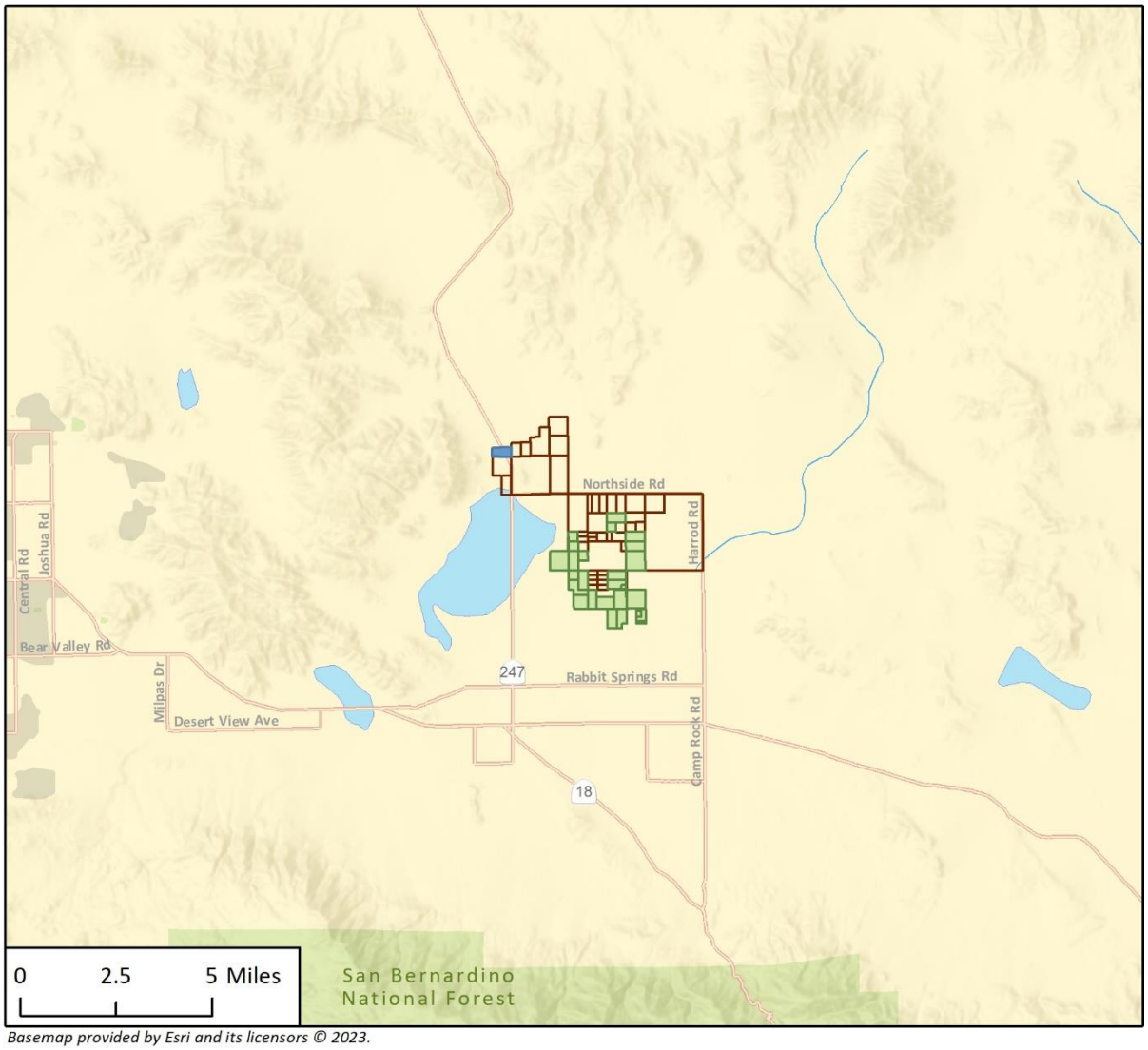
1.2 Project Area and Description

The proposed Sienna Solar Project is a 525-megawatt (MW) utility-scale solar farm with 525-MW battery storage located in unincorporated San Bernardino County. The Project area is located east of Barstow Road/State Route (SR) 247, roughly between Northside Road and Wilshire Road, northeast of the community of Lucerne Valley.

The Project consists of the installation of a photovoltaic (PV) solar facility, Battery Energy Storage System (BESS), Project substation, Operations and Maintenance building(s), underground collection system, and a 230-kV generation-interconnect (gen-tie) line. The Sienna Project will interconnect at the SCE Calcite Substation (currently pending environmental clearance and construction) via a proposed overhead and/or underground 230-kV gen-tie line in addition to other ancillary facilities utilizing private and potentially public ROWs. The Project area encompasses 1,854 acres with an additional 77-acres substation site. Approximately 39 miles of collector lines and gen-tie alternatives will be analyzed in this Assessment, although not all routes will be developed. Figure 1 and Figure 2 show the regional location and immediate vicinity of the Project Area, respectively.

The Project area is characterized by a mixture of residential properties, undeveloped playa and desert scrub communities, and agricultural land that includes alfalfa and jojoba farms and large-scale hemp growing operations. Small-scale abandoned and operational hemp and/or marijuana growing operations were present throughout the playa region of the Project area.

Figure 1 Regional Location



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Project Site
Proposed SCE Calcite Substation
Gen-tie Line and/or
Collector Line Alternatives

N

Figure 2 Project Location

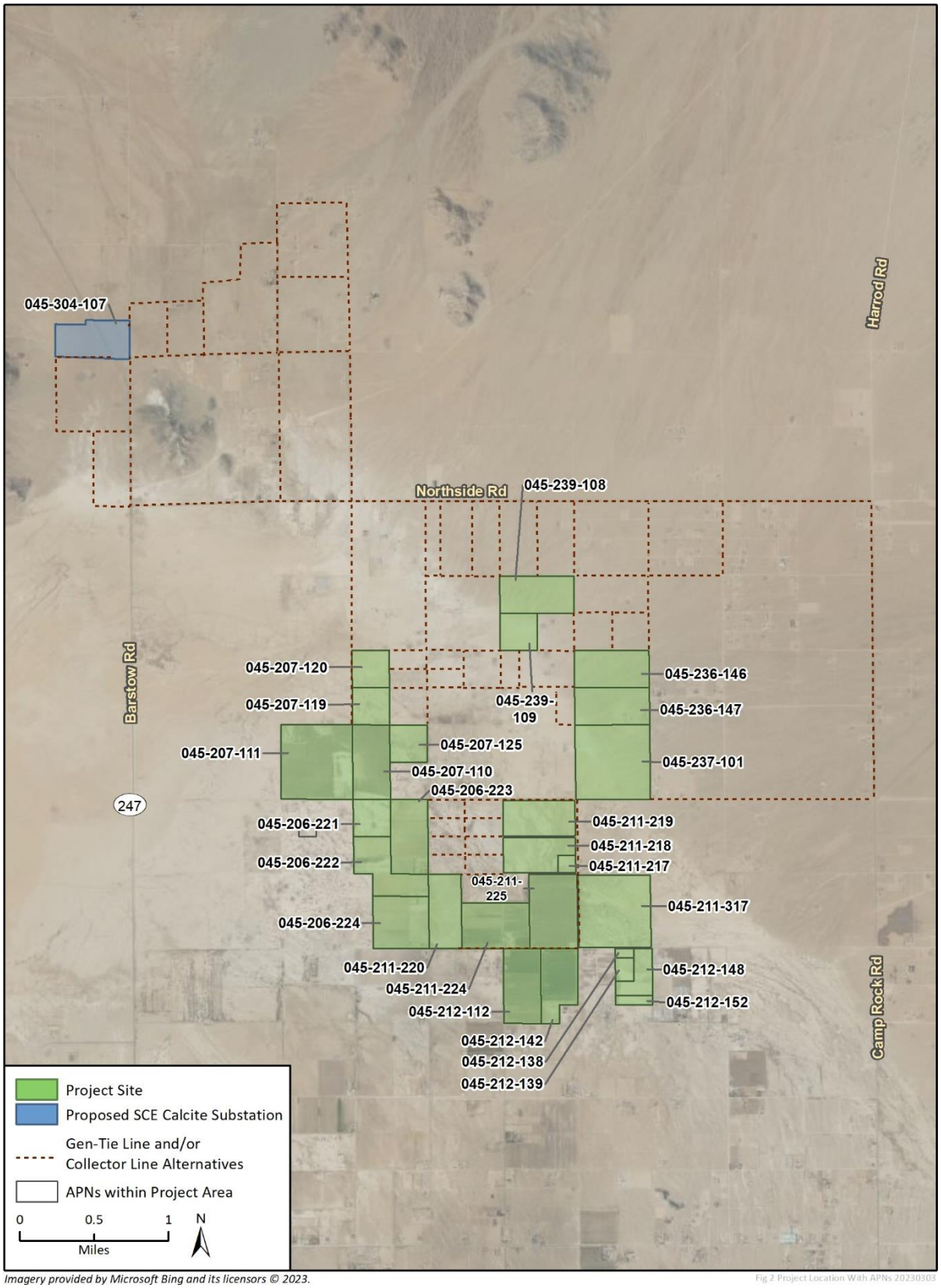

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Fig 2 Project Location With APNs 20230303

1.3 Construction Activities

Construction of all Project components would occur over approximately 12 to 24 months. Construction of the Project would include the following types of activities:[1]

- Site preparation
- Grading and earthwork
- Concrete foundations
- Structural steel work
- Electrical/instrumentation work
- Collector line installation
- Architecture and landscaping

Each parcel that comprises the Sienna Solar Project may be constructed simultaneously, and phases of construction would overlap. Table 1 shows the construction schedule, number of workdays, and overlapping phases for a potential 12-month period that were assumed in the following analysis.

Table 1 Overall Project Construction Schedule

Construction Phase	Workdays	Months											
		1	2	3	4	5	6	7	8	9	10	11	12
Phase 1: Site preparation & Grading	79												
Phase 2: Tracker Foundations (Piles)	125												
Phase 3: Underground Cabling	125												
Phase 4: Mechanical Installation	146												
Phase 5: Electrical Installation	167												

Note: Construction schedule assumptions are based on Eland 1 Solar Project, where number of days per phase were scaled down based a decrease in acreage. The solar capacity of Eland I and Sienna Solar is the same.

Construction traffic would access the Project area locally from Barstow Road, Camp Rock Road, Old Woman Springs Road to parcels located in the southern portion of the development areas. The substation located in the north would gain access from Haynes Road. It is estimated that up to 800 workers per day (during peak construction periods) would be required during construction. On-road traffic would consist of employee and vendor vehicle trips. The number of vehicle trips would vary by month depending on the construction activities.

[1] This list of types of construction activities is not all inclusive of the various activities that will be conducted during each phase of construction and is provided as an example of some of the work that will be conducted. For example, Phase 1 would include activities such as site preparation, grading and earth work; Phase 2 would include activities such as concrete foundations; Phase 3 would include activities such as trenching and collector line installation; Phase 4 would include activities such as structural steel work; Phase 5 would include activities such as electrical/instrumentation work. Additional activities not listed above such as material delivery would also occur during various phases of construction. As such, this list of types of construction activities is presented without respect to the construction schedule.

Heavy construction is expected to occur anytime between 7:00 a.m. and 7:00 p.m., Monday through Friday. Additional hours may be necessary to make-up schedule deficiencies or to complete critical construction activities. Some activities may continue 24 hours per day, seven days per week. Nighttime activities could include, but are not limited to, equipment refueling, staging material for the following day's construction activities, quality assurance/control, and commissioning. Earthmoving activities are expected to be limited to the construction of access roads, operations and maintenance (O&M) buildings, substations, energy storage systems, and storm water protection or storage (detention) facilities. Final grading may include revegetation with low lying grass or applying earth-binding materials to disturbed areas. Materials and supplies would be delivered to the Project area by truck. Truck deliveries would normally occur during daylight hours. However, there could be offloading and/or transporting of materials to the Project area on weekends and during evening hours.

1.4 Operational Activities

Once completed, the Project would generally be limited to the following maintenance activities:

- Cleaning PV panels
- Monitoring electricity generation
- Providing site security
- Maintaining the facility: replacing or repairing inverters, wiring, and PV modules

The Project would operate continuously, 24 hours per day, seven days a week The Project would require an operational staff of up to 15 full-time employees. The facility would generate electricity during normal daylight hours when the solar energy is available. Maintenance activities may occur seven days a week, 24 hours a day to ensure PV panel output when solar energy is available.

1.5 Decommissioning Activities

After 30 to 40 years, the Project would be repowered or decommissioned. If decommissioned, then the Project area would be reverted to undeveloped land. The decommissioning and restoration process would involve removing aboveground and belowground structures, restoring topsoil, revegetation, and seeding. All debris would be removed from the area.

2 Background

2.1 Overview of Sound Measurement

Sound is a vibratory disturbance created by a moving or vibrating source, which is capable of being detected by the hearing organs. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment (Caltrans 2013a).

In technical terms, sound levels are described as either a "sound power level" or a "sound pressure level," which while easily confused are two distinct characteristics of sound. Both share the same unit of measure, the decibel (dB). However, the sound power level, expressed as L_w, is the energy converted into sound by the source. As sound energy travels through the air, it creates a sound wave in the air that exerts pressure on receivers such as an eardrum or microphone, the SPL. Sound measurement instruments only measure SPL, and limits used in standards are generally SPL. Modeling uses the L_w of equipment to calculate the SPL at a distance.

Noise levels are commonly measured in dB using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels so that they are consistent with the human hearing response, which is most sensitive to frequencies around 4,000 Hertz and less sensitive to frequencies around and below 100 Hertz (Kinsler, et. al. 1999). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used to measure earthquake magnitudes. A doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; dividing the energy in half would result in a 3 dB decrease (Crocker 2007).

Human perception of noise has no simple correlation with sound energy: the perception of sound is not linear in terms of dBA or in terms of sound energy. Two sources do not "sound twice as loud" as one source. It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA, increase or decrease (i.e., twice the sound energy); that a change of 5 dBA is readily perceptible (8 times the sound energy); and that an increase (or decrease) of 10 dBA sounds twice (half) as loud ([10.5x the sound energy] Crocker 2007).

Sound changes in both level and frequency spectrum as it travels from the source to the receiver. The most obvious change is the decrease in level as the distance from the source increases. The manner by which noise reduces with distance depends on factors such as the type of sources (e.g., point or line, the path the sound will travel, site conditions, and obstructions). Noise levels from a point source typically attenuate, or drop off, at a rate of 6 dBA per doubling of distance (e.g., construction, industrial machinery, ventilation units). Noise from a line source (e.g., roadway, pipeline, railroad) typically attenuates at about 3 dBA per doubling of distance (Caltrans 2013a). The propagation of noise is also affected by the intervening ground, known as ground absorption. A hard site, such as a parking lot or smooth body of water, receives no additional ground attenuation and the changes in noise levels with distance (drop-off rate) result from simply the geometric spreading of the source. An additional ground attenuation value of 1.5 dBA per doubling of distance applies to a soft site (e.g., soft dirt, grass, or scattered bushes and trees) (Caltrans 2013a). Noise levels may also be reduced by intervening structures; the amount of attenuation provided by this "shielding" depends on the size of the object and the frequencies of the noise levels. Natural terrain features such as hills and dense

woods, and man-made features such as buildings and walls, can significantly alter noise levels. Generally, any large structure blocking the line of sight will provide at least a 5-dBA reduction in source noise levels at the receiver (Federal Highway Administration [FHWA] 2017). Structures can substantially reduce exposure to noise as well. The FHWA's guidelines indicate that modern building construction generally provides an exterior-to-interior noise level reduction of 20 to 35 dBA with closed windows.

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important factors of Project noise impact. Most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors have been developed. One of the most frequently used noise metrics is the equivalent noise level (L_{eq}); it considers both duration and sound power level. L_{eq} is defined as the single steady A-weighted level equivalent to the same amount of energy as that contained in the actual fluctuating levels over time. Typically, L_{eq} is summed over a one-hour period. L_{max} is the highest root mean squared (RMS) sound pressure level within the sampling period, and L_{min} is the lowest RMS sound pressure level within the measuring period (Crocker 2007).

Noise that occurs at night tends to be more disturbing than that occurring during the day. Community noise is usually measured using Day-Night Average Level (L_{dn}), which is the 24-hour average noise level with a +10 dBA penalty for noise occurring during nighttime (10:00 PM to 7:00 AM) hours. Community noise can also be measured using Community Noise Equivalent Level (CNEL or L_{DEN}), which is the 24-hour average noise level with a +5 dBA penalty for noise occurring from 7:00 p.m. to 10:00 p.m. and a +10 dBA penalty for noise occurring from 10:00 p.m. to 7:00 a.m. (Caltrans 2013).[2] The relationship between the peak-hour L_{eq} value and the CNEL/L_{dn} depends on the distribution of traffic during the day, evening, and night.

2.2 Vibration

Ground-borne vibration of concern in environmental analysis consists of the oscillatory waves that move from a source through the ground to adjacent structures. The number of cycles per second of oscillation makes up the vibration frequency, described in terms of Hz. The frequency of a vibrating object describes how rapidly it oscillates. The normal frequency range of most ground-borne vibration that can be felt by the human body starts from a low frequency of less than 1 Hz and goes to a high of about 200 Hz (Crocker 2007).

While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings, such as from nearby construction activities, may cause windows, items on shelves, and pictures on walls to rattle. Vibration of building components can also take the form of an audible low-frequency rumbling noise, referred to as ground-borne noise. Ground-borne noise is usually only a problem when the originating vibration spectrum is dominated by frequencies in the upper end of the range (60 to 200 Hz), or when foundations or utilities, such as sewer and water pipes, physically connect the structure and the vibration source (Federal Transit Administration [FTA] 2018). Although ground-borne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors. The primary concern from vibration is that it can be intrusive and annoying to building occupants and vibration-sensitive land uses.

[2] Because DNL and CNEL are typically used to assess human exposure to noise, the use of A-weighted sound pressure level (dBA) is implicit. Therefore, when expressing noise levels in terms of DNL or CNEL, the dBA unit is not included.

Vibration energy spreads out as it travels through the ground, causing the vibration level to diminish with distance away from the source. High-frequency vibrations diminish much more rapidly than low frequencies, so low frequencies tend to dominate the spectrum at large distances from the source. Discontinuities in the soil strata can also cause diffractions or channeling effects that affect the propagation of vibration over long distances (Caltrans 2020). When a building is impacted by vibration, a ground-to-foundation coupling loss will usually reduce the overall vibration level. However, under rare circumstances, the ground-to-foundation coupling may actually amplify the vibration level due to structural resonances of the floors and walls.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or root mean squared (RMS) vibration velocity. The PPV and RMS velocity are normally described in inches per second (in./sec.). PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings (Caltrans 2020).

2.3 Existing Project Area Noise Levels

The Project area is in a rural agricultural environment with mostly agricultural uses, and agriculturally zoned single-family residences and commercial uses in the Project area. The primary sources of noise in the surrounding area include aircraft over-flights, powerline hum, motor vehicles, wind, birds, and neighborhood activities (e.g., air-conditioners, music, horses, dogs).

To evaluate existing noise levels in the area, eight 15-minute noise measurements (NM1 through NM8) were conducted on and near the Project area on July 21, 2021 and one long term 24-hour noise measurement was conducted July 21 to July 22, 2021, using an ANSI Type II integrating sound level meter. Figure 3 shows the locations of the noise measurements. The noise measurement locations were chosen to provide a representative range of ambient noise levels across the Project area and in the nearby area, especially near existing noise-sensitive residences and roadways. The short-term noise measurement results are shown in Table 2 and the long term 24-hour noise measurement results are shown in Table 3. Detailed noise meter outputs are included in Appendix A.

Table 2 Noise Monitoring Results in the Project Area – Short Term

Measurement Site	Measurement Location	Sample Times	Approximate Distance to Primary Noise Source	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)
NM1	East of Meridian Road and Powerline Road	1:14 – 1:29 p.m.	20 feet from Meridian Road centerline	40	32	61
NM2	East of Meridian Road and No End Road	12:42 – 12:57 a.m.	25 feet from Meridian Road centerline	35	27	53
NM3	Cove Road west of Locust Avenue	8:15 – 8:30 a.m.	10 feet from Cove Road centerline	35	24	50
NM4	Lincoln Road south of Cambria Road	10:07 – 10:22 a.m.	10 feet from Lincoln Road centerline	30	27	44
NM5	West of Locust Avenue, center of Gaeta Parcel	8:54 – 9:09 a.m.	900 feet from Locust Avenue centerline	30	24	48

Measurement Site	Measurement Location	Sample Times	Approximate Distance to Primary Noise Source	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)
NM6	Lincoln Road north of Cambria Road	11:03 – 11:18 a.m.	25 feet from Lincoln Road centerline	45	26	70
NM7	Locust Avenue north of Granite Road	9:28 – 9:43 a.m.	30 feet from Locust Road centerline	35	24	51
NM8	South of Desert Lane at Waalew Road	12:03 – 12:18 a.m.	35 feet from Desert Lane centerline	30	26	48

See Figure 3 for Noise Measurement Locations.

[1] The equivalent noise level (L_{eq}) is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). For these measurements, the L_{eq} was over a 15-minute period.

Source: Rincon Consultants, field measurements conducted on July 21 to 22, 2021, using ANSI Type II Integrating sound level meter. See Appendix A.

Table 3 Project Area Noise Monitoring Results – Long Term

Sample Time	dBA L_{eq}	Sample Time	dBA L_{eq}
24-hour Measurement – Cambria Road – July 21-22, 2021			
2:41 p.m.	52	2:41 a.m.	48
3:41 p.m.	44	3:41 a.m.	52
4:41 p.m.	58	4:41 a.m.	47
5:41 p.m.	48	5:41 a.m.	57
6:41 p.m.	53	6:41 a.m.	61
7:41 p.m.	47	7:41 a.m.	57
8:41 p.m.	49	8:41 a.m.	41
9:41 p.m.	50	9:41 a.m.	46
10:41 p.m.	53	10:41 a.m.	45
11:41 p.m.	53	11:41 a.m.	49
12:41 a.m.	53	12:41 p.m.	60
1:41 a.m.	50	1:41 p.m.	62
24-hour Noise Level (CNEL)			**61**

L_{eq} = average noise level equivalent; dBA = A-weighted decibel; CNEL = Community Noise Equivalent Level defined as the 24-hour average noise level with a +5 dBA penalty for noise occurring from 7:00 p.m. to 10:00 p.m. and a +10 dBA penalty for noise occurring from 10:00 p.m. to 7:00 a.m.

Source: Rincon Consultants, field measurements conducted on July 21-22, 2021, using ANSI Type II Integrating sound level meter. See Appendix A.

Figure 3 Noise Measurement Locations

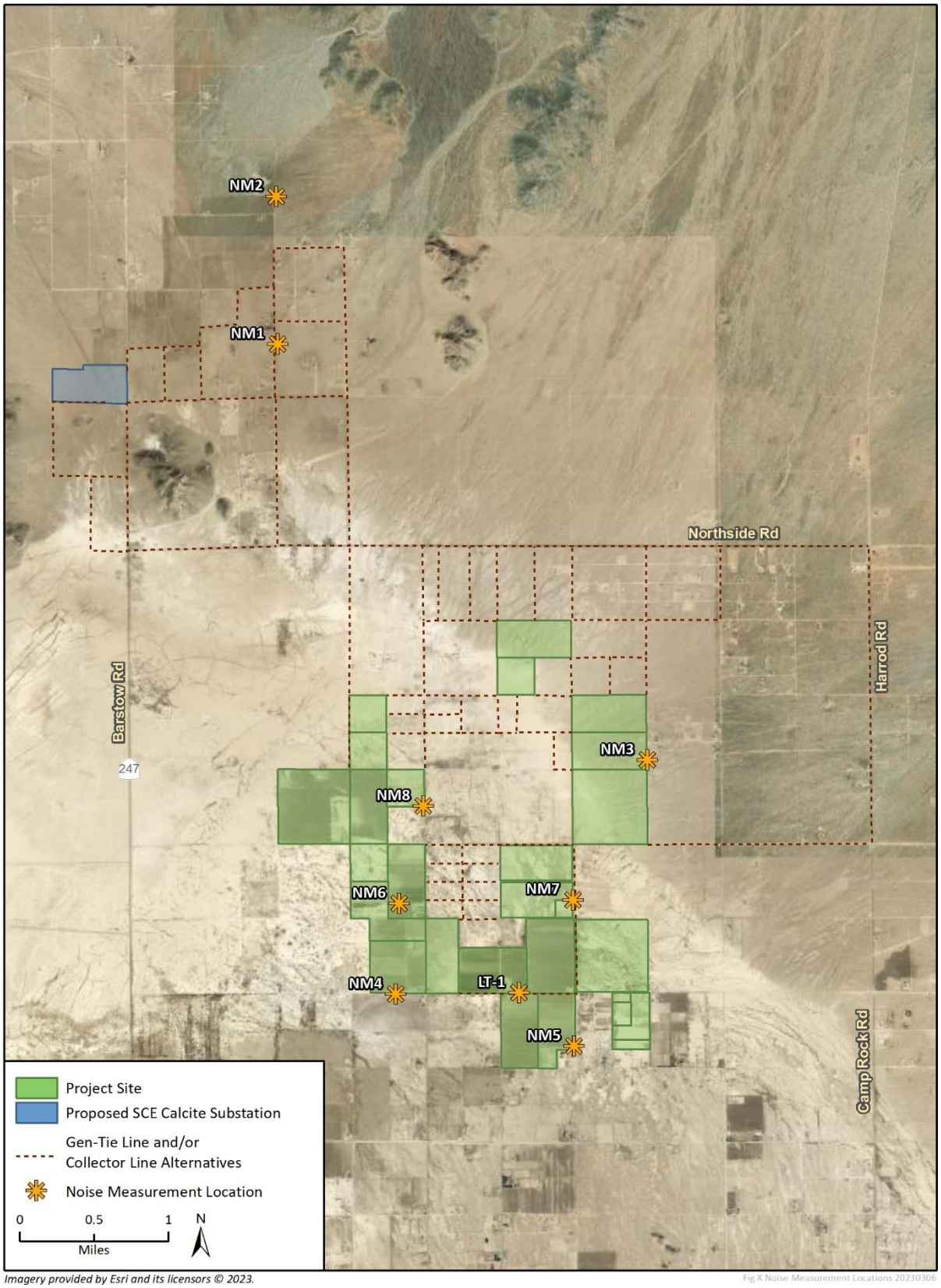

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Fig X Noise Measurement Locations 20230306

2.4 Regulatory Setting

San Bernardino County General Plan

Section seven of the San Bernardino County General Plan provides a framework to limit the exposure of the community to excessive noise levels (San Bernardino County 2007). The plan contains the following goals and policies related to noise in San Bernardino County that would be relevant to the Project:

- **Goal N 1.** The County will abate and avoid excessive noise exposures through noise mitigation measures incorporated into the design of new noise-generating and new noise-sensitive land uses, while protecting areas within the County where the present noise environment is within acceptable limits.
- **Policy N 1.3.** When Industrial, commercial, or other land use, including locally regulated noise sources, are proposed for areas containing noise-sensitive land uses, noise levels generated by the proposed use will not exceed the performance standards of Table N-2 within outdoor activity areas. If outdoor activity areas have not yet been determined, noise levels shall not exceed the performance standards listed in Chapter 83.01 of the Development Code at the boundary of areas panned or zoned for residential or other noise-sensitive land uses.
- **Policy N 1.5.** Limit truck traffic in residential and commercial areas to designated truck routes; limit construction, delivery, and through-truck traffic to designated routes; and distribute maps of approved truck routes to County traffic officers.
- **Policy N 1.6.** Enforce the hourly noise-level performance standards for stationary and other locally regulated sources, such as industrial, recreational, and construction activities as well as mechanical and electrical equipment.
- **Policy N 1.7.** Prevent incompatible land uses, by reason of excessive noise levels, from occurring in the future.
- **Goal N 2.** The County will strive to preserve and maintain the quiet environment of mountain, desert and other rural areas
- **Policy N 2.1**. The county will require appropriate and feasible on-site noise attenuating measures that may include noise walls, enclosure of noise-generating equipment, site planning to located noise sources away from sensitive receptors, and other comparable features.

San Bernardino County Development Code

The San Bernardino County Development Code provides uniform performance standards for development within the County that promotes compatibility with surrounding areas and land uses. Section 83.01.080 establishes standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating uses. The Code provides regulations for construction or operational noise that would apply to the Project.

Section 83.01.080(c)(1), *Noise Standards for Stationary Noise Sources*, Table 83-2 (Table 4 of this report) establishes noise standards for noise emanating from a stationary noise source as it affects adjacent properties.

Table 4 Noise Standards for Stationary Noise Sources

Affected Land Uses (Receiving Noise)	7 am-10 pm L_{eq}	10 pm-7 am L_{eq}
Residential	55 dBA	45 dBA
Professional Services	55 dBA)	55 dBA
Other Commercial	60 dBA	60 dBA
Industrial	70 dBA	70 dBA

L_{eq} = (Equivalent Energy Level). The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period, typically 1, 8 or 24 hours.

dBA = (A-weighted Sound Pressure Level). 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, placing greater emphasis on those frequencies within the sensitivity range of the human ear.

Source: San Bernardino Development Code, Section 83.01.080

The following adjustments are applicable to the standards in Table 4:

For a cumulative period of more than 30 minutes in any hour.

(A) The noise standard plus 5 dBA for a cumulative period of more than 15 minutes in any hour.

(B) The noise standard plus 10 dBA for a cumulative period of more than five minutes in any hour.

(C) The noise standard plus 15 dBA for a cumulative period of more than one minute in any hour.

(D) The noise standard plus 20 dBA for any period of time.

Section 83.01.080(d), *Noise Standards for Adjacent Mobile Noise Sources*, Table 83-3 (Table 5 of this report) establishes noise standards for mobile sources that may affect adjacent properties adversely.

Table 5 Noise Standards for Adjacent Mobile Noise Sources

Categories	Land Use	Ldn (or CNEL) dBA	
		Interior [1]	Exterior [2]
Residential	Single and multi-family, duplex, mobile homes	45	60 [3]
Commercial	Hotel, motel, transient housing	45	60 [3]
	Commercial retail, bank, restaurant	50	N/A
	Office building, research and development, professional offices	45	65
	Amphitheater, concert hall, auditorium, movie theater	45	65
Institutional/Public	Hospital, nursing home, school classroom, religious institution, library	45	65
Open Space	Park	N/A	65

Notes:

(1) The indoor environment shall exclude bathrooms, kitchens, toilets, closets and corridors.

(2) The outdoor environment shall be limited to:

- Hospital/office building patios
- Hotel and motel recreation areas
- Mobile home parks
- Multi-family private patios or balconies
- Park picnic areas
- Private yard of single-family dwellings
- School playgrounds

(3) An exterior noise level of up to 65 dBA (or CNEL) shall be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed 45 dBA (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level shall necessitate the use of air conditioning or mechanical ventilation.

L_{dn} = (Day-Night Noise Level). The average equivalent A-weighted sound level during a 24-hour day obtained by adding 10 decibels to the hourly noise levels measured during the night (from 10 pm to 7 am). In this way Ldn takes into account the lower tolerance of people for noise during nighttime periods.

CNEL = (Community Noise Equivalent Level). The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7 p.m. to 10 a.m. and 10 decibels to sound levels in the night before 7 a.m. and after 10 p.m.

Source: San Bernardino Development Code, Section 83.01.080

Section 83.01.080(e) Increases in Allowable Noise Levels. If the measured ambient level exceeds any of the first four noise limit categories in Subsection (d)(2), above, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category in Subsection (d)(2), above, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

Section 83.01.080(f) Reductions in Allowable Noise Levels. If the alleged offense consists entirely of impact noise or simple tone noise, each of the noise levels in Table 4 (Noise Standards for Stationary Noise Sources) shall be reduced by 5 dB(A).

Section 83.01.080(g) Exempt Noise. Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays are considered exempt from San Bernardino County Development Code noise regulations.

Section 83.01.090(a) Vibration Standard. No ground vibration shall be allowed that can be felt without the aid of instruments at or beyond the lot line, nor shall any vibration be allowed which produces a particle velocity greater than or equal to two-tenths (0.2) inches per second measured at or beyond the lot line.

Section 83.01.090(c) Exempt Vibrations. Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays are considered exempt from San Bernardino County Development Code vibration regulations.

3 Impact Analysis

3.1 Methodology and Significance Thresholds

To assess the potential for temporary construction and long-term operational noise impacts, noise-sensitive receivers closest to the Project area were identified. The Project parcels are generally located in a rural, agricultural area. The community of Lucerne Valley is located four miles southwest of the nearest Project parcel. Single-family residences are also present on agriculturally-zoned land throughout the Project area.

The nearest agriculturally zoned residences are located adjacent to potential gen-tie routes, collector lines, and solar arrays for the Project. For the analysis, it is assumed that gen-tie corridor and collector line construction would occur within 50 feet of noise-sensitive receivers and solar array construction would occur within 100 feet of noise-sensitive receivers.

Exposure of the proposed solar facility to ambient noise was not evaluated because the solar facility would not be a noise-sensitive land use.

Construction and Decommissioning Noise

The FHWA's software program Roadway Construction Noise Model (RCNM) was used to estimate construction noise at nearby sensitive receptors. Construction noise modeling results are provided in Appendix B. The types of construction equipment that would be used on-site were provided by 99MT 8me, LLC. RCNM provides reference noise levels at the standard distance of 50 feet and estimates noise levels at nearby sensitive receivers based on a standard noise attenuation rate of 6 dB per doubling of distance (line-of-sight method of sound attenuation for point sources of noise such as construction equipment). Although construction equipment may operate near the Project's property lines, construction equipment would be mobile throughout the day and would average a further distance from the property line over a typical construction day. This analysis conservatively assumes that in addition to the distance from the property line to each noise-sensitive receiver, the equipment would average at least 50 feet within the property lines from each noise-sensitive receiver. In addition, RCNM does not consider topography or other environmental factors that attenuate noise and is therefore a conservative model. Experience and observations from similar projects were used for the assumptions of the loudest construction equipment for each activity (gen-tie and parcel construction) that would be operating simultaneously. For gen-tie and collector line construction, this was assumed to be a crane, a pick-up truck, and an excavator operating simultaneously. For Project parcel construction, this was assumed to be an excavator, auger drill rig, loader, pneumatic tools, and a pickup truck operating simultaneously.

As San Bernardino County does not specify quantitative construction noise limits, for purposes of this analysis, the FTA Transit Noise and Vibration Impact Assessment (FTA 2018) criteria will be used. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction. For residential uses, the daytime noise threshold is 80 dBA L_{eq} for an 8-hour period.

As stated in Section 1.2, *Project Area and Description*, at the end of the Project's useful life (anticipated to be 30-40 years), the proposed solar facility and associated infrastructure would be decommissioned in accordance with then-current decommissioning practices. At this time, it is not

possible to quantitatively evaluate potential noise that would result from Project decommissioning, due to the uncertainty of when decommissioning would occur and the technology or construction practices that would be available at that time. Therefore, based on current decommissioning practices and as a reasonable worst-case scenario, this analysis assumes that noise impacts generated during future decommissioning would be similar to noise impacts generated during the construction phase of the Project.

Construction Traffic Noise

Noise levels from existing traffic and with-construction traffic along Barstow Road, Northside Road, Rabbit Springs Road, State Route 247, and State Route 18 were estimated in terms of peak-hour L_{eq} using the FHWA Highway Traffic Noise Prediction Model (FHWA RD 77-108). The model calculations are based on traffic volumes from the traffic analysis prepared by GHD for this Project (GHD 2023). Vehicle daily trips generated by Project construction activities are estimated at 1,830 workers and associated construction equipment during peak overlapping (Phases 3, 4, and 5) construction periods. A vehicle trip is defined as a one-direction vehicle movement. The total number of trips generated by the Project includes both inbound and outbound trips. The roadways were modeled conservatively using a straight-line analysis (i.e., assuming no attenuation from topography and a straight roadway). Loose soil was used as the default ground type; per FHWA's *Ground and Pavement Effects using FHWA's Traffic Noise Model 2.5* report, an example of loose soil ground can be dirt soil with sparse vegetation, similar to the agricultural setting and the single-family lots of the area (FHWA 2010).

Table 6 shows the estimated number of existing and construction-generated vehicle trips at the modeled roadways (GHD 2023). The table also includes the estimated speeds for each roadway used in the model. The modal split of existing trips was assumed to be a typical 94 percent passenger cars, 4 percent medium trucks, and 2 percent heavy trucks for Barstow Road, Northside Road, and Rabbit Springs Road. Based on Caltrans Average Daily Traffic Counts, the modal split applied to State Route 247 traffic volumes is 87 percent passenger cars, 4 percent medium trucks, and 9 percent heavy trucks and the modal split applied to State Route 18 is 81 percent passenger cars, 7 percent medium trucks, and 12 percent heavy trucks (Caltrans 2019). Model results are included in Appendix C.

Table 6 Estimated Existing and Construction Vehicle Trips

Roadway Segment	Speed Limit (mph)	Existing Daily Vehicle Trips	Construction Daily Vehicle Trips	Existing + Construction Daily Vehicle Trips
Barstow Road	55	2,920	1,030	3,950
Northside Road	45	700	170	870
Rabbit Springs Road	55	1,980	90	2,070
State Route 247	45	2,350	860	3,210
State Route 18	45	8,500	520	9,020

Source: GHD 2023

For traffic-related noise, impacts are considered potentially significant if Project-generated traffic would result in exposure of sensitive receivers to an unacceptable increase in noise levels during construction and/or operational activities. Recommendations in the FTA's *Transit Noise and Vibration Impact Assessment Manual* were used to determine whether increases in traffic noise would be unacceptable (FTA 2018). Under these FTA criteria, as existing ambient noise increases, the "allowable" increase in noise exposure due to a project is reduced. Table 7 shows the FTA criteria considered when evaluating traffic noise generated by this Project. If sensitive receivers would be exposed to traffic noise increases exceeding these criteria, impacts may be considered significant.

Table 7 Significance of Changes in Roadway Noise Exposure

Existing Noise Exposure (dBA L_{dn} or L_{eq})	Allowable Noise Exposure Increase (dBA L_{dn} or L_{eq})
40-45	10
45-50	7
50-55	5
55-60	3
60-65	2
65-74	1
75+	0

Source: FTA 2018

On-Site Operational Noise

On-site operational noise sources were modeled with SoundPLAN. Propagation of modeled stationary noise sources was based on ISO Standard 9613-2, "Attenuation of Sound during Propagation Outdoors, Part 2: General Method of Calculation." The assessment methodology assumes that all receivers would be downwind of stationary sources. This is a worst-case assumption for total noise impacts, since, in reality, only some receivers would be downwind at any one time.

Operational noise sources from the Project include PV solar arrays with associated electrical equipment (such as transformers and inverters), energy storage systems, substations, collector lines, and the operations and maintenance facility. The Project would operate continuously, seven days a

week, until the anticipated repowering or decommissioning of the Project in 30 to 40 years. Stationary noise sources during operation would include PV solar arrays with associated electrical equipment (such as transformers and inverters), energy storage systems, substations, collector lines, and the operations and maintenance facility. Electrical equipment produces a discrete low-frequency humming noise. The noise from transformers is produced by alternating current flux in the core, which causes it to vibrate.

Transformers would be co-located with the inverters, which would lie within an enclosed or canopied metal structure. Within enclosures, inverters typically produce a noise level of 58 dBA L_{eq} at the source (Monterey County 2014). However, a fully enclosed metal structure would attenuate noise from inverter stations more effectively than would a canopy structure with open walls. It is unknown at this time whether the inverters/transformers would be enclosed or open. This would be determined during design once the inverter/transformer manufacturer has been selected. Open inverters would generate a noise level of 52 dBA L_{eq} at a distance of 75 feet (*California Valley Solar Project Final EIR*, San Luis Obispo County 2011). If the inverters are enclosed, each inverter enclosure may also include heating, ventilation, and air conditioning (HVAC) systems mounted on the exterior of the inverter enclosure, which would generate a noise level of 58 dBA L_{eq} at a distance of 75 feet. BESS enclosures would be 8 feet wide by 40 feet long by 9.5 feet high (2.4 meters wide by 12 meters long by 2.9 meters high). Manufacturer's specifications indicate that these units generate a noise level of 75 dBA at 1 meter (see Appendix D for specification sheets). Noise from the proposed substation step-up transformer was modeled using the noise reference level of 80 dBA L_{eq} at 6 feet, consistent with manufacturer specifications for an ABB step-up transformer under the conservative "all cooling fans on" scenario (ABB 2019).

Table 8 lists representative noise levels of equipment used for similar solar projects that are assumed to be used for this Project .

Table 8 Estimated Noise Rating for Equipment Utilized During Project Operations

Equipment Type	Reference Noise Level (dBA L_{eq})	Distance from Source (feet)
Gen-Tie [1]	20	50
PV Panel	44	50
Inverter (unenclosed)	52	75
Inverter (enclosed with HVAC system)	58	75
Transformer	58	3.3
BESS Enclosure	75	3.3
Substation	80	6

[1] Only applicable to the gen-tie transmission line.

Sources: U.S. Department of Energy 2011; San Luis Obispo County 2011; Illingworth and Rodkin 2009; Kern County 2014; Monterey County 2014

As shown in Table 8, it is expected that the loudest noise generated by on-site solar operations would come from the HVAC systems at 58 dBA L_{eq} at a distance of 75 feet from the source and from substation equipment at 80 dBA L_{eq} at six feet from the source. As the closed inverter would generate a higher noise level than an open inverter due to the inclusion of HVAC units, the enclosed inverters are conservatively used for this analysis. The combined noise levels from the inverters, HVAC systems and transformers, which would be anticipated to operate simultaneously, are analyzed below at the

closest sensitive receivers through SoundPLAN modeling. Noise levels from the gen-tie transmission line, PV panels, and substations/energy storage systems are discussed separately, as these noise sources would be minor in comparison to the HVAC systems and transformers and were not modeled.

Because the operation of the Project is dependent on sunlight, substantial operational noise would not be anticipated during nighttime hours. Operational noise would result in a significant impact if it would exceed San Bernardino County's daytime standard for stationary noise sources of 55 dBA L_{eq} at the boundary of areas planned and zoned for residential or other noise-sensitive land uses.

Modeling was originally completed with an additional parcel near R-34 that has since been removed from the project; the potential noise contours from this parcel remain in Figure 4 as a conservative analysis.

Operational Traffic Noise

Since the project would have up to 15 full-time employees, it is conservatively assumed that there would be 30 daily trips associated with workers (two one-way trips per employee). The existing traffic volumes used in this analysis are shown in Table 6. These traffic volumes were compared with the expected increase in traffic volumes after construction of the Project. Modeling of traffic noise indicates that, in general, a 10 percent increase in traffic volume would raise traffic noise by 0.4 dBA, a 20 percent increase would raise traffic noise by about 0.8 dBA, a 30 percent increase would result in a 1.1 dBA increase in traffic noise, and a 40 percent increase would increase traffic noise by about 1.5 dBA. The significance of the Project's increase in traffic noise was determined using the FTA criteria shown in Table 7.

Vibration

Vibration associated with construction of the Project has the potential to be an annoyance to nearby land uses. San Bernardino County regulates vibration producing sources in the Development Code. Project construction vibration would be considered significant if any vibration is allowed which produces a particle velocity greater than or equal to two-tenths (0.2) inches per second measured at or beyond the lot line.

3.2 Results

Construction and Decommissioning Noise

Construction and decommissioning of the Project would involve the use of noise-generating equipment during various phases, including transport of personnel and materials to the Project, heavy machinery used in grading and clearing Project parcels, pneumatic post drivers to install foundation supports for solar array modules, as well as equipment used during construction of the proposed solar arrays, infrastructure improvements, and related structures. Emergency diesel generators may be used during construction activities. Project components at all Project parcels and the gen-tie would be constructed over a 12 to 24 month period.

Table 9 shows the noise levels associated with heavy construction equipment at a reference distance of 50 feet from the source. As shown therein, noise levels at this distance can range from about 74 to 85 dBA, depending upon the types of equipment in operation at any given time and phase of construction (FHWA 2006).

Table 9 Typical Construction Equipment Noise Levels

Equipment	Acoustical Usage Factor (%)[1]	Measured L_{eq} (dBA at 50 feet)
Augur Drill Rig	20	84
Backhoe	40	78
Compactor (ground)	20	83
Concrete Mixer Truck	40	85
Crane	16	85
Dozer	40	82
Dump Truck	40	76
Excavator	40	81
Flat Bed Truck	40	74
Front End Loader	40	79
Generator	50	81
Grader	40	83
Pickup Truck	40	75
Pneumatic Tools	50	85
Roller	20	80
Scraper	40	84
Warning Horn	5	83
Welder/Torch	40	74

[1] The average fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.

Source: FHWA 2006

Construction activities would be subject to San Bernardino County policies and regulations. Heavy construction activities would normally occur on-site between the hours of 7:00 a.m. and 7:00 p.m., which is between the acceptable hours for construction listed in the San Bernardino County General Plan (7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays). Additional hours may also be necessary to make up schedule deficiencies or to complete critical construction activities. As a result, some construction activities may be required to continue 24 hours per day, seven days per week. Activities that generate relatively low amounts of noise, such as refueling equipment, staging material for the following day's construction activities, quality assurance/control, and commissioning, may potentially occur between the hours of 9:00 p.m. and 6:00 a.m. on weekdays and the hours of 9:00 p.m. and 8:00 a.m. on Saturdays.

Noise-sensitive receivers near Project construction include single-family residences throughout the Project area. These land uses would experience a temporary increase in noise during construction of the Project. The following subsections detail the impacts to noise-sensitive receivers in proximity to the Project parcels and the gen-tie corridor.

Construction at Project Parcels

Table 10 shows the estimated average noise level from construction at the Project parcels at the nearest noise-sensitive land uses using RCNM.

Table 10 Noise Levels at Various Distances from Construction at the Project Parcels

Receiver	Distance from Construction (feet)[1]	Noise Level at Receptor (dBA L_{eq})
Reference Distance	50	82
Single-family residence along Meridian Road	100	79
Single-family residence along Sherman Way	150	75
Single-family residence along Midway Avenue	300	69
Single-family residence along Fern Road	600	63

See Appendix B for model outputs.

[1] Distances include the distance from the Project parcel boundary to the receivers, plus 50 feet to account for construction equipment that be mobile throughout the day and would average a further distance (of approximately 50 feet) from the property line over a typical construction day.

As shown in Table 10, although construction noise levels from simultaneous heavy equipment operation would reach 82 dBA L_{eq} at the reference distance of 50 feet, due to the further distance between construction at the Project parcels and the nearest noise-sensitive receivers, construction noise levels under the conservative scenario analyzed would only reach as high as 79 dBA L_{eq}. This would be below FTA's construction noise threshold of 80 dBA L_{eq} (8-hour). Heavy construction activity involving pneumatic tools and graders also would not occur during nighttime hours.

Construction activities outside of acceptable hours would require a variance to conduct construction activities during those hours. Project construction may occur outside of the allowed construction hours (7:00 AM to 7:00 PM, Monday through Saturday).

Gen-Tie

The gen-tie corridor may be routed along Meridian Road, Haynes Road, Huff Road, Waalew Road, Tampadero Road, Northside Road, Granite Road, Harrod Road, Lincoln Avenue, and Locust Road. Residential uses are located along each of these roadways. For the purposes of this analysis, at the closest point of construction, the gen-tie routes would be located 50 feet from single-family residences. As modeled, the loudest anticipated construction noise from gen-tie construction would potentially involve the simultaneous use of an excavator and a crane. Table 11 shows construction noise levels at the nearest noise-sensitive receiver.

Table 11 Typical Construction Noise Levels at Various Distances from Gen-Tie Construction

Receiver	Distance from Construction (feet)	Noise Level at Receptor (dBA L_{eq})
Reference Distance	50	78
Single-family residence along Harrod Road	50	78

See Appendix B for model outputs.

As shown in Table 11, simultaneous heavy equipment use during gen-tie construction would generate a noise level of up to 78 dBA L_{eq} when within 50 feet of single-family residences located along gen-tie routes. This would be below FTA's construction noise threshold of 80 dBA L_{eq} (8-hour). Most gen-tie construction activities would occur further from nearby noise receptors, and would, therefore, result in lower noise levels. Heavy construction would not occur during nighttime hours.

Construction activities outside of acceptable hours would require a variance to conduct construction activities during those hours. Project construction may occur outside of the allowed construction hours (7:00 AM to 7:00 PM, Monday through Saturday). Therefore, gen-tie construction noise would not exceed applicable thresholds.

Project Decommissioning

As stated in Section 1.2, *Project Area and Description*, at the end of the Project's useful life (anticipated to be 30-40 years), the solar facility and associated infrastructure may be decommissioned in accordance with then-current decommissioning practices. Given the Project's operating life cycle and distant timeframe for decommissioning activities, it is too speculative to quantify the potential noise impacts that could occur during decommissioning activities. On a rough basis, decommissioning would be similar to Project construction and be completed in 12 to 24 months. Assuming that the facility would be torn down and the materials present recycled or disposed, temporary noise associated with such actions are assumed to be generally similar to the noise levels that would result from Project construction. Similar to the noise generated during construction of the Project, decommissioning activities would be conducted in accordance with all applicable requirements in effect at the time of Project termination. Potential future environmental effects associated with Project decommissioning would be addressed at the time decommissioning is proposed consistent with regulations in effect at that time. A final decommissioning plan, based on then-current technology, site conditions, and regulations, would be prepared prior to actual decommissioning.

Cumulative Construction Noise

As described in Section 1.2, *Project Area and Description*, Project components at all parcels would be constructed over a 12 to 24 month period. This analysis makes a conservative assumption that construction at all Project parcels and the gen-tie would occur simultaneously. Concurrent construction activity at more than one parcel and the gen-tie line may expose nearby residences to cumulative noise impacts. This analysis of cumulative effects focuses on the effects of concurrent construction activities for the worst-case scenario (i.e., the closest residences which would be exposed to construction activities at multiple sites).

Some noise sensitive receivers located in Project area would be exposed to adjacent construction noise from gen-tie construction and more distant noise from Project parcels. Because of these residences' proximity to gen-tie construction (as close as 50 feet), cumulative noise levels are dominated by gen-tie construction noise. The residence on Lincoln Road (R-20) is the closest noise-sensitive receiver within 50 feet of gen-tie construction that is also close to multiple parcel construction, including construction on parcels 100, 150, and 200 feet. This residence is representative of a reasonable conservative scenario for combined Project construction noise impacts, assuming concurrent construction of gen-tie corridor and the nearest Project parcels. Table 12 estimates the cumulative construction noise levels for this scenario, which could reach 83 dBA L_{eq}. This would be above FTA's construction noise threshold of 80 dBA L_{eq} (8-hour). Therefore, cumulative construction noise would potentially exceed applicable FTA thresholds.

Table 12 Cumulative Construction Noise Levels for Worst-Case Scenario

Project Area	Distance from Construction (feet)	Noise Level at Receptor (dBA L_{eq})
Gen-tie	50	78

Project Parcel	100	79
Project Parcel	150	75
Project Parcel	200	73
Cumulative Noise Level		**83**

Construction Traffic Noise

Construction of the Project would increase traffic noise offsite from commuting construction workers and from haul trucks bringing materials to and from the Project area. Project components would be constructed simultaneously over a 12 to 24 month period. This could expose nearby residences to cumulative noise from construction traffic. This analysis of cumulative effects focuses on the effects of concurrent construction traffic for the worst-case scenario (i.e., traffic generated by the peak construction period). Table 6 in Section 3.1, *Methodology and Significance Thresholds*, compares existing daily traffic volumes on nearby road segments to anticipated traffic generated by Project construction. Based on these traffic volumes, Table 13 shows modeled traffic noise levels at 50 feet from roadway centerlines under existing traffic conditions and with construction traffic.

Table 13 Construction Traffic Noise

Roadway	From	To	Existing Traffic Noise (dBA L_{eq})	With-Construction Traffic Noise (dBA L_{eq})	Change in Traffic Noise (dBA L_{eq})	FTA Allowable Noise Exposure Increase (dBA L_{eq})
Barstow Road	Rabbit Springs Road	To the north	64	65	1	2
Northside Road	Barstow Road	To the east	56	57	1	3
Rabbit Springs Road	Barstow Road	To the east	62	63	1	2
State Route 247	Camp Rock Road	State Route 18	63	64	1	2
	State Route 18	Rabbit Springs Road	63	64	1	2
	Rabbit Springs Road	Lucerne Valley Cutoff	64	65	1	2
State Route 18	Lucerne Valley	State Route 247	70	70	<1	1

As shown in Table 13, construction traffic would increase noise levels by up to 1 dBA L_{eq} on Project utilized roadway segments. However, none of the traffic noise increases would exceed the applicable FTA criteria. Therefore, the short-term increase in traffic noise from Project construction would be less than significant.

On-Site Operational Noise

Solar Array Noise

Sensitive receivers nearby the Project parcels include rural single-family residences associated with agricultural properties. Noise levels from the Project's solar array operations (i.e., transformers and HVAC units associated with the inverters) are shown in Table 14, and noise level contours and receiver locations are shown in Figure 4. Modeling was originally completed with an additional parcel near R-34 that has since been removed from the project; the potential noise from this parcel remains in Table 14 and Figure 4 as a conservative analysis.

Table 14 Operational Noise Levels at Nearest Sensitive Receivers

Receiver	Receiver Description	Noise Level at Receiver dBA L_{eq}	Exceed Threshold?
R-1	Residence on agriculturally-zoned property	40	No
R-2	Residence on agriculturally-zoned property	37	No
R-3	Residence on agriculturally-zoned property	43	No
R-4	Residence on agriculturally-zoned property	43	No
R-5	Residence on agriculturally-zoned property	45	No
R-6	Residence on agriculturally-zoned property	44	No
R-7	Residence on agriculturally-zoned property	48	No
R-8	Residence on agriculturally-zoned property	42	No
R-9	Residence on agriculturally-zoned property	37	No
R-10	Residence on agriculturally-zoned property	38	No
R-11	Residence on agriculturally-zoned property	42	No
R-12	Residence on agriculturally-zoned property	45	No
R-13	Residence on agriculturally-zoned property	49	No
R-14	Residence on agriculturally-zoned property	50	No
R-15	Residence on agriculturally-zoned property	48	No
R-16	Residence on agriculturally-zoned property	48	No
R-17	Residence on agriculturally-zoned property	48	No
R-18	Residence on agriculturally-zoned property	51	No
R-19	Residence on agriculturally-zoned property	53	No
R-20	Residence on agriculturally-zoned property	51	No
R-21	Residence on agriculturally-zoned property	48	No
R-22	Residence on agriculturally-zoned property	52	No
R-23	Residence on agriculturally-zoned property	48	No
R-24	Residence on agriculturally-zoned property	45	No
R-25	Residence on agriculturally-zoned property	47	No

Receiver	Receiver Description	Noise Level at Receiver dBA L_{eq}	Exceed Threshold?
R-26	Residence on agriculturally-zoned property	47	No
R-27	Residence on agriculturally-zoned property	48	No
R-28	Residence on agriculturally-zoned property	42	No
R-29	Residence on agriculturally-zoned property	43	No
R-30	Residence on agriculturally-zoned property	43	No
R-31	Residence on agriculturally-zoned property	46	No
R-32	Residence on agriculturally-zoned property	41	No
R-33	Residence on agriculturally-zoned property	40	No
R-34	Residence on agriculturally-zoned property	44	No
R-35	Residence on agriculturally-zoned property	40	No
R-36	Residence on agriculturally-zoned property	26	No
R-37	Residence on agriculturally-zoned property	25	No

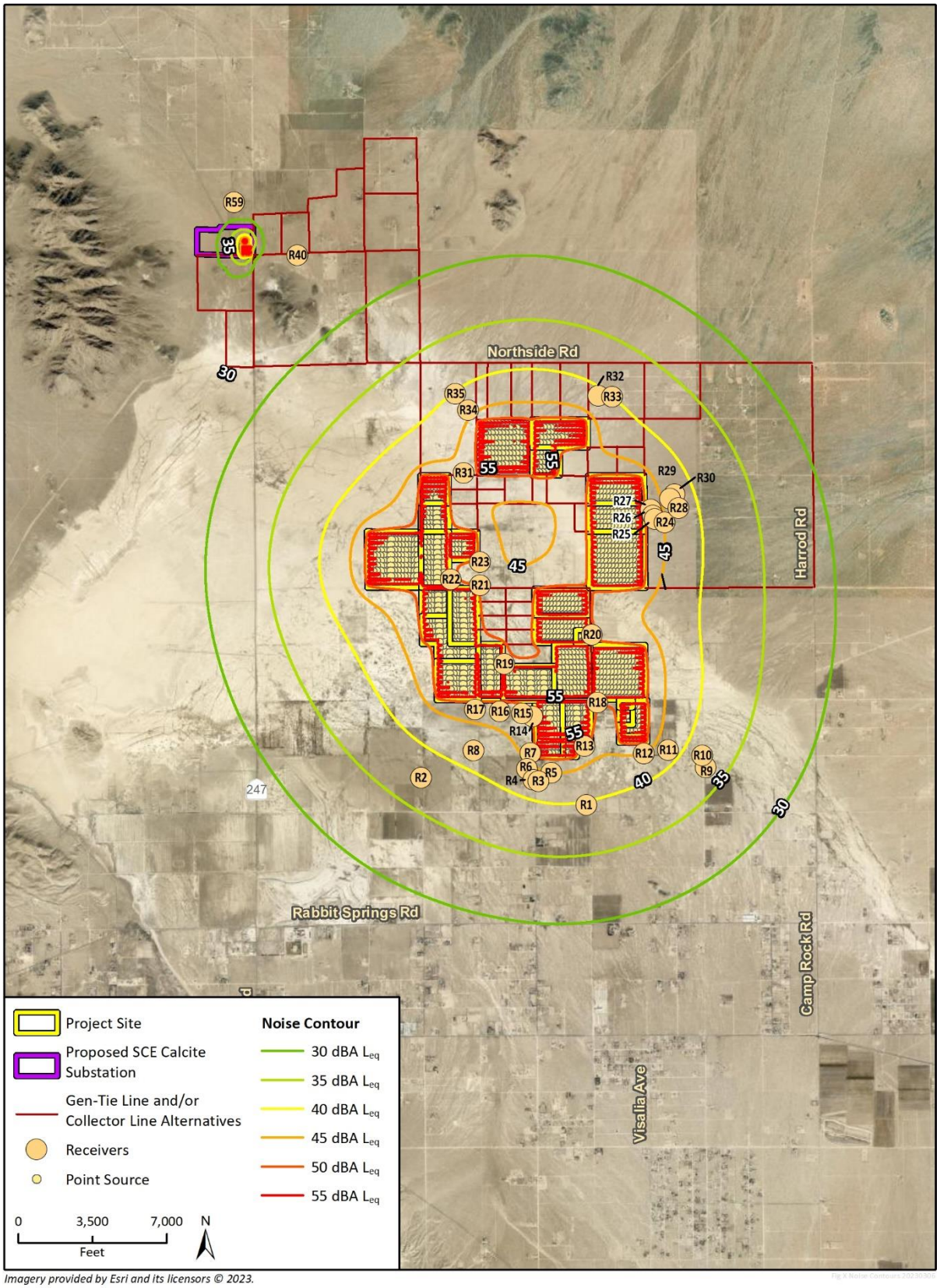
Note: Calculations completed in SoundPLAN; See Figure 4 for receiver locations.

As shown in Table 14, operational noise levels from the Project would reach up to 53 dBA L_{eq} at noise-sensitive land uses. These noise levels would be below San Bernardino County's daytime standard of 55 dBA L_{eq} for noise at noise-sensitive land uses. Because the operation of the Project is dependent on sunlight, substantial operational noise would not be anticipated during nighttime hours. Therefore, operational noise impacts from the Project would not exceed County thresholds.

Gen-Tie Noise

The gen-tie transmission line would generate noise from the corona affect, which is a phenomenon associated with the electrical ionization of the air that occurs near the surface of the energized conductor and suspension hardware due to very high electric field strength. This is audible power line noise that is generated from electric corona discharge, which is usually experienced as a random crackling or hissing sound. The corona effect on the gen-tie transmission line would generate a noise level of 20 dBA at a distance of 50 feet (*California Valley Solar Project Final EIR*, San Luis Obispo County 2011). This is the approximate distance to the nearest residences from the gen-tie route. As observed during a site visit to existing solar farms, noise levels from these transmission lines were not detected over the existing ambient noise sources in the area (wind and vehicles) just outside of the solar farm properties (Rincon 2020). Therefore, per site observations and the general low noise of transmissions lines, gen-tie noise would not exceed County's standard of 55 dBA L_{eq} at the nearest residences, and impacts would not exceed County thresholds.

Figure 4 Receiver Locations and Operational Noise Contours



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PV Panel Noise

PV panel noise would come from the tracking motors. These systems involve the panels being driven by motors to make brief, incremental adjustments to track the arc of the sun to maximize the solar effect. While these motors may generate noise of up to 44 dBA at 50 feet, these motors would operate briefly throughout an hour (e.g., several minutes per hour) as the sun moves west across the sky, and then would reset at night to face the eastern sky. By operating only several minutes per hour, the hourly noise level would be negligible at the nearest sensitive receivers. In addition, as observed during a site visit to the area and viewing of existing solar farms in the area, noise levels from PV panel tracking were not detected over the existing ambient noise sources in the area (wind, vehicles, planes, and trains) just outside of the solar farm properties. Therefore, noise levels from the PV panels would not exceed County thresholds.

Operational Traffic Noise

Once the Project is complete, vehicle trips to the Project area would be associated with operations and maintenance of the solar facility. In addition, the Project would require relatively more occasional nighttime activities, including deliveries, repairs, maintenance, office and administrative activities, security personnel, and emergency response.

Pursuant to the FTA criteria described in Table 7, a significant noise impact would occur if roadway noise would increase by more than 1 dBA for State Route 18, 2 dBA for State Route 2347, Rabbit Springs Road, and Barstow Road, and 3 dBA for Northside Road traffic. With the increase in traffic volumes from Project operation (30 trips), Project operation would increase noise by less than 1 dBA on each roadway. This increase would be imperceptible to the residents located near roadways and would not exceed applicable FTA criteria. Therefore, the Project's noise increases from operational traffic would not exceed applicable thresholds.

Vibration

Construction at Project Parcels

Construction at the Project parcels may require post driving and has the potential to result in temporary vibration impacts on structures and humans. Based on the potential parcel locations, post driving activities could occur within 100 feet of the nearest off-site residential structure. It was conservatively assumed that an impact pile driver, as discussed in Caltrans' *Transportation and Construction Vibration Guidance Manual* (Caltrans 2020), would be used for the Project. It should be noted that an impact pile driver as considered by Caltrans is larger than the type of equipment that would be used to drill in posts for the solar panels (e.g., an impact pile driver on the scale analyzed by Caltrans would typically be used for large bridge concrete footings, etc.). Other construction activities are less intensive than pile driving and would have lower PPV than pile driving. Therefore, vibration levels from pile driving are considered a conservative scenario for construction at the Project parcels. Caltrans provides the following equation to calculate PPV at sensitive receptors (Caltrans 2020):

$$\text{PPV Impact Pile Driver} = PPV_{Ref} (25/D)^{n} \times (E_{equip}/E_{Ref})^{0.5} \text{ (in./sec.)}$$

Where:

PPV_{Ref} = 0.65 in/sec for a reference pile driver at 25 feet

D = distance from pile driver to the receiver in feet

n = 1.1 is a value related to the vibration attenuation rate through ground

E_{equip} is rated energy of impact pile driver in ft-lbs

E_{Ref} is 36,000 ft-lb (rated energy of reference pile driver)

Using the referenced formula and an assumed 2,400 ft-lb rated energy for the post driver, the PPV at the nearest residential structure would be 0.091 in./sec. PPV, which would be below the County's vibration standard of 0.2 in./sec. PPV. Therefore, vibration associated with construction of the proposed Project would not exceed County thresholds.

Gen-tie Construction

Gen-tie construction may require the use of an auger drill rig that has the potential to result in temporary vibration impacts on structures and humans. Based on the potential gen-tie locations, auger drilling activities could occur within 50 feet of the nearest off-site residential structure. Other than use of an auger drill rig, other construction activities at the gen-tie corridors are less intensive than auger drill rig and would have lower PPV than the auger drill rig. Therefore, vibration levels from the auger drill rig are considered worst case for the gen-tie construction. Caltrans provides the following equation to calculate PPV at sensitive receptors (Caltrans 2020):

$$PPV\ Equipment = PPV_{Ref}\ (25/D)^{n}\ (in./sec.)$$

Where:

PPV_{Ref} = Equipment reference vibration level at 25 feet

D = distance from equipment to the receiver in feet

n = 1.1 is a value related to the vibration attenuation rate through ground

Caltrans vibration guidelines do not provide vibration levels specifically for an auger drill rig; however, the guidelines do provide vibration levels for caisson drilling of 0.089 in./sec. PPV. A caisson drill would typically drill a much larger hole than the type of bore performed for a solar foundation post (e.g., a caisson drill would be used to drill a bridge pier). Although a caisson drill is a more intensive activity that would result in greater vibration than an auger drill, it was used as a conservative reference for this analysis. Using the referenced formula, the PPV at the residential structure would be 0.031 in./sec. PPV, which would be below the County's vibration standard of 0.2 in./sec. PPV. In addition, heavy construction activity involving drilling would not occur during nighttime hours. Therefore, vibration associated with construction of the proposed Project would not exceed County thresholds.

Operation

Once constructed, the proposed PV facility would not have any components that would generate vibration levels. Thus, operation of the proposed Project would not result in any vibration and would not exceed County thresholds.

4 Recommendations

As discussed, cumulative construction noise levels from concurrent construction of the gen-tie corridor and Project parcels could reach 83 dBA L_{eq}, which is above FTA's construction noise threshold of 80 dBA L_{eq} (8-hour). Recommendation NOI-1 would reduce cumulative construction noise levels at adjacent residential properties by 10 dBA. As such, nighttime and cumulative construction noise levels would be reduced to 78 dBA and 69 dBA L_{eq} at 100 feet, respectively, which would not exceed applicable FTA construction noise level limit of 80 dBA L_{eq} at noise sensitive uses.

NOI-1 Temporary Construction Noise Reduction

Construction noise levels at the adjacent residences shall be reduced to below 80 dBA L_{eq} (one-hour) through the following measures:

- Electrically powered equipment instead of internal combustion equipment shall be used where feasible.
- Limit use of intensive excavating and earthmoving machinery to daytime hours.
- To the extent feasible, schedule construction activity during daytime working hours.
- Temporary noise barriers and/or blankets with a minimum height of eight feet shall be deployed when construction activities are within 100 feet of a sensitive receiver during nighttime or cumulative construction activities. The temporary noise barriers and/or blankets shall be constructed of material with a minimum weight of two pounds per square foot with no gaps or perforations and extend 25 feet from equipment activity area to ensure line of sight is blocked at sensitive receiver locations. Temporary noise barriers and/or blankets may be constructed of, but not limited to, 5/8-inch plywood, 5/8-inch oriented strand board, and hay bales. Example product sheets are included in Appendix E.

5 Conclusions

The Project would generate both temporary construction-related noise and long-term noise associated with operation.

Project-generated cumulative construction noise may exceed the FTA daytime construction noise threshold of 80 dBA L_{eq} at noise sensitive uses adjacent to the Project parcels. Implementation of recommendation NOI-1, *Temporary Construction Noise Reduction*, would include limiting the most intensive excavating and earthmoving machinery to daytime hours, schedule construction activity during daytime working hours, to the extent feasible, installation of temporary noise barriers and/or blankets with a minimum height of eight feet shall be deployed when construction activities are within 100 feet of a sensitive receiver. With implementation of recommendation NOI-1, construction noise levels would be reduced to a level that does not exceed the applicable FTA daytime construction noise threshold of 80 dBA L_{eq}, and impacts would be less than significant with mitigation incorporated.

The Project's stationary noise sources would not be anticipated to exceed applicable daytime exterior noise standards from the County Code at the nearest property lines. Therefore, stationary noise would comply with County Code thresholds.

Project-generated traffic would generate an increase of up to 1 dBA at adjacent roadways. This increase would not exceed applicable FTA criteria; and comply with applicable thresholds.

The Project would generate ground-borne vibration during construction, but vibration would not exceed County thresholds at the adjacent residential structures. Therefore, construction-related vibration impacts would comply with County Code thresholds.

6 References

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Appendix A

Project Area Noise Measurement Data

NM1

- Freq Weight : A
- Time Weight : SLOW
- Level Range : 40-100
- Max dB : 60.7 - 2021/07/21 13:16:45
- Level Range : 40-100
- SEL : 69.4
- Leq : 39.9
-

No.s	Date Time	(dB)				
1	2021/07/21 13:14:09	43.8	40.8	49.7	43.2	38.6
6	2021/07/21 13:14:24	35.9	36.3	38.1	40.2	47.1
11	2021/07/21 13:14:39	57.8	54.2	47.3	41.8	41.3
16	2021/07/21 13:14:54	41.8	38.1	36.8	35.5	34.4
21	2021/07/21 13:15:09	33.1	32.5	32.7	32.4	32.4
26	2021/07/21 13:15:24	34.8	32.8	32.4	33.5	32.9
31	2021/07/21 13:15:39	32.4	32.3	34.0	33.2	32.7
36	2021/07/21 13:15:54	33.1	33.1	33.3	33.3	34.1
41	2021/07/21 13:16:09	32.7	32.5	32.7	32.0	31.8
46	2021/07/21 13:16:24	32.4	32.8	34.6	36.0	37.2
51	2021/07/21 13:16:39	42.5	54.8	57.6	49.9	42.5
56	2021/07/21 13:16:54	40.0	36.8	34.9	34.0	33.1
61	2021/07/21 13:17:09	32.8	32.7	32.7	34.2	33.0
66	2021/07/21 13:17:24	34.2	35.2	33.0	32.8	32.6
71	2021/07/21 13:17:39	34.9	32.5	32.4	32.5	33.4
76	2021/07/21 13:17:54	32.5	32.1	32.8	33.4	33.0
81	2021/07/21 13:18:09	32.6	32.8	32.4	33.1	33.4
86	2021/07/21 13:18:24	32.7	34.6	34.3	34.5	33.4
91	2021/07/21 13:18:39	33.5	33.1	33.5	33.4	32.7
96	2021/07/21 13:18:54	32.5	32.7	32.3	34.0	32.6
101	2021/07/21 13:19:09	33.2	33.2	33.3	32.6	32.6
106	2021/07/21 13:19:24	32.3	32.5	32.3	32.0	32.8
111	2021/07/21 13:19:39	32.6	32.7	33.1	33.0	32.7
116	2021/07/21 13:19:54	33.3	32.8	32.9	32.9	32.7
121	2021/07/21 13:20:09	34.1	34.5	34.4	36.5	35.7
126	2021/07/21 13:20:24	39.1	37.8	39.5	39.2	36.3
131	2021/07/21 13:20:39	34.0	33.5	32.7	33.0	33.1
136	2021/07/21 13:20:54	33.5	32.7	32.8	32.8	32.7
141	2021/07/21 13:21:09	32.9	32.6	33.1	32.9	33.9
146	2021/07/21 13:21:24	34.9	33.9	33.8	34.8	35.1
151	2021/07/21 13:21:39	34.8	34.8	33.4	33.3	34.3
156	2021/07/21 13:21:54	34.3	33.0	33.4	33.2	32.8
161	2021/07/21 13:22:09	33.7	33.4	33.2	33.1	33.6
166	2021/07/21 13:22:24	33.1	33.6	33.4	32.8	32.9
171	2021/07/21 13:22:39	33.2	33.5	32.7	33.1	33.2
176	2021/07/21 13:22:54	33.2	33.4	33.8	33.3	33.9
181	2021/07/21 13:23:09	34.7	36.4	35.0	36.0	36.0
186	2021/07/21 13:23:24	37.8	38.3	38.2	37.3	39.3
191	2021/07/21 13:23:39	37.5	38.8	39.8	36.6	36.4
196	2021/07/21 13:23:54	37.5	36.2	34.6	34.6	34.4
201	2021/07/21 13:24:09	35.4	35.1	33.4	33.3	33.4
206	2021/07/21 13:24:24	33.1	33.2	33.1	33.2	33.3
211	2021/07/21 13:24:39	33.2	33.1	33.3	33.0	33.1
216	2021/07/21 13:24:54	33.4	32.8	33.1	33.2	33.0
221	2021/07/21 13:25:09	32.8	32.9	33.3	33.2	33.2
226	2021/07/21 13:25:24	33.1	33.1	33.2	32.8	32.9
231	2021/07/21 13:25:39	32.9	32.7	33.2	33.3	33.4
236	2021/07/21 13:25:54	33.8	33.8	33.7	33.9	33.3
241	2021/07/21 13:26:09	33.3	33.4	33.4	33.6	33.3
246	2021/07/21 13:26:24	33.2	33.0	33.3	33.3	33.7
251	2021/07/21 13:26:39	33.1	33.4	33.7	33.6	33.3
256	2021/07/21 13:26:54	33.4	33.4	33.0	33.0	32.9
261	2021/07/21 13:27:09	33.0	33.2	33.1	33.1	33.4
266	2021/07/21 13:27:24	33.8	33.6	33.7	34.8	34.6
271	2021/07/21 13:27:39	34.4	33.9	34.0	33.1	33.1
276	2021/07/21 13:27:54	33.3	33.4	33.3	33.5	33.2
281	2021/07/21 13:28:09	33.3	33.7	35.0	33.6	33.2
286	2021/07/21 13:28:24	33.3	33.4	33.1	33.3	33.7
291	2021/07/21 13:28:39	33.2	33.1	33.7	33.0	33.3
296	2021/07/21 13:28:54	33.7	33.5	34.1	33.6	34.4

NM2

- Freq Weight : A
- Time Weight : SLOW
- Level Range : 40-100
- Max dB : 53.4 - 2021/07/21 12:42:52
- Level Range : 40-100
- SEL : 64.2
- Leq : 34.7
-

No.s	Date Time	(dB)				
1	2021/07/21 12:42:47	41.1	51.3	41.1	48.4	42.2
6	2021/07/21 12:43:02	38.4	34.5	35.0	29.9	31.1
11	2021/07/21 12:43:17	32.5	34.8	39.1	40.0	38.0
16	2021/07/21 12:43:32	42.1	48.3	47.1	46.9	45.1
21	2021/07/21 12:43:47	45.0	40.7	41.2	40.7	39.3
26	2021/07/21 12:44:02	43.0	40.5	38.8	33.7	33.5
31	2021/07/21 12:44:17	33.4	35.9	32.9	33.9	31.5
36	2021/07/21 12:44:32	32.6	36.7	30.4	28.2	28.8
41	2021/07/21 12:44:47	28.7	28.0	28.8	31.3	29.3
46	2021/07/21 12:45:02	29.2	29.1	28.6	27.8	29.1
51	2021/07/21 12:45:17	29.3	28.5	30.0	33.9	36.2
56	2021/07/21 12:45:32	33.2	30.6	31.9	30.0	32.4
61	2021/07/21 12:45:47	30.4	28.9	28.4	28.3	27.7
66	2021/07/21 12:46:02	27.6	27.6	27.4	27.4	27.3
71	2021/07/21 12:46:17	27.2	27.2	27.1	27.7	27.3
76	2021/07/21 12:46:32	26.8	27.1	27.4	27.4	27.5
81	2021/07/21 12:46:47	27.4	27.3	27.3	27.1	27.4
86	2021/07/21 12:47:02	27.3	27.2	27.6	29.3	27.7
91	2021/07/21 12:47:17	29.7	29.2	30.8	29.8	28.8
96	2021/07/21 12:47:32	28.6	27.7	27.7	27.5	27.6
101	2021/07/21 12:47:47	27.6	28.5	28.2	27.6	28.2
106	2021/07/21 12:48:02	29.6	32.2	38.2	37.6	31.2
111	2021/07/21 12:48:17	29.8	28.9	28.8	29.7	31.9
116	2021/07/21 12:48:32	38.3	35.8	37.9	38.4	37.8
121	2021/07/21 12:48:47	35.6	36.6	35.0	34.8	37.3
126	2021/07/21 12:49:02	36.3	37.0	36.7	33.3	31.9
131	2021/07/21 12:49:17	34.3	36.0	33.4	33.0	32.8
136	2021/07/21 12:49:32	30.6	30.7	31.6	31.1	30.2
141	2021/07/21 12:49:47	31.0	28.5	28.2	28.1	28.9
146	2021/07/21 12:50:02	28.8	29.9	32.7	30.6	29.0
151	2021/07/21 12:50:17	28.4	27.6	28.0	27.9	27.9
156	2021/07/21 12:50:32	28.1	27.8	28.2	27.5	27.2
161	2021/07/21 12:50:47	27.3	27.0	27.0	27.2	27.9
166	2021/07/21 12:51:02	27.5	28.2	28.4	26.8	27.0
171	2021/07/21 12:51:17	26.9	27.4	27.0	26.8	26.5
176	2021/07/21 12:51:32	26.8	27.1	26.7	26.9	27.1
181	2021/07/21 12:51:47	26.9	26.6	26.7	26.8	26.5
186	2021/07/21 12:52:02	26.9	27.0	26.8	26.9	26.6
191	2021/07/21 12:52:17	26.8	26.8	27.0	27.0	27.0
196	2021/07/21 12:52:32	27.0	27.0	27.1	27.1	27.1
201	2021/07/21 12:52:47	27.2	26.9	27.2	27.0	27.2
206	2021/07/21 12:53:02	27.0	27.1	26.9	27.1	26.8
211	2021/07/21 12:53:17	26.9	27.1	27.2	27.3	27.2
216	2021/07/21 12:53:32	27.3	27.6	28.7	27.7	28.0
221	2021/07/21 12:53:47	27.7	27.5	28.2	27.6	27.6
226	2021/07/21 12:54:02	27.6	27.8	28.2	28.2	27.8
231	2021/07/21 12:54:17	28.2	28.5	34.0	34.4	38.1
236	2021/07/21 12:54:32	40.3	42.0	36.2	34.7	32.2
241	2021/07/21 12:54:47	29.8	30.4	32.5	30.3	32.9
246	2021/07/21 12:55:02	42.7	40.1	33.9	40.2	37.2
251	2021/07/21 12:55:17	34.8	33.3	31.3	30.8	33.4
256	2021/07/21 12:55:32	29.4	28.8	28.6	29.3	29.5
261	2021/07/21 12:55:47	44.0	39.0	34.8	39.4	37.1
266	2021/07/21 12:56:02	38.2	37.6	33.4	33.0	32.6
271	2021/07/21 12:56:17	32.6	34.1	32.1	29.9	32.5
276	2021/07/21 12:56:32	31.1	32.9	30.3	35.4	31.3
281	2021/07/21 12:56:47	35.1	39.5	38.9	35.6	33.1
286	2021/07/21 12:57:02	34.2	32.2	35.9	35.5	37.5
291	2021/07/21 12:57:17	37.3	36.5	36.0	35.9	37.7
296	2021/07/21 12:57:32	35.6	38.5	37.5	35.9	39.9

NM3

- Freq Weight : A
- Time Weight : SLOW
- Level Range : 40-100
- Max dB : 50.0 - 2021/07/21 08:25:29
- Level Range : 40-100
- SEL : 64.2
- Leq : 34.7
-

No.s	Date Time	(dB)				
1	2021/07/21 08:15:41	32.7	27.1	25.4	29.3	29.0
6	2021/07/21 08:15:56	29.8	30.0	31.2	27.9	24.9
11	2021/07/21 08:16:11	27.4	36.5	35.9	43.3	38.5
16	2021/07/21 08:16:26	37.5	31.2	30.4	29.9	27.9
21	2021/07/21 08:16:41	34.0	28.0	28.7	28.2	28.2
26	2021/07/21 08:16:56	26.3	25.5	26.9	28.3	28.1
31	2021/07/21 08:17:11	30.3	32.7	29.1	28.4	27.2
36	2021/07/21 08:17:26	28.8	27.5	28.9	29.0	32.6
41	2021/07/21 08:17:41	27.3	30.6	27.9	31.3	27.7
46	2021/07/21 08:17:56	26.8	27.0	26.3	26.1	25.0
51	2021/07/21 08:18:11	24.6	24.3	24.5	24.8	24.9
56	2021/07/21 08:18:26	24.8	25.3	25.3	25.2	25.3
61	2021/07/21 08:18:41	25.2	25.1	25.1	24.9	25.1
66	2021/07/21 08:18:56	26.6	27.3	29.1	28.8	32.1
71	2021/07/21 08:19:11	29.6	28.4	28.6	29.6	30.9
76	2021/07/21 08:19:26	29.3	28.4	32.5	34.1	35.3
81	2021/07/21 08:19:41	36.5	36.6	33.4	32.9	32.9
86	2021/07/21 08:19:56	37.8	33.1	33.9	34.5	33.5
91	2021/07/21 08:20:11	30.3	30.6	27.5	29.5	28.1
96	2021/07/21 08:20:26	27.2	27.0	26.4	27.6	25.4
101	2021/07/21 08:20:41	26.0	25.5	25.7	25.6	25.5
106	2021/07/21 08:20:56	25.1	24.8	24.9	24.6	24.8
111	2021/07/21 08:21:11	25.0	25.0	25.3	25.1	25.4
116	2021/07/21 08:21:26	26.1	24.9	24.9	24.8	24.7
121	2021/07/21 08:21:41	25.0	24.9	24.9	25.0	25.2
126	2021/07/21 08:21:56	24.8	24.9	24.7	24.7	24.8
131	2021/07/21 08:22:11	24.7	24.8	24.8	25.0	24.8
136	2021/07/21 08:22:26	25.1	25.1	25.3	26.7	25.8
141	2021/07/21 08:22:41	25.9	26.0	26.0	26.5	27.1
146	2021/07/21 08:22:56	26.0	26.0	26.2	26.6	26.5
151	2021/07/21 08:23:11	26.6	27.2	30.9	33.7	33.5
156	2021/07/21 08:23:26	30.8	29.6	27.1	26.9	27.1
161	2021/07/21 08:23:41	26.8	29.2	34.6	36.0	30.0
166	2021/07/21 08:23:56	29.1	28.6	29.8	32.5	30.9
171	2021/07/21 08:24:11	29.3	31.3	36.7	33.3	31.5
176	2021/07/21 08:24:26	34.8	33.5	32.6	32.6	31.5
181	2021/07/21 08:24:41	34.5	40.1	39.0	38.0	42.2
186	2021/07/21 08:24:56	42.7	45.1	43.2	44.7	44.9
191	2021/07/21 08:25:11	45.1	46.3	45.3	45.0	45.2
196	2021/07/21 08:25:26	46.6	47.0	44.5	45.5	41.4
201	2021/07/21 08:25:41	44.3	45.9	43.2	39.4	39.5
206	2021/07/21 08:25:56	37.4	38.0	34.9	39.4	40.0
211	2021/07/21 08:26:11	35.8	33.3	30.7	29.7	29.5
216	2021/07/21 08:26:26	28.7	29.4	29.0	29.1	27.5
221	2021/07/21 08:26:41	30.8	32.7	34.4	30.9	31.7
226	2021/07/21 08:26:56	33.1	33.2	32.3	33.2	33.8
231	2021/07/21 08:27:11	37.3	33.9	38.4	38.0	31.6
236	2021/07/21 08:27:26	34.9	34.4	37.2	33.3	34.4
241	2021/07/21 08:27:41	34.8	36.9	31.9	32.0	30.2
246	2021/07/21 08:27:56	28.2	27.9	31.4	27.9	28.7
251	2021/07/21 08:28:11	26.3	27.4	26.8	26.0	26.5
256	2021/07/21 08:28:26	26.3	25.7	25.7	26.4	26.0
261	2021/07/21 08:28:41	26.5	26.4	26.0	26.2	26.2
266	2021/07/21 08:28:56	26.1	25.9	26.3	26.2	26.5
271	2021/07/21 08:29:11	26.5	26.4	27.6	27.5	27.0
276	2021/07/21 08:29:26	26.1	26.4	27.2	26.4	26.3
281	2021/07/21 08:29:41	26.0	26.5	25.9	25.8	25.9
286	2021/07/21 08:29:56	26.4	26.3	26.2	25.9	26.2
291	2021/07/21 08:30:11	25.9	26.6	25.7	25.6	25.6
296	2021/07/21 08:30:26	25.5	25.6	25.7	25.7	25.6

NM4

- Freq Weight : A
- Time Weight : SLOW
- Level Range : 40-100
- Max dB : 43.9 - 2021/07/21 10:07:46
- Level Range : 40-100
- SEL : 59.5
- Leq : 30.0
-

No.s	Date Time	(dB)				
1	2021/07/21 10:07:43	30.6	36.6	33.9	33.0	34.1
6	2021/07/21 10:07:58	30.7	28.1	27.7	27.0	27.5
11	2021/07/21 10:08:13	36.4	33.0	29.0	32.5	31.0
16	2021/07/21 10:08:28	29.4	27.2	27.1	27.3	27.4
21	2021/07/21 10:08:43	31.0	35.1	33.8	29.9	31.7
26	2021/07/21 10:08:58	32.9	34.0	33.4	31.8	30.9
31	2021/07/21 10:09:13	36.3	34.2	32.6	37.0	29.9
36	2021/07/21 10:09:28	27.7	31.1	28.8	27.9	28.0
41	2021/07/21 10:09:43	28.8	27.6	27.7	28.0	27.9
46	2021/07/21 10:09:58	27.4	27.2	27.2	27.2	27.1
51	2021/07/21 10:10:13	27.5	27.3	27.6	27.3	27.4
56	2021/07/21 10:10:28	27.2	27.5	27.6	27.6	31.2
61	2021/07/21 10:10:43	31.0	28.6	27.2	27.0	27.3
66	2021/07/21 10:10:58	27.8	27.5	27.6	27.7	28.0
71	2021/07/21 10:11:13	28.0	27.7	27.8	27.6	27.7
76	2021/07/21 10:11:28	27.7	27.6	27.5	27.5	27.9
81	2021/07/21 10:11:43	27.8	28.2	28.0	29.1	27.9
86	2021/07/21 10:11:58	27.4	27.5	27.9	28.0	28.3
91	2021/07/21 10:12:13	30.0	28.9	28.5	28.7	28.1
96	2021/07/21 10:12:28	28.3	29.4	28.9	28.6	28.7
101	2021/07/21 10:12:43	28.4	28.6	28.4	27.9	28.0
106	2021/07/21 10:12:58	28.5	28.0	28.0	28.0	27.7
111	2021/07/21 10:13:13	27.8	28.0	27.8	28.0	28.9
116	2021/07/21 10:13:28	28.4	29.6	28.3	28.2	28.3
121	2021/07/21 10:13:43	27.9	28.0	27.9	27.9	28.1
126	2021/07/21 10:13:58	28.0	28.1	28.2	28.2	27.9
131	2021/07/21 10:14:13	28.2	28.3	28.2	28.0	28.2
136	2021/07/21 10:14:28	28.2	28.3	28.6	28.5	28.5
141	2021/07/21 10:14:43	28.5	28.4	28.9	30.1	29.5
146	2021/07/21 10:14:58	30.2	32.0	32.4	30.3	30.1
151	2021/07/21 10:15:13	29.3	29.2	30.8	33.6	32.6
156	2021/07/21 10:15:28	30.7	32.2	29.3	31.9	30.3
161	2021/07/21 10:15:43	29.5	30.5	30.7	29.6	29.1
166	2021/07/21 10:15:58	29.6	30.5	30.4	29.1	29.5
171	2021/07/21 10:16:13	28.9	28.9	29.0	29.7	29.7
176	2021/07/21 10:16:28	29.0	29.9	29.1	29.3	28.6
181	2021/07/21 10:16:43	29.0	28.7	28.1	29.0	30.1
186	2021/07/21 10:16:58	29.0	30.3	30.1	30.3	31.1
191	2021/07/21 10:17:13	29.6	28.6	28.7	28.1	27.9
196	2021/07/21 10:17:28	28.3	28.9	28.2	29.4	28.5
201	2021/07/21 10:17:43	28.0	28.6	28.2	28.0	28.6
206	2021/07/21 10:17:58	29.1	28.3	29.0	29.8	30.0
211	2021/07/21 10:18:13	29.9	29.9	30.2	30.1	28.5
216	2021/07/21 10:18:28	28.6	29.9	30.6	30.4	30.3
221	2021/07/21 10:18:43	30.4	31.2	31.3	31.0	32.0
226	2021/07/21 10:18:58	31.6	33.3	36.4	32.5	35.0
231	2021/07/21 10:19:13	33.0	31.4	29.9	32.5	30.9
236	2021/07/21 10:19:28	32.1	33.6	30.7	28.7	30.0
241	2021/07/21 10:19:43	28.6	29.0	30.2	28.7	28.4
246	2021/07/21 10:19:58	31.3	31.3	29.0	29.1	29.7
251	2021/07/21 10:20:13	31.0	30.2	29.5	30.8	29.9
256	2021/07/21 10:20:28	29.6	29.7	30.2	30.6	31.9
261	2021/07/21 10:20:43	29.8	30.4	32.0	30.4	32.3
266	2021/07/21 10:20:58	31.3	35.6	33.0	33.0	34.8
271	2021/07/21 10:21:13	33.5	34.8	34.3	34.3	34.5
276	2021/07/21 10:21:28	35.2	35.7	33.8	33.1	32.7
281	2021/07/21 10:21:43	32.5	31.0	31.0	31.7	30.8
286	2021/07/21 10:21:58	32.7	30.1	30.4	30.1	29.4
291	2021/07/21 10:22:13	30.1	31.8	31.7	35.1	40.5
296	2021/07/21 10:22:28	38.2	30.4	28.6	37.3	30.1

NM5

- Freq Weight : A
- Time Weight : SLOW
- Level Range : 40-100
- Max dB : 47.6 - 2021/07/21 08:54:48
- Level Range : 40-100
- SEL : 59.5
- Leq : 30.0
-

No.s	Date Time	(dB)				
1	2021/07/21 08:54:47	43.7	38.8	33.3	29.1	25.0
6	2021/07/21 08:55:02	24.5	24.9	24.7	25.9	25.5
11	2021/07/21 08:55:17	26.3	25.4	25.2	25.1	24.9
16	2021/07/21 08:55:32	25.0	24.8	28.6	25.0	24.4
21	2021/07/21 08:55:47	24.9	25.3	24.6	24.7	25.0
26	2021/07/21 08:56:02	25.5	24.9	26.6	26.2	26.2
31	2021/07/21 08:56:17	25.0	25.7	25.3	25.7	26.1
36	2021/07/21 08:56:32	26.0	25.9	26.1	33.7	28.5
41	2021/07/21 08:56:47	27.1	25.9	25.6	24.9	24.7
46	2021/07/21 08:57:02	25.3	24.8	24.8	24.9	24.8
51	2021/07/21 08:57:17	24.7	25.0	25.2	24.5	24.4
56	2021/07/21 08:57:32	24.3	24.6	24.2	24.3	24.1
61	2021/07/21 08:57:47	24.2	24.3	24.8	24.5	24.6
66	2021/07/21 08:58:02	24.5	24.1	24.7	24.5	24.2
71	2021/07/21 08:58:17	24.3	24.2	24.3	24.3	24.7
76	2021/07/21 08:58:32	24.3	24.4	25.4	24.7	26.8
81	2021/07/21 08:58:47	29.7	26.6	24.6	28.5	33.7
86	2021/07/21 08:59:02	30.0	33.4	32.4	28.7	31.0
91	2021/07/21 08:59:17	28.1	25.6	26.9	28.3	25.7
96	2021/07/21 08:59:32	24.6	30.6	32.9	32.9	33.6
101	2021/07/21 08:59:47	28.3	31.3	29.3	27.7	34.9
106	2021/07/21 09:00:02	29.3	24.9	24.4	24.6	24.7
111	2021/07/21 09:00:17	24.5	25.0	27.2	26.1	25.7
116	2021/07/21 09:00:32	25.5	25.8	24.8	28.0	25.0
121	2021/07/21 09:00:47	24.5	24.9	24.9	25.4	26.4
126	2021/07/21 09:01:02	26.1	27.0	26.3	25.7	25.1
131	2021/07/21 09:01:17	25.1	25.0	25.2	25.2	27.2
136	2021/07/21 09:01:32	26.7	26.6	26.6	25.7	26.5
141	2021/07/21 09:01:47	29.5	25.7	27.4	26.0	25.6
146	2021/07/21 09:02:02	25.9	26.1	25.4	25.5	26.8
151	2021/07/21 09:02:17	25.5	25.4	26.9	27.5	25.8
156	2021/07/21 09:02:32	27.8	27.4	26.3	26.5	26.8
161	2021/07/21 09:02:47	27.0	27.0	26.3	25.5	25.0
166	2021/07/21 09:03:02	25.4	25.5	25.3	25.7	25.5
171	2021/07/21 09:03:17	25.5	25.3	24.7	25.5	25.3
176	2021/07/21 09:03:32	25.2	25.1	24.7	24.7	24.7
181	2021/07/21 09:03:47	27.0	25.0	24.6	25.3	24.5
186	2021/07/21 09:04:02	25.1	25.5	25.2	25.6	25.1
191	2021/07/21 09:04:17	26.0	24.7	25.1	24.5	24.3
196	2021/07/21 09:04:32	24.6	24.4	24.5	25.9	26.1
201	2021/07/21 09:04:47	24.9	24.9	24.7	25.0	24.3
206	2021/07/21 09:05:02	24.5	24.4	25.2	24.9	25.7
211	2021/07/21 09:05:17	24.5	24.4	24.3	24.8	24.7
216	2021/07/21 09:05:32	30.1	25.1	24.5	25.8	24.5
221	2021/07/21 09:05:47	24.3	24.4	24.4	24.5	24.6
226	2021/07/21 09:06:02	25.7	26.7	26.4	26.4	24.7
231	2021/07/21 09:06:17	25.6	25.0	24.2	24.2	24.3
236	2021/07/21 09:06:32	24.0	24.0	25.4	26.1	26.2
241	2021/07/21 09:06:47	24.5	24.7	24.2	24.1	24.2
246	2021/07/21 09:07:02	24.5	24.3	24.3	24.5	24.4
251	2021/07/21 09:07:17	26.4	24.8	25.1	25.0	24.9
256	2021/07/21 09:07:32	28.0	25.8	24.8	24.4	25.3
261	2021/07/21 09:07:47	24.6	26.4	27.0	25.5	24.7
266	2021/07/21 09:08:02	25.2	24.6	24.4	24.7	24.7
271	2021/07/21 09:08:17	24.8	25.3	25.2	24.9	25.3
276	2021/07/21 09:08:32	25.9	25.0	25.6	25.9	25.1
281	2021/07/21 09:08:47	25.3	24.7	24.7	24.8	24.8
286	2021/07/21 09:09:02	24.9	25.6	24.7	24.9	26.7
291	2021/07/21 09:09:17	35.8	40.2	40.9	35.5	40.3
296	2021/07/21 09:09:32	31.3	26.3	28.7	30.5	38.4

NM6

- Freq Weight : A
- Time Weight : SLOW
- Level Range : 40-100
- Max dB : 69.9 - 2021/07/21 11:07:42
- Level Range : 40-100
- SEL : 74.5
- Leq : 45.0
-

No.s	Date Time	(dB)				
1	2021/07/21 11:03:33	38.8	38.6	35.9	45.7	37.6
6	2021/07/21 11:03:48	30.6	36.2	39.5	38.3	35.1
11	2021/07/21 11:04:03	35.7	39.3	36.4	28.9	35.1
16	2021/07/21 11:04:18	33.2	29.0	28.3	29.5	34.7
21	2021/07/21 11:04:33	34.9	30.2	27.6	27.2	29.1
26	2021/07/21 11:04:48	28.6	29.6	27.6	28.8	31.6
31	2021/07/21 11:05:03	29.4	28.8	29.6	27.2	27.1
36	2021/07/21 11:05:18	27.0	26.9	27.3	27.0	27.2
41	2021/07/21 11:05:33	26.9	28.5	27.4	28.5	27.3
46	2021/07/21 11:05:48	27.6	27.5	28.8	27.3	26.8
51	2021/07/21 11:06:03	27.1	26.7	26.9	27.9	28.1
56	2021/07/21 11:06:18	28.9	29.7	27.9	28.9	27.8
61	2021/07/21 11:06:33	27.7	27.4	27.8	27.5	27.3
66	2021/07/21 11:06:48	27.2	26.7	27.2	26.9	27.8
71	2021/07/21 11:07:03	27.8	27.8	27.9	27.9	27.8
76	2021/07/21 11:07:18	28.2	28.3	29.7	32.5	36.0
81	2021/07/21 11:07:33	40.9	48.1	69.0	63.7	54.4
86	2021/07/21 11:07:48	47.6	41.6	38.3	35.5	35.8
91	2021/07/21 11:08:03	35.4	33.0	30.4	29.2	28.7
96	2021/07/21 11:08:18	28.2	28.0	27.6	27.9	27.8
101	2021/07/21 11:08:33	29.0	28.3	28.3	28.0	30.5
106	2021/07/21 11:08:48	28.4	29.2	28.1	26.9	26.2
111	2021/07/21 11:09:03	27.4	27.0	26.4	26.2	28.3
116	2021/07/21 11:09:18	27.0	26.5	27.8	27.1	27.0
121	2021/07/21 11:09:33	26.6	26.4	26.6	26.5	28.2
126	2021/07/21 11:09:48	26.9	27.1	27.2	26.6	26.4
131	2021/07/21 11:10:03	26.1	26.4	26.2	26.3	26.3
136	2021/07/21 11:10:18	27.3	26.8	26.2	26.3	26.3
141	2021/07/21 11:10:33	26.2	26.4	26.2	25.9	26.2
146	2021/07/21 11:10:48	26.3	26.2	26.0	26.2	26.2
151	2021/07/21 11:11:03	26.3	26.3	26.4	26.3	30.7
156	2021/07/21 11:11:18	26.7	26.1	26.2	26.5	26.4
161	2021/07/21 11:11:33	26.4	26.4	26.5	27.5	26.1
166	2021/07/21 11:11:48	25.9	26.3	26.1	26.4	28.3
171	2021/07/21 11:12:03	26.8	28.6	29.0	30.2	28.2
176	2021/07/21 11:12:18	29.6	29.7	29.4	29.0	30.5
181	2021/07/21 11:12:33	34.0	33.2	31.8	32.3	30.5
186	2021/07/21 11:12:48	29.7	29.3	31.0	33.6	29.6
191	2021/07/21 11:13:03	30.2	30.7	29.0	29.0	28.0
196	2021/07/21 11:13:18	27.8	29.5	27.6	27.9	27.0
201	2021/07/21 11:13:33	27.2	27.8	27.4	27.5	27.5
206	2021/07/21 11:13:48	27.5	30.1	27.5	27.3	27.2
211	2021/07/21 11:14:03	27.8	28.7	27.7	27.4	26.2
216	2021/07/21 11:14:18	26.6	26.4	26.2	26.2	26.3
221	2021/07/21 11:14:33	26.4	26.6	27.0	26.5	26.3
226	2021/07/21 11:14:48	26.3	26.3	26.0	26.2	26.4
231	2021/07/21 11:15:03	26.2	26.2	26.3	26.2	26.4
236	2021/07/21 11:15:18	26.6	26.6	26.5	26.4	26.7
241	2021/07/21 11:15:33	30.9	27.9	27.2	26.9	26.8
246	2021/07/21 11:15:48	26.8	26.7	26.8	27.3	26.7
251	2021/07/21 11:16:03	26.9	26.9	26.8	26.7	26.8
256	2021/07/21 11:16:18	26.9	26.8	27.7	28.0	26.9
261	2021/07/21 11:16:33	27.0	26.9	26.7	26.9	26.9
266	2021/07/21 11:16:48	26.9	27.0	26.9	29.6	28.7
271	2021/07/21 11:17:03	28.0	28.0	28.2	27.9	28.0
276	2021/07/21 11:17:18	28.4	28.6	29.8	28.9	29.0
281	2021/07/21 11:17:33	28.9	29.1	29.4	28.8	29.3
286	2021/07/21 11:17:48	29.2	28.9	28.9	28.8	29.0
291	2021/07/21 11:18:03	28.8	29.3	29.4	29.3	29.5
296	2021/07/21 11:18:18	30.3	30.8	33.0	37.4	45.3

NM7

- Freq Weight : A
- Time Weight : SLOW
- Level Range : 40-100
- Max dB : 50.9 - 2021/07/21 09:42:38
- Level Range : 40-100
- SEL : 64.2
- Leq : 34.7
-

No.s	Date Time	(dB)				
1	2021/07/21 09:28:48	41.2	37.2	32.9	29.6	29.1
6	2021/07/21 09:29:03	25.8	35.8	34.2	27.2	30.2
11	2021/07/21 09:29:18	30.6	29.5	32.0	32.1	32.1
16	2021/07/21 09:29:33	26.9	30.0	29.1	25.8	25.2
21	2021/07/21 09:29:48	24.9	24.9	28.4	27.4	25.8
26	2021/07/21 09:30:03	25.3	28.2	25.8	25.8	25.4
31	2021/07/21 09:30:18	25.0	25.0	25.3	28.7	26.0
36	2021/07/21 09:30:33	28.1	25.9	24.9	24.8	28.9
41	2021/07/21 09:30:48	25.6	26.6	25.3	25.3	25.0
46	2021/07/21 09:31:03	25.1	24.7	24.6	25.4	24.9
51	2021/07/21 09:31:18	25.9	25.2	25.4	25.8	29.7
56	2021/07/21 09:31:33	25.8	26.5	25.3	25.2	25.1
61	2021/07/21 09:31:48	26.0	25.2	25.2	24.9	25.0
66	2021/07/21 09:32:03	25.2	25.0	24.8	24.7	24.8
71	2021/07/21 09:32:18	24.9	24.8	25.0	25.0	25.1
76	2021/07/21 09:32:33	24.8	24.9	25.2	24.9	25.0
81	2021/07/21 09:32:48	24.7	25.7	25.2	25.2	25.3
86	2021/07/21 09:33:03	25.1	24.9	25.0	25.4	25.0
91	2021/07/21 09:33:18	24.9	25.0	25.3	26.8	25.5
96	2021/07/21 09:33:33	25.0	25.2	24.8	24.7	24.6
101	2021/07/21 09:33:48	24.8	24.9	24.8	24.9	25.1
106	2021/07/21 09:34:03	25.0	25.3	25.2	27.5	25.4
111	2021/07/21 09:34:18	25.8	25.1	25.0	25.2	25.0
116	2021/07/21 09:34:33	25.0	24.9	26.1	25.2	25.0
121	2021/07/21 09:34:48	25.1	25.3	24.9	25.2	24.9
126	2021/07/21 09:35:03	24.9	25.0	25.0	24.8	25.0
131	2021/07/21 09:35:18	25.1	25.2	25.2	25.0	25.1
136	2021/07/21 09:35:33	25.2	25.4	25.2	25.3	25.4
141	2021/07/21 09:35:48	25.3	25.1	25.0	25.1	25.1
146	2021/07/21 09:36:03	24.9	25.2	25.2	25.1	25.0
151	2021/07/21 09:36:18	25.2	25.1	25.2	25.1	25.0
156	2021/07/21 09:36:33	24.7	25.0	24.9	24.8	25.0
161	2021/07/21 09:36:48	24.8	25.1	25.0	25.0	25.0
166	2021/07/21 09:37:03	25.1	25.2	24.9	25.2	25.3
171	2021/07/21 09:37:18	25.4	25.4	25.6	25.5	25.5
176	2021/07/21 09:37:33	25.5	25.5	25.4	25.4	26.0
181	2021/07/21 09:37:48	25.5	25.3	25.4	25.2	25.4
186	2021/07/21 09:38:03	25.4	25.1	25.2	25.2	25.5
191	2021/07/21 09:38:18	25.2	25.4	25.3	25.2	25.5
196	2021/07/21 09:38:33	25.4	25.4	25.1	25.1	25.2
201	2021/07/21 09:38:48	25.0	24.8	25.5	25.3	25.2
206	2021/07/21 09:39:03	25.2	25.1	25.1	25.5	25.1
211	2021/07/21 09:39:18	25.2	25.1	25.1	26.1	25.1
216	2021/07/21 09:39:33	24.9	24.9	25.2	25.0	25.0
221	2021/07/21 09:39:48	24.7	24.8	24.7	24.8	25.0
226	2021/07/21 09:40:03	36.3	27.8	25.2	25.0	43.8
231	2021/07/21 09:40:18	48.0	42.2	30.9	25.8	40.0
236	2021/07/21 09:40:33	49.7	49.3	44.6	32.9	26.1
241	2021/07/21 09:40:48	25.4	25.7	25.0	25.0	25.1
246	2021/07/21 09:41:03	25.0	25.2	25.0	25.1	25.1
251	2021/07/21 09:41:18	24.9	25.4	44.2	47.7	46.0
256	2021/07/21 09:41:33	42.2	30.9	25.9	25.7	24.9
261	2021/07/21 09:41:48	24.9	25.1	25.2	25.0	25.0
266	2021/07/21 09:42:03	25.0	25.1	24.7	24.9	25.0
271	2021/07/21 09:42:18	24.6	24.8	24.9	25.0	25.1
276	2021/07/21 09:42:33	40.6	49.7	46.8	46.8	37.8
281	2021/07/21 09:42:48	28.5	26.2	31.9	32.0	26.3
286	2021/07/21 09:43:03	26.1	26.6	25.6	26.3	26.3
291	2021/07/21 09:43:18	26.2	26.7	28.8	30.2	33.3
296	2021/07/21 09:43:33	38.5	30.3	40.9	33.6	27.5

NM8

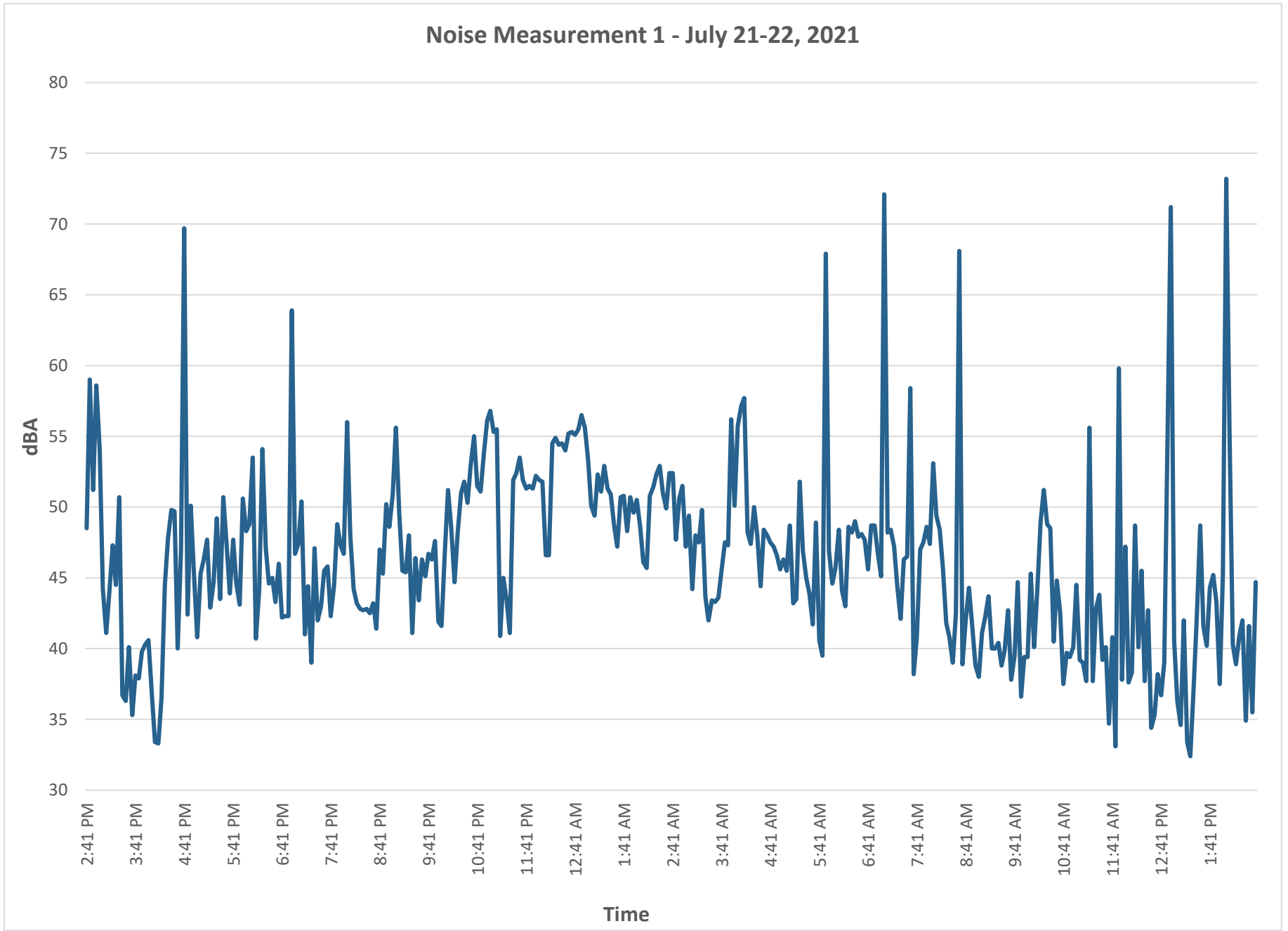
- Freq Weight : A
- Time Weight : SLOW
- Level Range : 40-100
- Max dB : 48.4 - 2021/07/21 12:04:07
- Level Range : 40-100
- SEL : 59.5
- Leq : 30.0
-

No.s	Date Time	(dB)				
1	2021/07/21 12:03:54	35.5	41.4	42.3	45.6	46.3
6	2021/07/21 12:04:09	39.6	35.4	33.1	34.1	31.9
11	2021/07/21 12:04:24	32.1	36.2	32.7	31.6	35.9
16	2021/07/21 12:04:39	33.1	31.2	32.7	31.0	31.7
21	2021/07/21 12:04:54	30.9	29.9	30.7	36.0	32.1
26	2021/07/21 12:05:09	28.7	27.9	28.3	29.2	28.1
31	2021/07/21 12:05:24	27.5	27.4	30.5	30.4	37.4
36	2021/07/21 12:05:39	30.3	30.8	29.5	32.3	31.9
41	2021/07/21 12:05:54	30.9	29.2	27.7	28.7	30.0
46	2021/07/21 12:06:09	28.7	30.3	29.5	32.0	29.9
51	2021/07/21 12:06:24	30.3	29.2	28.9	27.8	28.2
56	2021/07/21 12:06:39	27.1	27.8	28.9	29.2	27.2
61	2021/07/21 12:06:54	27.3	27.2	27.6	27.5	27.8
66	2021/07/21 12:07:09	27.8	27.3	27.0	28.6	28.0
71	2021/07/21 12:07:24	28.7	30.1	32.2	33.3	33.6
76	2021/07/21 12:07:39	36.0	36.5	37.4	36.2	37.2
81	2021/07/21 12:07:54	39.3	37.5	35.4	35.1	34.0
86	2021/07/21 12:08:09	36.3	34.1	33.8	33.3	33.2
91	2021/07/21 12:08:24	31.4	30.8	31.6	32.9	29.9
96	2021/07/21 12:08:39	29.1	29.3	27.9	28.0	28.2
101	2021/07/21 12:08:54	32.4	33.3	31.1	30.1	30.2
106	2021/07/21 12:09:09	28.9	31.6	34.1	30.9	33.0
111	2021/07/21 12:09:24	34.9	33.6	30.6	30.0	33.2
116	2021/07/21 12:09:39	33.6	31.8	28.6	28.5	31.2
121	2021/07/21 12:09:54	29.7	27.8	28.7	27.8	27.9
126	2021/07/21 12:10:09	28.9	31.3	28.4	28.7	30.0
131	2021/07/21 12:10:24	28.3	33.7	29.0	27.4	27.2
136	2021/07/21 12:10:39	29.8	33.0	31.4	29.7	36.2
141	2021/07/21 12:10:54	29.3	44.6	33.9	29.9	29.4
146	2021/07/21 12:11:09	27.2	27.0	33.6	31.0	30.6
151	2021/07/21 12:11:24	38.1	30.9	27.8	27.4	27.1
156	2021/07/21 12:11:39	27.1	27.0	27.0	27.1	27.1
161	2021/07/21 12:11:54	27.0	26.9	26.7	26.8	26.7
166	2021/07/21 12:12:09	26.5	26.7	26.6	26.8	26.8
171	2021/07/21 12:12:24	26.6	26.7	26.9	26.7	26.7
176	2021/07/21 12:12:39	26.8	26.8	26.8	26.8	26.7
181	2021/07/21 12:12:54	26.8	26.8	27.0	26.9	26.9
186	2021/07/21 12:13:09	27.2	27.0	27.0	27.5	27.4
191	2021/07/21 12:13:24	27.1	27.1	27.1	27.3	27.3
196	2021/07/21 12:13:39	27.2	27.4	27.4	27.4	27.7
201	2021/07/21 12:13:54	27.8	28.1	28.0	27.9	27.9
206	2021/07/21 12:14:09	28.0	27.8	28.1	28.4	28.5
211	2021/07/21 12:14:24	28.8	28.4	29.2	29.8	29.8
216	2021/07/21 12:14:39	31.2	32.3	34.4	37.9	35.5
221	2021/07/21 12:14:54	34.0	34.0	36.9	35.2	39.5
226	2021/07/21 12:15:09	33.4	33.9	33.8	35.8	36.0
231	2021/07/21 12:15:24	32.5	31.8	31.2	30.7	30.3
236	2021/07/21 12:15:39	30.4	30.6	31.4	31.2	30.4
241	2021/07/21 12:15:54	32.0	31.3	31.3	30.5	28.8
246	2021/07/21 12:16:09	28.6	29.1	29.0	28.8	28.5
251	2021/07/21 12:16:24	28.6	29.3	29.3	28.8	28.6
256	2021/07/21 12:16:39	28.3	28.4	28.4	28.3	28.2
261	2021/07/21 12:16:54	28.2	28.1	27.9	28.6	28.5
266	2021/07/21 12:17:09	28.4	28.4	28.6	28.6	28.6
271	2021/07/21 12:17:24	28.6	28.5	28.5	28.3	28.6
276	2021/07/21 12:17:39	28.6	28.5	28.4	28.3	28.3
281	2021/07/21 12:17:54	28.5	28.3	28.2	28.3	28.3
286	2021/07/21 12:18:09	28.5	28.5	28.6	28.8	28.7
291	2021/07/21 12:18:24	28.6	28.7	28.7	28.6	28.8
296	2021/07/21 12:18:39	29.1	29.0	29.1	29.1	29.2

LT-1 24hr Long Term

- Freq Weight : A
- Time Weight : SLOW
- Level Range : 40-100
- Max dB : 88.8 - 2021/07/21 15:13:11
- Level Range : 40-100
- SEL : 119.3
- Leq : 70.0
-

No.s	Date Time	(dB)				
1	2021/07/21 14:41:52	48.5	59.0	51.2	58.6	54.1
6	2021/07/21 15:01:52	44.2	41.1	44.0	47.3	44.5
11	2021/07/21 15:21:52	50.7	36.7	36.3	40.1	35.3
16	2021/07/21 15:41:52	38.1	37.9	39.8	40.3	40.6
21	2021/07/21 16:01:52	36.8	33.4	33.3	36.5	44.5
26	2021/07/21 16:21:52	47.8	49.8	49.7	40.0	47.1
31	2021/07/21 16:41:52	69.7	42.4	50.1	45.1	40.8
36	2021/07/21 17:01:52	45.3	46.3	47.7	42.9	44.7
41	2021/07/21 17:21:52	49.2	43.5	50.7	47.3	43.9
46	2021/07/21 17:41:52	47.7	44.6	43.1	50.6	48.3
51	2021/07/21 18:01:52	48.8	53.5	40.7	44.2	54.1
56	2021/07/21 18:21:52	47.1	44.6	45.0	43.3	46.0
61	2021/07/21 18:41:52	42.2	42.3	42.3	63.9	46.7
66	2021/07/21 19:01:52	47.4	50.4	41.0	44.4	39.0
71	2021/07/21 19:21:52	47.1	42.0	43.0	45.5	45.8
76	2021/07/21 19:41:52	42.3	44.5	48.8	47.3	46.7
81	2021/07/21 20:01:52	56.0	48.0	44.2	43.2	42.8
86	2021/07/21 20:21:52	42.7	42.8	42.5	43.2	41.4
91	2021/07/21 20:41:52	47.0	45.3	50.2	48.6	50.9
96	2021/07/21 21:01:52	55.6	49.5	45.5	45.4	48.0
101	2021/07/21 21:21:52	41.1	46.4	43.4	46.3	45.1
106	2021/07/21 21:41:52	46.7	46.3	47.6	41.9	41.6
111	2021/07/21 22:01:52	46.9	51.2	48.6	44.7	48.2
116	2021/07/21 22:21:52	51.0	51.8	50.3	53.0	55.0
121	2021/07/21 22:41:52	51.5	51.1	53.7	56.1	56.8
126	2021/07/21 23:01:52	55.3	55.5	40.9	45.0	43.4
131	2021/07/21 23:21:52	41.1	51.9	52.4	53.5	51.9
136	2021/07/21 23:41:52	51.3	51.5	51.3	52.2	51.9
141	2021/07/22 00:01:52	51.8	46.6	46.6	54.5	54.9
146	2021/07/22 00:21:52	54.4	54.5	54.0	55.2	55.3
151	2021/07/22 00:41:52	55.1	55.5	56.5	55.6	53.4
156	2021/07/22 01:01:52	50.1	49.4	52.3	51.1	52.9
161	2021/07/22 01:21:52	51.3	50.9	48.7	47.2	50.7
166	2021/07/22 01:41:52	50.8	48.3	50.7	49.6	50.5
171	2021/07/22 02:01:52	48.6	46.1	45.7	50.8	51.4
176	2021/07/22 02:21:52	52.3	52.9	51.0	49.9	52.4
181	2021/07/22 02:41:52	52.4	47.7	50.6	51.5	47.2
186	2021/07/22 03:01:52	49.4	44.2	48.0	47.5	49.8
191	2021/07/22 03:21:52	43.7	42.0	43.4	43.3	43.6
196	2021/07/22 03:41:52	45.5	47.5	47.3	56.2	50.1
201	2021/07/22 04:01:52	55.7	57.1	57.7	48.2	47.4
206	2021/07/22 04:21:52	50.0	48.0	44.4	48.4	48.0
211	2021/07/22 04:41:52	47.5	47.2	46.6	45.6	46.3
216	2021/07/22 05:01:52	45.5	48.7	43.2	43.5	51.8
221	2021/07/22 05:21:52	46.9	45.0	43.9	41.7	48.9
226	2021/07/22 05:41:52	40.6	39.5	67.9	46.9	44.6
231	2021/07/22 06:01:52	45.7	48.4	44.1	43.0	48.6
236	2021/07/22 06:21:52	48.2	49.0	47.9	48.1	47.7
241	2021/07/22 06:41:52	45.6	48.7	48.7	46.8	45.1
246	2021/07/22 07:01:52	72.1	48.2	48.4	47.2	44.4
251	2021/07/22 07:21:52	42.1	46.3	46.5	58.4	38.2
256	2021/07/22 07:41:52	40.8	47.0	47.5	48.6	47.4
261	2021/07/22 08:01:52	53.1	49.4	48.4	45.7	41.8
266	2021/07/22 08:21:52	40.8	39.0	42.5	68.1	38.9
271	2021/07/22 08:41:52	42.1	44.3	41.5	38.8	38.0
276	2021/07/22 09:01:52	41.1	42.3	43.7	40.0	40.0
281	2021/07/22 09:21:52	40.4	38.8	39.9	42.7	37.8
286	2021/07/22 09:41:52	39.5	44.7	36.6	39.4	39.4
291	2021/07/22 10:01:52	45.3	40.1	44.1	49.0	51.2
296	2021/07/22 10:21:52	48.8	48.5	40.5	44.8	42.5
301	2021/07/22 10:41:52	37.5	39.7	39.4	40.1	44.5
306	2021/07/22 11:01:52	39.2	39.0	37.7	55.6	37.7
311	2021/07/22 11:21:52	42.8	43.8	39.2	40.1	34.7
316	2021/07/22 11:41:52	40.8	33.1	59.8	37.8	47.2
321	2021/07/22 12:01:52	37.6	38.3	48.7	40.1	45.5
326	2021/07/22 12:21:52	37.7	42.7	34.4	35.3	38.2
331	2021/07/22 12:41:52	36.7	39.0	55.3	71.2	40.6
336	2021/07/22 13:01:52	36.3	34.6	42.0	33.4	32.4
341	2021/07/22 13:21:52	37.3	42.3	48.7	41.6	40.2
346	2021/07/22 13:41:52	44.3	45.2	43.3	37.5	45.3
351	2021/07/22 14:01:52	73.2	55.8	40.3	38.9	40.9
356	2021/07/22 14:21:52	42.0	34.9	41.6	35.5	44.7


Noise Measurement 1 - July 21-22, 2021
80
75
70
65
60
55
50
45
40
35
30
dBA
2:41 PM
3:41 PM
4:41 PM
5:41 PM
6:41 PM
7:41 PM
8:41 PM
9:41 PM
10:41 PM
11:41 PM
12:41 AM
1:41 AM
2:41 AM
3:41 AM
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5:41 AM
6:41 AM
7:41 AM
8:41 AM
9:41 AM
10:41 AM
11:41 AM
12:41 PM
1:41 PM
Time

Appendix B

Roadway Construction Noise Model (RCNM) Results

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 08/05/2021
Case Description: Parcel Construction

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Reference Distance	Residential	50.0	45.0	40.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Pickup Truck	No	40		75.0	50.0	0.0
Pneumatic Tools	No	50		85.2	50.0	0.0
Excavator	No	40		80.7	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	75.0	71.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pneumatic Tools	85.2	82.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Total	85.2	84.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Meridian Road	Residential	50.0	45.0	40.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Pickup Truck	No	40		75.0	100.0	0.0
Pneumatic Tools	No	50		85.2	100.0	0.0
Excavator	No	40		80.7	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	73.1	69.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	69.0	65.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pneumatic Tools	79.2	76.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	74.7	70.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	79.2	78.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Sherman Way	Residential	50.0	45.0	40.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	150.0	0.0
Front End Loader	No	40		79.1	150.0	0.0
Pickup Truck	No	40		75.0	150.0	0.0
Pneumatic Tools	No	50		85.2	150.0	0.0
Excavator	No	40		80.7	150.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	74.8	67.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	69.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	65.5	61.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pneumatic Tools	75.6	72.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	71.2	67.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	75.6	75.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night

Midway Avenue	Residential	50.0	45.0	40.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	300.0	0.0
Front End Loader	No	40		79.1	300.0	0.0
Pickup Truck	No	40		75.0	300.0	0.0
Pneumatic Tools	No	50		85.2	300.0	0.0
Excavator	No	40		80.7	300.0	0.0

Results

			Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	68.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	63.5	59.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	59.4	55.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pneumatic Tools	69.6	66.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	65.1	61.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	69.6	69.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #5 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Fern Road	Residential	50.0	45.0	40.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	600.0	0.0
Front End Loader	No	40		79.1	600.0	0.0
Pickup Truck	No	40		75.0	600.0	0.0
Pneumatic Tools	No	50		85.2	600.0	0.0
Excavator	No	40		80.7	600.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	62.8	55.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	57.5	53.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	53.4	49.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pneumatic Tools	63.6	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.1	55.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	63.6	63.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 09/13/2021
Case Description: Gen-Tie and Collector Lines

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Reference Distance	Residential	50.0	45.0	40.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Pickup Truck	No	40		75.0	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	80.6	72.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	75.0	71.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	80.7	78.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Nearest Residence	Residential	50.0	45.0	40.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Pickup Truck	No	40		75.0	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	74.5	66.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	74.7	70.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	69.0	65.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	74.7	72.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Appendix C

Traffic Noise Modeling Results

Appendix C

Rincon FHWA Traffic Noise Model

rincon

Model Input

Project Name :	Sienna Solar
Project Number :	21-11216
Modeling Condition :	Existing
Ground Type :	Soft
Metric (L_{eq}, L_{dn}, CNEL) :	Ldn

Peak ratio to ADT:	
Traffic Desc. (Peak or ADT) :	ADT

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Barstow Road	Rabbit Springs Road	to the north	2,920	55	50	94			4	2	65		35	
2	Northside Road	Barstow Road	to the east	700	45	50	94			4	2	65		35	
3	Rabbit Springs Road	Barstow Road	to the east	1,980	55	50	94			4	2	65		35	
4	State Route 247	Camp Rock Road	State Route 18	2,200	45	50	87			4	9	65		35	
5	State Route 247	State Route 18	Rabbit Springs Road	2,100	45	50	87			4	9	65		35	
6	State Route 247	Rabbit Springs Road	Lucerne Valley Cutoff	2,350	45	50	87			4	9	65		35	
7	State Route 18	Lucernce Valley	State Route 247	8,500	45	50	81			7	12	65		35	

rincon

Model Results

Project Number :	Sienna Solar
Modeling Condition :	21-11216
Ground Type :	Existing
Metric (Leq, Ldn, CNEL) :	Ldn

Segment Number	Roadway	Segment		Noise Levels (dB) Ldn					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Barstow Road	Rabbit Springs Road	to the north	62.7	0.0	0.0	55.0	56.4	64.2
2	Northside Road	Barstow Road	to the east	54.6	0.0	0.0	47.6	49.2	56.3
3	Rabbit Springs Road	Barstow Road	to the east	61.0	0.0	0.0	53.3	54.7	62.5
4	State Route 247	Camp Rock Road	State Route 18	59.2	0.0	0.0	52.5	60.7	63.4
5	State Route 247	State Route 18	Rabbit Springs Road	59.0	0.0	0.0	52.3	60.5	63.2
6	State Route 247	Rabbit Springs Road	Lucerne Valley Cutoff	59.5	0.0	0.0	52.8	61.0	63.7
7	State Route 18	Lucernce Valley	State Route 247	64.8	0.0	0.0	60.8	67.8	70.1

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
20	44	95	204	439
6	13	28	61	132
16	34	73	157	339
18	39	84	181	391
18	38	82	176	379
19	41	88	190	408
51	109	236	508	1,095

Appendix C

Rincon FHWA Traffic Noise Model

rincon

Model Input

Project Name :	Sienna Solar
Project Number :	21-11216
Modeling Condition :	Existing Plus Project
Ground Type :	Soft
Metric (L_{eq}, L_{dn}, CNEL) :	Ldn

Peak ratio to ADT:	
Traffic Desc. (Peak or ADT) :	ADT

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Barstow Road	Rabbit Springs Road	to the north	3,950	55	50	94			4	2	65		35	
2	Northside Road	Barstow Road	to the east	870	45	50	94			4	2	65		35	
3	Rabbit Springs Road	Barstow Road	to the east	2,070	55	50	94			4	2	65		35	
4	State Route 247	Camp Rock Road	State Route 18	2,460	45	51	87			4	9	65		35	
5	State Route 247	State Route 18	Rabbit Springs Road	2,960	45	52	87			4	9	65		35	
6	State Route 247	Rabbit Springs Road	Lucerne Valley Cutoff	3,210	45	53	87			4	9	65		35	
7	State Route 18	Lucernce Valley	State Route 247	9,020	45	54	81			7	12	65		35	

rincon

Model Results

Project Number :	Sienna Solar
Modeling Condition :	21-11216
Ground Type :	Existing Plus Project
Metric (Leq, Ldn, CNEL) :	Ldn

Segment Number	Roadway	Segment		Noise Levels (dB) Ldn					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Barstow Road	Rabbit Springs Road	to the north	64.0	0.0	0.0	56.3	57.7	65.5
2	Northside Road	Barstow Road	to the east	55.5	0.0	0.0	48.5	50.1	57.2
3	Rabbit Springs Road	Barstow Road	to the east	61.2	0.0	0.0	53.5	54.9	62.7
4	State Route 247	Camp Rock Road	State Route 18	59.6	0.0	0.0	52.9	61.0	63.8
5	State Route 247	State Route 18	Rabbit Springs Road	60.3	0.0	0.0	53.6	61.7	64.4
6	State Route 247	Rabbit Springs Road	Lucerne Valley Cutoff	60.5	0.0	0.0	53.8	61.9	64.7
7	State Route 18	Lucernce Valley	State Route 247	64.5	0.0	0.0	60.6	67.6	69.9

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
25	54	116	249	537
7	15	33	71	152
16	35	75	162	349
20	42	91	195	421
22	48	103	221	476
23	50	108	233	503
53	114	245	529	1,139

Appendix C

Rincon FHWA Traffic Noise Model

rincon

Model Input

Project Name :	Sienna Solar
Project Number :	21-11216
Modeling Condition :	Cumulative
Ground Type :	Soft
Metric (L_{eq}, L_{dn}, CNEL) :	Ldn

Peak ratio to ADT:	
Traffic Desc. (Peak or ADT) :	ADT

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Barstow Road	Rabbit Springs Road	to the north	6,270	55	50	94			4	2	65		35	
2	Northside Road	Barstow Road	to the east	890	45	50	94			4	2	65		35	
3	Rabbit Springs Road	Barstow Road	to the east	3,510	55	50	94			4	2	65		35	
4	State Route 247	Camp Rock Road	State Route 18	7,060	45	51	87			4	9	65		35	
5	State Route 247	State Route 18	Rabbit Springs Road	6,860	45	52	87			4	9	65		35	
6	State Route 247	Rabbit Springs Road	Lucerne Valley Cutoff	7,630	45	53	87			4	9	65		35	
7	State Route 18	Lucernce Valley	State Route 247	10,900	45	54	81			7	12	65		35	

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Model Results

Project Number :	Sienna Solar
Modeling Condition :	21-11216
Ground Type :	Cumulative
Metric (Leq, Ldn, CNEL) :	Ldn

Segment Number	Roadway	Segment		Noise Levels (dB) Ldn					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Barstow Road	Rabbit Springs Road	to the north	66.0	0.0	0.0	58.3	59.7	67.5
2	Northside Road	Barstow Road	to the east	55.6	0.0	0.0	48.6	50.2	57.3
3	Rabbit Springs Road	Barstow Road	to the east	63.5	0.0	0.0	55.8	57.2	65.0
4	State Route 247	Camp Rock Road	State Route 18	64.2	0.0	0.0	57.5	65.6	68.3
5	State Route 247	State Route 18	Rabbit Springs Road	63.9	0.0	0.0	57.2	65.4	68.1
6	State Route 247	Rabbit Springs Road	Lucerne Valley Cutoff	64.2	0.0	0.0	57.5	65.7	68.4
7	State Route 18	Lucernce Valley	State Route 247	65.4	0.0	0.0	61.4	68.4	70.7

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
34	73	157	339	731
7	15	33	72	154
23	50	107	230	496
39	85	183	395	850
39	83	180	387	834
42	90	193	416	896
60	129	278	600	1,292

Appendix C

Rincon FHWA Traffic Noise Model

rincon

Model Input

Project Name :	Sienna Solar
Project Number :	21-11216
Modeling Condition :	Cumulative Plus Project
Ground Type :	Soft
Metric (L_{eq}, L_{dn}, CNEL) :	Ldn

Peak ratio to ADT:	
Traffic Desc. (Peak or ADT) :	ADT

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Barstow Road	Rabbit Springs Road	to the north	6,270	55	50	94			4	2	65		35	
2	Northside Road	Barstow Road	to the east	890	45	50	94			4	2	65		35	
3	Rabbit Springs Road	Barstow Road	to the east	3,510	55	50	94			4	2	65		35	
4	State Route 247	Camp Rock Road	State Route 18	7,060	45	51	87			4	9	65		35	
5	State Route 247	State Route 18	Rabbit Springs Road	6,870	45	52	87			4	9	65		35	
6	State Route 247	Rabbit Springs Road	Lucerne Valley Cutoff	7,640	45	53	87			4	9	65		35	
7	State Route 18	Lucernce Valley	State Route 247	10,900	45	54	81			7	12	65		35	

rincon

Model Results

Project Number :	Sienna Solar
Modeling Condition :	21-11216
Ground Type :	Cumulative Plus Project
Metric (Leq, Ldn, CNEL) :	Ldn

Segment Number	Roadway	Segment		Noise Levels (dB) Ldn					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Barstow Road	Rabbit Springs Road	to the north	66.0	0.0	0.0	58.3	59.7	67.5
2	Northside Road	Barstow Road	to the east	55.6	0.0	0.0	48.6	50.2	57.3
3	Rabbit Springs Road	Barstow Road	to the east	63.5	0.0	0.0	55.8	57.2	65.0
4	State Route 247	Camp Rock Road	State Route 18	64.2	0.0	0.0	57.5	65.6	68.3
5	State Route 247	State Route 18	Rabbit Springs Road	63.9	0.0	0.0	57.2	65.4	68.1
6	State Route 247	Rabbit Springs Road	Lucerne Valley Cutoff	64.3	0.0	0.0	57.6	65.7	68.4
7	State Route 18	Lucernce Valley	State Route 247	65.4	0.0	0.0	61.4	68.4	70.7

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
34	73	157	339	731
7	15	33	72	154
23	50	107	230	496
39	85	183	395	850
39	84	180	388	835
42	90	193	416	896
60	129	278	600	1,292

Appendix D

Equipment Specification Sheets

Introduction

In order to meet Energy storage market requirement, BYD developed 500kVA PCS (Power Conversion System) with years' experiences. This PCS is usually used for medium to large energy storage power station with high efficiency, reliable operation, high stability, and supplied for the following services: peak load shifting, adjustable reactive power etc.

PCS Topology

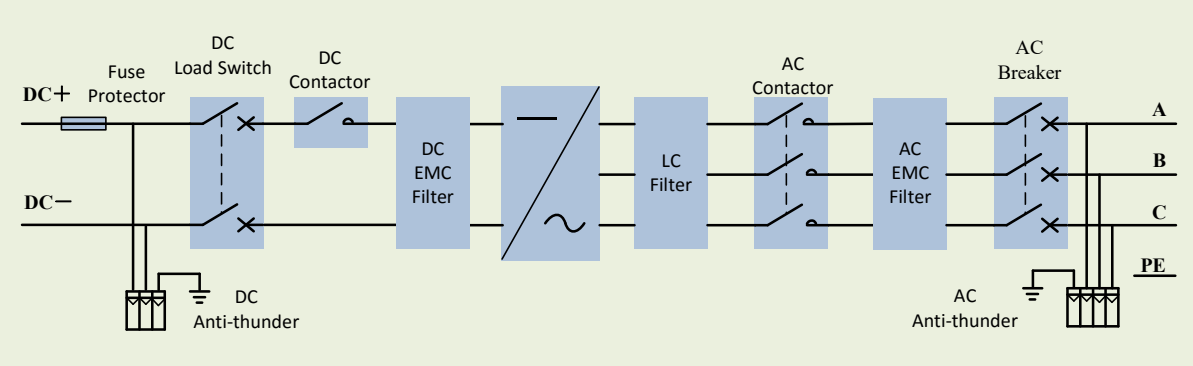


Figure 1: PCS Topology

System Parameters

No.	Item	Parameter	Remark
1	Type	BEG500KTL-U	
Parameters at DC side			
2	DC Voltage range	780～1000Vdc	
3	Max. DC current	700A	
Parameters at AC side			
4	Nominal AC voltage	480Vac	
5	Max.AC current	600A	
6	AC power	500kW	
7	Nominal Grid Frequency	60Hz	
8	Power Factor	0.95（leading）～0.95（lagging）	
9	THD	<5%	at nominal power
System parameter			
10	Isolation Method	Transformer less	

11	Max. Efficiency	97.5%	
12	Nominal power	97%	
13	Enclosure Protection Grade	IP20（indoor）	
14	Allowable Environment Temperature	-25～+55℃	Nominal output under 50℃
15	Allowable Relative Humidity	5～95% （no frozen）	
16	Allowable Max. Altitude	6000m	Power derating over 3000m
17	Noise	<75dB	
18	Cooling	Air cooling	
19	Fresh Air Consumption	10000m^3/h	
20	Display	Touch screen	
21	Communication Interface	RS485/Ethernet	
保护功能			
22	Short-circuit Protection	√	
23	Over-load Protection	√	
24	DC Over-voltage and Under-voltage Protection	√	
25	Grid Monitoring	√	
26	Insulation Monitoring	√	
27	Over-temperature Protection	√	
28	DC Reverse Polarity Protection	√	
29	Islanding Protection	Active and Passive Detection	
Mechanical Parameter			
30	Dimension (W/L/D) (mm)	2000/600/2150	
31	Weight (kg)	1700	
Reference Standard			
32	Safety	UL 1741-2nd Ed (January 28, 2010)	
33	On-grid	IEEE 1547（2003） IEEE 1547.1(2005)	

■ **Performance features**

- Wide DC voltage input range, max. voltage is 1000V
- Output harmonic wave is small, max. efficiency is up to 97.5%
- Very short switch time of charging and discharging at full power
- Adjustable reactive power
- Active power derating
- Thin-film capacitor design improve the system service life

■ Topology

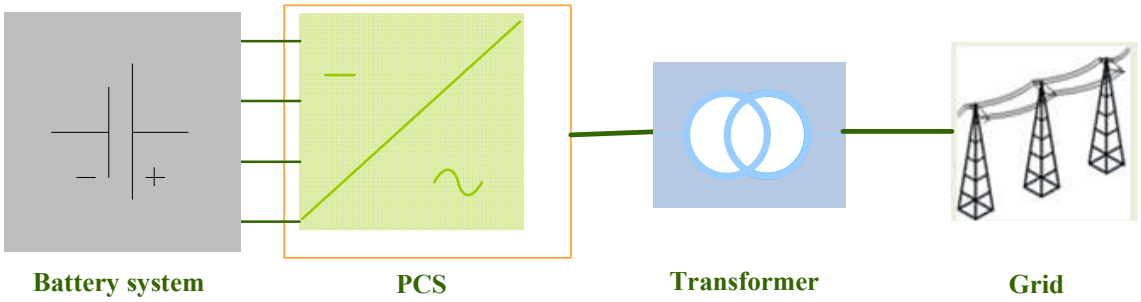


Figure 2: System Application

HEM

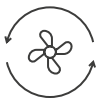
UTILITY SCALE MV CENTRAL STRING INVERTER

FIELD REPLACEABLE UNITS

OUTDOOR DURABILITY

BUS PLUS SOLAR + STORAGE

NEMA 3R



ICOOL 3

ACTIVE HEATING

3 LEVEL TOPOLOGY

ECON MODE

THE INNOVATIVE MEDIUM VOLTAGE CENTRAL STRING INVERTER

The Power Electronics HEM medium voltage inverter is designed for utility scale solar applications, that require the advantages of a central inverter solution but also the modularity of a string architecture. The HEM can reach up to a nominal power of 3.6 MVA, and offers a wide MPPT window. It also has the added advantage of having an integrated medium voltage transformer and switchgear.

The Bus Plus ready feature allows the connection of up to six Freemaq DC/DC converters. It is the most cost competitive solution for solar-plus-storage retrofits.

Its architecture, composed of six field replaceable units (FRU), is designed to provide the highest availability and optimize yield production. Its use in Utility Scale PV plants provides considerable savings in CAPEX, since having an integrated MV transformer and switchgear reduces the need of additional connections between the LV and MV sides.

Thanks to the Power Electronics iCOOL3 cooling system, the HEM is able to provide NEMA 3R degree of protection with an air cooling system, and as a result reducing OPEX costs. This product has been designed to be the lowest LCOE solution in the market for solar applications.

ROBUST DESIGN

Polymeric Painting

Closed-Cell Insulation

Galvanized Steel | Stainless Steel (Optional)

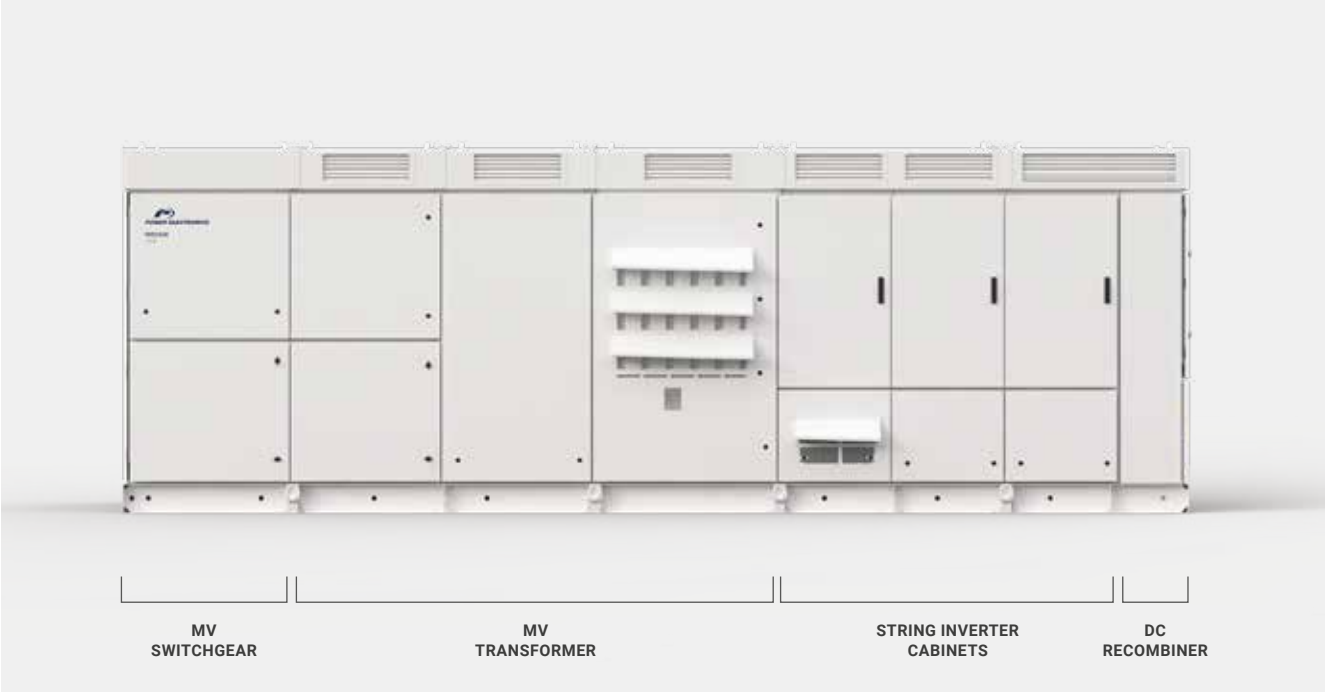
HEM inverter modules have a design life of greater than 30 years of operation in harsh environments and extreme weather conditions. HEM units are tested and ready to withstand conditions from the frozen Siberian tundra to the Californian Death Valley, featuring:

- Totally sealed electronics cabinet protects electronics against dust and moisture.
- Conformal coating on electronic boards shields PCBs from harsh atmospheres.
- Temperature and humidity controlled active heating prevents internal water condensation.
- C4 degree of protection according to ISO 12944.
  Up to C5-M optional.
- Closed-Cell insulation panel isolates the cabinet from solar heat gains.
- Roof cover designed to dissipate solar radiation, reduce heat build-up and avoid water leakages.
- The solid HEM structure avoids the need of additional external structures.
- Random units selected to pass a Factory Water Tightness Test ensuring product quality.
- NEMA 3R.

REAL TURN-KEY SOLUTION - EASY TO SERVICE

With the HEM, Power Electronics offers a real turn-key solution, including the MV transformer and switchgear fully assembled and tested at the factory. The HEM is a compact turn-key solution that will reduce site design, installation and connection costs, and therefore will minimize the LCOE.

By providing full front access the HEM series simplifies the maintenance tasks, reducing the MTTR (and achieving a lower OPEX). The total access allows a fast swap of the FRUs without the need of qualified technical personnel.



STRING CONCEPT POWER STAGES

The HEM combines the advantages of a central inverter with the modularity of the string inverters. Its power stages are designed to be easily replaceable on the field without the need of advanced technical service personnel, providing a safe, reliable and fast Plug&Play assembly system.

Following the modular philosophy of the Freesun series, the HEM is composed of 6 FRUs (field replaceable units), where all the power stages are physically joined in the DC side and therefore, in the event of a fault, the faulty module is taken off-line and its power is distributed evenly among the remaining functioning FRUs.

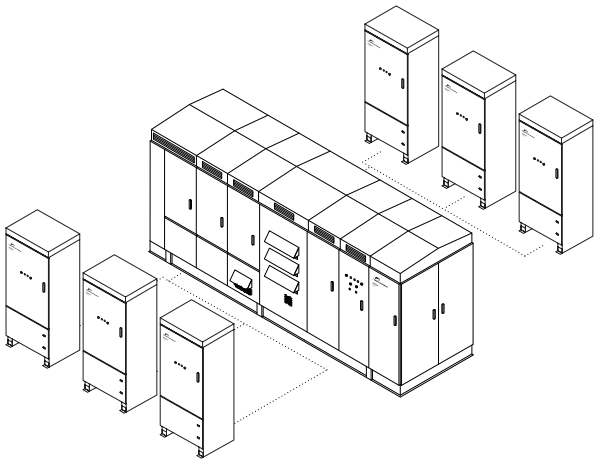
INNOVATIVE COOLING SYSTEM

Based on more than 3 years of experience with our MV Variable Speed Drive, the iCOOL3 system allows to get NEMA 3R degree of protection in an outdoor solar inverter. iCOOL3 delivers a constant stream of clean air to the FRUs and the MV transformer, being the most effective way of reaching up to NEMA 3R degree of protection, without having to maintain cumbersome dust filters or having to use liquid-cooling systems, avoiding the commonly known inconveniences of it (complex maintenance, risk of leaks, higher number of components…), therefore resulting in an OPEX cost reduction and a LCOE improvement.

BUS PLUS READY - SOLAR + STORAGE

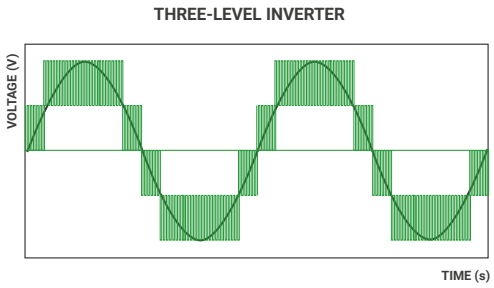
The Bus Plus feature allows the connection of up to six Freemaq DC/DC converters. It is the most cost competitive solution for solar-plus-storage retrofits. It prevents from additional connections out of the inverter between the DC/DC converters and the PV field. This solution provides considerable savings in CAPEX.

Power Electronics Freemaq DC/DC is a modular outdoor solution available from 500 kW to 3000 kW, fully compatible with different battery technologies and manufacturers. Freemaq DC/DC converter allows clipping energy recovery that will boost customer revenues and avoids the installation of additional station with a dedicated MV transformer.



MULTILEVEL TOPOLOGY

The multilevel IGBT topology is the most efficient approach to manage high DC link voltages and makes the difference in the 1,500 Vdc design. Power Electronics has many years of power design in both inverters and MV drives and the HEM design is the result of our experience with 3 level topologies. The 3 level IGBT topology reduces stage losses, increases inverter efficiency and minimizes total harmonic distortion. High efficiency to deliver the lowest LCOE.



VAR AT NIGHT

At night, in case of solar applications, the HEM inverter can shift to reactive power compensation mode. The inverter can respond to an external dynamic signal, a Power Plant Controller command or pre-set reactive power level (kVAr).

ACTIVE HEATING

At night, when the unit is not actively exporting power, the inverter can import a small amount of power to keep the inverter internal ambient temperature above -20°C, without using external resistors. This autonomous heating system is the most efficient and homogeneous way to prevent condensation, increasing the inverters availability and reducing maintenance. **PATENTED**

ECON MODE

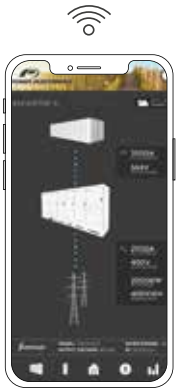
This innovative control mode allows increasing the efficiency of the MV transformer up to 25%, reducing the power consumption of the plant and therefore providing considerable savings. Available as an optional kit, this feature has a payback time of less than a few years, therefore resulting in the increase of the plant lifetime overall revenue.

EASY TO MONITOR

The Freesun app is the easiest way to monitor the status of our inverters. All our inverters come with built-in wifi, allowing remote connectivity to any smart device for detailed updates and information without the need to open cabinet doors.

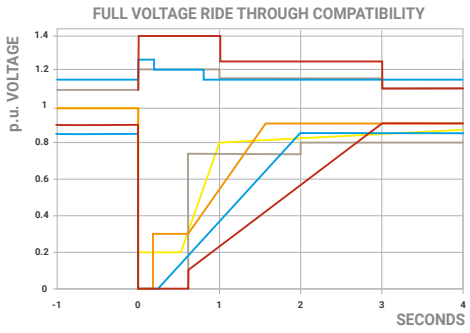
The app user-friendly interface allows quick and easy access to critical information (energy registers, production and events).

AVAILABLE INFORMATION	Grid and PV field data, inverter and power module data (voltages, currents, power, temperatures, I/O status...), weather conditions, alarms and warnings events, energy registers. Others.
FEATURES	Easy Wireless connection. Comprehensive interface. Real time data. Save and copy settings.
LANGUAGE	English, Spanish.
SYSTEM REQUIREMENTS	iOS or Android devices.
SETTINGS CONTROL	Yes.

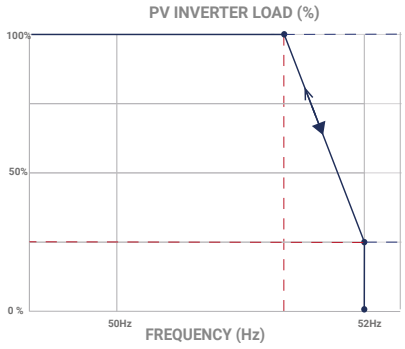


DYNAMIC GRID SUPPORT

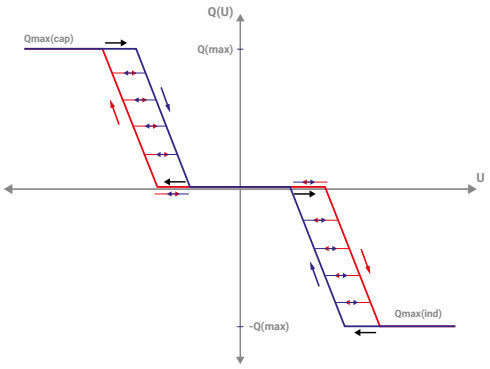
HEM firmware includes the latest utility interactive features (LVRT, OVRT, FRS, FRT, Anti-islanding, active and reactive power curtailment…), and can be configured to meet specific utility requirements.

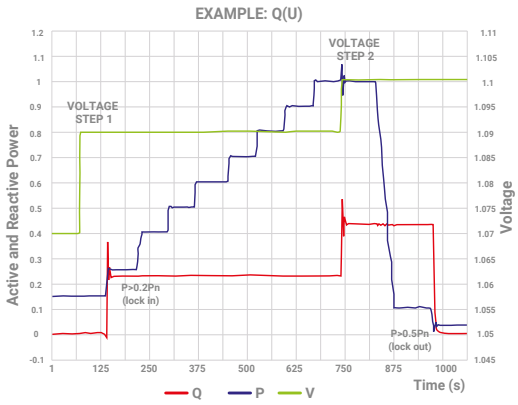


Low Voltage Ride Through (LVRT or ZVRT). Inverters can withstand any voltage dip or profile required by the local utility. In this situation, the inverter can inject current up to the nominal value.

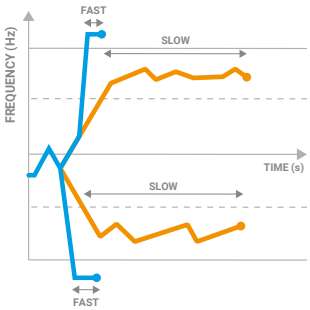


Frequency Regulation System (FRS). Frequency droop algorithm curtails the active power along a preset characteristic curve supporting grid stabilization.

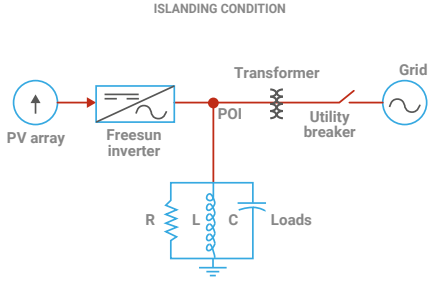




Q(V) curve. It is a dynamic voltage control function which provides reactive power in order to maintain the voltage as close as possible to its nominal value.



Frequency Ride Through (FRT). Freesun solar inverters have flexible frequency protection settings and can be easily adjusted to comply with future requirements.



Anti-islanding. This protection combines passive and active detection methods that eliminate nuisance tripping and allow to comply with the IEC 62116 and IEEE 1547 standards.

Introduction

In order to meet Energy storage market requirement, BYD developed 500kVA PCS (Power Conversion System) with years' experiences. This PCS is usually used for medium to large energy storage power station with high efficiency, reliable operation, high stability, and supplied for the following services: peak load shifting, adjustable reactive power etc.

PCS Topology

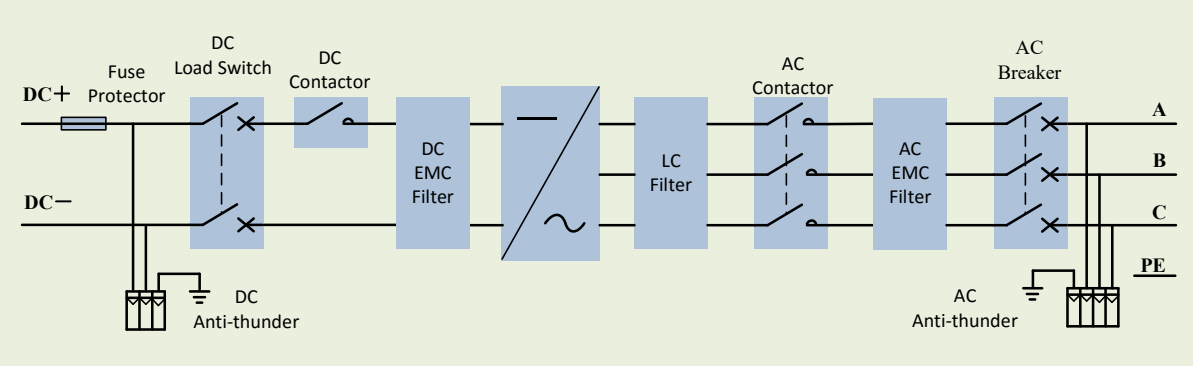


Figure 1: PCS Topology

System Parameters

No.	Item	Parameter	Remark
1	Type	BEG500KTL-U	
Parameters at DC side			
2	DC Voltage range	780～1000Vdc	
3	Max. DC current	700A	
Parameters at AC side			
4	Nominal AC voltage	480Vac	
5	Max.AC current	600A	
6	AC power	500kW	
7	Nominal Grid Frequency	60Hz	
8	Power Factor	0.95（leading）～0.95（lagging）	
9	THD	<5%	at nominal power
System parameter			
10	Isolation Method	Transformer less	

11	Max. Efficiency	97.5%	
12	Nominal power	97%	
13	Enclosure Protection Grade	IP20（indoor）	
14	Allowable Environment Temperature	-25～+55℃	Nominal output under 50℃
15	Allowable Relative Humidity	5～95% （no frozen）	
16	Allowable Max. Altitude	6000m	Power derating over 3000m
17	Noise	<75dB	
18	Cooling	Air cooling	
19	Fresh Air Consumption	10000m^3/h	
20	Display	Touch screen	
21	Communication Interface	RS485/Ethernet	
保护功能			
22	Short-circuit Protection	√	
23	Over-load Protection	√	
24	DC Over-voltage and Under-voltage Protection	√	
25	Grid Monitoring	√	
26	Insulation Monitoring	√	
27	Over-temperature Protection	√	
28	DC Reverse Polarity Protection	√	
29	Islanding Protection	Active and Passive Detection	
Mechanical Parameter			
30	Dimension (W/L/D) (mm)	2000/600/2150	
31	Weight (kg)	1700	
Reference Standard			
32	Safety	UL 1741-2nd Ed (January 28, 2010)	
33	On-grid	IEEE 1547（2003） IEEE 1547.1(2005)	

■ **Performance features**

- Wide DC voltage input range, max. voltage is 1000V
- Output harmonic wave is small, max. efficiency is up to 97.5%
- Very short switch time of charging and discharging at full power
- Adjustable reactive power
- Active power derating
- Thin-film capacitor design improve the system service life

■ Topology

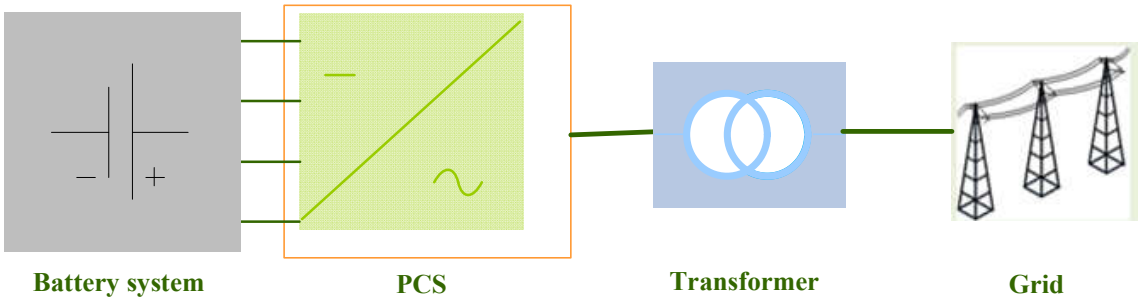


Figure 2: System Application

Transformer Performance Specification

For: For reference only Date: 3/20/2019

Quote: Item: Spec:

Rating								
Type	Substation Non-Auto	Class	H Winding		X Winding		Y Winding	
Phase	3		69	kV	34.5	kV	-	
Hertz	60	ONAN	72000	KVA	72000	KVA	-	KVA
Temp Rise	65 C	ONAF	96000	KVA	96000	KVA	-	KVA
Insulating Type	Mineral Oil	ONAF	120000	KVA	120000	KVA	-	KVA

Additional Tap Voltages	
H Winding (kV)	+2 -2 2.5%, DETC
X Winding (kV)	No Taps
Y Winding ()	-

Connections for Operation									
Transformers in Bank	To Transform from	Phase	Connected	To Transform from	Phase	Connected	To Transform To	Phase	Connected
1	69 kV	3	Delta	34.5 kV	3	Wye	-	3	-

Dielectric Tests				Insulation Levels	
Applied Voltage (To other windings and ground)	H Winding	34	kV	ITEMS	Basic Lightning Impulse Insulation Level (BIL kV)
	X Winding	34	kV		
	Y Winding	-	kV	H line	350
Induced Voltage	Enhancement level / 7200 Cycle (L-G)	72	kV	H neutral	-
				X line	150
	One hour level (L-G)	63	kV	X neutral	150
				Y line	-

Loss Data based on	NL @ 20C, LL @ 85C					
Based on loading at	69 kV	To	34.5 kV			
Winding Load KVA	H	72000	X	72000	Y	-
No Load Loss	TBD kW		Total Loss	TBD kW		

Regulation at		
69 kV	/	34.5 kV
72000		KVA
Power Factor	% Reg	% Load
1.0	TBD	100
0.8	TBD	100

Auxiliary Losses (Not included in above)	Percent Exciting Current	
	100% V	110% V
TBD kW	TBD	TBD

Average Sound Level	
dB(A)	Class
77	ONAN
79	ONAF
80	ONAF

Percent Impedance Voltage		
% IZ	Between Windings	At KVA
7.5	HV-XV	72000

Mechanical Data
Not for Construction Purposes

Drawing		
Height	(A)	216 in
Length	(B)	317 in
Width	(C)	188 in
Height over Cover	(D)	172 in
Untanking (Plus Slings)	(E)	291 in
Shipping Height		168 in
Shipping Width		118 in
Shipping Length		170 in
Oil Preservation		InertAir
Weights (approximate) (lbs)		
Core and Coils		112900 lbs
Tank and Fittings		66600 lbs
Fluid 7400 gal		54900 lbs
Total Weight		234400 lbs
Untanking Weight		112900 lbs
Shipping Weight		134900 lbs
Shipped in		Dry Air

For reference only – Losses and dimensions needs to be revised

WEG Transformers USA
One Pauwels Drive, Washington, MO 63090, USA
www.weg.net T: 1-636-239-9300 F: 1-636-239-9395

TECHNICAL SPECS

Customer Line No.:	Battery Storage System	**Quantity:**	36

Three Phase Pad-Mount Transformer(s)

kVA Rating:	3360 kVA	**Model #:**	
	Envirotemp FR3	**Cooling Class:**	KNAN
		Frequency:	60 Hz
		Avg. Winding Temp.	65 °C
Primary Voltage:	34500 Delta volts	**Secondary Voltage:**	600Y volts
Primary BIL Rating:	150 kV	**Secondary BIL Rating:**	45 kV
HV Winding Matl:	Aluminum	**LV Winding Matl:**	Aluminum
High Voltage Taps:	B Taps - Two 2.5% Taps below Nominal and Two 2.5% Taps above Nominal		
No Load Loss:	4200 Watts	**Load Loss:** 24300 Watts	**Total Loss:** 28500 Watts
Impedance:	5.75 %		

Tank Enclosure:
Welded Cover w/(1) Handhole(s) - 14x24
Cabinet Depth: 40 Inches, Pentahead Security Bolts
Steel HV-LV Barrier

Bushings:
Loop Feed ANSI Minimum Dimensions
Dead Front Primary Terminations: Integral Non-Loadbreak Bushings 600 Amp
Secondary Terminations: Epoxy Bushings w/Non-removable 12 Hole Spades, Spade Support

Protection:
PRCLF (), Weak Link Cartridge ()

Accessories:
Pressure Relief Valve Viat, Cover-Mounted Pressure Relief Device (), Drain valve w/Sampler
Liquid Level Gauge /w Contacts (Qty=1), Liquid Temperature Gauge, Pressure Vacuum Gauge

2-Winding SOLARPAD: Stadium Style Stacked Core Construction with Semi-Round Windings, Reduced Flux Density, Electrostatic Winding Shields, Increased Cooling, Door Gasketing, Hold down anchoring (x4 holes), Drain Valve & Sampler in External Box, Isolated Core Ground, Nitrogen Blanket, Schrader Valve, UL Listed

-Externally mounted gauges in pad lockable enclosure
-Externally mounted MV Switch in pad lockable enclosure
-HV located on the left and LV compartment located on the right
-Oil Temp Sensor: Analog output with 4-20mA transmitter, -50C to +150C
-Losses are at 20C core and 85C winding and are for reference only. ANSI tolerances will apply to quoted losses.

Switching:
Internally Isolated and Floating Neutral , One ON/OFF Transformer Switch (300 Amps)

Paint Color:
ASA #70 GRAY (Munsell 5.0BG7.0/0.4), Touch-up Paint Spray Can ,

Standards:
Quoted in compliance with the latest applicable ANSI standards unless otherwise specified by the customer.

Appendix E

Sample Noise Barrier

Acoustical Surfaces, Inc.

SOUNDPROOFING, ACOUSTICS, NOISE & VIBRATION CONTROL SPECIALISTS

123 Columbia Court North • Suite 201 • Chaska, MN 55318

(952) 448-5300 • Fax (952) 448-2613 • (800) 448-0121

Email: sales@acousticalsurfaces.com

Visit our Website: www.acousticalsurfaces.com

We Identify and S.T.O.P. Your Noise Problems

Echo Barrier™

The Industry's First Reusable, Indoor/ Outdoor Noise Barrier/Absorber

- Superior acoustic performance
- Industrial durability
- Simple and quick installation system
- Lightweight for easy handling
- Unique roll-up design for compact storage and transportation
- Double or triple up for noise 'hot spots'
- Ability to add branding or messages
- Range of accessories available
- Weatherproof – absorbs sound but not water
- Fire retardant
- 1 person can do the job of 2 or 3 people

Why is it all too often we see construction sites with fencing but no regard for sound issues created from the construction that is taking place? This is due to the fact that there has not been an efficient means of treating this type of noise that was cost effective ***until now.***

Echo Barrier temporary fencing is a reusable, outdoor noise barrier. Designed to fit on all types of temporary fencing. Echo Barrier absorbs sound while remaining quick to install, light to carry and tough to last.

BENEFITS: Echo Barrier can help reduce noise complaints, enhance your company reputation, extend site operating hours, reduce project timescales & costs, and improve working conditions.

APPLICATIONS: Echo Barrier works great for construction & demolition sites; rail maintenance & replacement; music, sports and other public events; road construction; utility/maintenance sites; loading and unloading areas; outdoor gun ranges.

DIMENSIONS: 6.56' × 4.49'.

WEIGHT: 13 lbs.

ACOUSTIC PERFORMANCE: 10-20dB noise reduction (greater if barrier is doubled up).

INSTALLATION: The Echo Barrier is easily installed using our quick hook system and specially designed elastic ties.

Echo Barrier Transmission Loss Field Data							
	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
Single Layer	6	12	16	23	28	30	30
Double Layer	7	19	24	28	32	31	32