DOCKETED

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Project Title:	Soda Mountain Solar
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Document Title:	Section 3-13 Noise
Description:	This Section evaluates the direct, indirect and cumulative impacts the Project may have related to noise and identifies any required Applicant-Proposed Measures (APM) and any required Mitigation Measures.
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3.13 NOISE

This section evaluates impacts regarding noise that may result directly or indirectly from the project. The analysis in this section describes the applicable regulations, presents an overview of existing conditions, identifies the criteria used for determining the significance of environmental impacts, lists applicant-proposed measures (APMs) that would be incorporated into the project to avoid or substantially lessen potentially significant impacts to the extent feasible, and describes the potential noise impacts of the proposed project. The analysis is based on a review of existing resources, technical data, and applicable laws, regulations, plans, and policies, as well as the following technical reports prepared for the project:

- *Noise and Ground Vibration Technical Report* prepared by SWCA Environmental Consultants (2024) (Appendix L).

3.13.1 Regulatory Setting

3.13.1.1 Federal

DESERT RENEWABLE ENERGY CONSERVATION PLAN

In September 2016, the Bureau of Land Management (BLM) adopted the Desert Renewable Energy Conservation Plan (DRECP) Land Use Plan Amendment (LUPA) to the California Desert Conservation Area Plan, Bishop Resource Management Plan, and Bakersfield Resource Management Plan. The DRECP LUPA addresses solar, wind, geothermal energy generation, and transmission projects on 10.8 million acres of BLM-administered lands in the desert regions of southern California (BLM 2016).

The BLM DRECP LUPA establishes several land use classifications, including Development Focus Areas (DFAs), Variance Process Lands (VPLs), Recreation Management Areas, General Public Lands, and various conservation land use designations. In DFAs, renewable energy projects are incentivized and permitting is streamlined. Renewable energy projects may be implemented on VPLs, but they must first be evaluated under a variance process and then approved by BLM to proceed through National Environmental Policy Act environmental review. BLM Conservation Areas include National Landscape Conservation System lands, Areas of Critical Environmental Concern (ACECs), and Wildlife Allocations. Recreation Management Areas are designated for recreation actions. This designation includes Extensive Recreation Management Areas, which entail management specifically to address recreation use and demand, and Special Recreation Management Areas, which are high-priority areas for recreation and have unique value and importance for recreation. General Public Lands are BLM-administered lands that do not have a specific land allocation or designation associated with energy development, conservation, or recreation. These lands are not needed to fulfill the DRECP biological conservation or renewable energy strategy. These areas are available to renewable energy applications but do not benefit from permit review streamlining or other incentives.

Most of the project site is on DRECP General Public Lands, and the generation-tie (gen-tie) line route is within an ACEC.

FEDERAL TRANSIT ADMINISTRATION

The Federal Transit Administration (FTA) established specific vibration impact thresholds to assess the potential effects on noise-sensitive buildings, residences, and institutional land uses. These thresholds have been designed primarily for evaluating the impacts resulting from the operation of mass transit systems, including heavy and light rail, buses, and similar transportation modes. The vibration impact thresholds specified by the FTA are as follows:

- Residences and buildings where people normally sleep: The threshold for vibration impacts at these locations is set at 80 vibration velocity decibels (VdB). This includes nearby residential areas and facilities such as daycare centers, where people reside or regularly sleep.
- Institutional buildings: For institutional buildings such as schools and churches, the threshold for vibration impacts is slightly higher and is set at 83 VdB. This recognizes the importance of ensuring minimal disturbance to sensitive activities that take place in such establishments.

When evaluating the potential impacts of ground-borne vibration on buildings and structures, the guidelines provided by FTA are often used as a reference. The FTA's *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) serves as a valuable resource in assessing the criteria for determining the potential impact to buildings, particularly during construction activities.

Table 3.13-1 specifically outlines the vibration criteria established by the FTA that are applicable to construction activities. These vibration impact thresholds established by the FTA serve as guidelines for assessing and managing potential impacts from mass transit system operations. They provide a standardized framework to evaluate vibrations and their potential effects on noise-sensitive structures and activities. It is important to note that these specific thresholds developed by the FTA may not directly apply to a solar project located in San Bernardino County, California. However, the nearest noise-sensitive area (NSA) to the project is in San Bernardino County, which has vibration impact thresholds based on FTA thresholds. As a result, these impact thresholds have been used to assess project-related vibrational impacts.

Table 3.13-1. Construction Vibration Impact Criteria for Building Damage

Building Category	Peak Particle Velocity (inches/second)
I. Reinforced-concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

Source: FTA (2018)

OCCUPATIONAL SAFETY AND HEALTH ACT

Under the Occupational Safety and Health Act of 1970 (29 United States Code 651 et seq.), the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) adopted regulations (29 Code of Federal Regulations 1910.95) designed to protect workers against the effects of occupational noise exposure. These regulations list limits on noise exposure levels as a function of the amount of time during which the worker is exposed (Table 3.13-2). The regulations further specify requirements for a hearing conservation program (1910.95(c)), a monitoring program (1910.95(d)), an audiometric testing program (1910.95(g)), and hearing protection (1910.95(i)). There are no federal laws governing community noise.

Table 3.13-2. OSHA-Permissible Noise Exposure Standards

Duration of Noise (hours/day)	A-Weighted Noise Level (dBA)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

Source: U.S. Environmental Protection Agency (1974); 29 Code of Federal Regulations 1910.95, Table G-16.
dBA = A-weighted decibels

Although no federal noise regulations exist, the U.S. Environmental Protection Agency (EPA) has promulgated noise guidelines (EPA 1974). The EPA guideline recommends a day-night noise level (Ldn) of 55 A-weighted decibels (dBA) to protect the public from the effect of broadband environmental noise outdoors in residential areas, farms, and other outdoor areas where people spend widely varying amounts of time, and in other places in which quiet is a basis for use (EPA 1974).

3.13.1.2 State

CALIFORNIA GOVERNMENT CODE SECTION 65302

The State of California has not adopted statewide regulations or standards for noise. However, the State of California General Plan Guidelines, published and updated by the Governor's Office of Planning and Research (OPR), provides standards and the acceptable noise categories for different land uses (OPR 2017) (Figure 3.13-1).

California also requires each local government entity to perform noise studies and implement a noise element as part of its general plan. The purpose of the noise element is to limit the exposure of the community to excessive noise levels; the noise element must be used to guide decisions concerning land use.

There are no state ground-borne vibration standards that directly apply to the project.

CALIFORNIA OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

The California Occupational Safety and Health Administration (Cal OSHA) has promulgated Occupational Noise Exposure Regulations (9 California Code of Regulations 5095–5099) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards described above.

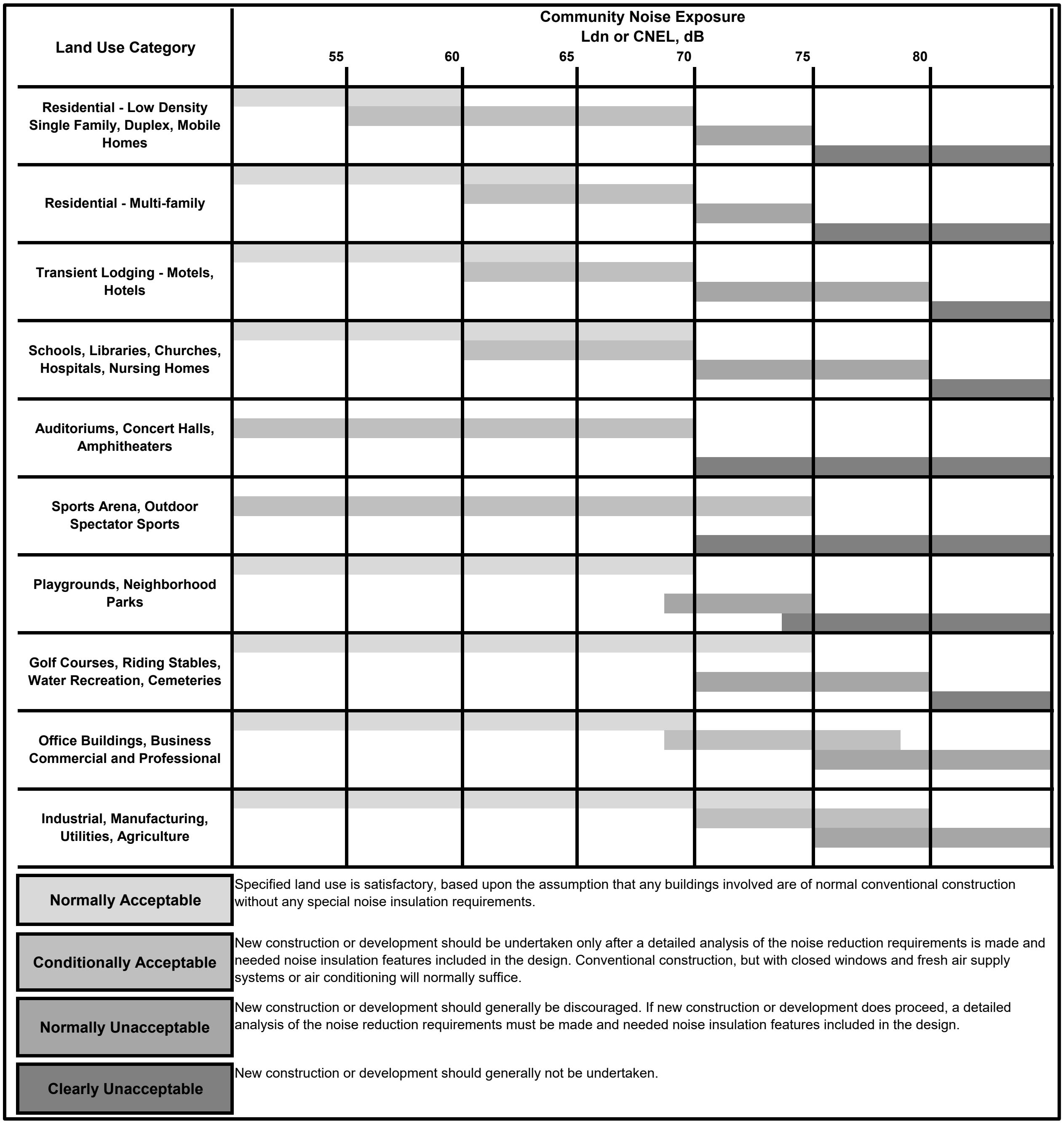

Figure 3.13-1. Land use compatibility for exterior community noise exposure (OPR 2017: Appendix D, Figure 2).

3.13.1.3 Local

SAN BERNARDINO COUNTYWIDE PLAN

The San Bernardino Countywide Plan (San Bernardino County 2024a), adopted by the Board of Supervisors in 2020, updates and expands the County's General Plan by addressing the physical, social, and economic issues facing the unincorporated portions of the county. The Countywide Plan consists of the Policy Plan, the Business Plan, and a communities plan. The Policy Plan, based on the former General

Plan, consists of 11 elements: Land Use, Housing, Infrastructure and Utilities, Transportation and Mobility, Natural Resources, Renewable Energy and Conservation, Cultural Resources, Hazards, Personal and Property Protection, Economic Development, and Health and Wellness. The Business Plan consists of a policy-based governance element along with an implementation plan. The communities plan consists of 35 Community Action Guides that provide a framework for communities to create future character and independent identity through community actions.

San Bernardino County's Policy Plan aims to reduce the community's exposure to high noise levels through objectives, guidelines, and initiatives that are essential for guiding decisions related to land uses often associated with high noise levels. Although the project is located on BLM land, the nearest identified NSA is in San Bernardino. As a result, the San Bernardino County guidelines were used to assess project-related noise and vibration impacts. The following policies (quoted directly) identified in the San Bernardino County Policy Plan are relevant to this analysis (San Bernardino County 2024b).

Goal HZ-2 Human-generated hazards. People and the natural environment protected from exposure to hazardous materials, excessive noise, and other human-generated hazards.

- **Policy HZ-2.6 Coordination with transportation authorities**. We collaborate with airport owners, FAA [Federal Aviation Administration], Caltrans [California Department of Transportation], SBCTA [San Bernardino Transportation Authority), SCAG [Southern California Association of Governments], neighboring jurisdictions, and other transportation providers in the preparation and maintenance of, and updates to transportation-related plans and projects to minimize noise impacts and provide appropriate mitigation measures.
- **Policy HZ-2.7 Truck delivery areas**. We encourage truck delivery areas to be located away from residential properties and require associated noise impacts to be mitigated.
- **Policy HZ-2.8 Proximity to noise generating uses**. We limit or restrict new noise sensitive land uses in proximity to existing conforming noise generating uses and planned industrial areas.
- **Policy HZ-2.9 Control sound at the source**. We prioritize noise mitigation measures that control sound at the source before buffers, soundwalls, and other perimeter measures.
- **Policy HZ-2.10 Agricultural operations**. We require new development adjacent to existing conforming agricultural operations to provide adequate buffers to reduce the exposure of new development to operational noise, odor, and the storage or application of pesticides or other hazardous materials.

Goal TM-6 Airports. A network of local and regional airports that meet regional and local aviation needs.

- **Policy TM-6.1 Local airports**. We maintain County airports and coordinate with other local airports to provide general aviation services to residents and businesses throughout the county.
- **Policy TM-6.4 Airport land use compatibility**. We require proposed development in unincorporated areas to be consistent with applicable airport master plans, airport safety review areas, and military air installation compatible use zones. We may support proposed development in the influence area of County airports only when they are consistent with applicable airport master plans.
- **Policy TM-6.5 Coordination on airport planning**. We collaborate with FAA, military installations, Caltrans Division of Aeronautics, airport owners, neighboring jurisdictions, and other stakeholders in the preparation, update, and maintenance of airport-related plans.

SAN BERNARDINO COUNTY CODE

San Bernardino County's (the County's) Development Code (Division 3, Countywide Development Standards; Chapter 83.01, General Performance Standards, 83.01.080, Noise) sets interior and exterior noise standards for specific land uses by type of noise source. The noise standard for residential properties is 55 dBA equivalent noise level (Leq) from 7 a.m. to 10 p.m. and 45 dBA Leq from 10 p.m. to 7 a.m. (Table 3.13-3). For industrial properties, the noise standard from stationary noise sources is 70 dBA at any time of the day or night. Areas exposed to noise levels exceeding these standards are considered noise-impacted areas. The County's Development Code exempts noise from construction, provided that construction is limited to between 7 a.m. and 7 p.m., except on Sundays or federal holidays, when construction is not allowed. Sections 83.01.080 and 83.01.090 of the County's Development Code are quoted directly below:

> **83.01.080 Noise**
>
> This Section establishes standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses.
>
> a) *Noise Measurement.* Noise shall be measured:
>
> 1. At the property line of the nearest site that is occupied by, and/or zoned or designated to allow the development of noise-sensitive land uses;
>
> 1. With a sound level meter that meets the standard of the American National Standards Institute (ANSI Section S14-1979, Type 1 or Type 2);
>
> 2. Using the "A" weighted sound pressure level scale in decibels (ref. pressure = 20 micronewtons per meter squared). The unit of measure shall be designated as dB(A).
>
> b) *Noise Impacted Areas.* Areas within the County shall be designated as "noise-impacted" if exposed to existing or projected future exterior noise levels from mobile or stationary sources exceeding the standards listed in Subdivision (d) (Noise Standards for Stationary Noise Sources) and Subdivision (e) (Noise Standards for Adjacent Mobile Noise Sources), below. New development of residential or other noise-sensitive land uses shall not be allowed in noise- impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels to these standards. Noise-sensitive land uses shall include residential uses, schools, hospitals, nursing homes, religious institutions, libraries, and similar uses.
>
> c) *Noise Standards for Stationary Noise Sources.*
>
> 1. Noise Standards. Table 83-2 [reproduced below as Table 3.13-3] describes the noise standard for emanations from a stationary noise source, as it affects adjacent properties:
>
> 2. Noise Limit Categories. No person shall operate or cause to be operated a source of sound at a location or allow the creation of noise on property owned, leased, occupied, or otherwise controlled by the person, which causes the noise level, when measured on another property, either incorporated or unincorporated, to exceed any one of the following:
>
> A) The noise standard for the receiving land use as specified in Subdivision (b) (Noise-Impacted Areas), above, for a cumulative period of more than 30 minutes in any hour.
>
> B) The noise standard plus five dB(A) for a cumulative period of more than 15 minutes in any hour.

C) The noise standard plus ten dB(A) for a cumulative period of more than five minutes in any hour.

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

E) The noise standard plus 20 dB(A) for any period of time.

Table 3.13-3. San Bernardino County Noise Standards for Stationary Noise Sources

Affected Land Uses (receiving noise)	7 a.m.–10 p.m. Leq	10 p.m.–7 a.m. Leq
Residential	55 dBA	45 dBA
Professional services	55 dBA	55 dBA
Other commercial	60 dBA	60 dBA
Industrial	70 dBA	70 dBA

Source: San Bernardino County Code of Ordinances 83.01.080.

d) *Noise Standards for Adjacent Mobile Noise Sources.* Noise from mobile sources may affect adjacent properties adversely. When it does, the noise shall be mitigated for any new development to a level that shall not exceed the standards described in the following Table 83-3 [reproduced below as Table 3.13-4].

Table 3.13-4. San Bernardino County Noise Standards for Mobile Noise Sources

Land Uses		Ldn (or CNEL) dB(A)	
Categories	**Uses**	**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

Source: San Bernardino County Code of Ordinances 83.01.080.

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 dB(A) (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 dB(A) (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.

Ldn = (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 from 10:00 p.m. to 7:00 a.m.

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

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 83-2 (Noise Standards for Stationary Noise Sources [see Table 3.13-3]) shall be reduced by five dB(A).

g) *Exempt Noise.* The following sources of noise shall be exempt from the regulations of this Section:

1. Motor vehicles not under the control of the commercial or industrial use.

3. Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

h) *Noise Standards for Other Structures.* All other structures shall be sound attenuated against the combined input of all present and projected exterior noise to not exceed the criteria [reproduced below as Table 3.13-5].

Table 3.13-5. San Bernardino County Noise Standards for Other Structures

Typical Uses	12-Hour Equivalent Sound Level (Interior) in dBA Ldn
Education, institutions, libraries, meeting facilities, etc.	45 dB(A)
General office, reception, etc.	50 dB(A)
Retail stores, restaurants, etc.	55 dB(A)
Other areas for manufacturing, assembly, testing, warehousing, etc.	65 dB(A)

Source: San Bernardino County Code of Ordinances 83.01.080.

83.01.090 Vibration

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 inches per second measured at or beyond the lot line.

b) *Vibration Measurement*. Vibration velocity shall be measured with a seismograph or other instrument capable of measuring and recording displacement and frequency, particle velocity, or acceleration. Readings shall be made at points of maximum vibration along any lot line next to a parcel within a residential, commercial and industrial land use zoning district.

c) *Exempt Vibrations*. The following sources of vibration shall be exempt from the regulations of this Section.

1. Motor vehicles not under control of the subject use.
2. Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

3.13.2 Environmental Setting

3.13.2.1 Noise Fundamentals

This section provides a brief overview of noise fundamentals, noise assessment components, and examples of sound levels from a variety of sources.

DEFINITION OF ACOUSTICAL TERMS

Noise is commonly defined as sound that is undesirable because it interferes with speech communication and hearing, causes sleep disturbance, or is otherwise annoying. The following acoustical terms are used throughout this analysis:

- Ambient sound level is defined as the composite of noise from all sources near and far, i.e., the normal or existing level of environmental noise at a given location.
- Decibel (dB) is the physical unit commonly used to measure sound levels. Technically, a dB is a unit of measurement that describes the amplitude of sound equal to 20 times the base 10 logarithm of the ratio of the reference pressure to the sound of pressure, which is 20 micropascals (μPa).
- Sound measurement is further refined by using a dBA scale that more closely measures how a person perceives different frequencies of sound; the A-weighting reflects the sensitivity of the ear to low or moderate sound levels.
- Leq is the energy average A-weighted noise level during the measurement period.
- The root-mean-squared maximum noise level (Lmax) characterizes the maximum noise level as defined by the loudest single noise event over the measurement period.
- Day-night average noise level (L_{dn}) is the A-weighted equivalent sound level for a 24-hour period with an additional 10-dB weighting imposed on the equivalent sound levels occurring during nighttime hours (10:00 p.m. to 7:00 a.m.).
- Community noise equivalent level (CNEL) is a measure of the 24-hour average noise level that penalizes noise that occurs during the evening and nighttime hours, when noise is considered more disturbing. To account for this increase in disturbance, 5 dBA is added to the hourly Leq during the evening hours (7:00 p.m. to 10:00 p.m.) and 10 dBA is added during the nighttime hours (10:00 p.m. to 7:00 a.m.).
- Percentile-exceeded sound level (Ln) describes the sound level exceeded for a given percentage of a specific period.

SOUND LEVELS OF REPRESENTATIVE SOUNDS AND NOISES

The EPA has devised an index for evaluating the impact of noise originating from various sources when affecting residential areas. In tranquil rural settings during nighttime, noise typically registers between 32 and 35 dBA. In urban areas with low noise levels during the nighttime, readings typically fall within the range of 40 to 50 dBA. In bustling urban areas during daylight hours, noise levels can frequently escalate to as high as 70 to 80 dBA. Noise levels exceeding 110 dBA are considered unmanageable, while continuous exposure to levels exceeding 80 dBA can lead to hearing impairment. Levels surpassing 70 dBA are often linked to disruptions in tasks, and noise levels ranging from 50 to 55 dBA typically correspond to raised voices during a regular conversation (EPA 1974).

Criteria have been established to estimate an individual's perception to increases in sound (Table 3.13-6). In general, an average person perceives an increase of 3 dBA or less as barely perceptible. An increase of 10 dBA is perceived as a doubling of the sound.

Table 3.13-6. Average Human Ability to Perceive Changes in Sound Levels

Increase in Sound Level (dBA)	Human Perception of Sound
2–3	Barely perceptible
5	Readily noticeable
10	Doubling of the sound
20	Dramatic change

Source: Bolt, Beranek and Newman, Inc. (1973)

Note: Perception levels apply to noise experienced in an urban or natural environment, not in a controlled auditory lab.

Table 3.13-7 presents sound levels for some common noise sources.

Table 3.13-7. Sound Levels of Representative Sounds and Noises

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

Source: FTA (2018).

NOISE ASSESSMENT COMPONENTS

A noise assessment is based on the following components: a sound-generating source, a medium through which the source transmits, the pathways taken by these sounds, and an evaluation of the proximity to noise receptors. Soundscapes are affected by the following factors:

1. Source. The sources of sound are any generators of small back-and-forth motions (i.e., motions that transfer their motional energy to the transmission path where it is propagated). The acoustic characteristics of the sources are very important. Sources must generate sound of sufficient strength, approximate pitch, and duration so that the sound may be perceived and can cause adverse effects, compared with the natural ambient sounds.
2. Transmission path or medium. The transmission path or medium for sound or noise is most often the atmosphere (i.e., air). For the noise to be transmitted, the transmission path must support the free propagation of the small vibratory motions that make up the sound. Atmospheric conditions (e.g., wind speed and direction, temperature, humidity, precipitation) influence the attenuation of sound. Barriers and/or discontinuities (e.g., existing structures, topography, foliage, ground cover, etc.) that attenuate the flow of sound may compromise the path. For example, sound will travel very well across reflective surfaces such as water and pavement but can attenuate across rough surfaces (e.g., grass, loose soil).
3. Proximity to noise-sensitive receptors. A noise-sensitive receptor is usually defined as a location where a state of quietness is a basis for use or where excessive noise interferes with the normal use of the location. Typical receptors include residential areas, monuments, schools, hospitals, churches, and libraries.

3.13.2.2 Ground-borne Vibration Fundamentals

This chapter describes basic concepts related to ground-borne vibration. Ground-borne vibration is a small, rapidly fluctuating motion transmitted through the ground. When seismic waves are perceptible (when they can be felt), they are called ground vibrations. Seismic waves are divided into two classes: body waves and surface waves.

1. Body waves travel across a rock mass, penetrating down into its interior. There are two forms of body waves: compressional waves and shear waves. The compressional wave (P-wave) is a push-pull wave that produces alternating compression and dilatation in the direction of wave travel. The shear wave (S-wave) is produced when the medium particles oscillate perpendicular to the propagation direction.
2. Surface waves (L-waves) travel over the surface of a rock mass but do not travel through it. Surface waves are generated by body waves that are constrained by physical and geometrical conditions from traveling into the rock mass. Surface waves are the large energy carriers and account for the largest ground motions. There are two fundamental types of surface waves: Rayleigh waves and Love waves (Q-waves). Rayleigh and Love waves represent the energy measured by a seismograph and are the main component of vibration when examining ground vibration from blasting activities.

The ground vibration from surface waves is measured as the velocity of motion, or how many inches per second the ground is moving. The motion of the ground particles (vibration) happens in three dimensions: radial, transverse, and vertical. During vibration, each particle has a velocity, and the maximum velocity is referred to as the peak particle velocity (PPV). The resulting vector of all three components (i.e., radial, transverse, and vertical) combined is referred to as peak vector sum (PVS).

The industry standard is to use the readings of the PPV as the metric to measure the intensity of the ground vibration. In reporting, the maximum measurement of any of the three components is used rather than the resulting PVS.

GROUND VIBRATION TERMS

Ground vibration is described using the following terms:

- Acceleration: the rate at which particle velocity changes
- Displacement: the farthest distance that the ground moves before returning to its original position
- Frequency: the number of oscillations per second that a particle makes when under the influence of seismic waves
- Hertz (Hz): the unit of acoustic or vibration frequency representing cycles per second
- PPV: the greatest particle velocity associated with an event
- PVS: the square root of the sum of the squares of the individual PPV values in all three vector directions
- Particle velocity: the velocity at which the ground moves
- Propagation velocity: the speed at which a seismic wave travels from the blast
- Root mean square (RMS): the square root of the mean-square value of an oscillating waveform, where the mean-square value is obtained by squaring the value of amplitudes at each instant of time and then averaging these values over the sample time
- Vibration velocity level (LV): 10 times the common logarithm of the ratio of the square of the amplitude of the RMS vibration velocity to the square of the amplitude of the reference RMS vibration velocity

GROUND VIBRATION AND STRUCTURE DAMAGE

Ground vibrations have the capacity to induce lasting alterations in the positions of the constituent particles making up structures. These enduring alterations, which are undesirable, are informally termed as damage. The magnitude of the vibration, signifying higher ground movement speeds, amplifies the likelihood of these lasting shifts in particle positions within structures. Table 3.13-8 provides an overview of the impacts of PPVs on structures and materials.

Table 3.13-8. Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (inches/second)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Note: Modified from Table 19, Guideline Vibration Damage Potential Threshold Criteria (California Department of Transportation 2020).

While ground vibrations can potentially lead to structural damage, observable damage from vibrations often manifests as visible cracks in materials like drywall, plaster, and exterior surfaces such as grout and stucco. Important to note is that such damage may or may not signify structural issues. Cosmetic damage of this nature can also result from factors like settling, temperature fluctuations, and the natural aging of a building. Consequently, the presence of a few hairline cracks in a house does not necessarily imply that vibrations are the root cause.

GROUND VIBRATION AND HUMAN PERCEPTION

Beyond concerns related to structural damage, ground vibrations can, under specific conditions, startle or irritate individuals. Assessing human reactions to vibration is challenging due to variations in individual perception. Humans can detect ground vibrations at lower levels than those that can potentially affect structures negatively (see Table 3.13-8). The human body is capable of distinctly sensing ground vibrations as low as 0.1 inch per second, and some individuals may perceive even lower levels.

The reason the general public might find ground vibration annoying is that it represents an A-Cultural Vibration, an experience to which people are unaccustomed. For instance, vibrations generated by explosions are unique and unexpected, prompting individuals to report them to a greater extent (Appendix L). Furthermore, the rattling of objects in the immediate vicinity can lead occupants to inspect their homes for cracks (Appendix L). Table 3.13-9 indicates the average human response that may be anticipated to vibration when the person is at rest, situated in a quiet surrounding.

Table 3.13-9. Human Response to Ground Vibration

Average Human Response	PPV (inches/second)
Barely to distinctly perceptible	0.020–0.10
Distinctly to strongly perceptible	0.10–0.50
Strongly perceptible to mildly unpleasant	0.50–1.00
Mildly to distinctly unpleasant	1.00–2.00
Distinctly unpleasant to intolerable	2.00–10.00

Source: California Department of Transportation (2020).

VIBRATION ASSESSMENT COMPONENTS

Vibration energy extends out as it travels through the ground, causing the vibration level to reduce with increasing distance from the source. High-frequency vibrations decrease much more rapidly than do low frequencies, so that low frequencies tend to dominate the spectrum at large distances from the source. The propagation of ground-borne vibration is not simple to model due to geological differences in the medium (ground). Geological factors that may influence the propagation of ground-borne vibration include the following:

- Soil conditions. The type of soil has a strong influence on the propagation of ground-borne vibration. Hard, dense, and compacted soil, stiff clay soil, and hard rock transfer vibration more efficiently than loose, soft soils, sand, or gravel.
- Depth to bedrock. Shallow depth to bedrock provides more efficient propagation of ground-borne vibration. Shallow bedrock concentrates the vibration energy near the surface, reflecting vibration waves that would otherwise continue to propagate farther down into the earth back toward the surface.

- Soil strata. Discontinuities in the soil layering can produce diffractions or channeling effects that impact the propagation of vibration over long distances.
- Frost conditions. Seismic waves typically propagate more efficiently in frozen soils than in unfrozen soils.
- Water conditions. The amount of moisture in the soil has an impact on vibration propagation. The depth of the water table in the path of the propagation also has substantial effects on ground-borne vibration levels.

Vibration levels can also be influenced by conditions at both the source and receptor locations. For instance, the way the source is linked to the ground (e.g., direct contact or through a structure) or whether the source is underground as opposed to on the surface will determine the extent of energy transferred into the ground. Similarly, at the receptor location, variables like building construction and the type of foundation can influence vibration levels.

3.13.2.3 Existing Land Use and Site Conditions

Lands adjacent to the project site serve different purposes, including residential spaces, ranching, and other private and public functions. Additionally, activities such as hiking, camping, stargazing, and photography are popular within the Mojave National Preserve. Furthermore, the Rasor Off-Highway Vehicle recreation area is a popular destination for off-road enthusiasts.

The project site primarily has a desert climate. Like much of the Mojave Desert, it has significant temperature fluctuations. Summer daytime temperatures can easily surpass 100 degrees Fahrenheit (°F) (38 degrees Celsius [°C]), while winter temperatures can be quite chilly, especially at higher elevations. The region receives limited precipitation, averaging around 6 inches annually, though this can vary by location.

The project site is not within an airport land use plan, within 2 miles of a public airport or public use airport, or within the vicinity of a private airstrip.

SENSITIVE RECEPTORS

People's reactions to noise can differ significantly. Noise at various intensities can disrupt sleep, focus, and communication and might lead to stress, both physiological and psychological, and even hearing damage. As a result, certain land uses known as sensitive receptors are seen as more vulnerable to environmental noise than others. Residences, schools, hotels, hospitals, and nursing homes, for instance, are usually perceived as highly noise sensitive. Locations like churches, libraries, and cemeteries, where individuals typically engage in prayer, study, or reflection, are also affected by noise. On the contrary, commercial and industrial areas are generally deemed least affected by noise.

The proposed project location is not close to any non-residential areas that might be sensitive to noise, such as schools, hospitals, daycare centers, or long-term care establishments. The nearest schools, Baker Elementary, Middle, and High Schools, are over 6.5 miles away in the northeastern part of Baker (see Section 3.17, Figure 3.17-1). The closest residences to the project location (referenced hereafter as monitoring location ST-1) can be found next to the Rasor Road service station, roughly 260 feet southwest of the proposed boundary. This area includes a standalone house.

Moreover, the Desert Studies Center of California State University is approximately 3.5 miles east of the project site, on Zzyzx Road. This center serves as a hub for research and education, capable of hosting up to 75 people in dormitory-style rooms designed for two to 12 occupants. The Rasor Open Area, which lies about 2.5 miles south of the proposed boundary, offers camping facilities and can be accessed via the Rasor Road exit from Interstate 15 (I-15).

3.13.2.4 Existing Sound Conditions

MEASUREMENT LOCATIONS

To determine the baseline or ambient sound levels experienced near the project site and at the closest NSAs, long-term and short-term sound monitoring was conducted from January 17 to January 18, 2023, to document the acoustic environment in the area surrounding the proposed project.

One long-term and one short-term noise monitoring location were selected to provide the existing ambient noise levels near and at the project site. The specific placement of the sound level meters was mainly determined by environmental and logistical constraints and the location of the closest NSAs.
The long-term noise monitor was placed at the northeast corner of the proposed project site. The short-term monitor was placed at the neighboring noise-sensitive land use and commercial location (residential home and gas station) to provide good coverage of the area surrounding the project site (Table 3.13-10, Figure 3.13-2).

Table 3.13-10. Noise Monitoring Locations

Monitoring Location	Description	Approximate Distance from Measuring Location to Nearest Project Site Boundary*
LT-1	Near dirt road within project boundary	Within project site
ST-1	Residence near gas station and I-15	0.1 mile

* Distance is estimated using 2021 map data from Google Earth (2022).

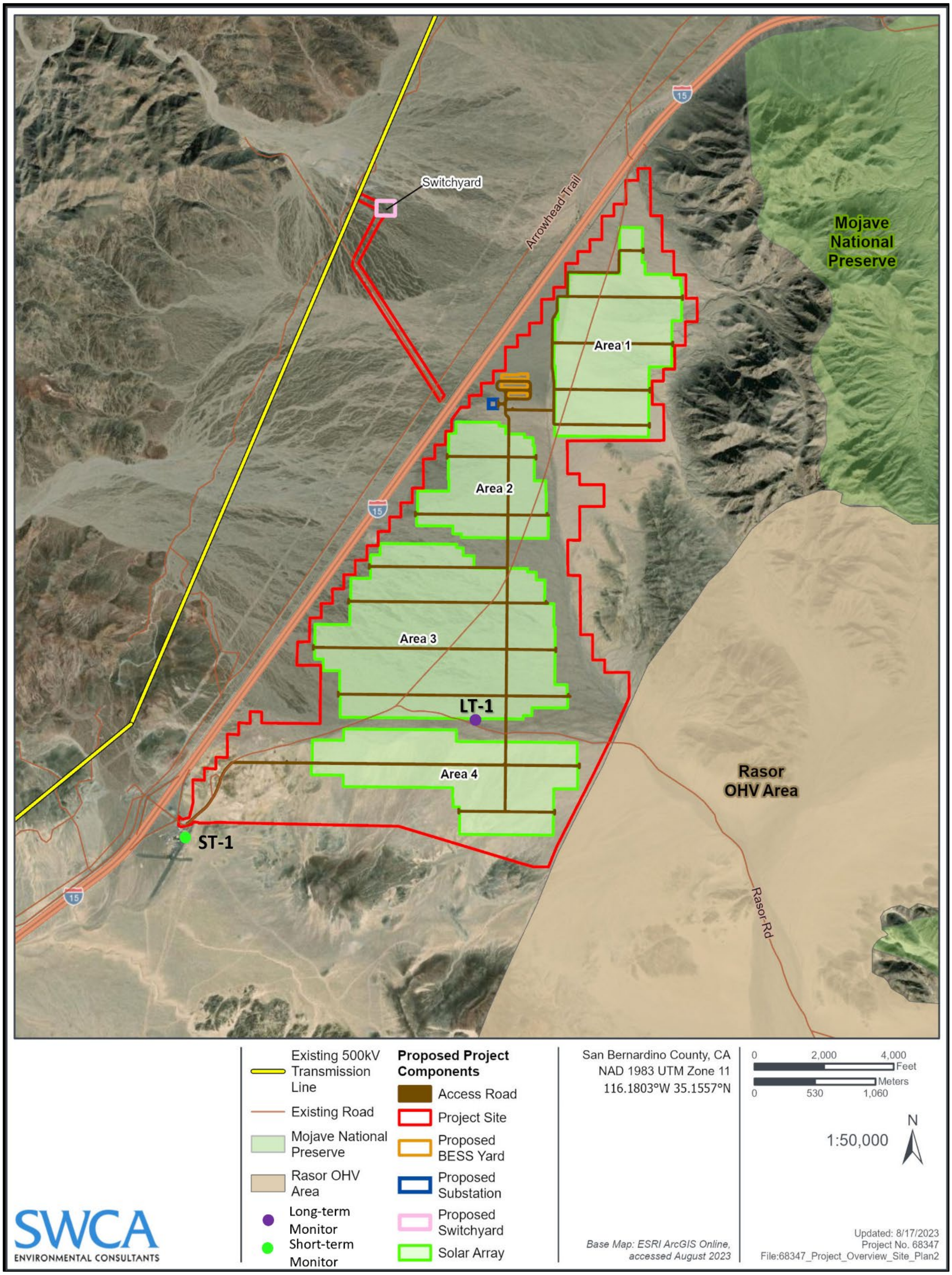

Figure 3.13-2. Noise measurement locations.

INSTRUMENT DESCRIPTION

Noise measurements were collected using one Larson Davis Precision Integrating Sound Level Meter Model 831C unit meeting ANSI requirements (ANSI 2013), three PCB PRM831 preamplifiers, and three PCB 377B02 free-field microphones (Table 3.13-11).

The microphone was fitted with an environmental windscreen and bird spikes, set on a tripod at a height of 5 feet above ground, and located as far from the influence of vertical reflective sources as possible. All cables were secured to prevent any sounds due to wiring hitting other objects. All clocks associated with the sound measurement were synchronized using the Larson Davis G4 LD Utility software. Field data sheets were completed during each visit and are provided in Appendix L of this EIR.

Table 3.13-11. Sound Monitoring Instrumentation

Monitoring Location	Sound Level Meter	Preamplifier	1/2-inch Free-Field Microphone
LT-1, ST-1	Larson Davis 831C (S/N 0011492)	PRM831 (S/N 071107)	377B02 (S/N 328714)

CALIBRATION CHECKS

The sound level meter was calibrated at the beginning and end of each measurement period using a Larson Davis Model CAL200 Precision Acoustic Calibrator. The Larson Davis CAL200 emits a 1-kilohertz (kHz) tone at 114 dB against which the response can be checked. The calibrator has been designed for both field and laboratory use, and the accuracy has been calibrated to a reference traceable to the National Institute of Standards and Technology. The LD 831C sound level meters showed a response of less than the normal error of 0.50 dB.

METEOROLOGICAL DATA

Meteorological data were not recorded at the monitoring sites during the measurement period. Instead, noise data collected during the survey were validated against weather data from the Lake Wainani Station (KCANEWBE16), approximately 29.5 miles northeast of the project site. Hourly weather information is presented in Appendix L. A summary of the survey's weather conditions is provided in Table 3.13-12.

Table 3.13-12. Weather Conditions during the Noise Survey

Weather Station	Start	End	Wind Speed (mph)		Temperature (°F)		Humidity (% relative humidity)	
			Range	Average	Range	Average	Range	Average
Lake Wainani (KCANEWBE16)	1/17/2023 00:00	1/18/2023 23:59	2.56–14.33	8.34	35.58–53.19	44.72	33–80	59

Source: Appendix L.

ASTM International standard 1014-12 (ASTM 2021) specifies that data should not be used when steady wind speeds exceed 20 kilometers per hour (12.4 miles per hour [mph]) (Appendix L). There were four instances (hours) where wind speeds were greater than 12.4 mph; those data points were not used.

READINGS

Long-term monitoring was conducted from January 17 to January 18, 2023. Sound meter LD 831C – 0011492 was placed at monitoring location LT-1 from 2:06 p.m. (Pacific Daylight Time [PDT]) on January 17 to 2:35 p.m. (PDT) on January 18. Data were collected for approximately 24 hours; sound levels were recorded over each 1-minute and 1-hour interval. Short-term monitoring was conducted at one monitoring location on January 18, 2023, for a single 15-minute interval.

The sound level meters were programmed to sample and store A-weighted sound level data including Leq, percentile levels, and community sound parameters. The following gives a brief description of the methodology used for the sound data collection.

- An A-weighted sound level was selected.
- During noise measurements, any dominant background noise source was noted.
- Weather conditions were observed and documented.

Observed sources of background noise that contributed to the existing sound level at the monitoring locations included highway noise and trucks idling in a nearby parking lot. No data points were excluded from the results interference as all the major noise-contributing sources were determined to be representative of the ambient soundscape.

Ambient noise levels for the long-term monitoring site are represented by the equivalent noise level (Leq) due to the duration of the monitoring period, as it provides a measure of the aggregate sound at a location. Leq represents the level of continuous sound over a given period that would deliver the same amount of energy as the actual fluctuating energy levels over the course of the measurement.

RESULTS

The daytime noise levels in project vicinity ranged between 43.3 and 53.1 dBA Leq (Table 3.13-13). Appendix L provides histograms of the hourly Leq and L90 levels for the long-term monitor. L90 indicates the level exceeded for 90% of the time.

Table 3.13-13. Measured Existing Ambient Noise Levels

Monitoring Location	Start Time	Stop Time	Measured Noise Levels (dBA), Leq				Estimated Noise Levels (dBA)	
			Daytime (7:00 a.m.– 7:00 p.m.)	Evening (7:00 p.m.– 10:00 p.m.)	Nighttime (10:00 p.m.– 7:00 a.m.)	L90 (24-hour)	Ldn* (24-hour)	CNEL* (24-hour)
LT-1	January 17, 2023 14:06:48	January 18, 2023 14:35:51	43.3	53.5	48.2	44.1	54.6	55.4
ST-1*	January 18, 2023 15:04:05	January 18, 2023 15:19:23	53.1	–	–	45.7	–	–

* Measurement ST-1 was taken during daytime hours. As a result, no evening or nighttime hours were collected, and Ldn and CNEL could not be calculated.

3.13.2.5 Existing Ground-Borne Vibration Levels

The primary ground-borne vibration source at urban settings is vehicular traffic. It is unusual for vibration from traffic sources to be perceptible, as trucks and buses typically generate vibration velocity levels of approximately 63 VdB at 50 feet (FTA 2018). Normally, 75 VdB is defined as the dividing line between barely perceptible and distinctly perceptible (FTA 2018). It is expected that the existing ground-borne vibration levels at the project vicinity would be below the perceptible level due to the distance from vibration sources (roads).

3.13.3 Impact Analysis

3.13.3.1 Thresholds of Significance

The determinations of significance of project impacts are based on applicable policies, regulations, goals, and guidelines defined by the California Environmental Quality Act (CEQA). Specifically, the project would be considered to have a significant effect on noise if the project

1. generated a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies;
2. generated excessive ground-borne vibration or ground-borne noise levels; or
3. for a project within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, exposed people residing or working in the project area to excessive noise levels.

Because the project site is not within an airport land use plan, within 2 miles of a public airport or public use airport, or within the vicinity of a private airstrip, the project would not expose project occupants to excessive airport-related noise. Therefore, impacts from airport-related noise would not occur and are not evaluated any further in this report.

3.13.3.2 Methodology

This analysis focuses on the potential change in the current noise levels resulting from the project's implementation. Both construction and operation of the project would generate noise and ground-borne vibration. Estimations for short-term construction, operation, and long-term non-transportation and transportation source noise levels, along with evaluations of ground-borne vibration impacts, were made by combining existing literature with the application of recognized noise and vibration prediction and propagation methodologies. Employing the assumptions given for the project's construction and operation, the predicted noise and vibration levels were calculated using the methodologies outlined below.

SHORT-TERM CONSTRUCTION NOISE CRITERIA

The County's Development Code, under Section 83.01.080, provides an exemption for construction noise from noise level standards, as long as the noise takes place between 7:00 a.m. and 7:00 p.m., except on Sundays and federal holidays. Nevertheless, the San Bernardino County Policy Plan and Development Code do not set specific numeric limits for acceptable construction noise levels at impacted receiver sites. This absence prevents a clear determination under CEQA of what counts as a *substantial temporary* noise increase.

To assess whether the project might produce significant construction noise levels at external sensitive receiver sites, the construction noise level criteria from the FTA's *Transit Noise and Vibration Impact Assessment Manual* for noise-sensitive residential areas were adopted (FTA 2018).

According to the FTA, a daytime exterior construction noise level of 80 dBA Leq is deemed the threshold for noise-sensitive residential zones. For commercial areas, the level is set at 85 dBA Leq, and for industrial zones, the level is set at 90 dBA Leq.

SHORT-TERM CONSTRUCTION VIBRATION CRITERIA

The County's Development Code, under Section 83.01.090(a), specifies that vibration levels should not exceed 0.2 inch per second when measured at or beyond the property boundary; therefore, a PPV vibration standard of 0.2 inch per second was applied in assessing the vibration levels resulting from the project's operation and construction. Though project components are located on BLM land, the NSA is in San Bernardino County. As a result, the San Bernardino standards were used to assess vibrational impacts.

LONG-TERM OPERATIONAL NOISE CRITERIA

The County's Development Code, as specified in Section 83.01.080(c), mandates that noise levels from stationary sources should not surpass 55 dBA Leq from 7 a.m. to 10 p.m. and 45 dBA Leq from 10 p.m. to 7 a.m. at residential areas. Additionally, in line with San Bernardino County's guidelines, noise levels during operation and maintenance will be assessed in comparison to the existing nighttime baseline noise levels, which currently exceed the county's nighttime hourly Leq standard of 45 dBA. Therefore, a noise level standard of 55 dBA will be used for both day and nighttime periods when evaluating the noise levels stemming from the project's operation and maintenance.

TRAFFIC NOISE CRITERIA

A 24-hour average noise level metric (i.e., dBA CNEL) was used to assess roadway noise impacts associated with the project, in accordance with the County's guidelines. An increase of 3-dBA CNEL at noise-sensitive uses with ambient noise levels within the "normally unacceptable" or "clearly unacceptable" category (see Figure 3.13-1), or any 5-dBA or greater noise increase if the ambient noise level at the affected sensitive land use is within the "normally acceptable" or "conditionally acceptable" category, would be considered significant.

3.13.3.3 Applicant-Proposed Measures

The applicant has identified and committed to implement the following APMs as part of the proposed project to avoid or substantially lessen potentially significant impacts to noise, to the extent feasible. The APMs, where applicable, are discussed in the impact analysis section below.

APM N-1: Construction and decommissioning activities associated with the operation and maintenance buildings and pile driving within 1.5 miles of residences shall not occur between the hours of 10:00 p.m. and 7 a.m., Monday through Saturday, or at any time on Sundays.

3.13.3.4 Impact Assessment

Impact N-1: Would the project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies? (Less than Significant)

CONSTRUCTION NOISE

Project construction would consist of different activities undertaken in phases through to the operation of the project. For this analysis, project construction is divided into three phases based on the types of equipment required and workload: 1) site preparation; 2) solar array structure construction; and 3) solar panel and battery energy storage system (BESS) construction.

On-Site Construction Noise

Construction of the project, from mobilization to the site to final completion, is expected to occur in 2025 and 2026 and would last for approximately 18 months. During this time, temporary increases in noise levels at the project site are expected to occur due to the operation of various large construction equipment within the project site (Table 3.13-14). Equipment is conservatively assumed to be operating 10 hours per day, 5 days per week for each construction phase duration. However, the project will incorporate APM N-1

Table 3.13-14. Construction Anticipated Schedule, Trips, and Equipment

Phase (duration)	Equipment Used		
	Type	Number	Hours/Day
Stage 1 March 1, 2025 – October 31, 2025 (175 working days)	tractors/loaders/backhoes	4	10
	off-highway truck	1	10
	plate compactors	2	10
	excavators	1	10
	graders	1	10
	rubber-tired bulldozers	2	10
Stage 2 June 1, 2025 – February 28, 2026 (195 working days)	cranes	2	10
	forklifts	5	10
	trenchers	1	10
	rubber-tired loaders	1	10
	generator sets	15	10
	off-highway truck	1	10
	excavators	4	10
	bore/drill rigs	1	10
	rubber tired dozers	1	10
	tractors/loaders/backhoes	5	10
	welders	12	10

Phase (duration)	Equipment Used		
	Type	Number	Hours/Day
Stage 3 December 1, 2025 – August 31, 2026 (196 working days)	off-highway truck	1	10
	forklifts	3	10
	excavators	1	10
	skid steer loader	1	10
	tractors/loaders/backhoes	1	10

The corresponding significance criterion used in this construction noise analysis is a noise level (Leq) of 80 dBA at the noise-sensitive use. The highest estimated construction-related noise levels that could result at nearby sensitive receptors throughout the project's construction period would be 79.0 dBA Leq at sensitive receptor ST-1 (Table 3.13-15). The analyzed sensitive receptors near the project site would not be exposed to construction-only noise levels exceeding 80 dBA Leq. Therefore, without employing mitigation, noise impacts associated with the construction activities for the project would be **less than significant.**

Table 3.13-15. Estimated Construction Noise Levels at Nearby Sensitive Receptors

Receptor	Measured Daytime Ambient Noise Levels, Leq (dBA)	Estimated Construction Noise Levels by Construction Phases (ambient plus construction), Leq (dBA)			Significance Threshold, Leq (dBA)*
		Stage 1	Stage 2	Stage 3	
ST1	53.1	74.7	79.0	70.4	80.0

* Threshold is equivalent to the FTA (2018) *Transit Noise and Vibration Impact Assessment Manual* daytime threshold of 80 dBA.

During the construction phase of the project, various activities and equipment will generate noise, potentially impacting workers. It is essential to assess and manage this noise exposure in accordance with OSHA regulations to ensure a safe working environment.

Noise levels from construction equipment, measured at a distance of 50 feet from the source, typically fall between 74 and 85 dBA. These levels require careful monitoring and potential mitigation measures to protect workers from excessive noise exposure. The Time-Weighted Average (TWA) method is used to calculate a worker's average exposure to fluctuating noise levels over an 8-hour workday, which OSHA uses to determine necessary interventions.

OSHA has set specific limits for noise exposure. The Permissible Exposure Limit (PEL) is 90 dBA for an 8-hour TWA. If exceeded, employers must implement measures to reduce noise exposure. The action level is set at 85 dBA for an 8-hour TWA, at which point a hearing conservation program must be implemented. This program includes regular monitoring of noise levels, providing hearing protection devices such as earplugs or earmuffs, training workers on the risks of noise exposure and the correct use of hearing protection, conducting baseline and annual audiometric tests, and maintaining accurate records of noise exposure levels, hearing protection provided, and audiometric test results.

To calculate the TWA, noise exposure levels are recorded throughout the day and averaged to account for varying intensities. For example, a worker exposed to 85 dBA for 4 hours and 74 dBA for the remaining 4 hours has a TWA of 82.3 dBA. This calculated TWA of 82.3 dBA, although below OSHA's action level of 85 dBA, still requires attention and precautionary measures.

Given the TWA of 82.3 dBA, several measures would be implemented to ensure worker safety and compliance with OSHA regulations. All construction workers will be provided with appropriate hearing protection devices, such as earplugs or earmuffs, designed to effectively reduce noise exposure. This protective equipment will be mandatory for all personnel on site. Workers will receive training on the correct use of hearing protection devices, including the importance of hearing protection, proper fitting and maintenance of earplugs or earmuffs, and risks associated with noise exposure. Noise control measures will include ensuring all construction equipment is well-maintained to minimize noise emissions. Where feasible, quieter construction equipment will be used. Administrative measures will involve rotating workers to limit their exposure to high noise levels and scheduling noisy activities during times when fewer workers are present on-site, thereby reducing overall workforce exposure to potentially harmful noise levels.

Off-Site Construction Noise

Worker vehicles and haul trucks transporting equipment and materials to and from the project site during construction would increase noise levels on the local roads in the vicinity of the project site. Construction trucks would generally access the project site from nearby I-15 and turn to Rasor Road to the project site.

The traffic analysis by Kittelson & Associates, Inc. (Appendix M), anticipates that during the construction period, daily vehicle traffic at the project site will be mainly composed of various types of vehicles, including workers' cars, delivery trucks, and construction equipment. The most frequent trips will be those of construction workers commuting to and from the site.

The project site is in an undeveloped area adjacent to I-15, where the predominant traffic is interstate, between California and Nevada. Unlike typical urban environments, the area does not exhibit standard commute periods, prompting the analysis to consider traffic during a.m., midday, and p.m. peak hours.

The construction workforce is anticipated to average 200 individuals, peaking at 300, and it is conservatively assumed that all workers will commute during the peak hours. Passenger vehicle trips from the workforce will be a daily occurrence, while heavy-duty vehicle trips will vary, with the majority expected to arrive and depart throughout the workday. It is also conservatively assumed that 80% of heavy-duty trucks would commute during the peak hours, with the rest distributed evenly.

It was assumed that 80% of the workforce would commute daily to the job site from communities south of the project site. The remaining 20% were assumed to commute from communities north of the project site.

The estimated noise levels generated by construction off-site traffic would be below the existing daytime ambient noise level at the noise sensitive receptors along the haul routes (Table 3.13-16). Therefore, potential noise impacts from off-site construction traffic would be **less than significant.**

Table 3.13-16. Off-Site Construction Traffic Noise Levels

Construction Phase	Estimated Number of Trips per Hour – Peak Hour *				Estimated Off-Site Construction Noise Levels along the Project Haul Routes, Leq
					Rasor Road
	Worker	Heavy-Duty Trucks	Water Trucks	Total	dBA
Stage 1	300	80	14	**394**	45.4
Stage 2	300	80	14	**394**	45.4
Stage 3	300	80	14	**394**	45.4

Construction Phase	Estimated Number of Trips per Hour – Peak Hour *				Estimated Off-Site Construction Noise Levels along the Project Haul Routes, Leq
					Rasor Road
	Worker	Heavy-Duty Trucks	Water Trucks	Total	dBA
Significance threshold, Leq†					53.1

Source: Kittelson & Associates, Inc. (2023).

* Trips are based on a.m. peak hour vehicle trips.

† Significance thresholds are equivalent to the existing daytime noise levels.

OPERATIONAL NOISE

To determine the potential noise impact from these sources, detailed noise modeling was conducted. The noise levels at the identified NSAs in the vicinity of the project and at the property boundary from the operation of the project have been predicted and compared with the relevant noise criteria.

Operational Activities

The primary noise sources anticipated due to operation of the proposed project are the inverters, BESS, and transformers.

Noise Profile

The sound power level for each equipment noise source is listed in Table 3.13-17. All equipment sound levels were estimated based on available data from the equipment manufacturers or obtained from other sources or calculations where manufacturer's data were not available.

Table 3.13-17. Equipment Sound Power Levels

Equipment	1/1 Octave Spectrum									dBA
	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Main power transformer	96.3	93.3	96.3	87.3	85.3	80.3	72.3	72.3	65.2	87.0
Inverter for Photo Voltaic	91.0	92.0	93.0	92.0	97.0	88.0	87.0	83.0	80.0	96.0
BESS power conversion system	44.2	91.0	95.0	101.6	94.8	90.1	86.4	78.9	66.5	97.2
Step-up transformer for BESS	83.4	77.4	88.4	77.4	71.4	66.4	60.4	62.4	57.4	76.0
BESS containers	104.2	96.0	97.9	91.4	76.0	72.8	65.6	59.8	56.9	86.0

Intermittent Noise Sources

An intermittent noise source refers to any stationary noise source that is active periodically or intermittently throughout the day or night. Noise-emitting sources with intermittent daily operation of 4 hours or less, or units used solely for emergency operations, were not included in the model.

The proposed switchyard, which will manage electricity transmission to and from the substation, includes components such as switches, breakers, and other equipment. These components may generate intermittent or impulsive noise during their operation. However, this noise is not continuous; it occurs sporadically, distinguishing it from continuous noise sources like those listed in Table 3.13-17, which are the primary focus of this operational noise assessment.

The intermittent noise from the switchyard components will be short-lived and infrequent, reducing the potential for prolonged exposure or disturbance. This is in contrast to continuous noise sources, which maintain a steady sound level and are more likely to have a significant environmental impact. Considering the intermittent nature of the noise from the switchyard, the noise impacts during the operational phase are expected to be minimal and insignificant. Therefore, the operational noise from the switchyard is not anticipated to contribute to adverse environmental noise impacts and impacts would be **less than significant**.

Sound Levels at the Nearest Receptor

The estimated noise levels from the operation of the proposed stationary noise sources are projected to be 24.2 dBA Leq at receptor ST-1 (Table 3.13-18). Consequently, these estimated noise levels would fall below the existing daytime ambient noise levels (53.1 dBA) and the thresholds outlined in Section 83.01.080(c) of the County's Development Code (55 dBA for daytime hours and 45 dBA for nighttime hours). Thus, the project's operation would not result in substantial increases in noise levels at nearby off-site sensitive uses, rendering this impact **less than significant**.

Table 3.13-18. Estimated Noise Levels at the Nearest Receptor

Off-Site Receptor	Existing Daytime Ambient Noise Levels, Leq (dBA)	Estimated Noise Levels from Equipment Operation, Leq (dBA)	Ambient plus Project Noise Levels, Leq (dBA)	Significance Threshold (dBA)*
ST-1	53.1	24.2	53.1	55.0

* Significance thresholds are assumed to be equal to 55 dBA.

Transmission Line Noise

Transmission line noise is a critical factor in the design and implementation of electrical infrastructure. For the gen-tie line described in this project, several factors contribute to potential noise generation. The gen-tie line will connect the collector lines from the substation to the project switchyard by boring under I-15 and will be positioned within an existing California Department of Transportation (Caltrans) culvert. The underground installation of the gen-tie line inherently mitigates much of the noise typically associated with overhead transmission lines. Underground lines generally produce less audible noise compared to their overhead counterparts, as the soil provides natural sound insulation.

However, even with underground placement, certain types of noise can still be relevant. One potential source of noise is corona discharge, a phenomenon that occurs when the electrical field near the conductor is strong enough to ionize the surrounding air, leading to audible noise and energy loss. Corona discharge is typically less prevalent in underground lines because the conductors are not exposed to the open air, thus minimizing the occurrence of ionization.

Thermal expansion and contraction of the transmission line as it operates might produce some noise due to the physical movement of materials. However, this noise is generally minor and further dampened by the underground setting. In summary, the underground placement of the gen-tie line contributes significantly to minimizing transmission line noise. These measures ensure that any potential noise impact on the surrounding environment and community is kept to a minimum. Impacts related to transmission line noise would be **less than significant.**

Impact N-2: Would the project generate excessive ground-borne vibration or ground-borne noise levels? (Less than Significant)

CONSTRUCTION

The operation of heavy construction equipment at the project site would generate ground-borne vibration that could affect structures immediately adjacent to the project site or could also cause an annoyance to people at those locations.

On-Site Construction Ground-Borne Vibration

Ground-borne vibration levels resulting from construction activities occurring within the project site were estimated using data published by the FTA (2018). Construction activities that would have the potential to generate levels of ground-borne vibration within the project site include mobile equipment activities. Project vibration impacts were estimated using the vibration source level of construction equipment and the construction vibration assessment methodology published by the FTA.

Construction vibration velocity levels were estimated at the different receptors using the reference vibration levels for the different pieces of equipment and the distances from the primary project construction activities. The estimated vibration velocities were then compared with the building damage criteria in the *Transit Noise and Vibration Impacts Assessment Manual* (FTA 2018). Vibration levels generated by the construction equipment at the project site during project construction would not exceed the applicable vibration criteria for building damage or human annoyance at the surrounding structures (Tables 3.13-19 and 3.13-20, respectively). Therefore, impacts related to on-site construction ground-borne noise and vibration would be **less than significant.**

Table 3.13-19. Construction Vibration Impacts – Building Damage

Off-Site Receptor	Estimated Vibration Velocity Levels at the Off-Site Receptors (PPV) (inches/second)			Significance Threshold (inches/second)
	Stage 1	Stage 2	Stage 3	
ST-1	0.0072	0.0027	0.0026	0.2

* FTA construction vibration impact criteria for building damage (FTA 2018).

Table 3.13-20. Construction Vibration Impacts – Human Annoyance

Off-Site Receptor	Estimated Vibration Velocity Levels at the Off-Site Receptors (VdB)			Significance Threshold (VdB)
	Stage 1	Stage 2	Stage 3	
ST-1	65	56	56	80

* FTA ground-borne vibration impact criteria for residences and buildings where people normally sleep for infrequent vibration events (FTA 2018).

OPERATION

Operation of the project would not involve any sources capable of generating perceptible levels of vibration in the surrounding area. There would be no permanent source or potential to change vibration levels except during unscheduled maintenance or repair activities, which would be similar to construction activities. Therefore, impacts related to operational ground-borne noise and vibration would be **less than significant.**

Impact N-3: Would the project be located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, and would the project expose people residing or working in the project area to excessive noise levels? (Less than Significant)

The project would be located approximately 6.8 miles southwest of the Baker Airport, and, at this distance, would not expose project workers to excessive airport noise levels. In addition, the project would not involve the development of noise-sensitive land uses that would be exposed to excessive aircraft noise. Therefore, the impacts would be **less than significant.**

3.13.4 Mitigation Measures

No mitigation measures are required.

3.13.5 Cumulative Impacts

Impact C-N-1: Would the impacts of the proposed project, in combination with other past, present, and reasonably foreseeable future projects, contribute to a cumulative impact related to noise? (Less than Significant)

Multiple projects are proposed or operating in the project area. However, due to the localized nature of the construction and operational noise impacts, any potential cumulative noise impacts from construction or operations would be largely limited to areas within 1 mile of the project site. As shown in Section 3.0 Environmental Analysis, the I-15 Mojave Wildlife Crossings Restoration Project is within 1 mile of the project site and has the potential to cause overlapping construction noise impacts. Active pieces of construction equipment typically cause noise levels of no more than 85 dBA when measured 50 feet from the source. Construction-phase noise impacts would be short-term and limited, with construction activities for all cumulative projects typically being limited to the daytime. However, the project would contribute to a cumulative increase in noise in the project area. The duration of construction work for the proposed project would be approximately 18 months; after that time, few notable permanent sources of noise would occur from the project or the cumulative I-15 Mojave Wildlife Crossings Restoration Project.

Cumulative noise impacts would be reduced through compliance with local laws and regulations. Furthermore, cumulative renewable energy projects and other development that are subject to the environmental permitting process would have a detailed analysis of noise and land use conflicts as part of the project-level environmental review. The permitting process normally requires each project to comply with local standards and to avoid noise-related land use conflicts. This means that all projects, even if unrelated to the proposed project, would need to comply with local community noise standards, such as the San Bernardino County Noise Ordinance. Additional mitigation may be applied to the cumulative projects through environmental permitting by lead agencies. This would ensure that cumulative noise impacts during construction would be less than significant. Accordingly, the project's incremental contribution to the cumulative construction noise impacts caused by other past, present, and probable future projects would not be cumulatively considerable or significant. Therefore, issuance of the permits would not result in cumulatively considerable impacts relative to construction noise.

The only sources of noise associated with the project's operations that could combine with the cumulative projects to result in a potential cumulative impact near sensitive receptors would be employee vehicles accessing the sites. Given the limited number of employees during operations of the project and the nearby cumulative projects, the cumulative operational noise impact **would not be cumulatively considerable.**

Cumulative effects due to ground-borne vibration would occur only if there were sources of vibration within 200 feet of the boundaries between the project and cumulative project sites. It is possible the Soda Mountain crossing of the I-15 Mojave Wildlife Crossings Restoration Project would be within 200 feet of the proposed project site, but the crossing would not be near existing residences. The potential overlap of construction-related vibration from cumulative projects is unlikely to create a significant impact on residences near the proposed project. Additionally, cumulative ground-borne vibration effects from past, present, and future projects would not be significant. Therefore, issuance of the permits **would not result in cumulatively considerable impacts** relative to ground vibration.

3.13.6 References Cited

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