Technical Noise Assessment for the Rancho Viejo Solar Project

Santa Fe County, New Mexico

AUGUST 2025

PREPARED FOR

Rancho Viejo Solar, LLC

PREPARED BY

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TECHNICAL NOISE ASSESSMENT FOR THE RANCHO VIEJO SOLAR PROJECT SANTA FE COUNTY, NEW MEXICO

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EXECUTIVE SUMMARY

This report presents the findings of a technical noise assessment conducted for the Rancho Viejo Solar Project, a proposed 96-megawatt (MW) solar photovoltaic (PV) and 48-MW battery energy storage system (BESS) facility to be developed by Rancho Viejo Solar, LLC in Santa Fe County, New Mexico.

The assessment, prepared by SWCA Environmental Consultants, includes 24-hour baseline ambient monitoring, predictive modeling of construction and operational noise, and comparison of results to applicable noise thresholds established under Santa Fe County Ordinance No. 2016-9, Chapter 7 – Sustainable Design Standards. This report incorporates feedback and recommendations provided by the County's third-party reviewer, GZA GeoEnvironmental, Inc., as part of the County's permitting review process.

The assessment also considered seasonal variations in noise impacts. Specifically, during summer months when sunrise occurs before 7:00 a.m., trackers and transformers may operate during periods subject to nighttime noise limits. Accordingly, a conservative threshold of 45 dB(A), or a 5 dB(A) increase over ambient levels at relevant property lines, was applied in the analysis.

A 24-hour ambient sound survey was conducted from July 30 to 31, 2025, at the southwestern property boundary near the closest noise-sensitive receptor. The average sound level measured over the full monitoring period was 41.7 dBA L_{eq}, with a daytime average (L_d) of 42.6 dBA and nighttime average (L_n) of 40.2 dBA. To support a conservative assessment in accordance with County ordinance, the lowest valid 30-minute L_{eq} ambient values were identified for the following time periods: 32.4 dBA during daytime hours (7:00 a.m. to 10:00 p.m.), 30.2 dBA at night (10:00 p.m. to 7:00 a.m.), and 34.8 dBA for the summer transitional period between 6:00 to 7:00 a.m. Based on the County's ordinance, property line noise thresholds were established as the lower of either a fixed limit or the ambient-based limit. The applicable thresholds are 37.4 dBA for daytime, 35.2 dBA for nighttime, and 39.8 dBA for the 6:00–7:00 a.m. period.

Operational noise modeling using SoundPLAN Essential predicted that the highest project-related contribution would be 35.1 dBA, occurring during full daytime operation and the early morning transitional period. Nighttime contributions were substantially lower, at 21.3 dBA. When combined with ambient conditions, cumulative operational levels at the southwest property boundary are estimated at 37.0 dBA (daytime), 30.7 dBA (nighttime), and 38.0 dBA (6:00–7:00 a.m.). All modeled cumulative levels remain below the applicable ordinance thresholds for each time period, and the resulting day-night sound level (L_{dn}) of 47.2 dBA is well below the EPA's recommended 55 dBA threshold for residential areas.

At the noise-sensitive area (NSA) with the highest modeled operational sound levels, located approximately 3,348 feet southwest of the nearest modeled project sound source, project-only contributions are predicted to be 30.7 dBA during daytime hours, 20.7 dBA during nighttime hours, and 30.7 dBA during the early morning period. Assuming ambient conditions at this NSA are equivalent to those measured at the property boundary, the estimated cumulative L_{dn} is 47.1 dBA, which also remains below the EPA's recommended threshold.

These values correspond to a sound environment comparable to a quiet rural area and are not expected to be perceptible above the existing ambient soundscape. The project's operational noise, even under worst-case conditions, would not result in a substantial or permanent increase in ambient sound levels at the property boundary or at nearby receptors.

Construction noise impacts were also evaluated using the FHWA Roadway Construction Noise Model. Equipment operating at 85 dBA at 50 feet is predicted to attenuate to approximately 56 dBA at the nearest receptor (1,400 feet). While construction noise is exempt from Santa Fe County's regulatory limits under

Ordinance No. 2009-11, the project will limit construction to daytime hours as required by the Conditions of Approval.

In summary, the Rancho Viejo Solar Project is expected to comply with all applicable operational noise limits and will not result in a significant or sustained increase in ambient noise levels. Construction-related noise will be temporary, will occur during exempt daytime hours, and is not anticipated to cause substantial disturbance to nearby receptors.

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1 INTRODUCTION

SWCA Environmental Consultants (SWCA) prepared this noise technical report in support of the proposed Rancho Viejo Solar Project (the project), which would be developed by Rancho Viejo Solar, LLC. The project site is located in unincorporated Santa Fe County, New Mexico, in the northern part of the state.

This report presents the results of a comprehensive noise assessment conducted to evaluate potential impacts from the construction and operation of the project. This report is an update to the previous assessment and incorporates recommendations provided by Santa Fe County's third-party consultant, GZA GeoEnvironmental, Inc. (GZA), during a teleconference held on July 24, 2025, and in a brief memorandum dated July 25, 2025. Based on the recommendations received, the assessment includes a 24-hour baseline sound survey to characterize existing ambient sound levels in the project area, modeled noise levels at the property boundaries and at nearby noise-sensitive areas (NSAs).

The analysis also evaluates compliance with Santa Fe County Ordinance No. 2016-9, Chapter 7 – Sustainable Design Standards, as well as other applicable local, state, and federal noise regulations. The purpose of this report is to evaluate whether the proposed activities could potentially result in a substantial or permanent increase in ambient noise levels, or lead to significant community noise impacts in the vicinity of the project, based on measured baseline conditions and predictive modeling.

1.1 Project and Study Description

Rancho Viejo Solar, LLC proposes to design, construct, operate, and maintain a solar energy generation and storage facility in Santa Fe County, New Mexico. The project involves the development of a 96-megawatt (MW) solar photovoltaic (PV) array, a 48-MW battery energy storage system (BESS), a substation, an operations building, a water storage tank, a generation tie-in line, and an access road. The facility would be located on private land approximately 3 miles south of the Santa Fe city limits and about 4.2 miles east of La Cienega (Figure 1). A general layout of the facility, based on the current design, is shown in Figure 2.

Potential noise impacts from project construction and operation were evaluated by assessing predicted increases in sound levels above existing ambient conditions and estimating potential exposure of nearby noise-sensitive areas (NSAs) and the property boundary to elevated noise from project-related sources.

Construction activities will include earthwork (e.g., site grading) and installation of solar infrastructure. Construction-related noise levels at nearby NSAs and the property boundary were predicted using the Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM), which is the national standard tool for evaluating noise from construction equipment and activities.

During operation, the primary noise-generating components include inverters, transformers, BESS equipment, and solar trackers. Operational noise impacts were assessed using SoundPLAN Essential Version 5.1, a computer-based noise modeling software. The results of the model were evaluated in relation to applicable noise standards and the proximity of nearby NSAs and the property boundary.

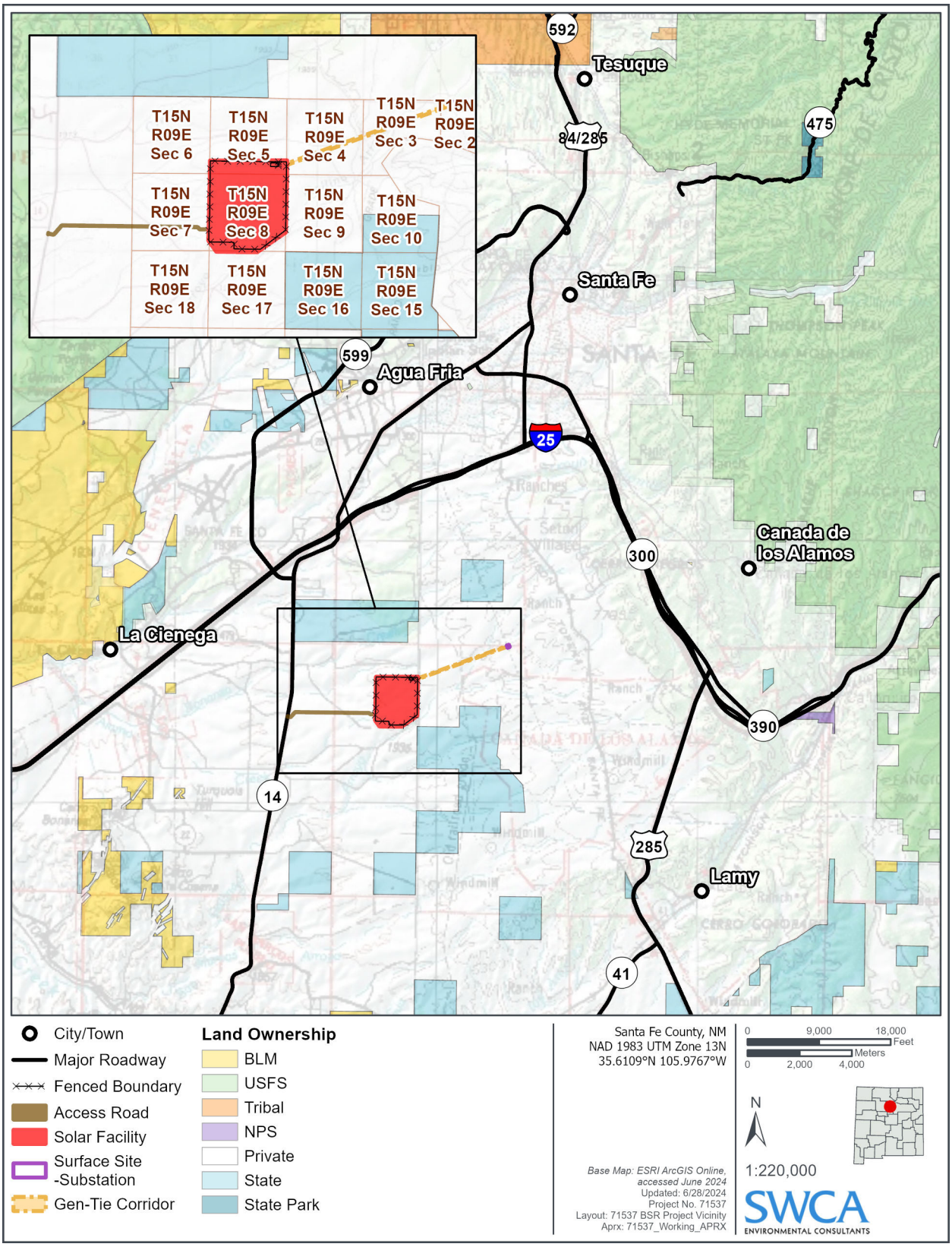


Figure 1. Project vicinity map.

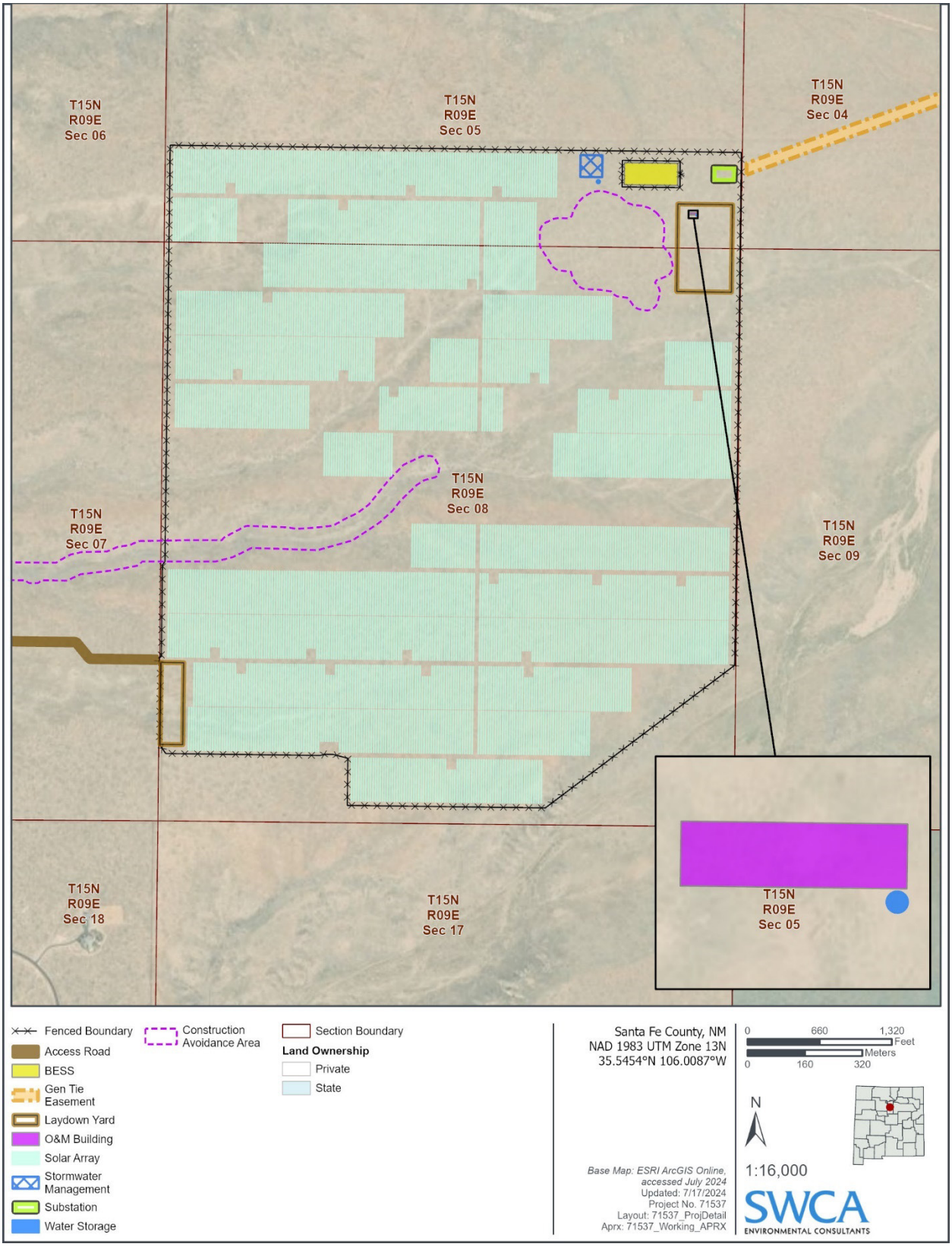


Figure 2. Project layout.

1.2 Sound Fundamentals – Background

Sound is defined as a form of energy that is transmitted by pressure variations, which the animal or human ear can detect. Noise can be defined as any unpleasant or unwanted sound that is unintentionally added to a desired sound or environment. The noise effects in humans include interference with communication, learning, rest, or sleep and physiological health effects. There are two main properties of sound: the amplitude and the frequency. Amplitude refers to the level of energy that reaches the ear (how loud we perceive the sound), while frequency is the number of cycles or oscillations per unit of time completed by the source. Frequency is normally expressed in hertz (Hz).

Sound power is defined as the measurement of the ability of a source to make sound. It is independent of the acoustic environment in which is located. The sound power level (L_w) of a source is the amount of energy it produces relative to a reference value and is normally expressed in decibels. The decibel is a logarithmic scale to describe the sound pressure ratio.

Humans perceive a frequency range of about 20 Hz to about 20,000 Hz. An internationally standardized frequency weighting, the A-weighting scale, was designed to approximate the audible range of frequencies of a healthy human ear. The A-weighting scale corresponds to the fact that the human ear is not as sensitive to sound at the lower frequencies as it is at the higher frequencies.

1.2.1 Definition of Acoustical Terms

Several different descriptors of time-averaged sound levels are used to account for fluctuations of sound intensity over time. The sound descriptors calculated by the sound meters and used in this report to describe environmental sound are defined below.

- Ambient sound level is defined as the composite of noise from all sources near and far, 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).
- Equivalent noise level (L_{eq}) is the energy average A-weighted noise level during the measurement period.
- Day-night sound 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 night-time hours (10 p.m. [22:00] to 7 a.m. [07:00]).
- Daytime Sound Level (L_d) is defined as the equivalent sound level for a 15-hour period between 7 a.m. (07:00) and 10 p.m. (22:00).

1.2.2 Sound Levels of Representative Sounds and Noises

The U.S. Environmental Protection Agency (EPA) has developed an index to assess noise impacts from a variety of sources using residential receptors. If L_{dn} values exceed 65 dBA, residential development is not recommended (EPA 1979). Noise levels in a quiet rural area at night are typically between 32 and 35 dBA. Quiet urban night-time noise levels range from 40 to 50 dBA. Levels between 50 and 55 dBA are associated with raised voices in a normal conversation. Levels above 70 dBA tend to be associated with task interference. Noise levels during the day in a noisy urban area are frequently as high as 70 to 80 dBA. Noise levels above 110 dBA become intolerable. Table 1 presents sound levels for some common noise sources and the human response to those decibel levels.

Table 1. Sound Levels of Representative Sounds and Noises

Source and Distance	Sound Level (dBA)	Human Response
Jet takeoff (nearby)	150	
Jet takeoff (15 m/50 feet)	140	
50-hp siren (30 m/100 feet)	130	
Loud rock concert (near stage)	120	Pain threshold
Construction noise (3 m/10 feet)	110	Intolerable
Jet takeoff (610 m/2,000 feet)	100	
Heavy truck (8 m/25 feet)	90	
Garbage disposal (0.6 m/2 feet)	80	Constant exposure endangers hearing
Busy traffic	70	
Normal conversation	60	
Light traffic (30 m/100 feet)	50	Quiet
Library	40	
Soft whisper (4.5 m/15 feet)	30	Very quiet
Rustling leaves	20	
Normal breathing	10	Barely audible
Threshold of hearing	0	

Source: Beranek (1988).

Table 2 provides criteria that have been used to estimate an individual's perception of increases in sound. 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 2. 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).

2 EXISTING CONDITIONS

2.1 Existing Land Use and Site Conditions

The site is located in Santa Fe County, New Mexico. The lands within the project area are privately managed. State Land Office–managed lands are located north (0.8 mile) and southeast (0.2 mile) of the project area. The project is located in a rural setting with predominantly undeveloped rangelands; however, there are several existing residential and commercial developments and industrial uses. The nearest noise sensitive receptor to a project boundary is a residence located approximately 1,400 feet to the southwest.

2.2 Existing Sound Conditions

2.2.1 Existing Sound Levels

Santa Fe County is a semi-rural, semi-urban county in central New Mexico. The acoustical environment in the project area and its immediate vicinity generally features relatively low ambient noise levels characteristic of rural settings. Noise in the region typically ranges from very quiet, dominated by natural sounds such as birds, wind, and occasional wildlife, to moderately noisy in localized areas near towns, highway crossings, or other human activities. Small ranches and rural residences are scattered throughout the area, contributing minimally to the overall soundscape.

To characterize existing conditions, a 24-hour ambient sound survey was conducted at the property boundary closest to the nearest noise-sensitive receptor. The survey followed established protocols for instrumentation, calibration, and data validation. The following subsections provide a summary of the measurement location, equipment and calibration methods, meteorological conditions, and baseline sound level data.

2.2.2 Measurement Locations

To characterize the existing acoustic environment near the proposed Rancho Viejo Solar Project, SWCA Environmental Consultants conducted a 24-hour ambient sound monitoring survey from July 30 to July 31, 2025. Monitoring was conducted along the southwestern property boundary of the Rancho Viejo development, adjacent to the nearest NSA, to capture acoustic conditions at the property line most likely to experience project-related noise impacts. The monitoring location is summarized in Table 3. A photograph of the monitoring location is provided in Appendix A.

The objective of this survey was to establish baseline (pre-construction) sound levels at the location of greatest potential sensitivity, with a focus on identifying the lowest 30-minute equivalent continuous sound L_{eq} periods during both daytime and nighttime hours. This worst-case approach supports a conservative evaluation of future operational sound levels relative to existing ambient conditions.

Measurements were collected using ANSI Type 1 precision sound level meters, with microphones mounted on tripods at approximately 1.5 meters above ground and fitted with environmental-grade wind screens. Instruments were field-calibrated before and after deployment to ensure data accuracy. Continuous sound level data were recorded over the 24-hour period and reviewed to exclude invalid data associated with precipitation, excessive wind, or transient non-representative noise events, in accordance with ANSI S12.18 and ANSI S12.9 Part 3.

The ambient sound environment during the monitoring period was consistent with the area's rural character. Dominant sources included distant traffic from local and regional roadways, aircraft overflights, low-level residential activity, and intermittent natural sounds such as wind through vegetation and bird calls. Human activity and vehicular noise were more prevalent during daytime hours, while quieter natural sounds were more noticeable at night, resulting in lower nighttime background levels.

Table 3. Monitoring Location

Monitor	Monitor Location		Elevation (feet amsl)
	Latitude	Longitude	
LT-1	35.537467°	-106.018789°	6,406

Note: amsl = Above Mean Sea Level.

2.2.3 Calibration Checks

A Larson Davis Model CAL200 Precision Acoustic Calibrator, which produces a 1 kHz reference tone at 114 dBA, was used to perform calibration checks on the sound level measurement equipment. Calibration was conducted immediately before and after the 24-hour monitoring period to verify instrument accuracy and ensure measurement stability throughout the deployment.

The CAL200 calibrator meets IEC 60942 Class 1 requirements and is traceable to National Institute of Standards and Technology (NIST) standards. All pre- and post-deployment calibration checks were within ±0.5 dBA, well within the ±1.0 dBA field calibration tolerance specified by relevant industry guidelines and consistent with best practices for environmental noise monitoring.

No calibration drift outside acceptable limits was observed during the monitoring period, and all equipment was confirmed to be functioning properly. Documentation of field data sheets is provided in Appendix B.

2.2.4 Instrument Description

Ambient noise monitoring was conducted using a Larson Davis Model 831C Precision Integrating Sound Level Meter, compliant with ANSI S1.4-2014 and IEC 61672-1 Class 1 standards for Type 1 instrumentation. This equipment meets the requirements for environmental sound monitoring as outlined in industry standards and is suitable for long-term unattended measurements.

The meter was paired with a PCB Piezotronics PRM831 preamplifier and a PCB 377B02 half-inch free-field microphone, forming a high-precision measurement system capable of capturing accurate sound level data across a wide frequency range. The complete instrumentation setup is summarized in Table 4.

Consistent with best practices for environmental noise studies, the microphone was mounted on a tripod at a height of 1.5 meters (approximately 5 feet) above ground level and placed at least 25 feet away from vertical reflective surfaces to minimize interference from reflected sound. The microphone was equipped with a weather-resistant windscreen and bird spike to protect against environmental contamination and acoustic distortion. All cables were securely fastened to prevent movement-related noise artifacts during the monitoring period.

The sound level meter was programmed and time-synchronized using Larson Davis G4 Utility software, ensuring accurate timestamping and data consistency throughout the 24-hour survey period.

Table 4. Instrumentation

Monitoring Location	Sound Level Meter	Preamplifier	0.5-inch free-field microphone
LT-1	Larson Davis 831C (S/N 10774)	PRM831 (S/N 76976)	377B02 (S/N 352914)

Note: S/N = Serial Number.

2.2.5 Meteorological Data

Baseline sound monitoring for the Rancho Viejo Solar Project was conducted over a continuous 24-hour period from July 30 to July 31, 2025, and validated using meteorological data from the Valle Serena weather station (ID: KNMSANTA289). This station is located approximately 3 miles north of the project site, at an elevation of 6,365 feet.

Weather conditions during the monitoring period are summarized in Table 5, with full hourly records provided in Appendix B. Observed temperatures ranged from 56.7°F to 84.8°F, with wind speeds between 0.4 and 9.6 miles per hour. Light precipitation was limited to brief, isolated events during the evening, with a maximum recorded value of 0.11 inches occurring at 2pm on July 30, 2025.

Table 5. Weather Conditions for July 30, 2025, through July 31, 2025

Weather Station	Monitoring Start	Monitoring End	Wind Speed (mph)		Temperature (°F)		Humidity (% relative humidity)	
			Range	Avg.	Range	Avg.	Range	Avg.
KNMSANTA289	07/30/2025	07/31/2025	0.4 – 9.6	3.9	56.7 – 84.8	68.7	40 - 92	69

Note: mph = miles per hour; avg. = average; °F = Degrees Fahrenheit.

Meteorological conditions during the monitoring period generally met the criteria for valid environmental sound measurements as defined by ANSI S12.9 Part 3 (2013). Wind speeds remained below the standard threshold of 11.2 mph (5 m/s). Brief precipitation events occurred during the evening hours of July 30, 2025. To maintain data integrity, 30-minute sound level data for the following periods were excluded from analysis: 14:00, 14:30, 15:00, 15:30, 20:30, 21:00, and 21:30.

2.2.6 Existing Sound Levels

To establish baseline ambient sound levels near the Rancho Viejo Solar Project, a 24-hour unattended ambient sound monitoring survey was conducted from July 30 to July 31, 2025. The monitoring location was positioned along the southwestern property boundary of the Rancho Viejo development, adjacent to the nearest noise-sensitive receptor, to represent the area most likely to be affected by potential project-related noise.

This survey was designed to characterize existing acoustic conditions in the vicinity of the project and to support comparison with modeled operational sound levels. The sound level meter recorded A-weighted equivalent continuous sound levels (L_{eq}) and statistical descriptors (L_n values) over 1-minute and 30-minute intervals. From these data, daytime average sound levels (L_d), nighttime average sound levels (L_n), and the day-night average sound level (L_{dn}) were calculated in accordance with standard environmental noise assessment practices.

Table 6 summarizes the validated A-weighted sound level data collected during the monitoring period. These values reflect the average sound conditions observed over the monitoring period and serve as a general baseline for understanding the site's acoustic environment.

Table 6. Summary of A-weighted Ambient Sound Measurements

Monitoring Location	Monitoring Start	Monitoring End	Elapsed Time	Measured Sound Levels (dBA)			
				L_{eq}	L_d	L_n	L_{dn}
LT-1	2025-07-30 12:56:34	2025-07-31 13:00:58	24:03:34	41.7	42.6	40.2	47.0

Notes: Summary excludes the following 30-minute intervals with measurable precipitation: 14:00, 14:30, 15:30, 20:30, 21:00, and 21:30 on July 30, 2025.
L_{eq} = Equivalent continuous sound level over the monitoring period; L_d = Daytime average L_{eq} (7:00 a.m. to 10:00 p.m.); L_n = Nighttime average L_{eq} (10:00 p.m. to 7:00 a.m.); L_{dn} = Day-night sound level; 24-hour L_{eq} with a 10 dB penalty added to nighttime hours.

The baseline sound environment is consistent with that of a rural residential setting. Acoustic conditions were influenced primarily by distant roadway traffic, occasional aircraft overflights, and natural sources such as wind and wildlife. These measurements establish a representative baseline for evaluating potential noise impacts associated with the operation of the proposed project.

2.2.7 Worst-Case 30-Minute Average Sound Levels and Metric Selection

To support a conservative and code-compliant operational noise assessment under Santa Fe County Land Development Code (SLDC) Section 7.21.4, a focused analysis was conducted to determine the lowest valid 30-minute A-weighted equivalent continuous sound levels (L_{eq}) during three relevant time periods:

- Daytime hours (7:00 a.m. to 10:00 p.m.)
- Nighttime hours (10:00 p.m. to 7:00 a.m.)
- Transitional early morning period from 6:00 a.m. to 7:00 a.m., when certain project components may become operational while nighttime limits are still in effect due to sunrise timing during summer months.

During the summer dawn period between 6:00 a.m. and 7:00 a.m., ambient sound levels typically increase due to a combination of natural and human-related sources. These include early morning traffic, agricultural activity, commercial operations, and intensified biological activity such as bird vocalizations and insect noise. According to FHWA (FHWA 2011a), this period can exhibit a 3–5 dBA increase in L_{eq} compared to pre-dawn baseline levels, particularly in rural and semi-rural environments. As such, it is not appropriate to rely solely on the absolute lowest nighttime hour as a basis for noise thresholds during this seasonal transition period. The measured sound levels during this transitional hour provide a more realistic and environmentally representative baseline for comparison with operational activity that begins at sunrise.

The metric selected for this analysis is L_{eq}, is a time-averaged energy metric that captures the total acoustic energy over a defined period. It is widely recognized in environmental acoustics for its ability to represent the cumulative impact of variable and intermittent noise sources, align with noise standards and impact thresholds used in ANSI S12.9, EPA, and many local codes.

While L_{50} (the level exceeded 50% of the time) can provide insight into background sound conditions, it does not account for short-duration but high-energy events, which are relevant when evaluating equipment like inverters, transformers, or solar tracking systems. As such, L_{eq} is considered the more appropriate and conservative metric for assessing operational noise impacts. These sound levels were derived from the 24-hour ambient monitoring conducted from July 30 to July 31, 2025, at the southwestern property boundary of the Rancho Viejo development and are presented in Table 7.

Table 7. Lowest Valid 30-Minute L_{eq} Sound Levels by Time Period

Time Period	Lowest 30-Minute L_{eq} (dBA)
Daytime (7:00–22:00)	32.4
Nighttime (22:00–7:00)	30.2
6:00 a.m. – 7:00 a.m.	34.8

Note: Table 7 presents the lowest valid 30-minute L_{eq} values recorded during each time period. These conservative values were selected in accordance with Santa Fe County ordinance requirements and represent the baseline thresholds used for operational noise compliance assessment.

Whereas Table 6 summarizes average acoustic conditions over the full 24-hour monitoring period, Table 7 isolates the lowest valid 30-minute L_{eq} levels by period, consistent with regulatory requirements for establishing conservative operational noise thresholds.

2.3 Regulatory Setting

Federal, state, and local agencies have set noise regulations and policies to protect the health and welfare of the public, as described below.

2.3.1 Applicable Noise Standards

2.3.1.1 FEDERAL

In 1974 the EPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare* with an Adequate Margin on Safety. In this publication, the EPA evaluated the effects of environmental noise with respect to health and safety and determined an L_{dn} of 55 dBA (equivalent to a continuous noise level of 48.6 dBA) to be the maximum sound level that will not adversely affect public health and welfare by interfering with speech or other activities in outdoor areas.

2.3.1.2 STATE

No state laws regulating noise were identified during a review of potentially applicable regulations.

2.3.1.3 SANTA FE COUNTY

Santa Fe County Ordinance No. 2016-9 Chapter 7 – Sustainable Design Standards

Under section 131.21 Prohibitions of this ordinance, it is stated that:

> The maximum permissible noise limit at the property line shall not exceed the following depending on the zoning district:
>
> **Industrial and Commercial Zoning Districts:**
>
> - Daytime (7:00 a.m. to 10:00 p.m.): 75 dB(A), or 10 dB(A) above ambient; whichever is less
> - Nighttime (10:00 p.m. to 7:00 a.m.): 60 dB(A), or 5 dB(A) above ambient; whichever is less
>
> **All Other Districts:**
>
> - Daytime (7:00 a.m. to 10:00 p.m.): 55 dB(A), or 5 dB(A) above ambient; whichever is less
> - Nighttime (10:00 p.m. to 7:00 a.m.): 45 dB(A), or 5 dB(A) above ambient; whichever is less

Based on the Santa Fe County Zoning Maps, no Industrial or Commercial Zoning Districts are located immediately adjacent to the Project. As a result, the noise limits for All Other Districts were applied in this analysis.

As presented in Section 2.2.7, the lowest valid 30-minute L_{eq} daytime and nighttime values measured at the southwestern property boundary were used to determine applicable noise thresholds in accordance with the ordinance. These thresholds are determined by adding 5 dBA to the measured ambient level for each period and comparing that result to the corresponding fixed limit set by the ordinance. The lower (more restrictive) of the two is applied as the applicable threshold, as summarized in Table 8.

Table 8. Applicable Property Line Noise Thresholds Based on Measured Ambient Conditions

Time Period	Measured Ambient L_{eq} (dBA)	Ambient + 5 dBA	Fixed Limit (dBA)	Applicable Threshold (dBA)
Daytime (7:00–22:00)	32.4	37.4	55	37.4
Nighttime (22:00–7:00)	30.2	35.2	45	35.2
6:00 a.m. – 7:00 a.m.	34.8	39.8	45	39.8

Santa Fe County Ordinance No. 2009-11

The Santa Fe County Noise Control and Public Nuisance Ordinance (2009-11) establishes specific restrictions on noise-generating activities to safeguard public health, safety, and quality of life. It defines maximum permissible sound levels and outlines enforcement procedures, while also identifying certain exceptions to its application.

The ordinance specifies that sound levels should not exceed 60 dBA between 10:00 p.m. and 7:00 a.m. or 75 dBA between 7:00 a.m. and 10:00 p.m. Compliance with these limits is determined based on measurements taken at 25 feet from the perimeter of a noise-sensitive unit or within the noise-sensitive unit itself. These limits must not be exceeded for more than five consecutive minutes, ten minutes in any half-hour, or intermittently on ten or more occasions within the same period.

Several exceptions to the sound restrictions are provided under the ordinance. For instance, noise caused by emergency work, regulated industrial activities, or agricultural operations is exempt. Additionally, public or private utility work related to maintenance, construction, or repairs conducted in easements, property, or public rights-of-way is also excluded from the ordinance's limitations.

For the Rancho Viejo Solar Project, compliance with these sound limits will be required to ensure adherence to the ordinance during both daytime and nighttime operations. While certain project-related activities may qualify for exemptions under the ordinance's provisions, routine operations must align with the specified sound thresholds.

For this analysis, the noise thresholds in Santa Fe County Ordinance No. 2016-9, Chapter 7 – Sustainable Design Standards were applied instead. These limits, set at 55 dBA or 5 dBA above ambient during the day and 45 dBA or 5 dBA above ambient at night (whichever is lower), are tailored to specific zoning districts and better reflect the rural and residential land use surrounding the project site. It should be noted that the noise thresholds presented and applied in this analysis are specific to long-term operational activities and do not apply to construction-related noise.

The Sustainable Design Standards provide a more localized and stringent framework for evaluating noise impacts in alignment with the zoning and land use characteristics of the project area.

2.3.1.4 CITY OF SANTA FE

Santa Fe, New Mexico – Code of Ordinances, Chapter X – Environmental Regulations, Section 10-2 – Noise

This ordinance provides restrictions on noise generating activities in order to ensure residents of Santa Fe are provided with an environment free from such excessive sound that may jeopardize their health, welfare and safety, or degrade the quality of life.

Section 10-2.4 of this ordinance (Noises Prohibited) restricts the allowable hours for construction activities within the city of Santa Fe. This section specifically applies to construction activities occurring within the city limits. Because the project is located outside of the city limits, this section is not applicable and no limitations on the allowable hours for construction activities based on noise ordinances have been identified.

Section 10-2.5 of this ordinance (Zone district noise levels; maximum; correction) provides the maximum allowable noise levels that are permitted at different receiving zones. This regulation stipulates that:

A. It is a violation of this section for any person to operate or permit to be operated any stationary source of sound in such a manner as to create a ninetieth percentile sound pressure level (L90) for a measurement period of ten (10) minutes or more unless otherwise provided in this section, which exceeds the limits set forth for the following receiving zones. The location for measuring exterior sound levels shall be at least one foot (1') inside the property line of the affected property and three to six feet (3' to 6') above ground level and at least four feet (4') from walls and other reflective surfaces.

Zone District	9:00 p.m. to 7:00 a.m.	7:00 a.m. to 9:00 p.m.
Residential	**50 dBA**	**55 dBA**
R-1, R-2, R-3, R-4, R-5, R-7, RC-5, RC-8, RM, RAC, AC, PRC, PRRC, HZ, Mobile Home Park		
Commercial	**55 dBA**	**60 dBA**
C-1, C-2, C-4, SC, BCD		
Industrial-Agricultural	**70 dBA**	**75 dBA**
I-1, I-2, IP		

When a noise source can be identified and its noise measured in more than one (1) land use category, the limits of the more restrictive use shall apply at the boundaries between different zones.

Although the project is located outside the City of Santa Fe, potential noise impacts within the city are acknowledged. However, Santa Fe County Ordinance No. 2016-9, Chapter 7 – Sustainable Design Standards provides more restrictive noise limits than those established by the City of Santa Fe. Because this ordinance imposes stricter thresholds for allowable noise levels, it was applied to assess the project's potential operational noise impacts. These thresholds are not intended to apply to temporary construction activities, which are exempt from this ordinance per County guidance.

By demonstrating compliance with the stricter standards set forth in Santa Fe County Ordinance No. 2016-9, the project inherently complies with the City of Santa Fe's noise requirements. Therefore, the city ordinance was not independently applied in this analysis.

3 NOISE IMPACTS

The following section provides results and interpretation of potential impacts from noise generated by the project during construction and operation phases.

3.1 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 impact locations. Soundscapes are affected by the following factors:

- 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.
- 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).
- Proximity to NSAs. An NSA is 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 NSAs include residential areas, parks, and wilderness areas, but also include passive parks and monuments, schools, hospitals, churches, and libraries.

3.2 Construction Noise

The noise levels generated by construction equipment vary significantly and depend on several different parameters, such as the type, model, size, and condition of the equipment; the operation schedule; and the condition of the area being worked. Additionally, construction projects are accomplished in several different stages. Each stage has a specific equipment mix, depending on the work to be completed.

3.2.1 Equipment and Machinery

The use of heavy equipment such as hoist cranes, excavators, dozers, and backhoes during construction will temporarily elevate ambient noise levels in the vicinity of the project site. Standard construction equipment typically operates within a range of 75 to 85 dBA at a distance of 50 feet from the source. In outdoor environments, noise levels decrease with distance, influenced by factors such as topography, vegetation, weather, and nearby traffic. On average, noise from a point source decreases by 6 dBA with each doubling of distance (Berger et al. 2003; Radtke 2016).

Noise impact calculations for this project use established noise attenuation principles and sound level reduction formulas for construction equipment, with a reference distance of 50 feet from the sound source (Thalheimer 2000). The noise generated by equipment operating within the range of 75 to 85 dBA is shown to attenuate predictably over distance, as illustrated in Table 9.

Additional sources of noise, such as worker commutes and material delivery vehicles, are expected to be short-term and sporadic, with minimal impact on hourly average noise levels. These temporary sources will have limited influence on overall noise conditions at sensitive receptors in the project area.

Table 9. Summary of Predicted Noise Generation from the Proposed Construction Equipment by Distance

Equipment - 75 dBA at 50 feet		Equipment - 80 dBA at 50 feet		Equipment - 85 dBA at 50 feet	
Distance in Feet from the Source (miles [approximate])	Noise Level (dBA)	Distance in Feet from the Source (miles [approximate])	Noise Level (dBA)	Distance in Feet from the Source (miles [approximate])	Noise Level (dBA)
50 (0.01)	75	50 (0.01)	80	50 (0.01)	85
100 (0.02)	69	100 (0.02)	74	100 (0.02)	79
200 (0.04)	63	200 (0.04)	68	200 (0.04)	73
400 (0.08)	57	400 (0.08)	62	400 (0.08)	67
800 (0.15)	51	800 (0.15)	56	800 (0.15)	61
1,600 (0.30)	45	1,600 (0.30)	50	1,600 (0.30)	55
3,200 (0.60)	39	3,200 (0.60)	44	3,200 (0.60)	49
6,400 (1.21)	33	6,400 (1.21)	38	6,400 (1.21)	43
12,800 (2.42)	27	12,800 (2.42)	32	12,800 (2.42)	37

Based on noise attenuation, construction equipment noise levels will be expected to dissipate to below background levels (assumed to be 42.6 dBA) within approximately 0.4 miles to 1.2 miles of the project area. The closest sensitive noise receptor, a residence located approximately 1,400 feet (0.27 miles) away, will experience a temporary increase in ambient outdoor noise levels during the 12-month construction period. At this distance, noise levels from equipment operating at 85 dBA are estimated to attenuate to approximately 56 dBA, comparable to the noise level of a normal conversation in a quiet room or light office noise.

Sensitive noise receptors between 1,600 feet (0.3 mile) and 3,200 feet (0.6 mile) away consist of 114 residences and the Turquoise Trail Charter School and will experience a temporary increase in ambient outdoor noise levels, which will attenuate to approximately 55 dBA or less, comparable to the noise level of a quiet suburban street. Sensitive noise receptors between 3,200 feet (0.6 mile) and 6,400 feet (1.2 miles) away consist of 262 residences and will experience a temporary increase in ambient outdoor noise levels, which will attenuate to levels 43 dBA or less comparable to the noise level of a quiet library or soft whisper.

It is expected that construction would occur primarily during daytime hours, though it is potential that some nighttime construction activities may be required. Santa Fe County Ordinance No. 2009-11, Section 7, exempts sounds made by activities performed at the direction of Santa Fe County or by any public or private utility for maintenance, construction, or repair of public improvements. It is anticipated that the project will qualify for this exemption.

3.3 Operational Noise

To evaluate potential noise impacts associated with the operation of the Rancho Viejo Solar Project, detailed predictive noise modeling was conducted. The analysis considered primary operational noise sources, including inverters, transformers, BESS equipment, and solar trackers.

Modeled sound levels were calculated at both the project property boundaries and at the nearest identified NSAs. The results were assessed for compliance with the following regulatory thresholds:

- Santa Fe County Ordinance No. 2016-9, Chapter 7 – Sustainable Design Standards, which sets noise limits at property lines based on ambient conditions and zoning designations (see Section 2.3 and Table 8), and
- The EPA recommended L_{dn} limit of 55 dBA at residential NSAs, which is commonly used as a health-based guideline for long-term community noise exposure.

Operational sound levels were compared to the applicable property line thresholds derived from measured ambient conditions (Section 2.2.7), and to the EPA L_{dn} criterion at nearby residences. The analysis ensures that predicted noise emissions from project operations remain within both local and federal guideline limits.

3.3.1 Operational Activities

The primary noise sources anticipated during operation of the proposed project include inverters, solar trackers, transformers, and battery energy storage system (BESS) equipment. Daytime sound levels (7:00 a.m. to 10:00 p.m.) assume the operation of all major equipment, including inverters, trackers, transformers, and BESS, to reflect typical energy production hours throughout the year. In contrast, nighttime sound levels (10:00 p.m. to 7:00 a.m.) account only for equipment expected to operate during those hours—specifically transformers and BESS—acknowledging that solar-related components such as inverters and trackers do not operate in the absence of sunlight.

3.3.2 Noise Profile

The sound power level (L_w) and quantities for each equipment noise source is listed in Table 10. 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 10. Equipment Sound Power Levels

Equipment	1/1 Octave Spectrum									dBA	Qty.
	31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz		
Aux Transformer	84	90	92	87	87	81	76	71	64	87.4	1
Substation Transformer	84	90	92	87	87	81	76	71	64	87.4	1
BESS HVAC	94	94	94	94	92	87	87	86	80	72 [1]	38
BESS Chiller	94	94	94	94	92	87	87	86	80	61 [1]	19
PCS Inverter	86	87	91	86	92	83	83	73	74	95.8	19
SG4400UD-MV-US	84	90	92	87	87	81	76	71	64	96	25
Solar Tracker Motor	94	94	94	94	92	87	87	86	80	72 [1]	72

[1] Representative spectra were used for equipment for which only dBA levels were used. dBA values noted here are the dBA values resulting from converting the spectra to a dBA value, then applying a correction factor. As a result, frequency values presented here do not directly correspond to the noted dBA values.

In addition to the equipment listed in Table 10, a 115 kV transmission line is proposed. However, based on previous analyses, it is generally accepted that 115 kV transmission lines are not responsible for audible noise that can be perceived by humans during fair weather (CH2M 2012).

Additionally, any corona discharges resulting in increased noise levels during foul (wet) weather would typically be quieter than the rain that would cause the increase in noise levels from the transmission line and would similarly not be perceptible to a human observer. It is expected that any noise generated during foul weather would attenuate to less than background noise levels at the edge of the right of way for the transmission line. For this reason, the 115 kV transmission line was not included in the SoundPLAN model.

3.3.3 Assessment Methodology

Based on the sound power levels for each of the sources, SoundPLAN estimates noise contours of the overall project in accordance with a variety of standards, primarily International Standards Organization (ISO) 9613-2:1996, Acoustics, standards for noise propagation calculations. All sound propagation losses, such as geometric spreading, air absorption, ground absorption, and barrier shielding, are calculated in accordance with these recognized standards.

The model accounts for reflection, from adjacent structures and the ground. The model uses industry-accepted propagation algorithms and accepts sound power levels (in dB) provided by the manufacturer and other sources. The calculations account for classical sound wave divergence, plus attenuation factors resulting from air absorption, basic ground effects, and barrier/shielding. SoundPLAN does not account for noise modulation or refraction.

The sound propagation model considers the following influences:

- sound power levels and locations of noise sources
- distance between noise sources and receivers
- topography of the area
- influence of the absorption provided by the ground
- shielding from structures or vegetation
- air absorption
- meteorological conditions

The ISO 9613-2 methodology provides tables and equations for estimating the atmospheric absorption coefficient corresponding to various temperatures and humidity levels. Topographic inputs were also included in the model.

The ISO 9613-2 standard estimates sound pressure levels at a specified distance by subtracting the attenuation factors from the source sound power level for each source in octave frequency bands. Attenuation factors include geometrical divergence, atmospheric attenuation, ground effect, and barrier attenuation. These terms are defined as follows.

- Geometrical divergence occurs as the source sound power is spread out over an increasing surface area (i.e., as the distance from the source increases). The estimated loss rate is the same for all frequencies. This is considered the most significant loss associated with propagation. Attenuation due to geometrical divergence is highly dependent on the distance between the source and the receiver. Direction also affects the noise level; 0° direct line of sight noise level will be higher than 90° direction line of sight to a stack emission point. Therefore, the differences in ground elevation and receiver height and hub height (source height) are important parameters.

- Losses due to atmospheric attenuation occur as the energy in the sound wave is transformed to heat. As this attenuation is frequency dependent and high frequencies are more readily attenuated than low frequencies, these losses are highly influenced by humidity and temperature.

- Ground effect is described according to the parameter Ground Factor, which varies between 0 for surfaces with low porosity ("hard" ground) and 1 for "soft" ground (surfaces including loose dirt, grass, crops, and other vegetation). This factor describes the effect of sound waves reflected off the ground. Parameters influencing the ground effect are the source height, receiver height, and propagation distance between the source and receiver and the ground conditions. Barrier attenuation describes the effect of sound waves refracted around an imperforate element or barrier.

- A barrier could include human-made objects such as structures, buildings, and fences, as well as topographical features. Therefore, the differences in ground elevation, source height, receiver height, dimensions, and location absorption and reflection coefficients of human-made structures and topographic features are important parameters when estimating barrier attenuation in SoundPLAN.

The following assumptions were made when running SoundPLAN:

- The model assumed all proposed noise-generating sources operated concurrently.
- Noise impacts at the selected impact locations and depicted in the isopleths were estimated assuming a receiver height of 5 feet above ground level.
- Elevations of the sources and of the receptors examined in the modeling were determined from U.S. Geological Survey Digital Elevation Map (DEM) and are based on North American Datum of 1927. The DEM files each had a 100-foot resolution (7.5-minute DEM providing coverage of 7.5 × 7.5-minute blocks).

To more accurately represent site-specific conditions for the proposed Rancho Viejo Solar Project, varying ground absorption coefficients were applied in the noise modeling to reflect the range of surface types present across the project area.

A ground absorption coefficient of 0.6 was applied to the majority of the modeling domain. This value is appropriate for semi-absorptive ground types such as gravel, compacted soil, and mixed sandy terrain, which are common in and around the project site. These surfaces are typical of solar facility installations, particularly in the arid high-desert environment of Santa Fe County, where ground cover tends to be coarse and well-drained.

In areas identified as vegetated or covered with looser, more porous soil, a higher ground absorption coefficient of 0.7 was applied to represent the acoustic characteristics of the terrain. This value reflects the elevated sound absorption associated with low grasses, scattered shrubs, and undisturbed soil, which are consistent with open-space and undeveloped rangeland in the project area. The selection of this coefficient was based on recent satellite imagery (Google Earth), aerial land cover analysis, and direct site observations conducted during the July 2025 ambient sound monitoring visit.

Highly reflective, acoustically hard surfaces (e.g., pavement or exposed bedrock) were not found to dominate the project area and were therefore not assumed in the base case model. The selected absorption values provide a conservative and realistic representation of ground conditions for assessing sound propagation from operational noise sources.

3.3.4 Operational Noise Impacts

The calculated noise levels from operation of the Rancho Viejo Solar Project comply with the Santa Fe County Ordinance No. 2016-9, Chapter 7 – Sustainable Design Standards, and remain below the EPA's recommended 55 dBA Ldn standard for residential areas.

The highest operational noise levels are predicted to occur at the southwestern property boundary, which is closest to a nearby noise-sensitive receptor. At this location, project-only contributions were estimated to be 35.1 dBA during both daytime hours and the early morning period from 6:00 a.m. to 7:00 a.m., when sunlight is present, and the full array of equipment—trackers, inverters, transformers, and BESS—is assumed to be operating. During nighttime hours (10:00 p.m. to 7:00 a.m., excluding sunrise), modeled project contributions were significantly lower, at 21.3 dBA, reflecting operation of only the transformers and BESS. Inverters and trackers, which are dependent on solar irradiance, are not expected to operate during nighttime hours.

When combined with the measured ambient 30-minute L_{eq} values, the cumulative noise levels (ambient plus project contribution) at the southwest property boundary are estimated to be:

- 37.0 dBA during daytime hours,
- 30.7 dBA during nighttime hours, and
- 38.0 dBA between 6:00 a.m. and 7:00 a.m., when both operational activity and nighttime noise limits may apply.

All modeled cumulative levels are below the applicable property line limits derived from measured ambient conditions, as shown in Table 11.

Noise levels at other property boundaries are expected to be lower due to increased distance from noise sources or the presence of natural and structural shielding. Therefore, the project is not expected to exceed any operational noise standards at its boundaries.

Table 11 summarizes the baseline ambient noise levels, modeled project contributions, total cumulative sound levels, and applicable limits for each operational period at the location of maximum impact.

Table 11. Summary of Operational Noise Levels and Compliance at Southwest Property Boundary

Time Period	Measured Ambient L_{eq} (dBA) [a]	Project Contribution (dBA) [b]	Cumulative L_{eq} (dBA) [c]	Applicable Threshold (dBA) [d]
Daytime (7:00–22:00)	32.4	35.1	37.0	37.4
Nighttime (22:00–7:00)	30.2	21.3	30.7	35.2
6:00 a.m. – 7:00 a.m.	34.8	35.1	38.0	39.8

[a] Measured Ambient L_{eq}: The lowest valid 30-minute A-weighted equivalent continuous sound level recorded during each time period.
[b] Project Contribution: The modeled L_{eq} sound level attributable to the proposed project alone during each time period, without ambient sound included.
[c] Cumulative L_{eq}: The combined sound level resulting from the logarithmic summation of the ambient background sound and the modeled project contribution.
[d] Applicable Threshold: The most restrictive allowable noise limit for each time period, determined in accordance with Santa Fe County Ordinance No. 2016-9 by comparing fixed limits and ambient-based thresholds (ambient + 5 dBA), and applying the lower value.

Using a conservative assumption that daytime project noise levels of 35.1 dBA occur consistently over 15 daytime hours (7:00 a.m. to 10:00 p.m.), and nighttime noise levels of 21.3 dBA occur consistently over 9 nighttime hours (10:00 p.m. to 7:00 a.m.), the cumulative L_{dn} at the southwest property boundary is estimated to be approximately 47.2 dBA. This estimate accounts for both the modeled project contribution and the existing ambient sound levels measured during the 24-hour monitoring period as presented in Table 6 (L_d = 42.6 dBA, L_n = 40.2 dBA, L_{dn} = 47.0 dBA). The resulting cumulative L_{dn} remains well below the EPA's recommended 55 dBA threshold for residential environments, indicating that the Project's operational noise would not pose a risk of long-term community noise impact under federal guidance.

A similar cumulative noise analysis was conducted for the NSA with the highest modeled operational sound levels. At this location, the project is predicted to contribute sound levels of 30.7 dBA during daytime hours and 20.7 dBA during nighttime hours. Assuming that ambient conditions at this NSA are equivalent to those measured at the southwestern property boundary (L_d = 42.6 dBA, L_n = 40.2 dBA), the resulting cumulative L_{dn} is estimated to be approximately 47.1 dBA. This cumulative value remains well below the EPA's recommended 55 dBA threshold for residential areas.

These findings confirm that operational noise from the Project will remain within the required thresholds for all applicable time periods.

In terms of human perception, the increase in sound levels relative to ambient conditions at the southwestern property boundary is estimated to be approximately 4.6 dBA during daytime hours, 0.5 dBA during nighttime hours, and 3.2 dBA during the 6:00 to 7:00 a.m. transitional period. These increases are based on the assumption that existing ambient conditions correspond to the lowest valid 30-minute L_{eq} values recorded for each period. According to established acoustic perception criteria, an increase of 2 to 3 dBA is typically considered barely perceptible, while a 5 dBA increase is generally regarded as readily noticeable. Therefore, the daytime increase may be noticeable to some listeners, while the early morning increase would likely be barely perceptible, and the nighttime increase would be imperceptible.

At the NSA with the highest modeled project noise levels, and conservatively assuming ambient sound levels are the same as those measured at the property boundary, the estimated increases are approximately 2.2 dBA during daytime hours, 0.5 dBA during nighttime hours, and 1.4 dBA during the 6:00 to 7:00 a.m. period. All of these increases fall within the range of imperceptible to barely perceptible and are not expected to result in any noticeable change in the acoustic environment for typical listeners.

Consequently, the project is not expected to result in a substantial or permanent increase in ambient noise levels in the vicinity of the site, nor is it anticipated to generate operational noise that would be audibly distinct to nearby residents.

To visualize the spatial extent of noise propagation, noise contour maps were generated using SoundPLAN Essential Version 5.1. These isopleth figures, included in Appendix C, illustrate project-only sound levels across the modeled area. They do not include background ambient noise, providing a conservative representation of potential project-related impacts.

4 POST-CONSTRUCTION COMPLIANCE

Within 120 days following the start of commercial operations, the Applicant will carry out a post-construction sound survey, overseen by a qualified, independent third party. The findings of the survey will be shared with the County and made publicly available. Should the results indicate that noise levels exceed those outlined in the County's noise ordinance, the Applicant will work to identify and implement appropriate mitigation measures to bring the project into compliance with applicable standards.

5 LITERATURE CITED

American National Standards Institute (ANSI). 2013. *Quantities and Procedures for Description and Measurements with an Observer Present – Part 3: Short-term Measurements with an Observer Present, ANSI/ASA S12.9-2013/Part 3.* American National Standards Institute, Inc.

American Society for Testing and Materials (ASTM). 2012. *E1014-12, Standard Guide for Measurement of Outdoor A-Weighted Noise levels*. West Conshohocken, Pennsylvania: American Society for Testing and Materials International.

Beranek, L.L. (ed.). 1988. *Noise and Vibration Control*. Washington, D.C.: Institute of Noise Control Engineering

Berger, E., L. Royster, and J. Royster. 2003. *Noise Surveys and Data Analysis*. In The Noise Manual, 5th ed., pp. 186–189. Fairfax, Virginia: American Industrial Hygiene Association.

Bolt Beranek and Newman, Inc. 1973. *Fundamentals and Abatement of Highway Traffic Noise*. Report Number PB-222-703. Prepared for U.S. Department of Transportation, Federal Highway Administration. Bolt Beranek and Newman, Inc.

CH2M Hill. 2012. *United Power Phase III Transmission Line Project Electric and Magnetic Fields and Audible Noise.*

Federal Highway Administration (FHWA). 2011a. *Highway Traffic Noise: Analysis and Abatement Guidance.* U.S. Department of Transportation, Federal Highway Administration. https://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf.

_____. 2011b. *Roadway Construction Noise Model (RCNM).* Software Version 1.1. Federal Highway Administration.

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manual*. FTA Report No. 0123. Washington, D.C.: U.S. Department of Transportation, Federal Transit Administration, Office of Planning and Environment.

Santa Fe County. 2009. *Ordinance No. 2009-11: Noise Control and Public Nuisance Ordinance*. Santa Fe County, NM. Available at: https://www.santafecountynm.gov/documents/ordinances/Ordinance200911K.pdf

Santa Fe County. 2016. *Ordinance No. 2016-9: Chapter 7 – Sustainable Design Standards*. Santa Fe County, NM. Part of the Santa Fe County Sustainable Land Development Code (SLDC). Available at: https://www.santafecountynm.gov/sldc

Thalheimer, E. 2000. *Construction Noise Control Program and Mitigation Strategy at the Central Artery/Tunnel Project*. Boston, Massachusetts: Noise Control Engineering.

U.S. Environmental Protection Agency (EPA). 1979. *Protective Noise Levels, Condensed Version of EPA Levels Document*. Available at: http://www.nonoise.org/library/levels/levels.htm.

APPENDIX A

Long-Term Monitoring Location Photographs

Photo A-1. Monitoring Location LT-1.

APPENDIX B

Survey Data Sheets

Noise Measurement Datasheet

PROJECT Rancho Viejo Solar Facility Project

Monitoring Location

Site ID LT-1

Coordinates
Lat: 35°32'14.88"N
Lon: 106° 1'7.64"W
Elevation (ft): 6,406

Ground Type Vegetation

Topography Flat

Observed Weather
Overcast

Equipment

Sound Meter Model : 831C, S/N: 0010774

Preamplifier Model : PRM831, S/N: 76976

Microphone Model : 377B02, S/N: 352914

Calibrator Model : CAL200, S/N: 100308

Settings A, slow

Monitoring Data Start Time: 2025-07-30 12:56:34, End Time: 2025-07-31 13:00:08

Dominant Background Noise Source(s) with Distance

Source	Distance (ft)	Source	Distance (ft)
Distant traffic		Thunder	
Planes		Wildfire	
Wind			

Monitoring Data

Parameter										
Duration hh:mm	24:03:33.797									
Memory										
Battery										
Calibration Error	0.14 dB									
Exceedance Events										
Overall Peak	120.3 dB									
Overall Laeq	49.1 dB									
LDN	50.7 dB									
Day	51.0 Db									
Night	40.2 dB									

Data File(s)	File Size
831C_10774-20250730 125634-RV.003	1,770 KB

Comments and Events

Event	Day	Time	Comment

Field Technician Carlos Ituarte-Villarreal

Noise Measurement Datasheet

PROJECT Rancho Viejo Solar Facility Project
Site ID LT-1

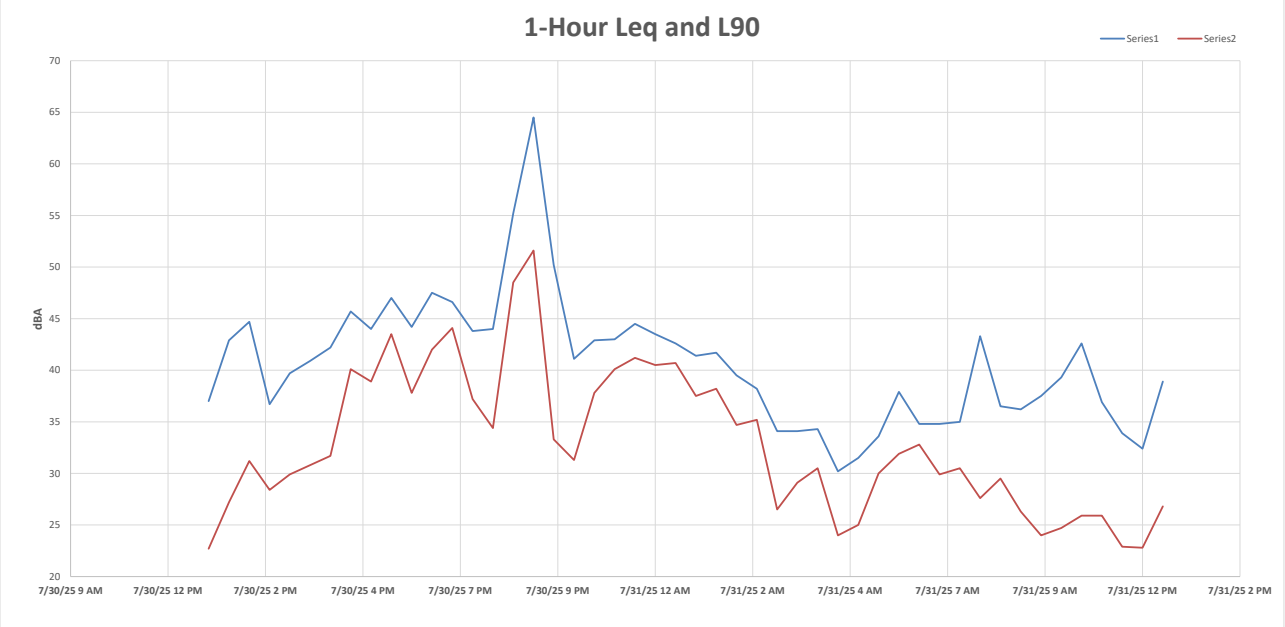
Date	Time	Duration	Leq	Lmax	Lmin	L5	L10	L50	L90
		hh:mm	dBA	dBA	dBA	dBA	dBA	dBA	dBA
7/30/2025	12:56	0:03	50.6	71.1	22.5	52	45.4	31.6	24
7/30/2025	13:00	0:30	37	55	21.1	43.4	40.9	29.2	22.7
7/30/2025	13:30	0:30	42.9	62.5	20.3	49	46.3	38	27.2
7/30/2025	14:00	0:30	44.7	64.4	20.9	49.6	47	39.3	31.2
7/30/2025	14:30	0:30	36.7	52.8	23.8	41.1	39.4	34.1	28.4
7/30/2025	15:00	0:30	39.7	52.1	22.7	45.1	42.9	36.5	29.9
7/30/2025	15:30	0:30	40.9	52.8	22.6	46.1	44.6	38.5	30.8
7/30/2025	16:00	0:30	42.2	57.4	26.2	47.1	45.2	38.9	31.7
7/30/2025	16:30	0:30	45.7	58.0	28.7	49.8	48.4	44.4	40.1
7/30/2025	17:00	0:30	44.0	53.1	31.2	47.9	46.8	43	38.9
7/30/2025	17:30	0:30	47.0	54.1	38.6	49.9	49.2	46.3	43.5
7/30/2025	18:00	0:30	44.2	59.6	30.0	47.4	46.2	42.6	37.8
7/30/2025	18:30	0:30	47.5	54.4	36.6	50.2	49.8	47.4	42
7/30/2025	19:00	0:30	46.6	51.1	37.0	49.0	48.4	46.3	44.1
7/30/2025	19:30	0:30	43.8	56.0	21.6	46.3	45.6	43.3	37.2
7/30/2025	20:00	0:30	44.0	64.7	20.4	48.1	47.2	40.0	34.4
7/30/2025	20:30	0:30	55.2	67.2	43.1	60.2	58.8	53.1	48.5
7/30/2025	21:00	0:30	64.5	92.2	43.4	63.9	62.1	56.5	51.6
7/30/2025	21:30	0:30	50.2	68.3	28.6	55.6	54.2	45.7	33.3
7/30/2025	22:00	0:30	41.1	53.2	26.2	46.6	44.7	37.9	31.3
7/30/2025	22:30	0:30	42.9	47.9	30.4	46.0	45.5	41.9	37.8
7/30/2025	23:00	0:30	43.0	47.0	37.7	45.7	45.3	42.0	40.1
7/30/2025	23:30	0:30	44.5	48.3	36.9	46.9	46.4	44.3	41.2
7/31/2025	0:00	0:30	43.5	47.9	37.0	46.6	46.2	42.4	40.5
7/31/2025	0:30	0:30	42.6	45.0	37.4	44.0	43.8	42.5	40.7
7/31/2025	1:00	0:30	41.4	46.0	33.8	43.6	43.3	41.5	37.5
7/31/2025	1:30	0:30	41.7	46.0	33.2	44.4	43.7	41.5	38.2
7/31/2025	2:00	0:30	39.5	43.4	31.2	42.4	42.2	38.6	34.7
7/31/2025	2:30	0:30	38.2	41.7	26.7	40.3	39.9	38.0	35.2
7/31/2025	3:00	0:30	34.1	45.6	24.4	37.8	37.0	32.6	26.5
7/31/2025	3:30	0:30	34.1	41.8	26.0	37.9	36.2	33.3	29.1
7/31/2025	4:00	0:30	34.3	39.1	25.7	38.0	37.4	33.3	30.5
7/31/2025	4:30	0:30	30.2	39.6	21.4	36.9	33.0	27.0	24
7/31/2025	5:00	0:30	31.5	38.1	22.9	36.3	35.8	29.4	25
7/31/2025	5:30	0:30	33.6	39.4	25.5	36.5	35.9	33.0	30
7/31/2025	6:00	0:30	37.9	55.7	29.9	40.0	38.3	34.6	31.9
7/31/2025	6:30	0:30	34.8	43.2	31.2	37.1	36.3	34.3	32.8
7/31/2025	7:00	0:30	34.8	44.5	27.5	38.8	37.9	33.6	29.9
7/31/2025	7:30	0:30	35.0	42.8	28.7	38.9	37.8	33.8	30.5
7/31/2025	8:00	0:30	43.3	74.8	25.4	41.5	39.7	32.3	27.6
7/31/2025	8:30	0:30	36.5	58.2	27.1	39.8	38.3	33.3	29.5
7/31/2025	9:00	0:30	36.2	59.4	24.2	41.0	36.8	29.7	26.3
7/31/2025	9:30	0:30	37.5	48.8	21.6	44.9	42.0	30.5	24
7/31/2025	10:00	0:30	39.3	59.1	21.3	43.6	41.9	33.2	24.7
7/31/2025	10:30	0:30	42.6	61.4	20.4	45.9	43.6	36.9	25.9
7/31/2025	11:00	0:30	36.9	49.3	21.0	42.6	40.8	33.6	25.9
7/31/2025	11:30	0:30	33.9	48.0	20.5	41.0	38.6	27.2	22.9
7/31/2025	12:00	0:30	32.4	45.2	21.2	38.5	36.2	28.0	22.8
7/31/2025	12:30	0:30	38.9	56.0	23.8	43.6	42.3	35.6	26.8
7/31/2025	13:00	0:00	29.0	31.5	26.9	31.3	30.0	28.2	27.2
Total		**24:03:34**	**49.1**	**92.2**	**20.3**	**50.4**	**47.1**	**38.1**	**28.2**

Field Technician Carlos Ituarte-Villarreal

Noise Measurement Datasheet

PROJECT Rancho Viejo Solar Facility Project

Site ID LT-1



Field Technician Carlos Ituarte-Villarreal

Rancho Viejo Solar Project
Baseline Noise Survey
Weather Data

Station: Valle Serena Elev 6365 ft, 35.59 °N, 106.03 °W
ID: KNMSANTA289

Start date: 7/30/2025 **End date:** 7/31/2025

Day	Time	Temperature		Hourly Wind	Precipitation	Humidity	Daily max	Daily min
		F	C	mph	in	%	F	F
7/30/2025	0:00	64.55	18.08	4.8	0.00	78%	83.33	56.70
	1:00	63.90	17.72	3.8	0.00	78%		
	2:00	62.78	17.10	2.8	0.00	80%		
	3:00	61.53	16.40	1.5	0.00	82%		
	4:00	60.65	15.92	1.0	0.00	82%		
	5:00	58.43	14.68	1.3	0.00	85%		
	6:00	56.70	13.72	0.7	0.00	89%		
	7:00	58.68	14.82	0.5	0.00	91%		
	8:00	65.33	18.51	1.3	0.00	81%		
	9:00	73.20	22.89	2.5	0.00	60%		
	10:00	77.70	25.39	3.4	0.00	52%		
	11:00	81.10	27.28	3.2	0.00	45%		
	12:00	83.33	28.51	3.9	0.00	41%		
	13:00	82.65	28.14	5.8	0.00	44%		
	14:00	70.88	21.60	5.6	0.11	69%		
	15:00	72.68	22.60	6.4	0.10	66%		
	16:00	77.33	25.18	8.4	0.00	53%		
	17:00	73.43	23.02	7.2	0.00	62%		
	18:00	72.98	22.76	6.6	0.00	63%		
	19:00	72.58	22.54	4.7	0.00	63%		
	20:00	68.30	20.17	3.3	0.03	66%		
	21:00	58.90	14.94	3.8	0.35	88%		
	22:00	59.08	15.04	4.0	0.03	88%		
	23:00	60.78	15.99	3.8	0.00	82%		

Rancho Viejo Solar Project
Baseline Noise Survey
Weather Data

Station: Valle Serena Elev 6365 ft, 35.59 °N, 106.03 °W
ID: KNMSANTA289

Start date: 7/30/2025 **End date:** 7/31/2025

Day	Time	Temperature		Hourly Wind	Precipitation	Humidity	Daily max	Daily min
		F	C	mph	in	%	F	F
7/31/2025	0:00	60.50	15.83	4.3	0.00	82%	84.78	57.88
	1:00	59.95	15.53	1.3	0.00	85%		
	2:00	60.08	15.60	0.4	0.00	87%		
	3:00	59.25	15.14	0.6	0.00	88%		
	4:00	58.93	14.96	0.7	0.00	86%		
	5:00	58.20	14.56	1.0	0.00	86%		
	6:00	57.88	14.38	4.5	0.00	87%		
	7:00	58.98	14.99	1.2	0.00	88%		
	8:00	62.23	16.79	1.8	0.00	82%		
	9:00	66.73	19.29	1.6	0.00	68%		
	10:00	71.13	21.74	3.0	0.00	61%		
	11:00	76.75	24.86	3.3	0.00	54%		
	12:00	79.58	26.43	4.5	0.00	49%		
	13:00	81.23	27.35	4.9	0.00	45%		
	14:00	83.30	28.50	4.4	0.00	41%		
	15:00	84.65	29.25	4.3	0.00	38%		
	16:00	84.78	29.32	7.8	0.00	36%		
	17:00	81.20	27.33	9.6	0.00	43%		
	18:00	77.55	25.31	7.7	0.00	47%		
	19:00	75.28	24.04	6.1	0.00	51%		
	20:00	70.25	21.25	4.9	0.02	69%		
	21:00	66.68	19.26	5.0	0.01	79%		
	22:00	62.88	17.15	6.0	0.00	81%		
	23:00	60.08	15.60	6.0	0.01	86%		

APPENDIX C

Project Operation Noise Maps

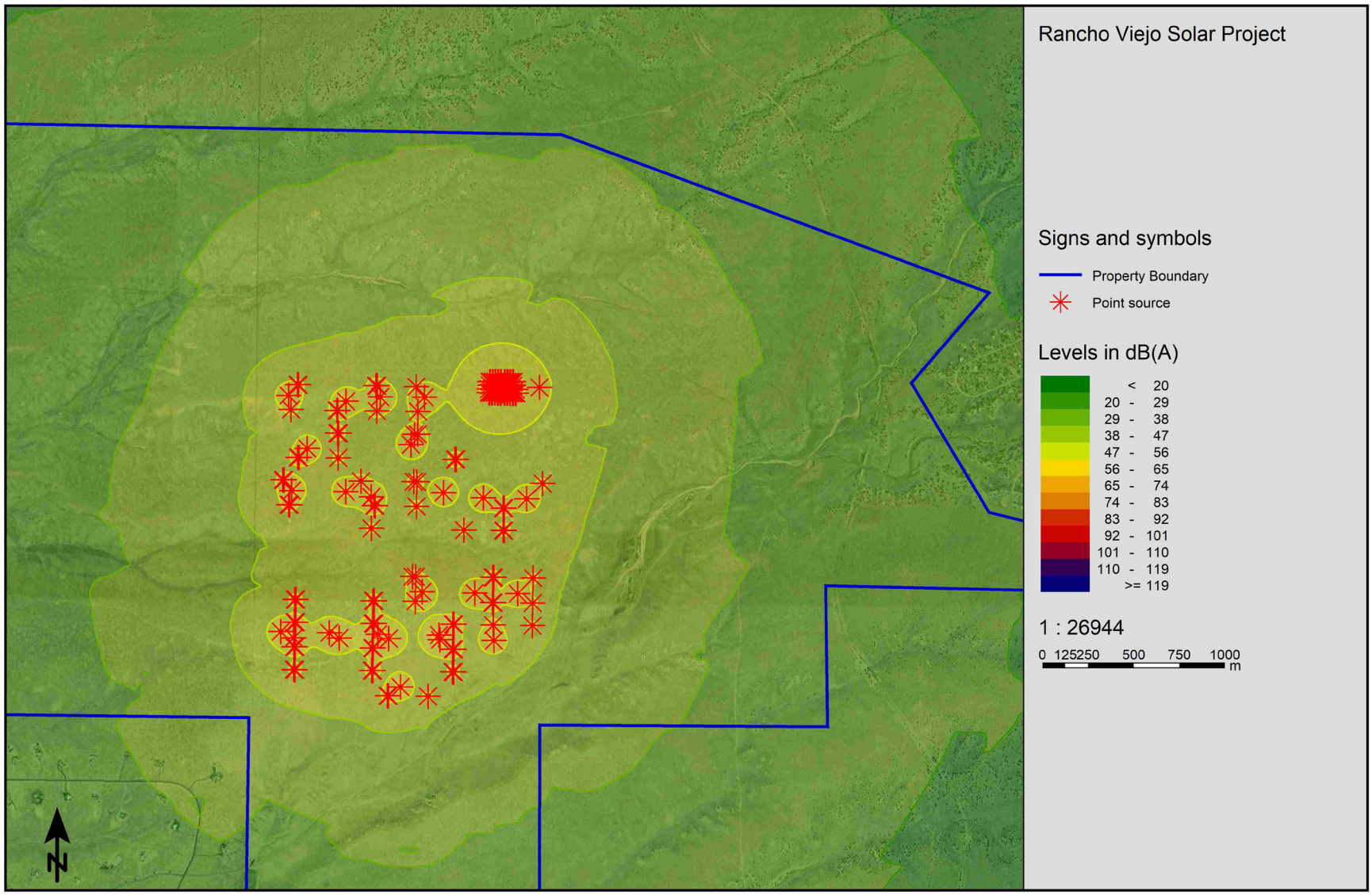


Figure C -1. Project operation noise isopleth – Daytime

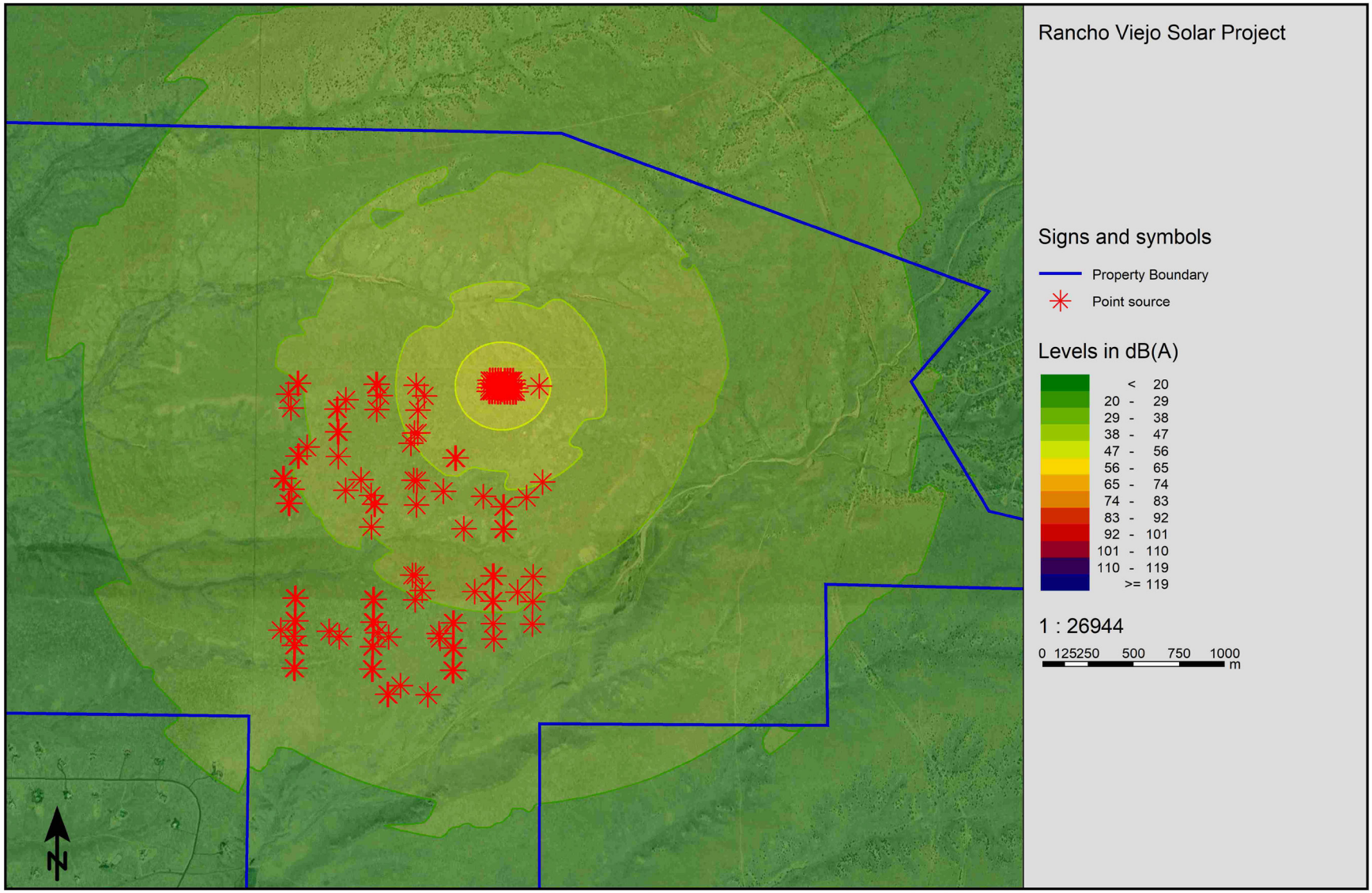


Figure C-2. Project operation noise isopleth - Nighttime

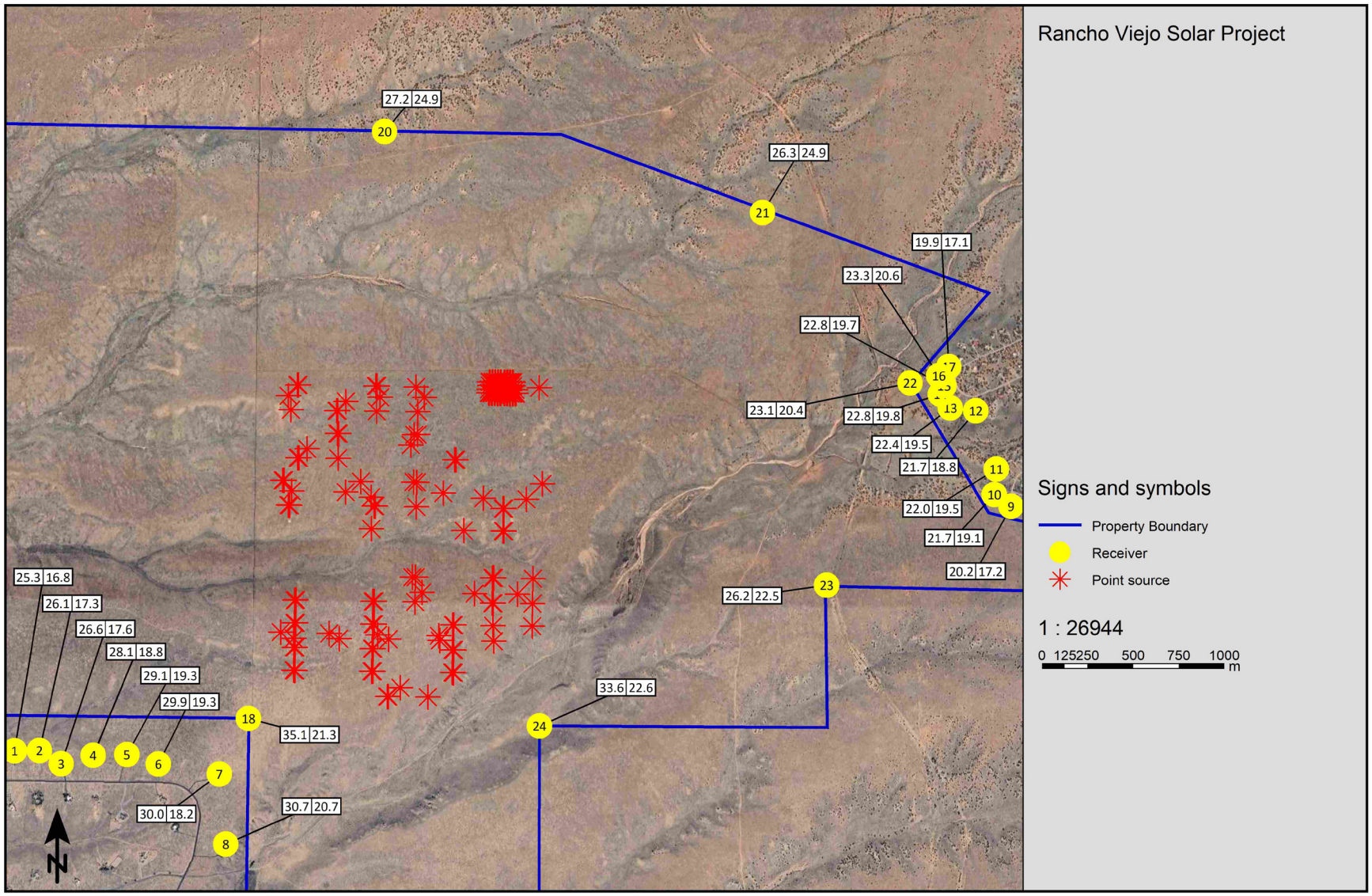


Figure C-3. Project operation noise single point map