5.9 NOISE

This section addresses the potential for adverse noise impacts associated with the construction and operation of the Genesis Solar Energy Project (the Project). The objective of this Noise Impact Assessment (NIA) is to determine the feasibility of the Project to operate in compliance with all Federal, State, and local noise regulations and ordinances.

5.9.1 Introduction

The Project site is located in an unincorporated area of Riverside County, between Desert Center and Blythe, California, located approximately 25 miles east of the Project. The area where the Project would be constructed is primarily open, undeveloped land within the Mojave Desert. The majority of the land near the proposed Project area is managed by the Bureau of Land Management (BLM), but there are several privately owned parcels, as well as a section of California State land located within, but not part of the Project extents or Right-of-Way (ROW).

Surrounding land uses include the McCoy Mountains to the east, the Palen Mountains (and Palen Mountains Wilderness Area) to the north, and Blythe Airport approximately 15 miles to the east. Interstate 10 (I-10) and State Route 78 (SR-78) are the primary highways in the Project area. Located approximately nine miles to the south of the Project are two incarceration facilities, the Chuckwalla Valley State Prison and Ironwood State Prison. Other existing land management areas in the vicinity of the plant site include the Chuckwalla Mountains, Little Chuckwalla Mountains and Joshua Tree Wildernesses, Chuckwalla Valley Dune Thicket Areas of Critical Environmental Concern (ACECs), and the Ford Dry Lake Off-Highway Vehicle (OHV) Limited Use Area.

Project site topography is characterized as relatively flat, with elevations ranging from approximately 400 feet above mean sea level (amsl) at the northwest corner to 370 feet amsl in the southwest portion. There were no existing residential structures or noise sensitive areas (NSAs) defined as residences, churches, hospitals, schools, day cares, or other facilities where quiet is a basis, at distances within five miles from the Project area. Due to the substantial separation distance between the Project and NSAs, a full NIA and comprehensive acoustic modeling analysis was not required.

5.9.2 Laws, Ordinances, Regulations, and Standards (LORS)

The following are the LORS that apply to noise generated by the project. Significance criteria from Federal, State, and local standards are discussed in the following sections.

Federal: Occupational Health and Safety Administration Safety Standards

The Federal Government has long recognized the potential hazards caused by noise on industrial and construction projects for many years. The Occupational Health and Safety Administration (OSHA) current noise standard for the construction industry stems from the occupational noise standard originally published in 1969 by the Bureau of Labor Standards under the authority of the Construction Safety Act (40 U.S.C. 333). OSHA adopted the construction noise standard in 1971 (36 FR 7340, 4/27/71) and later recodified it as 29 Code of Federal Regulations (CFR) 1926.52. Another section of the construction standard (29 CFR 1926.101) contains a provision requiring employers to provide hearing protection devices (HPD) when needed. Both sections 1926.52 and 1926.101 apply to employers engaged in construction where high noise levels are possible.

Paragraph (a) of section 1926.52 requires protection against the effects of noise exposure when 8-hour time-weighted average sound levels exceed a permissible exposure limit (PEL) of 90 dBA, measured on the A-scale of a sound level meter set at slow response. The exposure level is raised 5 decibels (dB) for every halving of exposure duration as shown in Table 5.9-1.

Table 5.9-1. OSHA Permissible Daily Noise Exposure Limits

Duration of Exposure Per Day (Hours)	Sound Level (dBA)
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

Furthermore, exposure to impulsive or impact noise should not exceed a 140 dB peak sound pressure level. Paragraph 29 CFR 1926.52(b) states that when employees are subjected to noise doses exceeding those shown in Table 5.9-1, feasible administrative or engineering controls will be identified and implemented to lower employee noise exposure. If controls fail to reduce sound to the PEL, personal protective equipment (PPE) must be provided and used to reduce noise exposure.

Federal: Environmental Protection Agency Environmental Noise Guidelines

While the U.S. Environmental Protection Agency (EPA) has no regulation governing environmental noise, the agency has conducted several extensive studies to identify the effects of sound level on public health and welfare. In 1974, the EPA published a landmark noise document entitled, “Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety” (USEPA, 1974). This publication remains the authoritative study based on a large sampling of community reaction to noise. The EPA sound level guidelines do not provide an absolute measure of noise impact, but rather a consensus on potential activity interference and annoyance. For outdoor residential areas, the recommended EPA guideline is an L_{dn} of 55 dBA (equivalent to a L_{eq} (1-hour) of 48.6 dBA assuming continuous 24-hour operation). The EPA sound level guidelines also suggest an L_{eq} of 70 dBA (24-hour) limit to avoid adverse effects on health and safety at publicly accessible property lines or work areas. Since the protective levels were derived without concern for technical or economic feasibility, and contain a margin of safety to insure their protective value, they must not be viewed as standards, criteria, regulations, or goals. Rather, they should be viewed as levels below which there are no reasons to suspect the general population will be at risk from any of the identified effects of noise. The EPA criteria limits are summarized in Table 5.9-2.

Table 5.9-2. Summary of EPA Cause and Effect Noise Levels

Location	Level	Effect
All public accessible areas with prolonged exposure	70 dBA $L_{eq(24)}$	Safety
Outdoor areas at residential structure and other NSAs where a large amount of time is spent	55 dBA L_{dn}	Protection against annoyance and activity interference
Outdoor areas where limited amounts of time are spent, i.e., park areas, school yards, golf courses, etc.	55 dBA $L_{eq(24)}$	
Indoor residential	45 dBA L_{dn}	
Indoor non-residential	55 dBA $L_{eq(24)}$	

The EPA sound level guidelines state the levels identified are low enough to be protective with an adequate margin of safety. The EPA sound level guidelines do not impose arbitrary federal decisions about the appropriateness of noise environments upon any level of government, nor is it a source of instructions for solving local noise problems. It is best viewed as a technical aid for local decisionmakers who seek to balance scientific information about effects of noise on people with other considerations, and reconcile local economic and political realities with scientific information such as cost and technical feasibility.

Federal: Bureau of Land Management Noise Requirements

The Project site is located on lands managed by BLM. A Phase II Assessment was completed for the Project, which included a review of noise requirements on the Federal and State levels. The Phase II assessment revealed there are no BLM regulations for assessing the potential for adverse noise impacts, either at a national level or within the BLM Northern and Eastern Colorado Desert Coordinated Management Plan (NECO).

State: California Government Code 65302

The State of California provides regulation by adopted laws and guidance regarding noise emissions through the jurisdiction of State commissions, requiring local jurisdictions (California Government Code Section 65302(f)) to prepare general plans, which include noise elements. The purpose of the Noise Element is to identify goals, policies, and implementation measures that can be used to guide future land use development regarding noise.

The State of California identifies the following land uses as noise sensitive: residential areas, schools, convalescent and acute care hospitals, parks and recreational areas, and churches. The recommended noise guideline for exterior living areas (yards and patios) for new residential land uses is a 55 dBA Community Noise Equivalent Level (CNEL), and must not exceed 65 dBA CNEL. In addition, for multi-family residential projects, the California Noise Insulation Standard (California Administrative Code, Title 25, Chapter 1, Subchapter 1, Article 4) requires the indoor noise levels in multi-family residential development do not exceed a CNEL of 45 dBA to be consistent with State of California standards.

The CEC has developed siting guidelines (CEC, 2006) for use in the evaluation of noise from power generating facilities. The CEC identifies incremental increases relative to the existing acoustic environment. Project generated sound resulting in an increase of 5 to 10 dBA or more at high noise-sensitive receptors may be considered significant. An increase of 10 dBA or more is generally considered a significant impact.

State: California Vehicle Code

The California Vehicle Code, Sections 23130 and 23130.5 regulates noise limits for highway vehicles. The limits are enforceable by the California Highway Patrol and the County Sheriff's Office.

State: Cal/OSHA Occupational Noise Exposure Regulations

Cal/OSHA regulations are identical to the Federal OSHA requirements for worker safety.

County: Riverside County Noise Ordinance 847

Riverside County regulates noise through County Ordinance 847. The code does not set construction noise limits but does restrict construction activities within 0.25 miles of an occupied residence

(property line) to the hours of 6:00 a.m. to 6:00 p.m. during the months of June through September, and from 7:00 a.m. to 6:00 p.m. during the months of October through May.

The Riverside County Department of Industrial Hygiene regulates operational noise levels, limiting the level of noise from industrial and other stationary source operations. Worst-case scenario levels for stationary noise sources projected to the property line of a “habitable dwelling, hospital, school, library, or nursing home” are to remain below 45 dBA during nighttime hours (10:00 p.m. to 7:00 a.m.) and are not to exceed 65 dBA during daytime hours (7:00 a.m. to 10:00 p.m.). Sensitive receptors are further defined in the Riverside County General Plan as rest homes, schools, hospitals, long-term care facilities, mental-care facilities, places of worship, passive recreation uses, and libraries. Noise levels greater than 65 CNEL are discouraged near these areas of increased sensitivity. However, since the County does not have jurisdiction over the Project, these noise standards are not directly applicable.

5.9.3 Engineering Acoustics

Airborne sound is described as the rapid fluctuation or oscillation of air pressure above and below atmospheric pressure, creating a sound wave. Sound is characterized by properties of the sound waves, which are frequency, wavelength, period, amplitude, and velocity. Noise is further defined as unwanted sound and is measured in the same way.

The range of frequencies humans can hear spans from 20 to 20,000 Hertz (Hz). The human ear has varying sensitivities to sound across the audible frequency range; some frequencies sound louder than other frequencies, even though the overall energy content is the same. The amplitude of a sound wave is measured in terms of its sound pressure level (SPL) where a logarithmic decibel scale is used. To reflect the sensitivity of the human ear across the audio spectrum, the SPL readings are given in what is termed the “A-weighted scale,” denoting they use a standard weighting system that accounts for the human hearing response. The measurements used for the “A-weighted scale” are decibels and are denoted as dBA.

An inherent property of the logarithmic decibel scale is that the SPLs of two separate sounds are not directly additive. Decibel values are logarithmic quantities and do not follow normal algebraic rules when being added. Instead, decibels are first converted to energy equivalents, the energy equivalents are added algebraically, and then the total energy equivalent is converted to its decibel value. The decibel sum (L_s) of two sound levels (L_1, L_2) can be evaluated from the following equation:

$$L_s = 10 \cdot \log\left(10^{\frac{L_1}{10}} + 10^{\frac{L_2}{10}}\right)$$

For example, if a sound of 50 dB is added to another sound of 50 dB, the resulting sound level is a three-decibel increase (or 53 dB), not an arithmetic doubling to 100 dB. The human ear does not hear changes in SPL as equal changes in perceived loudness. Scientific research demonstrates the following general relationships between sound level and human perception for two broadband sound levels with identical (or very similar) frequency characteristics are valid (ASHRAE, 1989):

- **1 dBA** is the practically achievable limit of the accuracy of noise measurement systems and corresponds to approximately 10 percent variation in sound pressure. A 1 dBA increase or decrease is a non-perceptible change in an environmental sound level.

- **3 dBA** increase or decrease is a doubling (or halving) of acoustic energy, and it corresponds to the threshold of perceptibility of change in a laboratory environment. In practice, the average person may or may not be able to distinguish a 3 dBA differential in environmental sound levels outdoors.
- **5 dBA** increase or decrease is described as a perceptible change in an environmental sound level and is a clearly discernible change in an outdoor environment.
- **10 dBA** increase is a tenfold increase in acoustic energy but is perceived as only a doubling in loudness (*i.e.,* the average person will judge a 10 dBA change in sound level to be twice or half as loud, depending on if it is a 10 dBA increase or decrease).

Sound levels can be measured, modeled, and presented in various formats. The sound metrics that were employed in the following noise assessment have the following definitions:

- **L_{eq}:** Conventionally expressed in dBA, the L_{eq} is the energy-averaged, A-weighted sound level for the complete time period. It is defined as the steady, continuous sound level over a specified time, which has the same acoustic energy as the actual varying sound levels over the specified period.
- **Lmax:** The maximum A-weighted sound level as determined during a specified measurement period. It can also be described as the maximum instantaneous sound pressure level generated by a piece of equipment.
- **Ln:** This descriptor identifies the sound level that is exceeded “n” percent of the time over a measurement period (e.g., L90 = sound level exceeded 90 percent of the time). The sound level exceeded for a small percent of the time, L10, closely corresponds to short-term, higher-level, intrusive noises (such as vehicle pass-by noise near a roadway). The sound level exceeded for a large percent of the time, L90, closely corresponds to continuous, lower-level background noise (such as continuous noise from a distant industrial facility). L50 is the level exceeded 50 percent of the time and is typically referred to as the median sound level over a given period.
- **Ldn:** The Ldn measures the 24-hour average noise level at a given location. It was adopted by the EPA for developing criteria for the evaluation of community noise exposure. The Ldn is calculated by averaging the 24-hour hour L_{eq} levels at a given location after adding 10 dB to the nighttime period (10:00 p.m. - 7:00 a.m.) to account for the increased sensitivity of people to noises that occur at night.
- **CNEL:** CNEL is another average A-weighted L_{eq} sound level measured over a 24-hour period; however, this noise scale is adjusted to account for some individuals’ increased sensitivity to noise levels during the evening and nighttime hours. A CNEL noise measurement is obtained after adding 5 dB to sound levels occurring during evening hours (7:00 p.m. to 10:00 p.m.) and 10 dB to sound levels occurring during nighttime hours (10:00 p.m. to 7:00 a.m.).

All of the above presented sound metrics are broadband, *i.e.,* inclusive of all sounds within audible frequencies. In addition to broadband, sound level data typically include an analysis of the various frequency components of the sound spectrum to determine tonal characteristics. The unit of frequency is Hz, measuring the cycles per second of the sound pressure waves, and typically the frequency analysis examines eleven octave (or 1/3 octave) bands from 16 Hz (low) to 16,000 Hz (high). Table 5.9-3 provides additional information on relevant acoustic terms and their definitions.

Table 5.9-3. Acoustic Terms and Definitions

Term	Definition
Noise	Noise and sound are physically the same. Noise is typically defined as unwanted sound based on level, character, frequency or pitch, time of day, and sensitivity and perception of the listener.
Sound Pressure Level (SPL)	Pressure fluctuations in a medium (air in this case). Sound pressure is measured in decibels referenced to 20 microPascals (μPa), the approximate threshold of human perception to sound at 1,000 Hz. The sound pressure level is generally what is meant by the term "noise level."
Sound Power Level (L_W)	The total acoustic power of a noise source measured in decibels referenced to 10^{-12} watts. Equipment specifications are provided by the manufacturer as sound power as it is virtually independent of the environment in which it is located. A sound level meter does not directly measure sound power.
Propagation/Attenuation	The decrease in amplitude of an acoustic signal due to geometric spreading losses with increased distance from the source. Other factors that can affect attenuation include air absorption, terrain effects, ground absorption, diffraction around objects and topographical features, trees, and meteorological conditions including wind velocity, temperature profiles, humidity, and non-homogenous atmospheric conditions.
A-Weighted Decibel (dBA)	Environmental sound is typically composed of acoustic energy across many different frequencies. To compensate for the auditory frequency response of the human ear, an A-weighting filter is commonly used for describing environmental sound levels. Sound levels that are A-weighted are presented as dBA in this report.
Unweighted Decibels (dBL)	Unweighted sound levels are referred to as linear, or dBL. Linear decibels are used to determine a sound's tonality and engineer solutions to reduce or control noise as mitigation techniques are different for attenuating low and high frequency noise.
Broadband	Containing sound energy at all frequencies across the entire audible spectra.
Octave Bands	The audible range of humans spans from 20 to 20,000 Hz (cycles per second) and is divided into center frequencies (or 1/3 center frequencies) for determination of a broadband sound's frequency content.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. The rate of oscillation of a sound, measured in units of Hz or kilohertz (kHz). One hundred Hz is a rate of one hundred times per second. The frequency of a sound is the property we perceive as pitch: a low-frequency sound (such as a bass note) oscillates at a relatively slow rate, and a high-frequency sound (such as a treble note) oscillates at a relatively high rate.

Note: Data compiled by Tetra Tech EC, Inc. (Tetra Tech) in part from multiple technical and engineering sources.

5.9.4 Affected Environment

The Project site is remote and isolated from residential, commercial, and industrial developments. Principal contributors to the existing acoustic environment consist of natural sounds including birds, wind, insects, and local wildlife. Overall sound levels may be periodically increased due to all terrain vehicles operating within the Ford Dry Lake OHV Limited Use Area or the four wheel drive road, which runs north-south through the westernmost portion of the Project area, providing access into the

Palen-McCoy Wilderness. Motor vehicle traffic from nearby highways may also contribute to the existing acoustic environment as well as periodic aircraft flyovers traveling to and from the small airports and airstrips located at Blythe, Desert Center, and Julian Hinds. Due to the isolated location of the Project, ambient sound levels are expected to be relatively low. On a diurnal basis, daytime ambient sound levels will likely be slightly higher than nighttime levels due to increased traffic and human activity. Estimates of various indoor and outdoor sound levels and acoustic environments are presented in Table 5.9-4.

Table 5.9-4. Various Indoor and Outdoor Sound Pressure Levels

Outdoor Sound Levels	Sound Pressure (μPa)	Sound Level (dBA)	Indoor Sound Levels
	6,324,555	110	Rock Band at 5 m
Jet Over-Flight at 300 m		105	
	2,000,000	100	Inside New York Subway Train
Gas Lawn Mower at 1 m		95	
	632,456	90	Food Blender at 1 m
Diesel Truck at 15 m		85	
Noisy Urban Area—Daytime	200,000	80	Garbage Disposal at 1 m
		75	Shouting at 1 m
Gas Lawn Mower at 30 m	63,246	70	Vacuum Cleaner at 3 m
Suburban Commercial Area		65	Normal Speech at 1 m
Air Conditioning Unit at 20 feet	20,000	60	
Light Auto Traffic at 100 feet		55	Quiet Conversation at 1m
Quiet Urban Area—Nighttime	6,325	50	
Suburban Area—Daytime		45	
Suburban Area—Nighttime	2,000	40	Empty Theater or Library
		35	
Rural Area—Nighttime	632	30	Quiet Bedroom at Night
		25	Empty Concert Hall
Rustling Leaves	200	20	Average Whisper
		15	Broadcast and Recording Studios
	63	10	
		5	Human Breathing
Reference Pressure Level	20	0	Threshold of Hearing

Notes:

μPa - Micropascals describe sound pressure levels (force/area).
dBA - A-weighted decibels describe sound pressure on a logarithmic scale with respect to 20 μPa.
m – meter.
Data compiled in part by Tetra Tech from multiple technical resources and direct acoustic field measurement experience. This data is being provided for general informational purposes only.

5.9.4.1 Ambient Sound Survey

There are no residences, hospitals, libraries, schools, places of worship, or other facilities where quiet is an important attribute of the environment identified within the acoustic study area. The closest NSA, two correctional facilities, is located approximately nine miles from the Project area. The proposed

Project is a solar generator and primary operation during which the principal noise sources are in use is generally limited to daytime hours, during which diurnal ambient levels are typically elevated.

The CEC's siting regulations (20 California Code of Regulations [CCR], Chapter 5, Article 6, Appendix B, sections (g) (4) (A) and (g) (4) (B)) require that noise measurements be made at noise-sensitive locations where there is a potential for an incremental increase of 5 dBA relative to regularly occurring existing ambient conditions during construction or operation of a proposed energy facility. In addition, Section 5.0 of the Riverside County Noise Ordinance describes how to conduct sound level measurements within potentially affected occupied properties.

Estimating an average sound level of 93 dBA at 50 feet (the upper range for construction equipment), the resultant sound level at a distance of five miles would be less than 30 dBA. Operational noise levels are also estimated to be less than 30 dBA. Given the extended distances to the nearest NSAs, Project sound generation limited to daytime periods, and estimated low received project levels at these locations, it has been demonstrated an ambient sound survey is not warranted nor required per the CEC siting regulations.

5.9.5 Acoustic Analysis

Noise would be produced during Project construction and operation. The net increase in noise levels at the closest sensitive receptors will be minimal. Potential noise impacts from construction and operation activities are assessed against LORS further described in Section 5.9.2. Environmental noise impacts are typically assessed at nearby NSAs; however, there are no NSAs within a minimum five-mile radius of the Project site.

5.9.5.1 Construction Noise

Construction activities at the Project site will result in a short-term, temporary increase in the noise levels. The magnitude of the noise effects would depend on the type of construction activity, noise level generated by construction equipment, duration of the construction phase(s), and the distance between the noise source and receiver. A list of representative construction equipment that is expected to be used on the Project and maximum (L_{max}) sound source levels are presented in Table 5.9-5.

Table 5.9-5. Representative L_{max} Noise Emission Levels of Construction Equipment

Construction Equipment	L_{max} Sound Level at 15 m (dBA)
Earth Moving	
Loader	85
Bulldozer	85
Backhoe	80
Scraper	89
Excavator	85
Grader	85
Trencher	80
Roller	82
Truck	85 (91 lift gate)
Tractor`	84

Table 5.9-5. Representative L_{max} Noise Emission Levels of Construction Equipment

Construction Equipment	L_{max} Sound Level at 15 m (dBA)
Materials Handling	
Crane (Mobile)	83
Compactor (Ground)	80
Concrete Mixer Truck	85
Concrete Pump	82
Concrete Vibrator	76
Paver	85
Forklift	76
Stationary Equipment	
Air Compressor	81
Generator	81
Impact Equipment	
Jack Hammer	88
Pile Driver (Impact)	101
Other	
Welder/Torch	74
Truck-Mounted Auger	75
Tensioner	80
Puller	78

For the purposes of a noise assessment, construction equipment can be considered to operate in two modes: stationary and mobile. Stationary equipment operates in one location for one or more days at a time, with either a fixed power operation (pumps, generators, compressors) or a variable noise operation (pile drivers, pavement breakers). Mobile equipment moves around the construction site with power applied in a cyclic fashion (bulldozers, loaders), or to and from the site (trucks). Noise impacts from construction would vary considerably over the course of Project construction dependent in part on the phase of construction being conducted and the number and class of equipment and activity in operation at a location at any given time. In addition to the L_{max}, the use of the L_{eq} of the construction activity is commonly used to assess the average noise, which incorporates the percentage of time the construction equipment is operating, *i.e.,* equipment usage factor.

This variation in power and usage imposes additional complexity in characterizing the noise source level from a piece of equipment. This is handled by describing the noise at a reference distance from the equipment operating at full power and adjusting it based on the duty cycle of the activity to determine the L_{eq} of operation. Average sound levels for typical power facility construction equipment at a set reference distance can be readily employed to calculate received sound levels using the standardized acoustic propagation equation given below:

$$L_{eq}(h) = EL + 10\log_{10}\left(\frac{UF}{100}\right) - 20\log_{10}\left(\frac{D}{50}\right) - A_{Shielding}$$

Where:

$L_{eq}(h)$:	The A-weighted, received equivalent sound level at a receptor resulting from operation of a piece of construction equipment over a 1-hour time period.
EL (Emission Level):	Maximum (L_{max}) noise emission level in dBA of equipment based on its work cycle at a reference distance of 50 feet.
UF (Usage Factor):	Accounts for the percent time that equipment is in use over the time period of interest (1 hour). For example, a UF of 100 percent applies for equipment in use over an entire hour (equivalent to the L_{max}).
D (Distance):	The distance in feet from the equipment to the receptor of interest.
$A_{\mathbf{Shielding}}$:	The Acoustical Shielding factor is the insertion loss of any barriers or mitigation, in dBA.

Combining the levels of each individual piece of equipment to calculate the overall L_{eq} from an activity can be completed using the following equation:

$$L_{eq}(overall) = 10\log_{10}\left(\Sigma 10^{\left(L_{eq}equipment/10\right)}\right)$$

Project construction is expected to span approximately 37 months and consists of approximately nine phases, as listed below:

- **Phase 1 – Mobilization**: The first month would consist solely of mobilization activities such as the construction of temporary staging areas on the solar facility site, including fenced parking, covered trash disposal facilities, construction trailers, a laydown area, and sufficient portable toilets and potable water for the construction staff. Construction laydown and parking areas would be within the areas of the Project site and would be relocated periodically as the solar field is built out.
- **Phase 2 – Clearing and Grubbing**: The second phase would consist of earthwork such as site clearing, grubbing, and grading activities to leave a uniform flat surface, which is critical for parabolic trough systems. This would be followed by the arrangement of all erosion and sediment control measures and site ground compaction.
- **Phase 3 – Solar Field Preparation**: After the first two months, solar field preparation would begin and the required equipment would be brought in including paving machines, trenching machines, concrete mixers and pumps, additional excavators for foundation drilling, tractors, and additional support vehicles. The existing site would be finish graded to create level solar pad elevations.
- **Phase 4 – Site Drainage**: Site drainage systems would be developed including the post-development sediment/retention basin at the discharge points and a perimeter road berm.
- **Phase 5 – Internal Road System:** A primary access road would be constructed to the power block area. Auxiliary roads would also be constructed.

- **Phase 6 – Solar Field Assembly Sequence**: Following site preparation, structure installation would begin, starting with the solar field assembly. Specialty trucks would be used to transport the assembled mirror assemblies to the solar field and a separate mobile crane would be used for setting the mirror assembly on the pre-poured concrete foundations. Trenching machines would be used for base trenching. Light skiploaders would be used for backfill, and light rollers would be used for compaction. Final field assembly would require small cranes, tractors, welding machines, and forklifts. At any given time, there would be 8 to 12 crews working the site, each with approximately eight vehicles.
- **Phase 7 – Power Block Assembly and Construction**: Foundation work and underground mechanical work would be required for construction of the Project's two power blocks. Major equipment and piping would be installed once the foundations have set. Final construction activities would include switchyard installation, site paving, and control system installation and programming.

Other construction activities are those associated with the Project interconnection and the natural gas pipeline.

- **Phase 8 – Transmission Line Construction:** Interconnection construction would take place along the ROW and would include the installation of power poles, pulling conductors and shield wires, and construction of a substation. Specialized pieces of equipment required for the interconnection are auger trucks, large cranes, and utility truck-mounted pullers to permanently connect the conductors to the insulators.
- **Phase 9 – Natural Gas Pipeline Construction**: Construction of the gas pipeline is expected to take about one month. Most major pieces of pipeline construction equipment would remain along the pipeline ROW during construction with storage and tagging of equipment and supplies located in the town of Blythe or at the Project plant site. The pipe segments would be brought in on specialized "stringing trucks." Installation consists of bending, welding, and coating weld-joint areas of the pipe after it has been strung, padding the ditch and lowering the pipe into the trench using side-boom tractors. After the pipe is installed, the trench is back-filled.

Table 5.9-6 presents received sound levels for a representative set of construction equipment for each phase of Project construction. The maximum sound level for each piece of construction equipment or vehicle is listed, as well as a composite sound level at a set distance of 15 m for the combination of construction equipment for each phase (FHWA, 2006 and EEIG, 1984). The composite site noise level, considering all of the equipment operating simultaneously (UF = 100%) at the maximum 100 percent load rating, is also presented in Table 5.9-6 for each phase. Received pressure sound levels from each individual construction phase are given at a distance of 5 miles incorporating the attenuation of the sound waves in open air due to wave divergence. There are no NSAs within this five mile radius; therefore, no adverse noise impacts at any NSAs during Project construction are expected.

Table 5.9-6. Representative Maximum Construction Noise Levels by Construction Phase

Phase No.	Construction Phase	Construction Equipment	Maximum L_{max} Equipment Noise Level at 15 m, dBA	Composite Noise Level at 15 m, dBA	Composite Noise Level at 5 miles, dBA
1	Mobilization	Dump Truck Dump Truck Backhoe Compactor (Ground)	91 (lift gate) 85 85 80	93	39
2	Clearing and Grubbing	Grader Scraper Bulldozer Roller	85 89 85 82	92	38
3	Solar Field Preparation	Paver Trencher Concrete Mixer Truck Concrete Pump Excavator Tractor Truck	85 80 85 82 85 84 85	93	39
4	Site Drainage	Dump Truck Grader Concrete Mixer Truck	91 (lift gate) 85 85	93	39
5	Internal Road System	Concrete Pump Concrete Mixer Truck Paver	82 85 85	89	35
6	Solar Field Assembly Sequence	Truck Crane (Mobile) Trencher Roller Tractor Welder Forklift	85 83 80 82 84 74 76	90	36

Table 5.9-6. Representative Maximum Construction Noise Levels by Construction Phase

Phase No.	Construction Phase	Construction Equipment	Maximum L_{max} Equipment Noise Level at 15 m, dBA	Composite Noise Level at 15 m, dBA	Composite Noise Level at 5 miles, dBA
7	Power Block Assembly and Construction	Trencher Welder Compactor (Ground) Dump Truck Paver	80 74 80 91 (lift gate) 85	93	39
8	Transmission Line Construction	Concrete Mixer Truck Trencher Crane (Mobile) Puller Tensioner	85 80 83 78 80	89	35
9	Natural Gas Pipeline Construction	Excavator Trencher Loader Dump Truck Truck Welder	85 80 85 91 (lift gate) 85 74	94	40

Notes: Conservatively assumes equipment UF of 100%, *i.e.,* all equipment operating concurrently at the maximum rated level.

5.9.5.2 Operational Noise

The Project would consist of two parabolic mirror fields, each having 880 solar collector assemblies. The mirror fields concentrate the sun's energy on a heat transfer fluid carried within the absorber tubes located at the parabolic mirror's focal point. The heat transfer fluid circulates through the collector field, reaching the power block where it enters the solar-steam generator. The heat transfer fluid is run through a heat exchanger where much of the heat is transferred to water, which is also circulating through the heat exchanger. The water becomes superheated steam, which is conveyed to the high-pressure section of a conventional steam turbine, driving the turbine and generating electrical power. Steam leaving the turbine is returned to the solar-steam generator where it is reheated, then sent to a reheat section of the steam turbine and through the low-pressure section of the steam turbine and used to generate additional electricity. The wet steam from the low-pressure section then enters a condenser that uses a cooling tower. After exchanging heat at the solar-steam generator, the heat transfer fluid is pumped back to the solar collector field to repeat the cycle.

The Project on-site noise sources include the following: steam-turbine generators, solar-steam generator heat exchangers, surface condenser, feedwater pumps, deaerator, feedwater heaters, cooling tower, a natural gas-fired auxiliary boiler, and an emergency generator. The solar thermal

collection field does not produce noise as they have no mechanical components. Reference equipment sound source data are presented in Table 5.9-7.

Table 5.9-7. Project Equipment Reference Sound Source Data

Plant Component	Sound Level (dBA)
Steam Turbine Generator[1]	111
Cooling Tower Air Inlet[2]	112.5
Cooling Tower Air Outlet[2]	113.5
Auxiliary Boiler[3]	85
Circulating Water Pumps[3]	90
Heat Transfer Fluid Circulation Pumps[3]	92
Boiler Feed Pumps[3]	92
Deaerator Vent[4]	105
General Step-Up Transformer[5]	85
Emergency Generator[4]	106

[1] Steam turbine noise data from NCPA Lodi AFC for similar sized steam turbine. Sound pressure level at 3 feet.
[2] Based on representative SPX air cooled condenser noise data.
[3] Sound pressure level at 3 feet.
[4] Sound power information taken from an in-house noise library database for similar units.
[5] GSUT data based on 261 MVA transformer. Sound pressure level at 3 feet.

A somewhat unique acoustic characteristic of solar generating facilities, as compared to conventional power generating facilities, is that operations are limited to daytime periods. The solar fields and power generation equipment start up each morning after sunrise and during insolation buildup. Shutdown occurs in the evening when insolation drops to a level where continued steam turbine operation is no longer feasible. Nighttime activities will mainly consist of regularly scheduled maintenance tasks and are not expected to result in significant noise generation.

Due to the substantial separation distance between the Project site and the closest NSAs, a full acoustic modeling analysis and regulatory compliance assessment of Project operation was not required and impacts are expected to be less than significant.

5.9.5.3 Switchyard/ Transmission Line Noise Levels

An electrical switchyard would be constructed on-site to step-up the electrical output. Transformers would be mounted in the switchyard located in the power block. Transformers produce a steady-state low frequency humming noise that is largely omnidirectional. Transformer noise is principally a result of core vibration and is a function of the surface area, mounting technique, whether the transformer is air-filled or oil-filled, and the power rating. Transformer noise is caused by a phenomenon called magnetostriction. A transformer is magnetically excited by an alternating voltage and current so that it becomes extended and contracted twice during a full cycle of magnetization. The transformer is vibrating at twice the frequency of the supply. For example, for a 60 cycles per second supply frequency, the noise is occurring at 120 Hz. This is defined as the fundamental noise frequency. In addition to core vibration noise, transformer cooling fans and oil pumps at larger transformer stations generate broadband noise but are limited to periods when additional cooling is required. The fan noise is comparatively low and is generally considered secondary to magnetostriction. The

transformers selected for this Project would be subject to noise standards issued by the National Electrical Manufacturers Association (NEMA).

Breaker noise is a very short duration sound event, expected to occur only a few times throughout the year. Power transmission lines have the potential to emit environmental noise under certain operating and environmental conditions. Transmission line noise (also called corona noise) is caused by partial discharges on insulators and in air surrounding electrical conductors of overhead power lines (BPA, 1996). Corona noise is primarily affected by weather and, to a lesser degree, altitude and temperature. It is generated when the atmosphere ionizes near isolated irregularities (*e.g.,* nicks, scrapes, and insects) on the conductor surface of operating transmission lines. Modern transmission lines are designed, constructed, and maintained so the line would generate a minimum of corona-related noise during dry conditions. During precipitation events, corona humming noise at 120 Hz can be described as tonal and by definition is more easily identifiable. Corona is generally a concern with transmission lines of 345 kV and higher. The interconnections associated with the Project would be 66 kV and would, therefore, not generate any significant corona noise.

The potential for adverse impact or from switchyard and transmission line noise during facility operations is expected to be less than significant.

5.9.5.4 Worker Exposure to Operational and Construction Noise

Outdoor sound levels within the Project's extents will typically range from 90 dBA near certain equipment to approximately 50 to 60 dBA at greater linear distances from the power generation equipment. Work areas with sound levels above the OSHA 85 dBA threshold, such as areas within acoustical enclosures, will be posted as high noise level areas and the use of hearing protection will be required. In compliance with OSHA and Cal/OSHA guidance, Project contractors will be required to readily provide construction workers with OSHA approved HPD.

The Project will implement a hearing conservation program for employees and actively maintain 8-hour exposure levels below OSHA 90 dBA threshold. However, there are no manned workstations located near high noise plant equipment. Individual time-weighted average exposure to noise should approach the level allowable under OSHA guidelines. Operational noise generated from the Project is not expected to exceed OSHA limits established for the protection of health and human safety. The Project's compliance with Cal/OSHA regulations ensures personnel are adequately protected from on-site noise hazards and extended noise exposure; therefore, the potential for adverse impact for occupational noise exposure is expected to be less than significant.

5.9.6 Noise Complaint Resolution Procedure

A noise complaint resolution procedure would be developed to provide an efficient and effective means of receiving and resolving all noise complaints. The Noise Complaint Resolution Form typically suggested by CEC or functionally equivalent will be used to document and respond to each noise complaint. Noise complaints received by the facility switchboard operator would be entered in a "Noise Complaint Logbook" kept at the switchboard desk. The caller would then be transferred to the plant manager or shift supervisor to explain the reason for the call. The manager or supervisor would briefly explain the resolution procedure to the caller. The source of the complaint will be actively investigated to determine the source of noise. If the noise complaint is found to be legitimate, all feasible mitigation measures will be considered to reduce the noise at the source. The manager would document all relevant information. Access to the noise complaint logbook would be available to the CEC for inspection, upon request.

5.9.7 Significant Unavoidable Adverse Noise Impacts

No significant unavoidable noise impacts have been identified outside the Project site boundaries at any off-site NSAs. Given that an extensive area surrounding the Project site is not considered noise sensitive, no noise mitigation measures are warranted.

5.9.8 Cumulative Impacts

Cumulative impacts are assessed in relation to a proposed Project's contribution together with other past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Pub. Resources Code § 21083; Cal. Code Regs., Title 14, §§ 15064(h), 15065(c), 15130, and 15355). Cumulative projects are discussed in Section 5.1.

It was determined that none of the projects are in close enough proximity to the Genesis Solar Energy Project to create a cumulative effect given that there are no existing NSAs within a five mile radius of the Project site. Cumulative noise impacts are expected to be less than significant.

5.9.9 LORS Compliance

Design, construction, and operation of the Project, including transmission lines and ancillary facilities, would be conducted in accordance with all LORS pertinent to noise from the Project. Applicable LORS are summarized in Section 5.9.2. The design, construction, and operation of the Project would conform to all worker health and safety noise limits. In addition, noise from the Project would not cause adverse noise impacts per all applicable community and residential environmental noise standards due to the substantial separation distance between the Project site and the closest NSAs.

5.9.10 Involved Agencies and Agency Contacts

Agencies with jurisdiction to enforce LORS related to noise are shown in Table 5.9-8.

Table 5.9-8. Agency Contact List for LORS

Agency/Address	Contact/Telephone	Permits/Reason for Involvement
California Energy Commission	Contact: 1516 9th Street Sacramento, CA 95814-5512 (916) 654-5204	Information regarding siting guidelines for power generating facilities.
Riverside County Department of Industrial Hygiene	Contact: 4065 County Circle Drive, #304 Riverside, CA 92503 (951) 358-5050	Information regarding County General Plan and Noise Elements.

5.9.11 Permits Required and Permit Schedule

No permits are required for noise relating to construction or operation of the proposed Project.

5.9.12 References

American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), 1989, ASHRAE Handbook—Fundamentals, Atlanta, Georgia, 1989.

BPA, Electrical and Biological Effects of Transmission Lines: A Review, U.S. Department of Energy, Portland, Ore., Dec.1996.

CEC (California Energy Commission), 2006. Rules of Practice and Procedure and Power Plant Site Certification Regulations. CEC-140-2006-002. Sacramento, CA. July 2006.

Edison Electric Institute, *Electric Power Plant Environmental Noise Guide*, Volumes 1 and 2 (1984).

Federal Highway Administration, 2006 (FHWA 2006). “Roadway Construction Noise Model User’s Guide,” Report FHWA-HEP-05-054 / IDOT-VNTSC-FHWA-05-01, January 2006.

Riverside County. 2000. Land Use Ordinance of Riverside County (Ordinance No. 847).

SC-FHWA-05-01, January 2006.

U.S. Environmental Protection Agency (EPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, EPA-550/9-74-004, EPA. U.S. Environmental Protection Agency (March 1974).