

## 2.6 Noise

This section discusses potential noise and vibration impacts resulting from the implementation of the Proposed Project. The analysis is based on the review of existing resources, technical data, and applicable laws, regulations, and guidelines, as well as the following noise technical reports prepared for the Proposed Project in accordance with the County of San Diego *Report Format and Content Requirements: Noise* (County of San Diego 2009b):

- *Acoustical Assessment Report, Tierra del Sol Solar Farm Project* (Appendix 2.6-1)
- *Rugged Solar LLC Project, Noise Impact Analysis Report* (Appendix 2.6-2).

### 2.6.1 Existing Conditions

This section describes the existing setting in the Proposed Project area and also identifies the resources that could be affected by the Proposed Project.

#### Noise Measurements

Noise is typically defined as unwanted sound. Sounds are perceived based on their loudness (i.e., volume or sound pressure level) or pitch (i.e., tonal or frequency content). The standard unit of measure for sound pressure levels is the decibel (dB). Sound pressures in the environment have a wide range of values and the sound pressure level was developed to describe this range as a logarithm of the sound pressure. The sound pressure level is the logarithm of the ratio of the unknown sound pressure to an agreed upon reference quantity. To account for the pitch of sounds and the corresponding sensitivity of human hearing to them, the raw sound pressure level is adjusted with an A-weighting scheme based on frequency that is stated in units of decibels (dBA). The A-weighting scale is appropriate because it is a close approximation of the human response to different frequencies of sound and is in broad use across many disciplines that address noise. The A-weighting scale attenuates low-frequency noises in a manner that simulates how human ears attenuate low-frequency noise at low levels (approximately 40 decibels (dB)). The A-weighting scale is the most common weighting scale for environmental acoustics analysis and assessing compliance with applicable noise limits. State and federal agencies that regulate environmental noise throughout the United States rely on the A-weighted decibel, or dB(A), as the appropriate metric for assessing human response to noise. San Diego County Code of Regulatory Ordinances Section 36.403, Sound Level Measurement, specifies that sound level measurements “shall be measured with a sound level meter using A-weighting.”

While there are weighting scales other than the A-weighting scale, which simulates human response to frequencies of sound, use of other weighting scales produces results that do not reflect how human ears respond to different frequencies of sound. Therefore, they are not used

in the context of an environmental acoustics analysis performed to assess compliance with applicable noise limits. C-weighting, for example, is nearly flat for audible frequencies, and therefore narrowly accounts for the human ear's decreased sensitivity to high and low frequencies while approximating the human ear's sensitivity to higher intensity sounds. Currently, there are no low-frequency or C-weighted sound level limits or thresholds adopted by the County. However, in response to comments received during the Notice of Preparation public review period, further information regarding low frequency and C-weighted noise is included in Section 2.6.7 for the benefit of the public and decision makers.

Typical A-weighted noise levels are listed in Table 2.6-1.

A given level of noise can be more or less tolerable depending on the sound level, duration of exposure, character of the noise sources, time of day during which the noise is experienced, and activity affected by the noise. For example, noise that occurs at night tends to be more disturbing than that which occurs during the day because sleep has the potential to be disturbed. Additionally, rest at night is a critical requirement in the recovery from exposure to high noise levels during the day. In consideration of these factors, different measures of noise exposure have been developed to quantify the extent of the effects anticipated from these activities. For example, some indices consider the 24-hour noise environment of a location by using a weighted average to estimate its habitability on a long-term basis. Other measures consider portions of the day and evaluate the nearby activities affected by it as well as the noise sources. The most commonly used indices for measuring community noise levels are the Equivalent Energy Level (Leq), and the Community Noise Equivalent Level (CNEL).

- **Leq**, the Equivalent Energy Level, is the average acoustical or sound energy content of noise, measured during a prescribed period, such as 1 minute, 15 minutes, 1 hour, or 8 hours. It is the decibel sound level that contains an equal amount of energy as a fluctuating sound level over a given period of time.
- **CNEL**, Community Noise Equivalent Level, is the average equivalent A-weighted sound level over a 24-hour period. This measurement applies weights to noise levels during evening and nighttime hours to compensate for the increased disturbance response of people at those times. CNEL is the equivalent sound level for a 24-hour period with a +5 dBA weighting applied to all sound occurring between 7:00 p.m. and 10:00 p.m., and a +10 dBA weighting applied to all sound occurring between 10:00 p.m. and 7:00 a.m.

The decibel level of a sound decreases (or attenuates) exponentially as the distance from the source of that sound increases. For a single point source such as a piece of mechanical equipment, the sound level normally decreases by about 6 dBA for each doubling of distance from the source. Sound that originates from a linear (or "line") source, such as a heavily traveled

traffic corridor, attenuates by approximately 3 dBA per doubling of distance, provided that the surrounding site conditions lack ground effects or obstacles that either scatter or reflect noise.

### Noise Effects

Noise can have a substantial effect on the quality of life. An individual's reaction to a particular noise depends on many factors, such as the source of the noise, its loudness relative to the background noise level, and the time of day. The reaction to noise can also be highly subjective; the perceived effect of a particular noise can vary widely among individuals in a community. Because of the nature of the human ear, a sound must be about 10 dBA greater than the reference sound to be judged as twice as loud. In general, a 3 dBA change in community noise levels is perceivable, while 1 to 2 dBA changes generally are not perceived. Although the reaction to noise can vary, it is clear that noise is a significant component of the environment, and excessively noisy conditions can affect an individual's health and well-being. The effects of noise are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. The effects of noise can be organized into six broad categories: general annoyance, sleep disturbance, interruption of human performance and behavior, interruption of social interaction of communication, extra-auditory health effects, and permanent hearing loss.

### Noise-Sensitive Land Uses

Noise-sensitive land uses (NSLUs) include areas where an excessive amount of noise would interfere with normal activities. Primary NSLUs include residential uses, public and private educational facilities, hospitals, convalescent homes, hotels/motels, daycare facilities, and passive recreational parks. Sleep disturbance is the most critical concern for an NSLU on a 24-hour basis or longer compared to activities that are occupied only a portion of a day.

### Groundborne Vibration

Groundborne vibration propagates from the source through the ground to adjacent buildings by surface waves. Vibration may be composed of a single pulse, a series of pulses, or a continuous oscillatory motion. The frequency of a vibrating object describes how rapidly it is oscillating, measured in Hertz (Hz). The normal frequency range of most groundborne vibration that can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz. Vibration energy spreads out as it travels through the ground, causing the vibration amplitude to decrease with distance away from the source. Ambient and source vibration are often expressed in terms of the peak particle velocity (PPV) or root mean square (RMS) velocity in inches per second that correlates best with human perception. The Federal Transit Administration (FTA) estimates that the threshold of perception is approximately 0.0001 inches/second RMS and the level at which continuous vibrations begins to annoy people is approximately 0.001 inches/second RMS.

### Vibration-Sensitive Land Uses

Groundborne vibration can disrupt vibration-sensitive land uses by causing movement of buildings, rattling of windows and items inside buildings, rumbling sounds, and even property damage. Vibration-sensitive land uses include buildings where vibration would interfere with operations within the building, such as vibration-sensitive research and manufacturing, hospitals with vibration-sensitive equipment, and university research operations. The degree of sensitivity to vibration depends on the specific equipment that would be affected by the vibration. Residential uses are also sensitive to excessive levels of vibration of either a regular or an intermittent nature. According to the Transit Noise and Vibration Impact Assessment (FTA 2006), background vibration level in residential areas is typically 0.00003 inches/second RMS, which is lower than 0.0001 inches/second RMS, the threshold of perception for humans. There are several sources of groundborne vibration in the unincorporated areas of San Diego County (County), including construction, railroad operations, and extractive mining operations.

#### **2.6.1.1 Regional Overview**

The Proposed Project would be located in the Mountain Empire Subregion of southeastern San Diego County (County), an approximately 285,000-acre, largely rural, low-density population area with a relatively low ambient noise environment. However, several higher-density communities, including Valle de Oro community planning area (CPA), Spring Valley CPA, and Sweetwater CPA, also exist in the County, which have a louder ambient noise environment.

Non-transportation-related noise generators are commonly called “stationary,” “fixed,” “area,” or “point” sources of noise. Industrial processing, mechanical equipment, pump stations, and heating, ventilating, and air conditioning (HVAC) equipment are examples of fixed location, non-transportation noise sources within the Proposed Project area. Some non-transportation sources are not stationary but are typically assessed as point or area sources due to the limited area in which they operate, such as truck deliveries, agricultural field machinery, and mining equipment.

#### **2.6.1.2 Tierra del Sol**

The Tierra del Sol solar farm site is within the Boulevard Subregional Plan Area of San Diego County’s General Plan; the land use category is Rural Lands (RL). The site and surrounding area are zoned General Rural (S92) and Limited Agriculture (A70).

The Tierra del Sol solar farm site is located adjacent to Tierra del Sol Road. Tierra del Sol Road is described as a local road in the County of San Diego’s Circulation Element. Existing noise sources in the area include intermittent traffic along Tierra del Sol Road and occasional helicopters and general aviation aircraft.

The nearest NSLUs to the Tierra del Sol site are the residences located to the north and west, as shown on Figure 2.6-1. The property boundaries of the nearest residences are approximately 75 feet north and 150 feet west of the closest construction areas at the Tierra del Sol site.

Noise measurements were conducted on January 19, 2012 (surrounding land uses did not substantially change between January 2012 and the start of the EIR preparation, December 2012). The noise measurements were conducted for 15 minutes at the locations depicted as Sites 1 and 2 on Figure 2.6-1. Site 1 is located near the northeastern boundary of the Tierra del Sol site; noise measurement Site 2 is located near the western portion of the site near Tierra del Sol Road. The measured average noise level was 38 dB at Site A1 and 44 dB at Site A2. The measured average, maximum and minimum noise levels are depicted in Table 2.6-2 below.

The gen-tie line is also aligned along a portion of Tierra del Sol Road, as well as unnamed private (unpaved) roads as shown on Figures 2.6-2a and 2.6-2b. Tierra del Sol Road is described as a local road in the County of San Diego's Circulation Element. Existing noise sources in the area include intermittent traffic along Tierra del Sol Road and occasional helicopters and general aviation aircraft. Figures 2.6-2a and 2.6-2b also includes the location of presumed sensitive residential receptors along the gen-tie route.

For airborne noise effects, limits are typically evaluated and applied at the parcel boundary of a parcel with occupied residence, or at the boundary of an exterior use area dedicated for the residence. For vibration impacts, the distance to the actual structure from activity such as blasting or pile driving is of interest. In Table 2.6-3 below the value in the column "Distance to Residence / NSLU" is the distance from the gen-tie transmission line alignment to the closest side of a 1-acre rectangle containing the existing residence (the outdoor living area defined under the County Guidelines for Determination of Significance, 4.1 Noise Sensitive Land Uses Affected by Airborne Noise is a one acre portion of the parcel, for lots 10 acres or larger). Table 2.6-3 provides information for each of the parcels along the gen-tie alignment pertinent to the evaluation of project noise effects. Note that parcels along or adjacent to the alignment are each included in the table, but many of these are dismissed from project analysis, according to the preceding discussion. A column is provided in the table which indicates whether the parcel was included in the noise analysis, or dismissed from noise evaluation. As shown in the Table 2.6-3 the nearest analyzed distance from the underground gen-tie route to a NSLU is approximately 300 feet, and the nearest distance the aboveground gen-tie route is to a NSLU is approximately 1,125 feet. All properties along the gen-tie route are zoned S92, General Rural.

### **2.6.1.3 Rugged**

The Rugged solar farm would be constructed on approximately 765 acres of relatively flat to gently sloping land located approximately 1.25 miles north of Interstate 8 (I-8), extending

roughly 2 miles between Ribbonwood Road and McCain Valley Road. The site lies within the Boulevard Subregional Plan Area of the County General Plan with a land use designation of RL-80, Rural Lands, with a permitted density of 1 dwelling unit per 80 acres. Existing zoning is General Rural (S92) and General Agriculture (A72), and the Rugged solar farm area is currently an active horse and cattle ranch used for grazing.

The nearest NSLUs are single-family residences located around the Rugged solar farm site. The four NSLUs identified as the most likely to be impacted by the Rugged solar farm operations are shown on Figure 2.6-3. The locations of the nearest residences to the Rugged site are approximately 350 feet and 475 feet to the southwest, 600 feet to the northeast and 725 feet to the north. The property boundaries of the nearest residences are approximately 80 feet to the closest construction areas at the Rugged solar farm site.

Six noise measurements were taken at the Rugged solar farm site or on adjacent sites on October 25 and 26, 2011 (surrounding land uses did not substantially change between October 2011 and the start of the EIR preparation, December 2012). The noise measurement locations are shown in Figure 2.6-3, and the noise measurements are listed below in Table 2.6.3. The dominant noise source at the Rugged solar farm site is traffic noise from I-8, with additional traffic noise attributed to local roadways.

#### **2.6.1.4 LanEast**

The LanEast site is within the Boulevard Subregional Plan Area of the County General Plan with a land use designation RL-80, or Rural Lands with a permitted density of 1 dwelling unit per 80 acres. Existing zoning is S92, General Rural Use Regulations, and the minimum required lot size is 8 acres.

The LanEast solar farm site is on both sides of McCain Valley Road, and contiguous along its southern boundary with Old Highway 80 and along its northern boundary with I-8 as shown on Figure 2.6-4, LanEast and LanWest Project Sites. Access would be from McCain Valley Road, which is a two-lane paved local road. The primary existing noise source on the LanEast site and within the vicinity is vehicle traffic on I-8 to the north and Old Highway 80 to the south. Existing average daily traffic volumes along I-8 east of the CA-94 interchange is approximately 13,700 vehicles (AECOM 2012).

As stated in Section 2.5 of this EIR, sensitive land uses, including residences, are located in the vicinity of the LanEast solar farm site; see Figure 2.5-6. However, as at this time a noise analysis of the proposed LanEast solar farm has not been prepared because project level details, such as the layout of trackers, construction equipment and traffic, are not yet available. Such an analysis would identify the surrounding NSLUs nearest the site and their distance to noise generating project

components. Noise in this area is dominated by noise from traffic on I-8 located just north of the proposed solar farm site, and existing ambient noise levels are anticipated to be higher than those in the vicinity of the Tierra del Sol and Rugged solar farms.

### **2.6.1.5 LanWest**

The LanWest solar farm site is within the Boulevard Subregional Plan Area of San Diego County's General Plan; existing zoning is General Rural (S92). The site is relatively flat to gently sloping and currently used for grazing.

The LanWest solar farm site is approximately 0.50 mile west of McCain Valley Road and contiguous along its southern boundary with Old Highway 80 and along its northern boundary with I-8, as shown on Figure 2.6-4, LanEast and LanWest Project Sites. Access would be from McCain Valley Road, which is a two-lane paved local road. The primary existing noise source on the LanWest site and within the vicinity is vehicle traffic on I-8 to the north and Old Highway 80 to the south. Existing average daily traffic volumes along I-8 east of the CA-94 interchange is approximately 13,700 vehicles (AECOM 2012). To the east of the site is the LanWest solar farm site.

As stated in Section 2.5 of this EIR, sensitive land uses, including residences, are located in the vicinity of the LanWest solar farm site; see Figure 2.5-7. However, as at this time a noise analysis of the proposed LanWest solar farm has not been prepared because project level details, such as the layout of trackers, construction equipment and traffic, are not yet available. Such an analysis would identify the surrounding NSLUs nearest the site and their distance to noise generating project components. Noise in this area is dominated by noise from traffic on I-8 located just north of the proposed solar farm site, and existing ambient noise levels are anticipated to be higher than those in the vicinity of the Tierra del Sol and Rugged solar farms.

## **2.6.2 Regulatory Setting**

### **Federal Regulations**

The following federal regulations pertaining to noise would apply to the Proposed Project.

#### **U.S. Environmental Protection Agency and Occupational Safety and Health Administration**

The U.S. Environmental Protection Agency (EPA) has indicated that residential noise exposure of 55 to 65 dBA is acceptable when analyzing land use compatibility (EPA 1981); however, these guidelines are not regulatory. With regard to noise exposure and workers, the federal Occupational Safety and Health Administration (OSHA) establishes regulations to safeguard the hearing of workers exposed to occupational noise (29 CFR 1910.95). OSHA specifies that sustained noise over 85 dBA (8-hour time-weighted average) can be a threat to workers' hearing,

and if worker exposure exceeds this amount, the employer shall develop and implement a monitoring plan (29 CFR 1910.95(d)(1)).

### State Regulations

The following state regulations pertaining to noise would apply to the Proposed Project.

#### California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, finds that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also finds that there is a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the state to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

As with federal standards, State of California regulations (California Noise Exposure Regulations and 8 CCR, Section 5095) address worker exposure noise levels. These regulations limit worker exposure to noise levels of 85 dB or lower over an 8-hour period. The State of California has not established noise levels for various non-work-related environments.

### Local Regulations

#### San Diego County Code of Regulatory Ordinances Title 3, Division 6, Chapter 4, Sections 36.401–36.435, Noise Ordinance

The Noise Ordinance establishes prohibitions for disturbing, excessive, or offensive noise as well as provisions such as sound level limits for the purpose of securing and promoting the public health, comfort, safety, peace, and quiet for its citizens. Planned compliance with sound level limits and other specific parts of the ordinance allows presumption that the noise is not disturbing, excessive, or offensive. Limits are specified depending on the zoning placed on a property (e.g., varying densities and intensities of residential, industrial, and commercial zones). Where two adjacent properties have different zones, the sound level limit at a location on a boundary between two properties is the arithmetic mean of the respective limits for the two zones, except for extractive industries. The 1-hour average sound level limit applicable to extractive industries, including but not limited to borrow pits and mines, shall be 75 dBA at the property line regardless of the zone in which the extractive industry is located. It is unlawful for any person to cause or allow the creation of any noise that exceeds the applicable limits of the Noise Ordinance at any point on or beyond the boundaries of the property on which the sound is produced.

Section 36.404 of the County Noise Ordinance contains sound level limits specific to receiving land uses. Sound level limits are in terms of a 1-hour average sound level. The allowable noise limits depend upon the County's zoning district and time of day. The Proposed Project and adjacent properties would be located in County Noise Ordinance zone (1) as the sites and surrounding properties are within areas zoned S92 (General Rural), A70 (Limited Agriculture), A72 (General Agriculture) or S80 (Open Space) (As shown on Figure 2.5-5). Table 2.6-5 lists the sound level limits for the County.

Section 36.408 of the County Noise Ordinance sets limits on the time of day and days of the week that construction can occur, as well as setting noise limits for construction activities. In summary, the ordinance prohibits operating construction equipment on the following days and times:

- Mondays through Saturdays except between the hours of 7:00 a.m. and 7:00 p.m.
- Sundays and days appointed by the president, governor, or board of supervisors for a public fast, Thanksgiving, or other holiday.

In addition, Section 36.409 code requires that between the hours of 7:00 a.m. and 7:00 p.m., no equipment shall be operated so as to cause an 8-hour average construction noise level in excess of 75 dBA when measured at the boundary line of the property where the noise source is located, or on any occupied property where the noise is being received. In addition to the general limitations on sound levels discussed above, maximum sound level limitations in Table 2.6-6 shall apply to impulsive noise from construction equipment, per County Noise Ordinance Section 36.410.

Importantly, all thresholds identified above are based on the A-weighted sound levels (dBA). C-weighting, while helpful in describing impulsive sounds, is not accounted for in these thresholds.

### Noise Element

The San Diego County General Plan Noise Element establishes noise and land use compatibility standards and outlines goals and policies to achieve these standards. The County's General Plan Noise Element characterizes the noise environment in the County and provides the context for the County's noise/land use compatibility guidelines and standards. The Noise Element also describes the County's goals for achieving the standards and introduces policies designed to implement the goals. Under implementation of the General Plan Update, the County would use the Noise Compatibility Guidelines to determine the compatibility of land uses when evaluating proposed development projects. The Noise Compatibility Guidelines indicate ranges of compatibility and are intended to be flexible enough to apply to a range of projects and environments. Table 2.6-7 below lists the San Diego County Land Use Compatibility Guidelines.

A land use located in an area identified as “acceptable” indicates that standard construction methods would attenuate exterior noise to an acceptable indoor noise level and that people can carry out outdoor activities with minimal noise interference. Land uses that fall into the “conditionally acceptable” noise environment should have an acoustical study that considers the type of noise source, the sensitivity of the noise receptor, and the degree to which the noise source has the potential to interfere with sleep, speech, or other activities characteristic of the land use. For land uses indicated as “conditionally acceptable,” structures must be able to attenuate the exterior noise to the indoor noise level as indicated in the Noise Standards. For land uses where the exterior noise levels fall within the “unacceptable” range, new construction generally should not be undertaken.

### Policies

- **Policy N-1.2 Noise Management Strategies.** Require the following strategies as higher priorities than construction of conventional noise barriers where noise abatement is necessary:
  - Avoid placement of noise sensitive uses within noisy areas
  - Increase setbacks between noise generators and noise sensitive uses
  - Orient buildings such that the noise sensitive portions of a project are shielded from noise sources
  - Use sound-attenuating architectural design and building features
  - Employ technologies when appropriate that reduce noise generation (i.e., alternative pavement materials on roadways).
- **Policy N-2.1 Development Impacts to Noise Sensitive Land Uses.** Require an acoustical study to identify inappropriate noise level where development may directly result in any existing or future noise sensitive land uses being subject to noise levels equal to or greater than 60 CNEL and require mitigation for sensitive uses in compliance with the noise standards listed in Table N-2 of the County’s General Plan Noise Element.
- **Policy N-3.1 Groundborne Vibration.** Use the Federal Transit Administration and Federal Railroad Administration guidelines, where appropriate, to limit the extent of exposure that sensitive uses may have to groundborne vibration from trains, construction equipment, and other sources.
- **Policy N-6.2 Recurring Intermittent Noise.** Minimize impacts from noise in areas where recurring intermittent noise may not exceed the noise standards listed in Table N-2, but can have other adverse effects.

- **Policy N-6.4 Hours of Construction.** Require development to limit the hours of operation as appropriate for non-emergency construction and maintenance, trash collection, and parking lot sweeper activity near noise sensitive land uses.

### Subregional Plans

There are no policies relevant to noise in the Mountain Empire Subregional Plan or the Boulevard Subregional Plan.

### County Guidelines for Noise Sensitive Uses Affected by Airborne Noise

The County of San Diego Department of Planning and Development Services (2009a) published guidelines for determining the significance of Noise Sensitive Uses Affected by Airborne Noise. The guidelines consider a significant impact would occur if a project were to cause the exterior noise to exceed 60 db (CNEL), or cause an increase of 10 dB (CNEL) over pre-existing noise levels at outdoor living areas or private usable open space.

### County Guidelines for Vibration and Groundborne Noise Impacts

The County of San Diego Department of Planning and Development Services (2009a) published guidelines for determining the significance of groundborne vibration and noise impacts for use during the preparation of California Environmental Quality Act (CEQA) documents. Vibration is considered significant if project implementation would expose specific uses (organized into three categories) to groundborne vibration or noise equal to or in excess of levels determined by the FTA's Transit Noise and Vibration Impact Assessment (FTA 2006). County Guidelines are provided in Table 2.6-8.

## **2.6.3 Analysis of Project Effects and Determination as to Significance**

The Proposed Project consists of four renewable energy solar farms in southeastern San Diego County. The following impact analysis has been separated into discussions for each of the four solar farms: Tierra del Sol, Rugged, LanEast, and LanWest, as well as a combined discussion of the Proposed Project as a whole. For the purposes of this Program Environmental Impact Report (EIR), the Tierra del Sol and Rugged solar farms are analyzed at a project level, whereas the LanEast and LanWest solar farms are analyzed at a programmatic level as sufficient project-level data has not been developed at this time.

### Methodology and Assumptions

Noise impacts associated with the Proposed Project are related to short-term construction and long-term operations. Construction noise would result from construction equipment including

drilling equipment and helicopters, vehicles driven to/from the Proposed Project site by construction workers, and water and material delivery trucks. Operational emissions would result primarily from inverters and washing activities.

Noise measurements were conducted at the Proposed Project sites to determine the existing noise level. The measurements were made using a calibrated Rion Model NA 27 (SN 01030561) integrating sound level meter or a Larson-Davis Model 820 sound level meter. The sound level meter was positioned at a height of approximately 5 feet above the ground. All sound levels discussed in this Environmental Impact Report (EIR) are A-weighted because the A-weighted scale measures sound levels corresponding to the human frequency response.

### **2.6.3.1 Operational Noise**

#### Guidelines for the Determination of Significance

For the purpose of this EIR, the County's *Guidelines for Determining Significance: Noise* (January 27, 2009) applies to both the direct impact analysis and the cumulative impact analysis. A significant impact would result if:

Noise Element:

- For NSLUs affected by airborne noise: project implementation would result in the exposure of any on- or off-site, existing or reasonably foreseeable future NSLU to exterior or interior noise (including noise generated from the project, together with noise from roads [existing and planned Mobility Element roadways], railroads, airports, heliports and all other noise sources) in excess of the following:
  - Exterior Locations: 60 dB (CNEL) or an increase of 10 dB (CNEL) over preexisting noise. In the case of single-family residential detached NSLUs, exterior noise shall be measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum area:
    - (1) Net lot area up to 4,000 square feet: 400 square feet
    - (2) Net lot area 4,000 sq. ft. to 10 acres: 10% of net lot area
    - (3) Net lot area over 10 acres: 1 acre

For all other projects, exterior noise shall be measured at all exterior areas provided for group or private usable open space.

Noise Ordinance:

- For project-generated airborne noise: The project will generate airborne noise which, together with noise from all sources, will be in excess of:
  - Non-Construction Noise: The limit specified in San Diego County Code Section 36.404, General Sound Level Limits, at the property line of the property on which the noise is produced or at any location on a property that is receiving the noise (see Table 2.6-5. The Proposed Project and adjacent properties would be located in County Noise Ordinance zone (1) as the sites and surrounding properties are within areas zoned S92 (General Rural), A70 (Limited Agriculture), A72 (General Agriculture) or S80 (Open Space) (As shown on Figure 2.5-5). The maximum allowable noise levels for these property zones are 50 dBA Leq between 7 a.m. and 10 p.m., and 45 dBA Leq between 10 p.m. and 7 a.m.).

## Analysis

### Tierra del Sol

#### **Equipment Noise**

During operation of the Tierra del Sol solar farm, on-site noise sources would include pad-mounted inverters and transformers, substation transformers, and tracker array motors and dryers/blowers. The locations of the noise-generating equipment are shown on Figure 2.6-1. The primary noise source at the property lines would be the inverters which generate noise levels of 77 dB at 6 feet. Transformers generate noise levels of 60 dB at 5 feet. The tracker array motors generate noise levels of 37 dB at 50 feet, and the dryers/blowers generate noise levels of 43 dB at 50 feet. The substation transformers generate noise levels up to 72 dB at 5 feet.

The inverter stations would be located throughout the site as shown in Figure 2.6-1. Also depicted in Figure 2.6-1 are the noise modeling locations selected to determine the worst-case cumulative noise levels at the property lines, resulting from the building block inverters and transformers, substation transformers, tracker motors, and dryers/blowers. The noise modeling locations were selected based on the closest receptors to the tracker installations since these near distance noise sources contribute more to the project-generated operational noise levels at the project boundaries than the transformers and O&M yard activities. The noise levels from all the noted equipment were combined and calculated for the nearest property line without any shielding from proposed buildings. The primary noise source at the property lines would be the inverters. As shown in Table 2.6-9, the 1-hour average sound levels would range up to approximately 50 dB along the northern property line, 49 dB along the western property line, 48 dB along the eastern property line, and 55 dB along the southern property line. The noise level

would exceed the County's Noise Ordinance nighttime hours (i.e., 10 p.m. to 7 a.m.) sound level limit of 45 dBA at the northern, western, and eastern property lines, and would exceed the County's Noise Ordinance daytime hours (i.e. 7 a.m. to 10 p.m.) sound level limit of 50 dBA at the southern property line, resulting in a significant noise impact.

In addition to the County Noise Ordinance, County's *Guidelines for Determining Significance: Noise* considers a significant impact would occur if a project were to cause the exterior noise to exceed 60 db (CNEL), or cause an increase of 10 dB (CNEL) over pre-existing noise levels at outdoor living areas or private usable open space. The residential properties to the east, north, and west would be exposed to exterior noise levels of 54 dB CNEL, 55 dB CNEL, and 56 dB CNEL at the property boundary closest to the solar farm property, which would be within the County's *Guidelines for Determining Significance: Noise* exterior living area criterion limit of 60 dB CNEL. However, since existing ambient noise exposure at the closest NSLUs to the project is approximately 40 dB CNEL, the County's development-related land use compatibility limit for these uses would be 50 dB CNEL (10 dB above ambient). For exterior use areas on the residential properties to the east, north, and west, which are relatively close to the property boundary, these exterior use areas could be subjected to a project-resultant CNEL greater than 50 dB CNEL; consequently, noise exposure in exterior use areas of residential parcels along the east, north, and west property boundary would be a significant noise impact unless mitigation is provided. Overall, noise from on-site operational equipment (primarily the inverters) would exceed the County Noise Ordinance and County's Guidelines for Determining Noise Significance standards and, therefore, would result in a significant noise impact (**N-TDS-1**).

### **Washer Station Noise**

Periodic washing of solar trackers would be achieved using the IPC Eagle Wash Station or equipment similar in nature. It is assumed that washing of the trackers using the wash station would generally occur during evening and nighttime hours, or between sunset and sunrise, when all trackers are aligned in a westerly direction (i.e., overnight storage position). It is expected that tracker washing for the entire solar farm site would take several consecutive days to complete, but would only occur once every 6 to 8 weeks. Additionally, during tracker washing times, project tracker systems would not be operational (i.e., trackers in stored position), and power inverters would have limited operations due to limited or no sunlight. Therefore, it is expected that neither tracker nor inverter noise would occur while the trackers washing operation is in progress; this means the trackers washing may be assessed by itself as an overnight noise source, and that it would not add to project-related noise exposure during the day (i.e., normal operating period).

Ambient noise exposure at the closest NSLUs to the project is approximately 40 dB CNEL. Therefore, the County's Noise Element compatibility limit for these uses would be either 50 dB

CNEL (10 dB above ambient), or the County's Noise Ordinance limits of 50 dB Hourly  $L_{eq}$  (daytime) and 45 dB Hourly  $L_{eq}$  (nighttime) at the project property lines. Because the trackers washing activity is proposed to occur from sunset to sunrise, the nighttime Noise Ordinance limit of 45 dB Hourly  $L_{eq}$  would be applicable. Consequently, the County's Noise Ordinance criteria are the most restrictive for application to project on-site sources of noise, and are the criteria applied in determining significance

Noise exposure from the proposed operation of the solar tracker wash station was calculated at the identified project property lines based on reference noise level data provided by the equipment manufacturer, approximate solar tracker array placement/spacing, solar tracker array setback distances from neighboring property lines, and a noise attenuation rate of 6 dB per doubling of distance (i.e., standard spherical divergence). The noise produced by the water spray nozzle itself was not calculated because the noise level is anticipated to be at least 10 dBA less than the enclosed engine (and would therefore not contribute to the composite noise level of the wash station) (see Appendix 2.6-1 for more information). Basic noise calculation data applicable to the tracker washing is as follows:

- IPC Eagle Wash Station reference noise levels at 9 feet is 99 dBA
- Approximate solar tracker spacing: 75 feet
- Approximate solar tracker washing rate: 6 solar trackers/hour.

Initial noise calculations from the trackerswashing indicated that the noise exposure at neighboring properties from trackers washing operations could potentially exceed the County's daytime and nighttime Noise Ordinance limits. Therefore, the following project design feature (PDF), as listed in Table 1-10 of Section 1.0, Project Description, would be implemented in order to ensure tracker washing activities are in conformance with the County Noise Ordinance standard:

**PDF-N-TDS-1** To ensure noise from tracker washing activities will comply with the County Noise Ordinance, the following will be implemented:

**Wash Station Gasoline Engine Enclosure:** The proposed IPC Eagle Wash Station has a reference noise level of 99 dBA, at 9 feet from the engine. The wash station incorporates a new generation Honda GX-160 gasoline powered engine. In the factory configuration, this engine is mounted to an open frame on the wash station. A number of manufacturers produce acoustic panels suitable for exterior use, fabricated with steel casing and foam insulation, which have a sound transmission class (STC) rating up to 40. Acoustic-rated louvers are also available to permit air circulation while dampening sound propagation; such

louvers can achieve an STC rating up to approximately 25. A cubic enclosure constructed with solid panels on 5 sides, and an acoustic louver on the remaining face, would achieve a composite STC of 32. Such an enclosure would reduce the operational sound level of the wash station to 67 dBA at 9 feet. As a design feature, the applicant is proposing to employ a sound enclosure for the wash station engine to achieve a sound level of not greater than 67 dBA at 9 feet; as long as this maximum noise level is respected, other equipment may be substituted.

**North/South Panel Washing Operations:** Because of the orientation of the trackers (long axis north–south), tracker washing would take place in a north–south direction, using the service roads oriented in this direction. Along the northern and southern property lines, washing of the closest tracker to the property line would require 10 minutes, after which the adjacent tracker (at the end of the next row over) would be washed for another 10 minutes, and then then equipment would be moved down the row, away from the property line. The maximum amount of time within a critical 130 foot distance from the property line would therefore be 20 minutes in an hour.

**Wash Station Operations Setback Distance:** Using simple distance attenuation formulas, it was determined that continuous operation of the wash station within 130 feet of a property line with adjacent residential use would exceed the applicable portion of the San Diego County Noise ordinance (Section 36.404 Sound Level Limits). For eastern and western property lines, the distance from tracker washing activity would remain constant, as the equipment moves parallel to the property line; therefore a design feature is to place the IPC Eagle Wash Station a minimum of 130 feet from the eastern and western property lines. This would equate to following the center-line of the service road on the interior side of the solar tracker row closest to the east and west property lines. The noise produced by the water spray nozzle itself was not calculated because the noise level is anticipated to be at least 10 dBA less than the enclosed engine, which would not affect the composite noise level from the wash station.

Calculated noise exposure to adjacent property boundaries from project tracker washing with PDF-N-TDS-1 implemented are summarized below in Table 2.6-10. As shown in Table 2.6-10, with implementation of **PDF-N-TDS-1**, noise levels at adjacent property boundaries during operation of the wash station at the Tierra del Sol solar farm would be below the nighttime County Noise Ordinance limit of 45 dB Hourly  $L_{eq}$ , and therefore, **less than significant**.

### Tierra del Sol Emergency Generator Noise

Two back-up generators are proposed to be located in the sub-station, to be used in the event of power loss from the electricity distribution grid. The generators would be used very infrequently, only when power is not available from the electricity grid and the tracking systems need to be repositioned in response to an identified pending storm condition. Two generators will be provided, for redundancy, but only one will be used at any one time. It is estimated the generator would be used a total of 20 minutes for the repositioning of the tracking systems in this scenario. The noise level from a diesel powered generator in a factory-supplied Level 1 Sound Enclosure would be 79 dBA at 23 feet (Generac SD600). At the closest residential property line (1,230 feet from the electrical sub-station) the noise level from generator operation would be 35 dBA Leq. Transformers, inverters, and tracker blowers would not be in operation while the generator is being used; consequently the generator noise may be considered and evaluated without the noise from these components. Noise from the trackers would be 34 dBA at 75 feet, the nearest residential property boundary. When combined with the noise from the generator the resulting noise at the nearest property would be 38 dBA. Therefore, operation of the generator, even at night and in conjunction with the temporary operation of the trackers, would comply with the County Noise Ordinance criterion of 45 dBA and would be below the applicable CNEL standard of 10 dB above existing ambient noise of 40 dBA, and impacts would be **less than significant**.

### Tierra del Sol Gen-tie Maintenance Noise

A 138-kilovolt (kV) gen-tie would be utilized to deliver power from the solar farm site to the Rebuilt Boulevard Substation, located approximately 5 miles to the northeast of the solar farm site; see Section 1.2.1.2 and Figures 1-7a through 1-7d, and 2.6-2a and 2.6-2b, for further details on the Tierra del Sol gen-tie route.

The gen-tie transmission line would consist of approximately 2.5 miles of buried cable and 3.5 miles of above-ground cable strung between towers. The buried cable portion of the gen-tie line will not require routine maintenance once installed, due to protection provided by placing the cable underground; infrequent activity along the buried portion of the gen-tie could occur in response to emergency situations. For the above ground portion of the gen-tie line, maintenance and repair activities for the Tierra del Sol gen-tie would include both routine preventive maintenance and emergency procedures conducted to maintain system integrity, as well as vegetation clearing.

Certain poles or structures would require the removal of vegetation to increase aerial patrol effectiveness or to reduce fire danger. Vegetation would be removed during the day (i.e., 7 a.m. to 7 p.m.) using mechanical equipment, such as chainsaws, weed trimmers, rakes, shovels, and brush hooks. To prevent vegetation from reoccurring around structures, herbicides may also be

used. These vegetation clearing activities may involve a crew of up to three employees, who would either walk from the nearest access road or drive a pickup truck directly to each pole location as access permits. Chainsaws at full throttle can produce up to 104 dB at 10 feet; gas-powered weed trimmers would produce similar noise levels. Maximum noise levels from a chainsaw would be reduced to 62 dB at 1,125 feet; which is the distance from the above ground gen-tie alignment to the closest NSLU. Brush maintenance activities, carried out during the day, would not have the potential to increase existing CNEL by 10 dB, or to contribute to a CNEL that exceeds 60 dB because noise from these activities would occur in temporary bursts and CNEL is the average equivalent A-weighted sound level over a 24-hour period. Therefore, brush maintenance activity around transmission poles would produce noise levels below the County noise significance threshold resulting from project operations at nearby exterior locations. However, these activities could potentially produce an hourly  $L_{eq}$  at the closest NSLU that exceeds the County daytime noise Ordinance limit of 50 dB  $L_{eq}$  (at 1,125 feet, a gas-powered weed trimmer would produce an  $L_{max}$  of 62 dB; 20 minutes at full-power and 40 minutes idling would generate an hourly  $L_{eq}$  of 52 dB).

Poles or structures support a variety of equipment, such as conductors, insulators, switches, transformers, lightning arrest devices, line junctions, and other electrical equipment. Equipment repair or replacement generally requires a crew to gain access to the location of the equipment to be repaired or replaced. The crew normally consists of four people with two to three trucks, a boom or line truck, an aerial-lift truck, and an assist truck. The necessary assembly of trucks, if they were all running during a maintenance operation, could produce a combined maximum noise level of approximately 85 dB, measured at 50 feet. Maximum noise levels from the truck operations would be reduced to 57 dB at 1,125 feet, which is the distance from the above ground gen-tie alignment to the closest NSLU. Equipment maintenance activities, carried out during only a portion of a 24-hour period, would not have the potential to increase existing CNEL by 10 dB, or to contribute to a CNEL that exceeds 60 dB (the County's development-related land use compatibility standard) because such maintenance activities would occur for short durations in one location, and CNEL is the average equivalent A-weighted sound level over a 24-hour period. The Federal Highway Administration Roadway Construction Noise Model assigns a usage cycle of 16% for cranes and 20% for boom trucks (man-lift). Based on this worst-case scenario, this activity could produce an hourly  $L_{eq}$  at a residential property boundary of 46 dB if the trucks were left idling for the entire hour (at 1,125 feet, combined truck operations for 2–3 trucks could produce an  $L_{max}$  of 46 dB), which is below the Noise Ordinance daytime hourly non-construction noise limit affecting residential uses.

If no vehicle access exists, the crew and material are flown in by helicopter. Each electric transmission line is inspected once per year via helicopter. It is anticipated that a passenger type helicopter would be used for the line inspection. The most common helicopter of this type is the Bell 407. At a hovering height of 100 feet above the ground, the Bell 407

produces a noise level of 82 dB ( $L_{eq}$ ) at 400 feet horizontal feet from the ground location below the hover point (NPS 2007). With the closest NSLU to the above ground gen-tie alignment at a distance of 1,125 feet, helicopter operations within 100 feet of the ground would generate maximum noise levels of 72 dBA at the closest NSLU, and could therefore result in an hourly  $Leq$  greater than 50 dBA at the closest NSLU.

For areas of the gen-tie line with limited ground access, repair materials and equipment may also be delivered by helicopter. The type of helicopter used for delivery of materials would be a utility or “lift” helicopter such as the Kman Kmax. While suspending a load and hovering 200 feet above the ground, this helicopter produces a noise level of 92 dBA at 100 feet horizontal feet from the ground location below the hover point (USFS 2008). Helicopters would only be used during daytime hours due to safety reasons. Also, for inspection and limited use for equipment replacement, the helicopter would not be in any one location for more than 3–5 minutes. With the closest NSLU approximately 1,125 feet from the above-ground portion of the gen-tie alignment, helicopter operations within 200 feet of the ground for maintenance materials delivery would generate maximum noise levels of 70 dBA at the closest NSLU, and could, therefore, result in an hourly  $Leq$  greater than 50 dBA at the closest NSLU.

Materials staging for helicopter-assisted routine repairs or maintenance would make sense to have delivered to the Tierra del Sol operations and maintenance yard, where they could be retrieved and ferried to the work area by helicopter. The identified location of the O&M yard not closer than 1,000 feet from a property line with occupied residence would avoid raising the average noise level above 50 dBA at the closest residential property lines, when using the site for staging helicopter-lift materials. The use of helicopters during the day for both inspections and delivery of maintenance equipment and materials would not have the potential to increase existing CNEL by 10 dB, or to contribute to a CNEL that exceeds 60 dB because noise from these activities would occur in temporary bursts and CNEL is the average equivalent A-weighted sound level over a 24-hour period.

Based on the discussion above, activities associated with maintenance of the Tierra del Sol gen-tie line (including vegetation trimming, equipment maintenance and repair activities, and helicopter inspections and maintenance activities) could cause the hourly  $L_{eq}$  at a residential property boundary to exceed the daytime Noise Ordinance limit of 50 dB Hourly  $L_{eq}$  depending on the distance to neighboring residential properties along the gen-tie line, and therefore result in a significant noise impact (**N-TDS-2**).

For a discussion on corona noise, see Section 2. 6.3.4 below.

## Rugged

### Equipment Noise

Similar to the Tierra del Sol solar farm, during operation of the Rugged solar farm on-site noise sources would include pad-mounted inverters and transformers, substation transformers, and tracker array motors and dryers/blowers. The O&M operations yard would also potentially generate noise levels during daytime hours on the order of 70 dBA  $L_{eq}$  at 50 feet. The locations of the noise-generating equipment and the O&M building are shown on Figure 2.6-3. The primary noise source at the property lines would be the inverters and the O&M building.

As taken from Appendix 2.6-2, Table 2.6-11 below demonstrates that the combined operational equipment and O&M building noise levels at the property boundaries of the Rugged solar farm would exceed the County's more stringent Noise Ordinance criteria of 45 dB during the nighttime hours (i.e., 7 p.m. to 7 a.m.), and operational noise impacts at the solar farm would, therefore, be significant (**N-R-1**). The property line locations referenced in Table 2.6-11 are shown on Figure 2.6-3.

As discussed above, the County has published guidelines for determining the significance of Noise Sensitive Uses Affected by Airborne Noise. The guidelines consider a significant impact would occur if a project were to cause the exterior noise to exceed 60 dB (CNEL), or cause an increase of 10 dB (CNEL) over pre-existing noise levels at outdoor living areas or private usable open space. Equipment noise from the Rugged solar farm would result in noise levels ranging from 55–58 dB CNEL at the property boundary of the four closest NSLU sites to the solar LLC property (refer to Figure 2.6-3). Though noise levels of 55–58 dB CNEL would be within the County exterior living area criterion limit of 60 dB CNEL, they would be above the County's development-related land use compatibility limit of 50 dB CNEL (10 dB above existing ambient noise of 40 dB CNEL). Therefore, for exterior use areas on the identified NSLU residential properties that are relatively close to the property boundary, these exterior use areas could be subjected to a project-resultant CNEL greater than 50 dB CNEL; consequently, noise exposure in exterior use areas of the NSLU residential parcels would be a significant noise impact (**N-R-1**).

### Washer Station Noise

As discussed above for the Tierra del Sol solar farm, during operation of the Rugged solar farm periodic washing of the solar trackers would be achieved using the IPC Eagle Wash Station or equivalent equipment. The same assumptions and methodologies that applied to the Tierra del Sol solar farm were applied in analyzing the potential wash station noise at the Rugged solar farm (see Appendix 2.6-2). Similar to the Tierra del Sol analysis, noise calculations from the tracker washing for the Rugged solar farm indicated that the noise exposure at neighboring properties from washing operations could potentially exceed the County's daytime and nighttime

Noise Ordinance limits. It should be noted that noise produced by the water spray nozzle of the wash station was not calculated, because the noise level is anticipated to be at least 10 dBA less than the enclosed engine; when combining two noise levels at least 10 dBA apart, the sum equals simply the larger value (the noise produced from the engine). **PDF-N-TDS-1** would also be implemented for the Rugged solar farm. Calculated noise exposure to adjacent property boundaries from project solar panel/array washing with **PDF-N-TDS-1** implemented are summarized below in Table 2.6-12. As shown in Table 2.6-12, with implementation of **PDF-N-TDS-1**, tracker washing activity would comply with the daytime and nighttime San Diego County Noise Ordinance limits, and would be **less than significant**.

### **Rugged Solar Farm Emergency Generator Noise**

Two back-up generators are proposed to be located in the sub-station, to be used in the event of power loss availability from the electricity distribution grid. The generators would be used very infrequently, only when power is not available from the electricity grid and the tracking systems need to be repositioned in response to an identified pending storm condition. Two generators will be provided, for redundancy, but only one will be used at any one time. It is estimated the generator would be used a total of 20 minutes for the repositioning of the tracking systems in this scenario. The noise level from a diesel powered generator in a factory-supplied Level 1 Sound Enclosure would be 79 dBA at 23 feet (Generac SD600). At the closest residential property line (1750 feet from the electrical sub-station) the noise level from generator operation would be less than 30 dBA Leq (assuming that operation of the generator would be no longer than 20 minutes). Transformers, inverters, and tracker blowers would not be in operation while the generator is being used; consequently the generator noise may be considered and evaluated without the noise from these components. Noise from the trackers would be 34 dBA at 1750 feet, the nearest residential property boundary. When combined with the noise from the generator the resulting noise at the nearest property would be 36 dBA. Therefore, operation of the generator, even at night, would comply with the County Noise Ordinance criterion of 45 dBA and would be below the applicable CNEL standard of 10 dB above existing ambient noise of 40 dBA, and impacts would be **less than significant**.

### **LanEast**

#### **Equipment Noise**

Similar to the Tierra del Sol solar farm and Rugged solar farm, during operation of the LanEast solar farm on-site noise sources would include pad-mounted inverters and transformers, substation transformers, tracker array motors, and dryers/blowers. The locations of the noise-generating equipment cannot be determined at this time because preliminary engineering and site design has not yet been performed. However, similar to the Tierra del Sol solar farm and Rugged solar farm, the primary noise source at the property lines would be the inverters which would be

expected to cause noise levels at the LanEast property boundaries to exceed the County's Noise Ordinance criteria of 45 dB during the nighttime hours (i.e., 7 p.m. to 7 a.m.) and exceed the County's development-related land use compatibility limit of 50 dB CNEL (10 dB above existing ambient noise of 40 dB CNEL) at nearby residential exterior use areas. Additionally, depending on where the emergency generator was placed on the site, temporary noise from the generator and trackers could exceed the County's Noise Ordinance criteria of 45 dB during the nighttime hours and 50 dB during daytime hours. Therefore, operational noise impacts at the LanEast solar farm would be considered significant (**N-LE-1**).

### **Washer Station Noise**

As discussed above for the Tierra del Sol solar farm and Rugged solar farm, during operation of the LanEast solar farm periodic washing of the solar panels would be achieved using the IPC Eagle Wash Station or equivalent equipment. When the same assumptions and methodologies that applied to the Tierra del Sol solar farm's and Rugged solar farm's panel washing are applied at the LanEast solar farm, the noise exposure at neighboring properties from panel/array washing operations (including washer engine noise and lesser noise contribution from the spray nozzle) could potentially exceed the County's daytime and nighttime Noise Ordinance limits. Therefore, **PDF-N-TDS-1** would be implemented for the LanEast solar farm. With implementation of **PDF-N-TDS-1**, washer truck noise during operations is expected to be **less than significant**.

### LanWest

#### **Equipment Noise**

Similar to the Tierra del Sol solar farm and Rugged solar farm, during operation of the LanWest solar farm on-site noise sources would include pad-mounted inverters and transformers, substation transformers, tracker array motors, and dryers/blowers. The locations of the noise-generating equipment cannot be determined at this time because preliminary engineering and site design has not yet been performed. However, similar to the Tierra del Sol solar farm and Rugged solar farm, the primary noise source at the property lines would be the inverters which would be expected to cause noise levels at the LanEast property boundaries to exceed the County's Noise Ordinance criteria of 45 dB during the nighttime hours (i.e., 7 p.m. to 7 a.m.) and exceed the County's development-related land use compatibility limit of 50 dB CNEL (10 dB above existing ambient noise of 40 dB CNEL) at nearby residential exterior use areas. Additionally, depending on where the emergency generator was placed on the site, temporary noise from the generator and trackers could exceed the County's Noise Ordinance criteria of 45 dB during the nighttime hours and 50 dB during daytime hours. Therefore, operational noise impacts at the LanWest solar farm would be considered significant (**N-LW-1**).

### Washer Station Noise

As discussed above for the Tierra del Sol solar farm and Rugged solar farm, during operation of the LanWest solar farm periodic washing of the solar panels would be achieved using the IPC Eagle Wash Station or equivalent equipment. When the same assumptions and methodologies that applied to the Tierra del Sol solar farm's and Rugged solar farm's panel washing are applied at the LanWest solar farm, the noise exposure at neighboring properties from panel/array washing operations (including washer engine noise and lesser noise contribution from the spray nozzle) could potentially exceed the County's daytime and nighttime Noise Ordinance limits. Therefore, **PDF-N-TDS-1** would be implemented for the LanWest solar farm. With implementation of **PDF-N-TDS-1**, washer truck noise during operations is expected to be less than significant.

### Proposed Project

Noise impacts are generally considered to be localized, mainly within approximately 500 feet from any noise source. Therefore, the Proposed Project sites that are greater than 500 feet apart would not result in increased noise impacts under a combined analysis. As discussed above, **PDF-N-TDS-1** would be implemented at all four solar farm sites to ensure operational noise impacts from operation of the wash station at each site would be less than significant. Operational noise sources at the Proposed Project sites would include the stationary solar farm equipment noise, and the O&M building, that would exceed the County Noise Ordinance standard of 45 dB during the nighttime hours (i.e., 7 p.m. to 7 a.m.) and exceed the County's development-related land use compatibility limit of 50 dB CNEL (10 dB above existing ambient noise of 40 dB CNEL) at nearby residential exterior use areas (significant impacts **N-TDS-1**, **N-R-1**, **N-LE-1**, and **N-LW-1**). Additionally, impacts from noise generated by maintenance activities along the Tierra del Sol gen-tie line would also exceed County noise standards (significant impact **N-TDS-2**).

#### 2.6.3.2 Construction Noise

##### Guidelines for the Determination of Significance

For the purpose of this EIR, the County's *Guidelines for Determining Significance: Noise* (January 27, 2009) applies to both the direct impact analysis and the cumulative impact analysis. A significant impact would result if:

- For project-generated airborne noise: The project will generate airborne noise which, together with noise from all sources, will be in excess of:
  - Construction Noise: Noise generated by construction activities related to the project will exceed the standards listed in San Diego County Code Section 36.409, Sound Level Limitations on Construction Equipment. Section 36.409 states: Except for

- emergency work, it shall be unlawful for any person to operate construction equipment or cause construction equipment to be operated, that exceeds an average sound level of 75 decibels for an eight-hour period, between 7 a.m. and 7 p.m., when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is being received.
- Impulsive Noise: Noise generated by the project will exceed the standards listed in San Diego Code Section 36.410, Sound Level Limitations on Impulsive Noise (See Table 2.6-6).

### Analysis

#### Tierra del Sol

#### **Standard Construction Equipment Noise**

Construction of the Tierra del Sol solar farm would involve clearing and grubbing of the existing vegetation; grading necessary for construction of access roads and tracker foundations; trenching for the electrical collection system and communication lines; installation of a small concrete footing at each pair of inverters; construction of an overhead 34.5 kV “trunk line” for the collection system leading to the project substation; and construction of the 34.5/138 kV substation and an operations and maintenance building. During the peak of construction, a typical day would include the transportation of trackers (delivered in sections by conventional trailer trucks), movement of heavy equipment, and transportation of materials including delivery of water by trucks.

Construction activities would occur during the County’s allowable hours of operation. Construction equipment would include standard equipment such as graders, scrapers, backhoes, loaders, cranes, dozers, water trucks, portable generators and air-compressors, and miscellaneous trucks. The maximum noise level ranges for various pieces of construction equipment at a distance of 50 feet are depicted in Table 2.6-13 below. Construction noise would be temporary and short-term as construction occurs intermittently and varies depending on the nature or phase of construction (e.g., demolition/land clearing, grading and excavation, erection).

The property boundaries of closest residences to the Tierra del Sol solar farm site are located approximately 75 feet north and 150 feet west of the closest construction areas at the solar farm site, and the location of occupied residences on properties adjacent to the solar farm site are depicted on Figure 2.6-1. The construction equipment would be spread out over the entire site with some equipment operating along the perimeter of the site while the rest of the equipment may be located from 3,000 to 6,000 feet from the same property perimeter.

The maximum noise levels at 50 feet for typical equipment is expected to range up to 88 dBA as indicated in Table 2.6-13. Simultaneous operation of on-site construction equipment could result in hourly average noise levels of approximately 80 dBA at 50 feet. Construction noise in a well-defined area typically attenuates at approximately 6 dB per doubling of distance. When the sites have an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, an excess ground attenuation value of 1.5 dB per doubling distance can be assumed (Caltrans 2009). Since the ground around the trackers would remain unpaved, the excess ground attenuation value was applied to the project. Eight-hour average noise levels would be less as the mobile equipment would move around the site increasing the distance to the acoustic center of the site; there would also be work breaks and idle time. Thus, the construction noise level during grading and other typical construction activities at the solar farm site is expected to be approximately 73 dBA  $L_{eq}$  or less at the nearest property line. With the exception of the pile driving activities discussed below, the construction activities would comply with the County's 8-hour average construction noise standard of 75 dB at the property lines, and impacts would be considered **less than significant**. Refer to Appendix 2.6-1 for more information. Though the noise generated from general construction activities would be in compliance with the County standard and would not be considered a significant impact, temporary construction noise would still be audible to nearby residences. To reduce the temporary construction noises audible at nearby residences the applicant will implement the following project design features, as listed in Table 1-10 of Section 1.0, Project Description.

**PDF-N-2** To the extent feasible the applicant will implement the following noise-reducing features during construction activities:

- Whenever feasible, electrical power will be used to run air compressors and similar power tools.
- Equipment staging areas will be located as far as feasible from occupied residences or schools.

### **Pile Driver Noise**

Each tracker would be installed on a 28-inch-diameter steel mast. One foundation design includes pile driving to a maximum depth of 20 feet. To install the mast to the necessary depth the project includes the use of a RG Model RG21T vibration pile driver. Blasting will not be necessary. Based on previous experience, the project applicant anticipates it would take approximately 18 minutes to set up the pile driver, drive a pile, and move to the next pile driving location. This time estimation is broken down into the following sub-activities: 3 minutes for pile driver setup; 12 minutes of pile driving; 3 minutes to move to the next pile location. Thus, for a given pile location, there would be 12 minutes of pile driving activity (or full-power operation of

the driver). This time also allows for complications in a more rocky terrain. Equipment noise levels are not available for the RGT RG21T vibratory pile driver. However, this size and type of equipment is anticipated to generate a maximum noise level of approximately 85–90 dB at a distance of 50 feet. At a distance of 75 feet, which is the shortest distance between the pile driving activity and the property boundary of any occupied residence, the maximum noise level from pile driving would be approximately 82–87 dB.

Assuming pile driving occurs for 12 minutes at each tracker site, the average hourly noise level would be approximately 83 dB at 50 feet from the pile driver or 80 dB at 75 feet, the distance to the closest residential property boundaries to the pile driving locations. Given an 8-hour workday (or 480 minutes), and 18 minutes required for pile driving and movement between each pile location, a pile driver could complete approximately 27 piles per day. The 27 closest tracker masts would be located between 75–335 feet from the nearest property line with an occupied residence (the northern property line exhibits the minimum distance to neighboring occupied residential property at 75 feet). The worst-case noise exposure for adjacent residences assumes that pile driving at the 27 closest tracker masts to the nearest property line are completed in one day.

The total distance along the northern property boundary represented by 27 tracker masts is 2,200 feet, which would be covered in a single day under the worst-case pile driver noise scenario; dividing this distance by 8 hours per day, the average distance the pile driver would move along the property boundary per hour is 275 feet. This means the distance from active pile driving to a given adjacent residential property line would increase or decrease by 275 feet per hour, resulting in an increase or decrease each hour of the average pile driver noise level at that property line. For a property line immediately adjacent to the pile driving operation (and at the closest distance of 75 feet from the operations), the hourly average noise levels from pile driving during the 8-hour day (due to increasing and decreasing distance from pile driving to a given property line as the pile driving activity would move around the site) would be: 80 dBA (Hour 1); 65 dBA (Hour 2); 58 dBA (Hour 3); 53 dBA (Hour 4); 50 dBA (Hour 5); 47 dBA (Hour 6); 45 dBA (Hour 7); and 43 dBA (Hour 8). Consequently, under this scenario, pile driving would generate an 8-hour average noise level of 71 dB at the nearest property line with an occupied residence (i.e., the northern property boundary, where adjacent occupied residential property boundaries are situated 75 feet away). If we look at the scenario where the pile driving is performed in a direction perpendicular to the property boundary, and using the same 2,200 feet covered during one construction day, the worst-case would be for the pile driving to commence 1,100 feet from the property line (1,175 feet to the closest adjacent residential property boundary), moving toward the property line for the first half day, moving over one row space at the project property boundary, and reversing direction away from the property line. The hourly average for pile driving would then be: 53 dBA (Hour 1); 58 dBA (Hour 2); 65 dBA (Hour 3); 80 dBA (Hour 4); 80 dBA (Hour 5); 65 dBA (Hour 6); 58 dBA

(Hour 7); and 53 dBA (Hour 8). Under this scenario as well, pile driving would generate an 8-hour average noise level of 71 dB at the nearest property line with an occupied residence. Consequently, whether pile driving occurs parallel or perpendicular to the property boundary, worst-case noise levels at the closest occupied residential property boundary would comply with the County's noise criterion.

Thus, noise from vibratory pile driving would comply with the County's noise criterion, thereby maintaining pile driving noise levels at a **less than significant** level.

### **Pile Driving Impulsive Noise**

According to the Federal Highway Administration, a vibratory pile driver is not considered to be a source of impulsive noise (FHWA 2011). Therefore, the use of a vibratory pile driver during construction would not generate impulsive noise, and would therefore not result in a significant impact related to impulsive noise.

### **PreDrilling for Mast Emplacement**

In areas of the site with intact bedrock within 20 feet of the ground surface, vibratory driving methods alone would not be capable of emplacing the mast to the design depth of up to 20 feet. A geotechnical survey will be performed of the entire site prior to the commencement of construction, to determine in which areas bedrock exists. In these areas, the construction process would include pre-drilling of a pilot hole with slightly smaller diameter than the mast, followed by insertion of the mast using the vibratory driver. Pilot hole drilling and emplacement of the mast with vibratory driver would not occur on the same day. Pilot holes would be drilled by one crew using the rock drill, the vibratory driver crew would be directed to an area once the pilot hole drilling within that area was completed (drilling takes about twice the time as the vibratory emplacement, so it is not efficient to have the vibratory rig following along behind the rock drilling). However, to ensure that the rock drilling and use of a vibratory pile would not occur on the site on the same day the project will implement the following project design feature, as listed in Table 1-10 of Section 1.0, Project Description:

**PDF-N-3** In the event that pilot hole drilling would be necessary prior to installing the tracker masts due to bedrock conditions, any pilot hole drilling would not occur on the site on the same day as pile driver use. This will be added as a condition to the MUP.

Based upon bedrock drilling information from a construction industry handbook (McGraw, 2002), drilling up to 20 feet through granitic rock would require approximately 16 minutes. Allowing 7 minutes to set up the rig, and 7 minutes to move to the next site, two holes could be drilled per hour. Thus, for a given pile location, there would be 16 minutes of drilling activity (or

full-power operation of the drill), which equates to 26% of an hour. From Table 11, a rock drill produces 85 dBA at a distance of 50 feet. At a distance of 75 feet, which is the shortest distance between the pile driving activity and the property boundary of any occupied residence, the maximum noise level from rock drilling would be approximately 81 dBA.

Assuming rock drilling occurs for approximately 16 minutes of an hour at each tracker site, the average hourly noise level would be approximately 79 dB at 50 feet from the drill or 75 dB at 75 feet, the distance to the closest residential property boundaries to the rock drilling locations. Given an 8-hour workday (or 480 minutes), and 30 minutes required for rock drilling and movement between each pile location, a rock drill could complete approximately 16 pilot holes per day. The 16 closest tracker masts would be located between 75–200 feet from the nearest property line with an occupied residence. The worst-case noise exposure for adjacent residences assumes that rock drilling at the 16 closest tracker masts to the nearest property line are completed in one day. In this scenario, rock drilling would generate an 8-hour average noise level of 75 dB at the nearest property line with an occupied residence, and would comply with the County's 75 dBA 8-hour average noise criterion.

According to the Federal Highway Administration, a rock drill is not considered to be a source of impulsive noise (FHWA 2011). Therefore, the use of a rock drill during construction would not generate impulsive noise.

Thus, noise from bedrock drilling in preparation for emplacement of masts would comply with the County construction and impulsive noise criterion, thereby maintaining rock drilling noise levels at **less than significant**.

### **Construction Traffic Noise**

The proposed Tierra del Sol solar farm would require worker vehicles and truck material deliveries to the site. It is anticipated that on average approximately 58 trips per day, see Section 3.1.8. The worker vehicles and delivery trucks would generate an annual CNEL of less than 60 dB beyond the Tierra del Sol Road right-of-way. Noise impacts associated with worker vehicles and delivery trucks would be less than significant because the construction activities would be short-term, and the noise level along Tierra del Sol Road associated with the construction vehicles would be less than 60 dB CNEL. Therefore, noise impacts along area roadways due to the temporary increase in construction-related trips would be **less than significant**. Refer to Appendix 2.6-1 for more information.

### Tierra del Sol Gen-Tie Line Construction

The proposed 138 kV Tierra del Sol gen-tie line traverses both undeveloped land and rural residential land uses as shown on Figures 2.6-2a and 2.6-2b. A discussion of the nearest NSLUs along the gen-tie route is included in Section 2.6.1.2 above, and summarized in Table 2.6-3.

Construction of the Tierra del Sol gen-tie line would involve clearing and grubbing of the existing vegetation; grading necessary for transmission pole foundations; trenching for the 1-mile buried portion of the transmission line at the beginning of the alignment and the 1.5-mile buried portion of the transmission line at the end of the alignment; and stringing of the transmission cable. Construction activities would occur during the County's allowable hours of operation. The noise levels generated by construction equipment would vary greatly depending upon factors such as the type and specific model of the equipment, the operation being performed, and the condition of the equipment. The average sound level of the construction activity also depends upon the amount of time that the equipment operates and the intensity of the construction during the time period.

Construction equipment would include standard equipment such as graders, scrapers, backhoes, loaders, cranes, dozers, water trucks, portable generators and air-compressors, and miscellaneous trucks (and blasting equipment described separately below). The maximum noise level ranges for various pieces of construction equipment at a distance of 50 feet are depicted in Table 2.6-13. The maximum noise levels at 50 feet for typical equipment would range up to 88 dB for the type of equipment normally used for this type of project. The hourly average noise levels would vary, but construction noise levels of up to approximately 75 to 80 dB at 50 feet are typical for the anticipated construction activities (the analysis below assume 78 dB, a value in the middle of the range). Construction noise in a well-defined area typically attenuates at approximately 6 dB per doubling of distance. When the sites have an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, an excess ground attenuation value of 1.5 dB per doubling distance can be assumed (Caltrans 2009). The project does not include paving any areas around the gen-tie line, and therefore, the excess ground attenuation value was used in this noise analysis.

The gen-tie alignment passes thru four occupied parcels not excluded from the noise analysis requirements, and is aligned coincident with the parcel boundary of a fifth occupied parcel (refer to Figures 2.6-2a and 2.6-2b, and Table 2.6-3). On these properties, exclusionary fencing would be erected to keep residents a minimum of 50 feet away from the construction zone (the closest residence is 300 feet from the alignment); since a construction easement must be obtained from the property owner, the edge of the easement will serve as the "property boundary" during construction, and will be located not closer than 50 feet from the construction zone. The construction noise level during grading and other typical construction activities would be approximately 78 dBA  $L_{eq}$  (hourly) at 50 feet from the construction activity, or the shortest

distance to an “occupied residential property boundary.” With these average noise levels sustained across an 8-hour workday, the project could exceed the County’s 75 dBA 8-hour average for the properties where a construction easement must be obtained to accommodate the gen-tie line (establishing a ‘property boundary’ for temporary construction 50 feet from the construction). Thus, these activities associated with the gen-tie line construction (with the exception of blasting, see below)) could exceed the County’s 75 dB standard at the nearest sensitive receptors along the Tierra del Sol gen-tie route, and impacts would be **considered significant without mitigation implemented (N-TDS-3)**.

Additionally, blasting activities may be required to facilitate excavation in areas where competent bedrock occurs at depths which interfere with transmission pole installation. The project applicant will obtain a blasting permit from the County prior to initiating any blasting activities. Blasting would not occur simultaneously with other construction activities. Blasting activities would typically involve drilling multiple 2-inch-diameter holes into the rock to a depth between 40 inches and 15 feet, so that the pole holes can ultimately be excavated to a depth of approximately 15 feet. According to the Federal Highway Administration Construction Noise Handbook (2011), a rock drill is not an impactful device; the noise level for a rock drill is identified as 81 dB at 50 feet, and a loading factor of 20% is applicable (which takes into consideration that the equipment would not be used continuously through the hour). Charges, typically weighing between 2.5 and 5 pounds each, would then be inserted into each drilled hole. (Drilling associated with the placement of charges for blasting would not exceed the construction noise limit (i.e., 75 dB 8-hour average) where rock drilling sites are at least 100 feet from property lines with occupied residences.) The charges would then be detonated sequentially, limiting the blasting-related noises to one individual charge at a time. Smaller charges and/or multiple blasting operations may be used to further limit blasting-related noise levels at individual pole holes. Based upon these assumptions, blasting would exceed the County’s impulsive noise limit in any 1 minute at the boundary of any parcel used for agricultural purposes at a distance of approximately 1,100 feet, and for residential purposes at a distance of approximately 1,550 feet (refer to Table 2.6-6, Maximum Sound Level (Impulsive) Measured, 85 dBA for occupied agricultural, commercial, and industrial use properties, properties along the gen-tie route are zoned General Rural (S92)). Assuming that 5-pound charges will be used and soil, rubberized blankets, and/or steel plates will be placed over the area to be blasted to reduce the noise, the resulting noise level would be 85 dBA at a distance of 430 feet. Though the nearest residence to the gen-tie line is approximately 1,125 feet away, since a construction easement must be obtained from the property owner, the edge of the easement will serve as the “property boundary” during construction, and would be located not closer than 50 feet from the construction zone. Therefore, if blasting were to occur within 430 feet of the boundary of any occupied parcels zoned for agricultural use (the applicable zoning along the proposed gen-tie alignment), blasting noise could exceed the County’s impulsive noise standard, resulting in a

significant impact (**N-TDS-4**). Drilling associated with the placement of charges for blasting would not exceed the construction noise limit (i.e., 75 dB 8-hour average) where rock drilling sites are at least 100 feet from NSLUs.

In areas where there is limited access, helicopters may be used intermittently to assist with the installation of transmission line poles and conductors. The noise level generated by a utility or lift helicopter can be represented by the Kman Kmax, which produces a sound level of 92 dBA at 100 feet, measured horizontally from the point on the ground beneath the hovering helicopter. Materials staging for helicopter-assisted routine repairs or maintenance would be located at the Tierra del Sol operations and maintenance yard, where materials could be retrieved and ferried to the work area by helicopter. The location of the O&M yard is not closer than 1,000 feet from a property line with occupied residence, and therefore would avoid raising the average noise level above 50 dBA at the closest residential property lines. There are four residences with property boundaries located within approximately 1,600 feet of potential helicopter use (refer to Table 2.6-3, Information Regarding Properties Along Gen-Tie Route) that may experience temporary noise levels due to helicopter use in excess of an 8-hour 75 dBA average between, 7 a.m.–7 p.m. Use of helicopters only during daytime hours (for safety reasons) will partially mitigate these impacts by limiting construction activities to the hours permitted by the San Diego County Noise Ordinance. Therefore, short-term helicopter noise levels could exceed the County's Construction Noise Ordinance limit of 75 dB for an eight-hour period between 7 a.m. and 7 p.m., and would result in a potentially significant noise impact (**N-TDS-5**).

## Rugged

### Standard Construction Equipment Noise

Construction of the Rugged solar farm would include noise from activities such as site preparation, material delivery including trucked-in water, concrete preparation and pouring, tracker installation, transmission line and inverter/transformer installation, and use of power tools. Vibratory pile driving and rock crushing/batch plant activities are discussed separately below. Construction activities would not require the use of rock drilling or blasting. Construction activities would occur during the County's allowable hours of operation. Construction equipment would include standard equipment such as graders, scrapers, backhoes, loaders, cranes, dozers, water trucks, portable generators and air-compressors, and miscellaneous trucks. The maximum noise level ranges for various pieces of construction equipment at a distance of 50 feet are previously depicted in Table 2.6-13. Construction noise would be temporary and short-term as construction occurs intermittently and varies depending on the nature or phase of construction (e.g., demolition/land clearing, grading and excavation, erection).

Although noise ranges are generally similar for all construction phases, the noisiest equipment types operating at construction sites typically range up to 88 dBA at 50 feet as indicated in Table 2.6-13 (with exception to vibratory pile drivers and rock crushing/batch plant activities). Average noise levels at construction sites typically range from approximately 65 to 88 dB  $L_{eq}$  at 50 feet, depending on the activities performed. The nearest property line to proposed construction areas at the Rugged solar farm would be 100 feet. At this distance, project-generated construction noise would be 70.4 dBA  $L_{eq}$  and 77.1 dBA  $L_{max}$  (with the exception of pile drivers) (refer to Appendix 2.6-2). Therefore, noise generated by construction activities would be less than the County standard of 75 dBA  $L_{eq}$  8-hour average at the nearest property line, and a less-than-significant impact would occur during standard construction activities (with exception of vibratory pile drivers) (Appendix 2.6-2). Therefore, this impact would be **less than significant**. Refer to Appendix 2.6-2 for more information.

As discussed above for the Tierra del Sol solar farm site, though the noise generated from general construction activities would be in compliance with the County standard and would be considered a less-than-significant impact, temporary construction noise would still be audible to nearby residences. To reduce the temporary construction noises audible at nearby residences the applicant will implement **PDF-N-2**, as listed above and in Table 1-10 of Section 1.0, Project Description.

### **Pile Driver Noise**

Some pile driving may be required for some tracker mast installations. Vibratory pile drivers would be used at the Rugged solar farm site in the same manner as discussed above under the Tierra del Sol project. Consequently, under the scenario described above, at a distance of 100 feet, which is the shortest distance between the pile driving activity and the property boundary of any occupied residence, the maximum noise level from pile driving would be approximately 82–86 dBA. Assuming pile driving occurs for approximately 12 minutes at each tracker site, the average hourly noise level would be approximately 83 dB at 50 feet from the pile driver or 76 dB at 100 feet, the distance to the closest residential property boundaries to the pile driving locations. Given an 8-hour workday (or 480 minutes), and 18 minutes required for pile driving and movement between each pile location, a pile driver could complete approximately 27 piles per day. The 27 closest tracker masts would be located between 100–200 feet from the nearest property line with an occupied residence. The worst-case noise exposure for adjacent residences assumes that pile driving at the 27 closest tracker masts to the nearest property line are completed in one day.

The total distance along the northern property boundary represented by 27 tracker masts is 2200 feet, which would be covered in a single day under the worst-case pile driver noise scenario; dividing this distance by 8, the average distance the pile driver would move along the

property boundary per hour is 275 feet. This means the distance from active pile driving to a given adjacent residential property line would increase by 275 feet per hour, resulting in a reduction each hour of the average pile driver noise level at that property line. For a property line immediately adjacent to the pile driving operation at the start of the day (and at an initial distance of 100 feet from the operations), the hourly average noise levels from pile driving during the 8-hour day (due to increasing distance from pile driving to a given property line) would be: 76 dBA (Hour 1); 65 dBA (Hour 2); 58 dBA (Hour 3); 53 dBA (Hour 4); 50 dBA (Hour 5); 47 dBA (Hour 6); 45 dBA (Hour 7); and 43 dBA (Hour 8). Consequently, under this scenario, pile driving would generate an 8-hour average noise level of 70 dB at the nearest property line with an occupied residence (i.e., any of the property lines for the NSLU properties discussed in this report, where adjacent occupied residential property boundaries are situated 100 feet away). If we look at the scenario where the pile driving is performed in a direction perpendicular to the property boundary, and using the same 2,200 feet covered during one construction day, the worst-case would be for the pile driving to commence 1,100 feet from the property line (1,200 feet to the closest adjacent residential property boundary), moving toward the property line for the first half day, moving over one row space at the project property boundary, and reversing direction away from the property line. The hourly average for pile driving would then be: 53 dBA (Hour 1); 58 dBA (Hour 2); 65 dBA (Hour 3); 76 dBA (Hour 4); 76 dBA (Hour 5); 65 dBA (Hour 6); 58 dBA (Hour 7); and 53 dBA (Hour 8). Under this scenario as well, pile driving would generate an 8-hour average noise level of 70 dB at the nearest property line with an occupied residence. Consequently, whether pile driving occurs parallel or perpendicular to the property boundary, worst-case noise levels at the closest occupied residential property boundary would comply with the County's noise criterion and would be **less than significant**.

### **Pile Driving Impulse Noise**

According to the Federal Highway Administration, a vibratory pile driver is not considered to be a source of impulsive noise (FHWA 2011). Therefore, the use of a vibratory pile driver during construction would not generate impulsive noise.

### **Pre-drilling for Mast Emplacement**

As discussed above under the Tierra del Sol Project, in areas of the site with intact bedrock within 20 feet of the ground surface, vibratory driving methods alone would not be capable of emplacing the mast to the design depth of up to 20 feet. A geotechnical survey will be performed of the entire site prior to the commencement of construction, to determine in which areas bedrock exists. In these areas, the construction process would include pre-drilling of a pilot hole with slightly smaller diameter than the mast, followed by insertion of the mast using the vibratory driver. Pilot hole drilling and emplacement of the mast with

vibratory driver would not occur on the same day. Pilot holes would be drilled by one crew using the rock drill, the vibratory driver crew would be directed to an area once the pilot hole drilling within that area was completed (drilling takes about twice the time as the vibratory emplacement, so it is not efficient to have the vibratory rig following along behind the rock drilling). However, to ensure that the rock drilling and use of a vibratory pile would not occur on the site on the same day the project will implement **PDF-N-3**, as described above and listed in Table 1-10 of Section 1.0, Project Description. Based upon bedrock drilling information from a construction industry handbook (McGraw, 2002), drilling up to 20 feet through granitic rock would require approximately 16 minutes. Allowing 7 minutes to set up the rig, and 7 minutes to move to the next site, two holes could be drilled per hour. Thus, for a given pile location, there would be 16 minutes of drilling activity (or full-power operation of the drill), which equates to 26% of an hour. From Table 11, a rock drill produces 85 dBA at a distance of 50 feet. At a distance of 75 feet, which is the shortest distance between the pile driving activity and the property boundary of any occupied residence, the maximum noise level from rock drilling would be approximately 81 dBA.

Assuming rock drilling occurs for approximately 16 minutes of an hour at each tracker site, the average hourly noise level would be approximately 79 dB at 50 feet from the drill or 75 dB at 75 feet, the distance to the closest residential property boundaries to the rock drilling locations. Given an 8-hour workday (or 480 minutes), and 30 minutes required for rock drilling and movement between each pile location, a rock drill could complete approximately 16 pilot holes per day. The 16 closest tracker masts would be located between 75-200 feet from the nearest property line with an occupied residence. The worst-case noise exposure for adjacent residences assumes that rock drilling at the 16 closest tracker masts to the nearest property line are completed in one day. In this scenario, rock drilling would generate an 8-hour average noise level of 75 dB at the nearest property line with an occupied residence. Thus, noise from bedrock drilling in preparation for emplacement of masts would comply with the County's 75 dBA 8-hour average noise criterion, thereby maintaining rock drilling noise levels at less than significant. As with vibratory pile driving operations, drilling performed in a row perpendicular to a property boundary would also comply with the County's noise criterion and would be **less than significant**.

### Construction Traffic Noise

Project construction would also result in a short-term increase in traffic on the local area's roadway network, but this increase would not be sufficient to increase traffic noise levels a substantial amount. Typically, traffic volumes must double to create an increase in perceptible (3 dBA) traffic noise (Caltrans 2009). The proposed Rugged solar farm would require worker vehicles and truck material deliveries to the site. It is anticipated that on average approximately 160 trips per day would be generated during construction (for more

details on the anticipated trips generated see Section 3.1.8). The addition of 160 construction-related trips per day to the roadway network would not double existing traffic levels and, therefore, would not increase traffic noise by 3 dBA (Appendix 2.6-2). Noise impacts along area roadways due to the temporary increase in construction related trips would be **less than significant**. Refer to Appendix 2.6-2 for more information.

### Rock Crushing and Batch Plant

Rock crushing of aggregate rock material may also occur on site and may include a concrete batch plant. A rock crusher generates higher noise levels than typical construction equipment as noise is generated by the breaking of rocks as well as the diesel engine operating the crusher. Rock crushing would typically include the use of a dozer and a loader for loading the rock crusher. The combined noise level from all these pieces of equipment would be approximately 95 dBA  $L_{max}$  at 50 feet, which averages approximately 92 dBA  $L_{eq}$  at 50 feet. Typical concrete batch plant equipment includes conveyors, elevators, elevated storage bins and silos, weight hoppers, and mixers. Assembly of the concrete batch plant would generate noise levels of typical construction, as previously identified above. The facility is proposed to operate throughout the construction of the proposed Rugged and Tierra del Sol solar farms (and possibly the LanEast and LanWest solar farms) and will be decommissioned following installation of project facilities. The plant footprint following decommissioning is ultimately anticipated to consist of solar trackers. It is assumed the facility will operate during a typical 8 a.m. to 5 p.m. schedule, well within the County of San Diego Noise Ordinance, which limits construction noise to the hours of 7 a.m. to 7 p.m., Monday through Saturday. Operation of the batch plant would potentially generate maximum noise levels of 96 dBA  $L_{max}$  at 50 feet, and average noise levels of 92 dBA  $L_{eq}$  at 50 feet. Assembly of the concrete batch plant would generate noise levels of typical construction, as previously identified above. Operation of the batch plant would potentially generate maximum noise levels of 96 dBA  $L_{max}$  at 50 feet, and average noise levels of 92 dBA  $L_{eq}$  at 50 feet. With attenuation of distance, the average hourly noise level at the nearest property line from batch plant operations would be 64 dBA  $L_{eq}$ .

The proposed location for the rock crusher / batch plant is near the center of the central portion of the Rugged Site. This location has the following distances to the nearest project property lines: 1,400 feet (north); 2,680 feet (east); 1,200 feet (south); and 1,200 feet (west). Based on a conservative attenuation rate of 6 dBA per doubling of distance, noise levels from rock crushing activities would attenuate to 75 dBA  $L_{eq}$  at approximately 350 feet. The closest property line is more than three times this distance from the rock crusher location. Thus, the rock crushing operations would comply with the County's noise level limit for construction noise. The proposed concrete batch plant for the project would also be located in the centroid of the project site, with the closest property line at a distance of 1,200 feet.

Adding the individual noise contribution of the rock crusher (92 dBA Leq at 50 feet) to the individual noise contribution of the batch plant operations (92 dBA Leq at 50 feet) yields a composite noise level from both operations of 95 dBA Leq (which could occur when both are operating at the same time). Based on a conservative attenuation rate of 6 dBA per doubling of distance, noise levels from combined rock crushing activities and batch plant operations would attenuate to 75 dBA Leq at approximately 475 feet; the closest property line is more than twice this distance away from the site for the rock crusher/batch plant. Thus, when considering the simultaneous operation of the rock crusher and batch plant, the noise levels would remain well below the construction noise limit of 75 dBA Leq at the closest property lines to the proposed rock crusher/batch plant location, and hence would comply with the County's noise level limit for construction noise and would be **less than significant**.

## LanEast

### Standard Construction Equipment Noise

Construction of the LanEast solar farm would require the same equipment and activities as discussed above for the Rugged solar farm (with the exception that the LanEast site would not include rock crushing/batch plant activities). The size and scope of the construction activities at the LanEast solar farm site is expected to be proportional to the relative size of the LanEast site compared to the Tierra del Sola and Rugged sites (or between 55% to 30% of their sizes respectively). Construction activities would be limited to 7 a.m. and 7 p.m., Monday through Saturday pursuant to the County Noise Ordinance. Resulting construction noise would be temporary and short term as construction occurs intermittently and varies depending on the nature or phase of construction (e.g., demolition/land clearing, grading and excavation, erection). However, the equipment layout for LanEast has not yet been determined and, therefore, the distance that the construction activities would occur to the property line cannot be analyzed at this time. As discussed above for the Tierra del Sol and Rugged solar farms, noise from standard construction equipment operating at the LanEast site within 100 feet of the nearest property boundary is not anticipated to exceed the County standard of 75 dBA Leq 8-hour average. However, because it is not known what the distance from construction activities will be to the nearest property boundary, construction noise impacts are considered significant (**N-LE-2**).

### File Driver Noise

Construction of the LanEast solar farm site would require the same equipment and activities as discussed above for the Tierra del Sol and Rugged solar farms, including the use of vibratory pile drivers. The distance to nearby sensitive receptors may be less than the distance analyzed under the Tierra del Sol or Rugged solar farm sites. Therefore, because it is not known what the distance from construction activities will be to the nearest property boundary, construction

noise impacts, including noise impacts from the use of a vibratory pile driver at the site, are considered significant (**N-LE-3**).

### **Construction Traffic Noise**

Based on the size of the LanEast solar farm, the number of construction-related trips is expected to be fewer than those discussed above for the Tierra del Sol solar farm and Rugged solar farm; see Section 3.1.8 for further details. The LanEast solar farm is located between two roadways (I-8 and Old Highway 80) that have higher existing traffic volumes than those that would be used to access the Tierra del Sol solar farm and Rugged solar farm sites. Therefore, temporary impacts associated with construction generated trips in this area are expected to be **less than significant**.

### LanWest

#### **Standard Construction Equipment Noise**

Construction of the LanWest solar farm site would require the same equipment and activities as discussed above for the Rugged solar farm (with the exception that the LanWest site would not include rock crushing/batch plant activities). The size and scope of the construction activities at the LanWest solar farm site is expected to be proportional to the relative size of the LanEast site compared to the Tierra del Sol and Rugged sites (or between 13% to 7% of their sizes respectively). Construction activities would be limited to 7 a.m. and 7 p.m., Monday through Saturday pursuant to the County Noise Ordinance. Resulting construction noise would be temporary and short-term as construction occurs intermittently and varies depending on the nature or phase of construction (e.g., demolition/land clearing, grading and excavation, erection). However, solar farm equipment layout has not yet been determined and, therefore, the distance that the construction activities would occur to the property line cannot be analyzed at this time. As discussed above for the Tierra del Sol and Rugged solar farms, noise from standard construction equipment operating at the LanWest site within 100 feet of the nearest property boundary is not anticipated to exceed the County standard of 75 dBA  $L_{eq}$  8-hour average. However, because it is not known what the distance from construction activities will be to the nearest property boundary, construction noise impacts are considered significant (**N-LW-2**).

#### **Pile Driver Noise**

Construction of the LanWest solar farm site would require the same equipment and activities as discussed above for the Tierra del Sol and Rugged solar farms, including the use of vibratory pile drivers. Because the equipment layout for LanWest has not yet been determined and the distance that the pile driver activities would occur to the property line cannot be analyzed at this time, the distance to nearby sensitive receptors may be less than the distance analyzed under the Tierra del Sol or Rugged solar farm sites. Therefore, because

it is not known what the distance from construction activities will be to the nearest property boundary, construction noise impacts, including noise impacts from the use of a vibratory pile driver at the site, are considered significant (**N-LW-3**).

### Construction Traffic Noise

Based on the size of the LanEast solar farm, the number of construction-related trips is expected to be fewer than those discussed above for the Tierra del Sol solar farm and Rugged solar farm; see Section 3.1.8 for further details. Additionally, the LanWest solar farm is located between two roadways (I-8 and Old Highway 80) that have higher existing traffic volumes than those that would be used to access the Tierra del Sol solar farm and Rugged solar farm sites. Therefore, temporary noise impacts associated with construction generated trips in this area are expected to be **less than significant**.

### Proposed Project

As indicated in Tables 1-8 and 1-9 from Section 1.0, Project Description, construction at each of the solar farm sites would not overlap at any one time, and therefore, would not result in combined noise impacts. Although construction of the Tierra del Sol gen-tie line would overlap with the construction at the Rugged solar farm, these sites are located at a sufficient distance that would not result in combined noise impacts and construction traffic would be traveling in opposing directions off of Interstate I-8. Further details are provided below.

### Standard Construction Equipment Noise

Construction of the Proposed Project would require equipment and activities, as discussed above, that would generate noise, including pavers, loaders, cranes, and trucks that can generate noise levels up to 88 dBA  $L_{eq}$  at 50 feet. Simultaneous operation of on-site construction equipment could result in hourly average noise levels of approximately 80 dBA at 50 feet. Construction activities would be limited to 7 a.m. and 7 p.m., Monday through Saturday pursuant to the County Noise Ordinance. Resulting construction noise would be temporary and short-term as construction occurs intermittently and varies depending on the nature or phase of construction (e.g., demolition/land clearing, grading and excavation, erection). At the Tierra del Sol and Rugged solar farm sites with noise decreasing with distance, noise levels would be below the County standard and impacts would be **less than significant**. The distance at which construction activities would occur to the property lines of the LanEast and LanWest solar farm sites cannot be analyzed because sufficient data, such as tracker locations, is not available at this time. Since the distances from construction activities to the nearest property boundaries at the LanEast and LanWest sites are not known, construction noise impacts at these project sites are considered significant (**N-LE-2 and N-LW-2**).

### Pile Driver Noise

Construction of the solar farms would require equipment and activities as discussed above, that would include the use of a vibratory pile driver, and possible predrilling for mast placement. Noise from pile driving activities and noise from potential predrilling activities would not exceed the County's construction noise standard as long as these activities did not occur simultaneously at the same site. Therefore, the project includes **PDF-N-3** that would ensure that pile driving and predrilling would not occur at the Tierra del Sol or Rugged solar farm sites on the same day, and that noise impacts from these activities would be **less than significant**. The distance that the pile driving activities would occur to the property lines at the LanEast and LanWest solar farm sites cannot be analyzed at this time because sufficient data, such as tracker locations, is not available at this time. Since the distances from construction activities to the nearest property boundaries at the LanEast and LanWest sites are not known, construction noise impacts, including noise from the use of a vibratory pile driver at these project sites, are considered significant (**N-LE-3 and N-LW-3**).

### Rock Crushing and Batch Plant

Rock crushing of aggregate rock material and a batch plant may occur at the Rugged solar farm site only. Operation of the batch plant would potentially generate maximum noise levels of 96 dBA  $L_{max}$  at 50 feet, and average noise levels of 92 dBA  $L_{eq}$  at 50 feet; operation of the rock crushing operation would likewise result in maximum noise levels of 96 dBA  $L_{max}$  at 50 feet, and average noise levels of 92 dBA  $L_{eq}$  at 50 feet. With the proposed location of the rock crushing and batch plant in the center of the site, the closest distance to the property line is 1,200. At this distance noise from the rock crushing and batch plant operations would be below the County's noise level limit for construction and impacts would be **less than significant**.

### Gen-Tie Line Construction

Noise associated with gen-tie line construction would occur as a result of the Tierra del Sol solar farm only. Noise generated from the use of standard construction equipment and standard construction activities would result in a significant impact along the gen-tie route (**N-TDS-3**). Additionally, construction of the gen-tie line may require the use of blasting and helicopters. As discussed above, if blasting were to occur within 600 feet of the boundary of any occupied parcels zoned for residential use or within 430 feet of the boundary of any occupied parcels zoned for agricultural use (the zoning along the majoring of the gen-tie line alignment), blasting noise could exceed the County's impulsive noise standard, resulting in a significant impact (**N-TDS-4**). Additionally, there are two residences with property boundaries located within approximately 1,600 feet of potential helicopter use that may experience temporary noise levels due to helicopter use in excess of a 75 dBA average between 7 a.m. and 7 p.m. Therefore, short-

term helicopter noise levels could exceed the County's Construction Noise Ordinance criteria and would result in a potentially significant noise impact (**N-TDS-5**).

### **Construction Traffic Noise**

As discussed above, construction of the Proposed Project will cause a temporary increase in traffic along area roadways. The only overlap in construction activities would be the Tierra del Sol gen-tie line and construction at the Rugged solar farm for an approximate three month period. These sites are located at a sufficient distance that the majority of their resulting trips would not result in combined noise impacts and because construction traffic would be traveling in opposing directions off of Interstate I-8. A few trips associated with concrete deliveries to the Tierra del Sol gen-tie line would overlap on roads used to access the Rugged solar farm site, as the concrete batch plant would be located at the Rugged site. However, these trips have already been accounted for in trips anticipated at the Rugged solar farm. Overall, temporary noise impacts associated with construction generated trips is expected to be less than significant.

#### **2.6.3.3 Vibration**

##### Guidelines for the Determination of Significance

For the purpose of this EIR, the County's *Guidelines for Determining Significance: Noise* (January 27, 2009) applies to both the direct impact analysis and the cumulative impact analysis (County of San Diego 2009b). A significant impact would result if:

- Ground-Borne Vibration and Noise Impacts: project implementation would expose people in any land use category to ground-borne vibration or noise levels equal to or in excess of the acceptable levels specified in the County Guidelines (Refer to Table 2.6-8).

##### Analysis

###### Tierra del Sol

No operational components of the Tierra del Sol solar farm or gen-tie line include significant groundborne noise or vibration sources, and no significant vibrations sources currently exist, or are planned, in the area. Thus, no significant groundborne vibration impacts would occur with operation of the Tierra del Sol solar farm or gen-tie line.

Construction activities produce varying degrees of ground vibration, depending on the equipment and methods employed. The construction activities that typically generate the highest levels of vibration are blasting and impact pile driving. Therefore, on-site construction equipment that would cause the most noise and vibration would be associated with site grading and driving of masts for tracking machinery. According to the Federal Transit Administration

(FTA), vibration levels associated with the use of bulldozers range from approximately 0.003 to 0.089 inch/second PPV and 58 to 87 vibration decibels (VdB referenced to 1 microinch per second [ $\mu\text{in}/\text{sec}$ ] and based on the root mean square [RMS] velocity amplitude) at 25 feet, as shown in Table 2.6-14. Using FTA's recommended procedure for applying a propagation adjustment to these reference levels, vibration levels would exceed County-recommended thresholds (0.004 inch/second RMS) within 45 feet of bulldozers and 75 feet of trucks. For vibratory pile driving, vibration levels would exceed County-recommended thresholds (0.010 inch/second RMS) within 100 feet of pile driving. The nearest residence to these activities would be a minimum of 250 feet across property lines from potential construction activities. Therefore, vibration levels would not exceed 0.040 inch/second RMS or 0.010 inch/second RMS from general and pile-driving construction activities at the nearest residences. This impact would be **less than significant**.

As discussed above, blasting activities may occur during construction of the Tierra del Sol gen-tie line, that would cause groundborne vibration. According to Caltrans (2001) blasting of rock to support roadway and structural foundation construction produces peak particle velocity groundborne vibration of 2 inches/second (0.12 inch/sec RMS) up to 35 meters (100 feet) from the blast activity. Blasting would therefore have vibration levels which exceed County-recommended thresholds (0.1 inch/second RMS) within 1,700 feet of the blast activity. At this time it is not known whether blasting will be necessary, or where it may be necessary. However, if there are structures located within 1,700 feet of blast sites, a significant vibration impact could occur from the blasting activities (**N-TDS-6**).

### Rugged

As discussed above for the Tierra del Sol solar farm, the Rugged solar farm would not include operational components that would be sources of substantial groundborne noise or vibration (Appendix 2.6-2). Therefore, **no significant groundborne vibration impacts** would occur with operation of the Rugged solar farm.

Construction activities at the Rugged solar farm site would produce ground vibration levels similar to those described above for the Tierra del Sol solar farm; refer to Table 2.6-14. Using FTA's recommended procedure for applying a propagation adjustment to the reference levels in Table 12, vibration levels would exceed FTA-recommended thresholds (0.0040 inches/second RMS) for residential structures subject to frequent vibration events) within 80 feet of bulldozers and 75 feet of trucks. For vibratory pile driving, vibration levels would exceed FTA-recommended thresholds (0.010 inches/second RMS for residential structures subject to infrequent vibration) within 100 feet of pile driving. The nearest residence to these activities would be a minimum of 350 feet across property lines from potential construction activities.

Therefore, vibration levels would not exceed applicable thresholds for residential structures for general construction activity or pile driving. This impact would be **less than significant**.

Blasting would not be required as part of the Rugged solar farm, as all components would be installed as described above.

### LanEast

As discussed above for the Tierra del Sol solar farm and Rugged solar farm, the LanEast solar farm would not include operational components that would be sources of substantial groundborne noise or vibration. Therefore, **no significant groundborne vibration impacts** would occur with operation of the LanEast solar farm.

Construction activities at the LanEast solar farm site would produce ground vibration levels similar to those described above. The construction activity that would typically generate the highest level of vibration is vibratory pile driving. However, equipment layout has not yet been determined for the LanEast solar farm and, therefore, the distance that the pile driver activities would occur to the nearest sensitive receptors cannot be analyzed at this time. Construction-generated vibration from pile driving could exceed County criteria at the nearest sensitive receptors if they are within 35 feet of the pile driving activity, resulting in a significant impact (**N-LE-4**).

### LanWest

As discussed above for the Tierra del Sol solar farm and Rugged solar farm, the LanWest solar farm would not include operational components that would be sources of substantial groundborne noise or vibration. Therefore, **no significant groundborne vibration impacts** would occur with operation of the LanWest solar farm.

Construction activities at the LanWest solar farm site would produce ground vibration levels similar to those described above. The construction activity that would typically generate the highest level of vibration is vibratory pile driving. However, equipment layout has not yet been determined for the LanWest solar farm and, therefore, the distance that the pile driver activities would occur to the nearest sensitive receptors cannot be analyzed at this time. Construction-generated vibration from pile driving could exceed County criteria at the nearest sensitive receptors if they are within 35 feet of the pile driving activity, resulting in a significant impact (**N-LW-4**).

## Proposed Project

As discussed, the Proposed Project would not include operational components that would be sources of substantial groundborne noise or vibration. Therefore, **no significant groundborne vibration impacts** would occur with operation of the Proposed Project.

Construction activities associated with the Proposed Project would produce ground vibration levels as described. The construction activities that typically generate the highest levels of vibration are blasting and impact pile driving. At the Tierra del Sol and Rugged solar farm sites, because vibration decreases with distance, vibration levels from pile driving activities would be below the County standard at the nearest residences and impacts would be **less than significant**. Along the Tierra del Sol gen-tie line blasting may be necessary and would result in significant impacts if it were to occur within proximity to structures (**N-TDS-6**). Equipment layout at the LanEast and LanWest solar farm sites has not yet been determined and, therefore, the distance that the pile driver activities would occur to the nearest sensitive receptors cannot be analyzed at this time. Construction-generated vibration from pile driving could exceed County criteria at the nearest sensitive receptor to the LanEast and LanWest sites if they are within 35 feet of the pile driving activity, resulting in a significant impact (**N-LE-4** and **N-LW-4**).

### 2.6.3.4 Corona Noise

#### Guidelines for the Determination of Significance

The County's Guidelines for Determining Significance do not include a separate section on corona noise, and the County Noise Ordinance does not directly address corona noise. However, since corona noise is the audible noise created when energy dissipates from electrical conductive equipment, potential impacts can be addressed under the General Plan Noise Element and County Noise Ordinance requirements. Therefore, for the purpose of this EIR, a significant impact from corona noise would result if:

- The project would result in the exposure of persons to or generation of noise levels in excess of standards established by the County's General Plan, County's Noise Ordinance, or County's Noise Compatibility Guidelines (Refer to Section 2.6.2 above).

#### Analysis

##### Tierra del Sol

The Tierra del Sol solar farm would include electrical equipment and transmission lines which represent a potential source of corona noise. Corona noise is the audible noise created when energy dissipates from electrical conductive equipment. Corona noise does not apply to other on-site transmission equipment that would be installed underground. As energy

dissipates from electrical conductive equipment, some of the energy causes local pressure changes that result in audible noise, or in radio or television interference. The audible corona noise generated by corona discharge is characterized as a hissing or crackling sound that may be accompanied by a hum.

Slight irregularities or water droplets on the conductor and/or insulator surface accentuate the electric field strength near the conductor surface, making corona discharge and the associated audible noise more likely. Therefore, audible noise from transmission lines is generally a foul weather (wet conductor) phenomenon or occurs briefly when dew collects on the transmission lines. Based on precipitation data from the Western Regional Climate Center, eastern San Diego County receives approximately 17.5 inches of precipitation a year, with daily highs of less than 0.10 inch per day. Because the number of days and amount of precipitation per year would be minimal, corona events would be rare and intermittent (Appendix 2.6-1).

Nonetheless, in order to dismiss the potential significance of corona noise, research was conducted to determine the sound level associated with this phenomenon. Veneklasen Associates conducted noise measurements of a 500 kV double-circuit transmission line. Since corona noise is relative to the capacity of the transmission line, the noise levels from a 500 kV line would be greater than for the project's 138 kV transmission line. Veneklasen conducted noise measurements on a 15-minute average for a 500 kV double-circuit transmission line near Serrano Substation in Anaheim Hills, when humidity was greater than 80 percent and temperatures were in the range of 60 degrees F (conditions contributing to high corona noise). Directly under the transmission line tower, the measured level of corona noise, when ideal conditions existed for this phenomenon to occur, were 46 dBA (Veneklasen Associates, Inc. 2004). Beyond 100 feet of the transmission line, the corona noise level drops at a rate of approximately 4 dB for each doubling of the distance. So at 100 feet from the transmission line, the average corona noise would be 42 dBA, roughly equivalent to the existing ambient noise levels in the project area. Consequently, corona noise would not have the potential to create an operational noise level of 60 dBA CNEL, or to increase ambient noise levels greater than 10 dBA above ambient.

As discussed previously, the Tierra del Sol solar farm includes a new gen-tie line connecting the site to the Rebuilt Boulevard Substation. The Tierra del Sol gen-tie line would involve installation of polymer (silicon rubber) insulators on any new transmission line connections. This material is hydrophobic (repels water) and minimizes the accumulation of surface contaminants such as soot and dirt, which in turn reduces the potential for corona noise to be generated at the insulators. With consideration of these standard practices, noise from coronal discharge would not represent a substantial increase in noise levels in the vicinity of the site, including along the Tierra del Sol gen-tie line. Impacts from corona noise are, therefore, considered **less than significant**.

### Rugged

The Rugged solar farm would include electrical equipment and transmission lines which represent a potential source of corona noise as described above for the Tierra del Sol solar farm. Similar to the Tierra del Sol solar farm, corona noise would occur during wet weather events or when dew has formed, and would be audible only when such events are not causing noise, such as after the rain has stopped and moisture has dried. As part of the Rugged solar farm, polymer (silicon rubber) insulators would be installed on all new transmission line connections located on site, which would minimize the accumulation of surface contaminants such as soot and dirt, and in turn reduce the potential for corona noise to be generated at the insulators. Finally, noise measurements conducted of an operational 500 kV transmission line during high coronal noise activity indicate the corona noise from the project-related electrical transmission lines would not exceed 42 dBA directly underneath the lines, which is roughly equivalent to ambient noise level in the project vicinity. Overall, noise from coronal discharge would not represent a substantial increase in noise levels (Appendix 2.6-2), and impacts are considered **less than significant**.

### LanEast

The LanEast solar farm would include electrical equipment and transmission lines which represent a potential source of corona noise as described above for the Tierra del Sol solar farm. Similar to the Tierra del Sol solar farm, corona noise would occur during wet weather events or when dew has formed, and would be audible only when such events are not causing noise, such as after the rain has stopped and moisture has dried. As part of the LanEast solar farm, polymer (silicon rubber) insulators would be installed on all of the new transmission line connections located on site, which would minimize the accumulation of surface contaminants such as soot and dirt, and in turn reduce the potential for corona noise to be generated at the insulators. Finally, noise measurements conducted of an operational 500 kV transmission line during high coronal noise activity indicate the corona noise from the project-related electrical transmission lines would not exceed 42 dBA directly underneath the lines, which is roughly equivalent to ambient noise level in the project vicinity. Overall, noise from coronal discharge would not represent a substantial increase in noise levels, and impacts are considered **less than significant**.

### LanWest

The LanWest solar farm would include electrical equipment and transmission lines which represent a potential source of corona noise as described above for the Tierra del Sol solar farm. Similar to the Tierra del Sol solar farm, corona noise would occur during wet weather events or when dew has formed, and would be audible only when such events are not causing noise, such as after the rain has stopped and moisture has dried. As part of the LanWest solar farm, polymer (silicon rubber) insulators would be installed on all of the new transmission

line connections located on site, which would minimize the accumulation of surface contaminants such as soot and dirt, and in turn reduce the potential for corona noise to be generated at the insulators. Finally, noise measurements conducted of an operational 500 kV transmission line during high coronal noise activity indicate the corona noise from the project-related electrical transmission lines would not exceed 42 dBA directly underneath the lines, which is roughly equivalent to ambient noise level in the project vicinity. Overall, noise from coronal discharge would not represent a substantial increase in noise levels, and impacts are considered less than significant.

### Proposed Project

The Proposed Project would include electrical equipment and transmission lines which represent a potential source of corona noise as described above. Corona noise would occur during wet weather events or when dew has formed, and would be audible only when such events are not causing noise, such as after the rain has stopped and moisture has dried. As part of the Proposed Project, polymer (silicon rubber) insulators would be installed on new transmission line connections, which would minimize the accumulation of surface contaminants such as soot and dirt, and in turn reduce the potential for corona noise to be generated at the insulators. Finally, noise measurements conducted of an operational 500 kV transmission line during high coronal noise activity indicate the corona noise from the project-related electrical transmission lines would not exceed 42 dBA directly underneath the lines, which is roughly equivalent to ambient noise level in the project vicinity. Overall, noise from coronal discharge would not represent a substantial increase in noise levels. Impacts from corona noise are, therefore, considered **less than significant**.

#### 2.6.4 Cumulative Impact Analysis

The geographic extent for the analysis of cumulative impacts related to noise is generally limited to areas within approximately 0.25 mile of the project components and access routes. This area is defined as the geographic extent of the cumulative noise impact area because noise impacts would generally be localized, mainly within approximately 500 feet from any noise source; however, it is possible that noise from different sources within 0.25 mile of each other could combine to create a significant impact to receptors at any point between the projects. At distances greater than 0.25 mile, construction noise would be briefly audible and steady construction noise from the Proposed Project would generally dissipate into quiet background noise levels. The baseline for assessing cumulative noise impacts includes the noise sources associated with other projects in the immediate vicinity of the Proposed Project in Table 1-12 and Figure 1-12 in Chapter 1.0, Project Description.

### **2.6.4.1 Operational Noise**

There are no cumulative projects, as listed in Table 1-12 and shown on Figure 1-12 in Chapter 1.0, Project Description, within 0.25 mile of the Proposed Project that would be expected to generate substantial noise levels during operations of the proposed development.

The nearest cumulative project to the Tierra del Sol solar farm site is a cell tower that would not contribute to a substantial cumulatively considerable operational noise. The nearest cumulative projects to the Rugged solar farm site are a motel, cell tower, antenna, a subdivision (two residential properties and one commercial property), the Rough Acres Foundation Campground Facility, and a bridge construction project. These cumulative projects are not expected to generate substantial cumulatively considerable operational noise based on the proposed uses. The LanEast and LanWest solar farm sites would be located near pending residential subdivisions (one into four single-family lots, the other into five single-family lots), and two cell towers. These cumulative projects are not expected to generate substantial noise levels during operations and would not contribute to a substantial cumulatively considerable operational noise impact. Therefore, with implementation of PDF-N-TDS-1 regarding tracker washing activities as discussed above, operational noise from the solar farm sites would not contribute to a cumulatively considerable noise impact.

### **2.6.4.2 Construction Noise**

Since noise does not accumulate over time, construction noise, though louder than operational noise, is temporary and is only considered cumulative when construction schedules overlap. For the majority of the projects listed in Table 1-12 and shown on Figure 1-12 in Chapter 1.0, Project Description, the expected construction timeline is unknown. However, since noise dissipates quickly with distance the geographic extents of the projects considered is generally limited to areas within approximately 0.25 mile of the project components and access routes, as described above.

No cumulative projects are located within 0.25 mile of the Tierra del Sol solar farm site.

The Jewel Valley (Jordan) Wind Energy Project is located within 0.25 mile of the Tierra del Sol gen-tie line. The Jewel Valley (Jordan) Wind Energy Project is still in the early meteorological testing phase and not anticipated to start construction until sometime after the Tierra del Sol gen-tie line construction is complete.

The nearest cumulative projects to the Rugged solar farm site are a subdivision (two residential properties and one commercial property) and the Rough Acres Foundation Campground Facility project. Construction of the Rough Acres Foundation Campground Facility is anticipated to start in January 2014, and would therefore overlap with construction of the Rugged solar farm. The

noise generated during construction of the campground would be subject to the same noise standards discussed above for the Proposed Project and is not expected to violate these standards. Additionally, construction of the campground is not expected to generate substantial amounts of construction noise or extend over a long period of time.

The LanEast and LanWest solar farm sites would be located near one pending residential subdivision (one lot into four single-family lots).

None of the cumulative projects located in the vicinity of the Proposed Project that may have overlapping construction schedules are substantial in size such that they would contribute to a cumulatively considerable increase in area traffic trips that would result in a temporary noticeable increase in traffic noise. Additionally, cumulative projects would be subject to the same noise standards discussed above and are not expected to violate these standards. Therefore, noise from construction of the Proposed Project **would not contribute to a cumulatively considerable noise impact**.

As discussed above, construction of the Proposed Project would require a temporary increase in traffic on area roadways that is not expected to result in a significant noise impact from the temporary increase in trips. None of the cumulative projects located in the vicinity of the Proposed Project that may have overlapping construction schedules are substantial in size such that they would contribute to a cumulatively considerable increase in area traffic trips that would result in a temporary noticeable increase in traffic noise. Therefore, noise from the Proposed Project **would not contribute to a cumulatively considerable noise impact** along area roadways.

#### **2.6.4.3 Vibration**

As discussed above, the Proposed Project would not produce groundborne vibration during operations. During construction activities, some groundborne vibration would be generated, but it would dissipate quickly as distance increased from the source of the vibration. The cumulative projects nearest to the Proposed Project include cell towers, Jewel Valley Wind Energy Project, a motel, cell tower, antenna, residential subdivisions, the Rough Acres Foundation Campground Facility, and a bridge construction project. Of these cumulative projects, the bridge project would represent the greatest potential source of groundborne vibrations during construction. However, the bridge project is expected to be completed in 2017, well after the expected completion of the Proposed Project. Additionally, none of these projects are located at a distance (less than 35 feet) such that groundborne vibrations would be cumulatively considerable. Therefore, groundborne vibration from construction of the Proposed Project would not contribute to a cumulatively considerable vibration impact.

#### 2.6.4.4 Corona Noise

As described above, corona noise would occur only after rain events or when dew forms and would not represent a substantial increase in noise levels. Noise measurements conducted of an operational 500 kV transmission line during high coronal noise activity indicate the corona noise from the electrical transmission lines for each of the projects would not exceed 42 dBA directly underneath the lines, which is roughly equivalent to ambient noise level in the project vicinities. Therefore, the Proposed Project **would not contribute to a cumulatively considerable corona noise impact.**

### 2.6.5 Significance of Impacts Prior to Mitigation

#### Operational Noise

With implementation of **PDF-N-TDS-1**, operational noise impacts from wash station operations at the Proposed Project sites would be **less than significant**. Noise generated during operation of the proposed solar farms would result in significant impacts related to:

- Solar farm equipment, such as inverters (at all solar farm sites) and O&M building (at the Rugged solar farm only) (**N-TDS-1, N-R-1, N-LE-1, and N-LW-1**)
- Gen-tie line maintenance activities, such as brush clearance and helicopter inspections (**N-TDS-2**).

#### Construction Noise

Noise from vibratory pile driving activities at the Tierra del Sol and Rugged solar farm sites would be less than significant. General construction noise impacts at the Tierra del Sol and Rugged solar farm sites are not expected to exceed County Noise Ordinance standards and would be less than significant (though in compliance with the County standard and not a significant impact, temporary construction noise would still be audible to nearby residences, and therefore the project includes **PDF-N-2** to reduce temporary construction noises audible at nearby residences). Implementation of **PDF-N-3** would ensure that noise from pile drivers and possible pre-drilling for mast placement would not occur simultaneously and noise levels would comply with the County's construction noise standard. The use of general construction equipment, blasting and the use of helicopters which may be necessary during construction of the Tierra del Sol gen-tie line may result in noise levels exceeding County standards and cause significant noise impacts depending on the distance to the boundary line of the nearest residence (**N-TDS-3, N-TDS-4, and N-TDS-5**). Noise from rock crushing combined with noise from the operation of the batch plant at the Rugged solar farm site would be less than significant. Since the distances from construction activities (including pile driving operations) to the nearest property

boundaries at the LanEast and LanWest sites are not known, construction noise impacts at these project sites are considered significant (**N-LE-2, N-LE-3, N-LW-2, and N-LW-3**).

### Vibration

Operational activities would not produce groundborne vibrations, and therefore would not cause impacts associated with groundborne vibrations.

The use of vibratory pile drivers at the Tierra del Sol and Rugged sites would comply with the County's vibration standard. Vibration standards would not be exceeded beyond 35 feet from the pile driving locations, and the nearest residences are at least 250 feet distant. Therefore, impacts would be **less than significant**.

Blasting activities occurring during construction of the Tierra del Sol gen-tie line would result in significant vibration impacts where the blasting were to occur within 1,700 feet of a structure (**N-TDS-6**).

Since equipment layout at the LanEast and LanWest solar farm sites has not yet been determined, construction-generated vibration from pile driving could exceed County criteria at the nearest sensitive receptor to the LanEast and LanWest sites if they are within 35 feet of the pile driving activity, resulting in a significant impact (**N-LE-4 and N-LW-4**).

### Corona Noise

Since corona noise would occur only after rain events and would not represent a substantial increase in noise levels, impacts from corona noise due to the Proposed Project are considered **less than significant**.

## **2.6.6 Mitigation Measures**

### **2.6.6.1 Operational Noise**

#### Tierra del Sol

##### Equipment Noise

As discussed above in Section 2.6.3.1, noise from on-site operational equipment (primarily the inverters) would exceed County standards and, therefore, would result in a significant noise impact (**N-TDS-1**). The mitigation measure described below has been identified to reduce this significant noise impact to below a level of significance.

**M-N-TDS-1** Enclose Inverters in Noise Attenuating Structures: To ensure noise from inverters would comply with the County Noise Ordinance, the following would be implemented:

- Locate non-enclosed inverters a minimum of 800 feet or greater from the nearest property line, or enclose inverters within 800 feet of property lines in cement blocks or other type of structure capable of achieving a minimum 10 dB attenuation. Inverters located within 130 feet of a residential property line require an enclosure capable of achieving a minimum of 15 dB attenuation.
- Direct all switch station doorways and exterior ventilation ducts away from adjacent property lines.
- Prior to the approval of building plans, a noise analysis shall be prepared that demonstrates that the inverters comply with the County Noise Ordinance.

#### Tierra del Sol Gen-Tie Maintenance Noise

As discussed above in Section 2.6.3.1, noise generated during maintenance of the Tierra del Sol gen-tie line (including activities such as vegetation trimming, equipment maintenance and repair activities, and helicopter inspections and maintenance activities) could result in significant noise impacts to sensitive receptors along the gen-tie line (**N-TDS-2**). The mitigation measure described below has been identified to reduce this significant noise impact to below a level of significance.

**M-N-TDS-2** Tierra del Sol Gen-Tie Line Maintenance Protocol: To ensure noise from maintenance activities along the gen-tie line will comply with the County noise standards, the following shall be implemented throughout the use of the gen-tie line:

- Brush clearance along the gen-tie route shall be accomplished using non-motorized equipment and hand tools when performing work within 4,500 feet of a noise sensitive land use.
- For equipment maintenance or replacement associated with the gen-tie facilities, the number of simultaneously operating trucks or other support equipment shall be limited to the minimum practicable number to accomplish the task, with a maximum of two trucks to be operating simultaneously once in position.
- As part of an operations and maintenance program, prepare a Helicopter Noise Control Plan that addresses the use of helicopters for annual line inspection, and for delivery of repair parts or materials to limited access portions of the gen-tie

line. The plan shall demonstrate compliance with the County Noise Ordinance for the impacts caused by helicopter noise on properties with an occupied residence, and with property lines within 3,000 feet of proposed helicopter use locations. Components of the plan may include the following.

- Affected property owners shall be notified prior to the use of helicopters for repair/maintenance activity within 3,000 feet of their property boundaries.
- Helicopter operations for line inspection and repair materials delivery shall be restricted to an altitude not less than 400 feet above ground level within 1,125 feet of a noise sensitive land use, unless a helicopter quieter than a Bell 407 or Kman Kmax is proposed to be used.
- The area for take-off and landing of helicopters associated with line inspection or repair operations shall not be located within 3,000 feet of a property line with an occupied residence.

### Rugged

#### Equipment Noise

As discussed above in Section 2.6.3.1, noise from on-site operational equipment (primarily the inverters) would exceed County standards and, therefore, would result in a significant noise impact (**N-R-1**). The mitigation measure described below has been identified to reduce this significant noise impact to below a level of significance.

**M-N-R-1** Enclose Inverters in Noise Attenuating Structures: To ensure noise from inverters would comply with the County Noise Ordinance, the following would be implemented:

- Locate non-enclosed inverters a minimum of 800 feet or greater from the nearest property line, or enclose inverters within 800 feet of property lines in cement blocks or other type of structure capable of achieving a minimum 10 dB attenuation.
- Direct all switch station doorways and exterior ventilation ducts away from adjacent property lines.
- Prior to the approval of building plans, a noise analysis shall be prepared that demonstrates that the inverters comply with the County Noise Ordinance.
- The O&M building at the Rugged solar farm shall be located no closer than 1,250 feet from the property line.

### LanEast and LanWest

As discussed above in Section 2.6.3.1, noise generated during operation of the LanEast and LanWest solar farms equipment could result in significant noise impacts along adjacent property boundaries (**N-LE-1** and **N-LW-1**). The mitigation measure described below has been identified to reduce these significant impacts to below a level of significance.

**M-N-LE-1** Site-Specific Noise Technical Report: To ensure compliance with all applicable County laws, regulations, and policies, each solar farm will prepare a site-specific noise technical report that will include project specifications, applicable noise calculations, project design features and mitigation measures applicable to the LanEast and LanWest solar farms. The Noise Technical Report will address both operational and construction related noise sources, as well as noise from the use of generators during an emergency. The technical report will calculate specific anticipated noise and vibration levels from operations and construction-related activities in accordance with County standards and provide specific mitigation when noise levels are expected to exceed County standards.

**M-N-LW-1** See **M-N-LE-1**.

### **2.6.6.2 Construction Noise**

#### Tierra del Sol

##### Gen-Tie Line Construction

As discussed above in Section 2.6.3.2, construction activities such as grading that may be necessary during construction of the gen-tie line could exceed the County's construction Noise Ordinance standard at nearby residences and, therefore, would result in significant noise impacts (**N-TDS-3**). The mitigation measure described below has been identified to reduce this potential significant noise impacts to below a level of significance.

**M-N-TDS-3** Construction Management Plan: Prior to construction, the applicant shall prepare a construction management plan which establishes construction restrictions in order to achieve compliance with the County's 8-hour average 75 dB standard at the property lines, or edge of construction easement, for occupied residences along the gen-tie route. The Plan shall demonstrate compliance with the County Noise ordinance for the impacts caused by gen-tie construction activities within 100 feet of the affected property boundary. Components of the plan may include the following.

- Affected property owners shall be notified prior to construction activity within 100 feet of their property boundaries.

- In order to comply with the County Noise Ordinance (Section 36.409 – Construction Equipment), the duration of heavy equipment for construction shall comply with the following limitations, for the specified distance between heavy equipment operations and property line of (or edge of construction easement within the) occupied parcel:
  - Within 50 feet – no more than 4 hours per 8-hour period
  - Within 75 feet – no more than 6 hours per 8-hour period
  - Within 100 feet or greater - no use restriction
- All construction equipment operations associated with the gen-tie route shall incorporate all recommended noise reducing measures such as, but not limit to limiting construction equipment operations, installation of temporary noise barriers, and implementation of the recommendations within the Construction Management Plan all to demonstrate compliance with the County Code Noise Ordinance, Sections 36.408 and 36.409.

## Blasting

As discussed above in Section 2.6.3.2, blasting activities that may be necessary during construction of the gen-tie line could exceed the County impulsive Noise Ordinance standard and vibration standard at nearby residences and, therefore, would result in significant noise impacts (**N-TDS-4** and **N-TDS-6**). The mitigation measure described below has been identified to reduce these significant noise impacts to below a level of significance.

**M-N-TDS-4** Blasting Plan: If blasting is required during construction of the gen-tie line, the applicant shall obtain a blasting permit from the County and shall prepare a blasting plan prior to start of construction that will reduce impacts associated with construction-related noise and vibrations related to blasting. The blasting plan will be site-specific, based on general and exact locations of required blasting and the results of a project-specific geotechnical investigation. The blasting plan will include a description of the planned blasting methods, an inventory of receptors potentially affected by the planned blasting, and calculations to determine the area affected by the planned blasting. Noise calculations in the blasting plan will account for blasting activities and all supplemental construction equipment. The final blasting plan and pre-blast survey shall meet the requirements provided below.

- Blasting associated with gen-tie transmission line construction shall be prohibited within 430 feet of the boundary of any occupied parcels zoned for

agricultural use. Alternate non-impulsive methods (i.e., chemical fracturing of the rock) shall be used, as necessary, to facilitate pole installation when bedrock is encountered within this blast prohibition radius.

- Blasting associated with gen-tie transmission line construction shall be prohibited within 1,700 feet of existing structures. Alternate non-explosive methods (i.e., chemical fracturing of the rock) shall be used, as necessary, to facilitate pole installation when bedrock is encountered within this blast prohibition radius.
- The blasting plan will include a schedule to demonstrate, where feasible, construction blasting to occur infrequently enough that it will not exceed the County's impulsive noise standard because blasting would not occur for more than 25% (15 minutes) during a 1-hour period due to the short time duration of a blast. Where this is not possible, other construction blasting would be coordinated with impacted building occupants to occur in their absence, or at other acceptable times, to avoid nuisance or annoyance complaints.
- To ensure that potentially impacted residents are informed, the applicant will provide notice by mail to all property owners within 1,700 feet of the project at least 1 week prior to the start of construction activities.
- Blasting would be completed between 7 a.m. and 7 p.m. to be compliant with County Noise Ordinance.
- All blasting associated activities (specifically drilling operations) shall incorporate all recommended noise reducing measures such as, but not limit to limiting drilling operations, installation of temporary noise barriers, etc. that demonstrate compliance with the County Code Noise Ordinance, Sections 36.408, 36.409, and 36.410.

### Helicopter Noise

As discussed above in Section 2.6.3.2, noise from the use of helicopters during construction of the gen-tie line could exceed the County construction noise standard at nearby residences and, therefore, would result in a significant noise impact (**N-TDS-5**). The mitigation measure described below has been identified to reduce this significant noise impact to below a level of significance.

**M-N-TDS-5** Construction Helicopter Noise Control Plan: Prior to construction, the applicant will prepare a Helicopter Noise Control Plan that indicates where helicopters would be used and the frequency and duration for such use during construction. The plan shall demonstrate compliance with the County Noise ordinance for the

impacts caused by helicopter noise on properties with an occupied residence, and with property lines within 1,600 feet of proposed helicopter use locations. Components of the plan may include the following.

- Affected property owners shall be notified prior to the use of helicopters for construction activity within 1,600 feet of their property boundaries.
- In order to comply with the County Noise Ordinance (Section 36.409, Construction Equipment), the duration of helicopter use for construction shall comply with the following limitations, for the specified distance between helicopter operations and property line of occupied parcel:
  - Within 400 feet – no more than 1 hour per 8-hour period
  - Within 600 feet – no more than 5 hours per 8-hour period
  - Within 800 feet or greater – no use restriction

### Rugged

Noise impacts during construction of the Rugged solar farm would be less than significant, and therefore, no mitigation is required.

### LanEast and LanWest

Noise generated during construction of the LanEast and LanWest solar farms could result in significant impacts if construction activities were to occur within 100 feet of the property boundary (**N-LE-2** and **N-LW-2**). Pile driving activities could also result in significant vibration impacts (**N-LE-3** and **N-LW-3**). Mitigation measure **M-N-LE-1** would reduce potentially significant impacts (**N-LE-2** and **N-LE-3**) for the LanEast site. Mitigation measure **M-N-LW-1** would reduce potentially significant impacts (**N-LW-2** and **N-LW-3**) for the LanWest site.

#### **2.6.6.3 Vibration**

### Tierra del Sol

As discussed above in Section 2.6.3.3, If there are existing structures which are located within 700 feet of blast sites for the gen-tie construction activities, a significant vibration impact could occur from the blasting activities (**N-TDS-6**). Mitigation Measure **M-N-TDS-4** described above, would require that the applicant prepare a blasting plan that will ensure that blasting would not occur within 700 feet of a structure. With implementation of Mitigation Measure **M-N-TDS-4**, impacts would be less than significant.

### Rugged

The project will not result in any significant impacts related to vibration, therefore, no mitigation measures are required.

### LanEast and LanWest

As discussed above in Section 2.6.3.3, if there are sensitive receptors within 35 feet of pile driving activities, a significant vibration impact could occur (**N-LE-4** and **N-LW-4**). Mitigation Measure **M-N-LE-1** and **M-N-LW-1** would require that the applicant prepare a site specific noise technical report. With implementation of Mitigation Measures **M-N-LE-1** and **M-N-LW-1**, impacts would be less than significant.

#### **2.6.6.4 Corona Noise**

The Proposed Project would not result in any impacts related to corona noise; therefore, no mitigation is required.

#### **2.6.7 Low Frequency Noise**

Concerns were raised regarding human exposure to low-frequency sound from the Proposed Project. Sound is perceived and recognized by its loudness (pressure) and pitch (frequency). Human hearing of sound loudness ranges between 0 dB (threshold of sound for humans) and 140 dB (very loud and painful sound for most humans). Not all sound pressures are perceived as being equally loud by the human ear because the human ear does not respond equally to all frequencies. Low-frequency sound is generally sound at frequencies between 20 and 200 Hz. The sound perception, or “hearing,” for humans is less sensitive to lower frequency (low pitch) and higher frequency (high pitch) sounds. As a result, the human ear can most easily recognize sounds in the middle of the audible spectrum, which is ideally between 1 to 4 kHz (1,000 to 4,000 vibrations per second). As previously discussed, inaudible sound is not generally assessed in analyses of environmental noise because it cannot be heard. Additionally, there are no locally adopted low-frequency or C-weighted sound thresholds.

The Proposed Project includes inverters and transformers, which have a slight capability to produce low frequency noise. However, the magnitude of generation is very low for a solar facility. Unlike sources such as large wind turbines, solar facilities are largely passive in nature and the sources which do generate noise such as the inverters, transformers and motors are relatively small in scale. The amount of sound power generated by the inverters and transformers is low. As a result, the sound energy (including the low frequency portion of the sound) does not propagate very far from the source.

Additionally, most people do not experience low frequency noise as an audible sound but rather as a sensation. Some are more sensitive to this than others. However, several reviews of currently

available scientific data have determined that there is no direct causal relationship between low frequency sound and health effects. As a result, no health effects are anticipated to occur due to low frequency noise associated with the Proposed Project.

### 2.6.8 Conclusion

This section provides a synopsis of the conclusion reached in each of the above impact analyses, and the level of impact that would occur after mitigation measures are implemented.

#### Operational Noise

As stated above, noise generated during operation of the equipment at the proposed solar farms would result in potentially significant impacts (**N-TDS-1**, **N-R-1**, **N-LE-1**, and **N-LW-1**). Tables 2.6-14 and 2.6-15 below indicate the noise levels anticipated at the adjacent property boundaries from the Tierra del Sol and Rugged solar farms with implementation of Mitigation Measure **M-N-TDS-1** and **M-N-R-1**. As shown in Table 2.6-15, noise from operational equipment at the Tierra del Sol solar farm with mitigation implemented would be reduced to below the County standard and would be considered **less than significant**. As shown in Table 2.6-16, noise from operational equipment and the O&M building at the Rugged solar farm with mitigation implemented (**M-N-R-1**) would be reduced to below the County standard and would be considered **less than significant**. Mitigation Measures **M-N-LE-1** and **M-N-LW-1** would require the preparation of site-specific noise technical studies for both the LanEast and LanWest sites that will analyze all site-specific expected noise and demonstrate adherence to the County noise standards with necessary mitigation measures, such as those applicable to the Tierra del Sol and Rugged solar farms, impacts associated with noise at the LanEast and LanWest solar farm sites are anticipated to also be **less than significant**.

As discussed above in Section 2.6.3.1, with implementation of **PDF-N-TDS-1**, noise levels at adjacent property boundaries during operation of the wash station at the Tierra del Sol solar farm would be below the County Noise Ordinance, and therefore, noise impacts would be **less than significant**.

As discussed above in Section 2.6.3.1, noise generated during maintenance of the Tierra del Sol gen-tie line (including activities such as vegetation trimming, equipment maintenance and repair activities, and helicopter inspections and maintenance activities) could result in significant noise impacts to sensitive receptors along the gen-tie line (**N-TDS-2**). Mitigation Measure **M-N-TDS-2** will require several noise reducing methods, such as limiting brush clearing to non-motorized equipment and hand tools when being completed within 450 feet of a property line associated with a sensitive receptor to ensure that noise levels from gas-powered equipment will not cause noise levels to exceed County standards.

The Federal Highway Administration Roadway Construction Noise Model assigns a usage cycle of 16% for cranes and 20% for boom trucks (man-lift). Based on these use cycles, three typical trucks would produce an average noise level at 450 feet of 55 dB ( $L_{eq}$ ). Turning off one of the boom trucks (operation of the boom with electrically driven hydraulics only) would reduce the average noise to 50 dB ( $L_{eq}$ ) at 450 feet (the closest residential property line). Thus, limiting the number of trucks running during maintenance activities, as required per Mitigation Measure **M-N-TDS-2**, would ensure that maintenance activities along the Tierra del Sol gen-tie line would not exceed the County Noise Ordinance limits.

Use of helicopters as described above in Mitigation Measure **M-N-TDS-2** for only a portion of an hour at any location, would ensure that the use of helicopters does not have the potential to increase existing CNEL by 10 dB, or to contribute to a CNEL that exceeds 60 dB.

Therefore, for the reasons described above, with implementation of Mitigation Measure **M-N-TDS-2**, noise generated during maintenance activities along the Tierra del Sol gen-tie line would be **less than significant**.

#### Construction Noise

During construction of the Tierra del Sol gen-tie line, construction activities, such as grading, could result noise levels that exceed the County's construction noise Ordinance limit at nearby residences (**N-TDS-3**). With implementation of Mitigation Measure **M-N-TDS-3**, which requires a Construction Management Plan be prepared and implemented, potential temporary noise impacts from standard equipment would be **less than significant**.

During construction of the Tierra del Sol gen-tie line, blasting may be required that would result in significant impacts due to impulsive noise and vibrations depending on the distance to residences and structures (**N-TDS-4** and **N-TDS-6**, respectively). With implementation of Mitigation Measure **M-N-TDS-4**, which requires that the applicant prepare a blasting plan prior to construction, impulsive noise impacts and vibration impacts from blasting activities would be reduced to **less than significant**.

The use of helicopters may also be necessary during construction of the Tierra del Sol gen-tie line; and may also result in noise levels exceeding County standards, resulting in significant noise impacts depending on the distance to the nearest residence (**N-TDS-5**). With implementation of Mitigation Measure **M-N-TDS-5**, noise impacts from the use of helicopters in areas where access is limited would be **less than significant**.

Noise impacts that occur during construction of the Rugged solar farm would be less than significant, and therefore, no mitigation is required.

Noise generated during construction of the LanEast and LanWest solar farms could result in significant impacts if construction activities were to occur within 100 feet of the property boundary (**N-LE-2** and **N-LW-2**). Pile driving activities could also result in significant vibration impacts (**N-LE-3** and **N-LW-3**). Mitigation measure **M-N-LE-1** requiring further analysis by a Noise Technical Report would reduce potentially significant impacts (**N-LE-2** and **N-LE-3**) at the LanEast site. Mitigation measure **M-N-LW-1** which also requires a Noise Technical Report would reduce potentially significant impacts (**N-LW-2** and **N-LW-3**) at the LanWest site.

### Vibration

Operational activities would not produce groundborne vibrations, and therefore would not cause impacts associated with groundborne vibrations. Vibration from pile driving activities at the Tierra del Sol and Rugged solar farm sites would be **less than significant**. Blasting activities, which may be required along the Tierra del Sol gen-tie line, may cause significant vibration impacts where structures are located within 7,000 feet of blasting activities (**N-TDS-6**). Mitigation Measure **M-N-TDS-4** will require that, should blasting be necessary, the applicant prepare a blasting plan and not conduct blasting within certain distances of sensitive receptors. With implementation of Mitigation Measure **M-N-TDS-4**, potential vibration impacts from blasting activities would be **less than significant**.

As discussed above in Section 2.6.3.3, if there are sensitive receptors within 35 feet of pile driving activities, a significant vibration impact could occur (**N-LE-4** and **N-LW-4**) at the LanEast and LanWest sites. Mitigation Measure **M-N-LE-1** and **M-N-LW-1** would require that the applicant prepare site specific noise technical reports . With implementation of Mitigation Measures **M-N-LE-1** and **M-N-LW-1**, impacts would be **less than significant**.

### Corona Noise

Since corona noise would occur only after rain events and would not represent a substantial increase in noise levels, impacts from corona noise due to the Proposed Project are considered **less than significant**.

**Table 2.6-1  
Typical Sound Levels Measured in the Environment and Industry**

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

Source: Caltrans 2009, pp. 2-21.

**Table 2.6-2  
Measured Noise Level**

Site	Location	Start Time	Noise Level (dBA)		
			L <sub>eq</sub> <sup>1</sup>	L <sub>max</sub> <sup>2</sup>	L <sub>min</sub> <sup>3</sup>
1	North/East side of project site	3:05 p.m.	38	49	32
2	West side of project site	3:30 p.m.	44	57	34

Source: See Appendix 2.6-1.

**Notes:**

- <sup>1</sup> Equivalent Continuous Sound Level (Time-Average Sound Level)
- <sup>2</sup> Maximum Sound Level
- <sup>3</sup> Minimum Sound Level

**Table 2.6-3  
Information Regarding Properties Along Gen-Tie Route**

Parcel Number	Status	Analyzed/ Dismissed	Above Ground/ Under Ground	Distance To Property Line (Feet)	Distance To Residence/ Nslu (Feet)
65809017	Vacant	Dismissed	Underground	N/A	N/A
65809036	Occupied	Analyzed	Underground	Within Parcel	300
65809034	Occupied	Analyzed	Underground	0	450
65805117	Occupied	Analyzed	Underground / Above ground	100 375	1,125 1,125
65805108	Vacant	Dismissed	Underground	N/A	N/A
65809040	Occupied	Analyzed	Underground / Above Ground	Within Parcel 625	560 1,375
65806020	Occupied	Analyzed	Underground	625	1,250
65809053	Occupied	Analyzed	Underground / Above Ground	1,060 1,060	1,375 1,375
65805107	Vacant	Dismissed	Above Ground	N/A	N/A
65907011	Vacant	Dismissed	Above Ground	N/A	N/A
65907016	Vacant	Dismissed	Above Ground	N/A	N/A
65907015	Vacant	Dismissed	Above Ground	N/A	N/A
65901001	Vacant	Dismissed	Above Ground	N/A	N/A
61210002	Vacant	Dismissed	Above Ground	N/A	N/A
61210001	Vacant	Dismissed	Above Ground	N/A	N/A
61211018	Occupied	Analyzed	Above Ground	Within Parcel	4,500
61211020	Vacant	Dismissed	Above Ground	N/A	N/A
61211002	Occupied	Analyzed	Underground	Within Parcel	2,480
61208212	Vacant	Dismissed	Underground	N/A	N/A
61209057	Vacant	Dismissed	Underground	N/A	N/A
61209058	Vacant	Dismissed	Underground	N/A	N/A
61209211	Vacant	Dismissed	Underground	N/A	N/A
61209211	Sub-Station	Dismissed	Underground	N/A	N/A
61209202	Occupied	Analyzed	Underground	1,000	1,125

**Table 2.6-4  
Noise Measurement Data**

Measurement Location ID*	Location	Start Time	dBA			Noise Sources
			<i>L<sub>eq</sub></i>	<i>L<sub>max</sub></i>	<i>L<sub>min</sub></i>	
1	Central Rugged Site	11:19 a.m.	39.8	52.7	34.3	Traffic on I-8
2	McCain Valley Road, North End of Site	12:05 p.m.	38.8	50.4	34.0	Traffic on I-8
3	McCain Valley Road, South End of Site	12:36 p.m.	50.0	65.1	34.6	Traffic on I-8
4	250 Feet West of McCain Valley Road, Southeast Site	1:49 p.m.	45.5	58.0	38.1	Traffic on I-8

**Table 2.6-4  
Noise Measurement Data**

Measurement Location ID*	Location	Start Time	dBA			Noise Sources
			<i>L<sub>eq</sub></i>	<i>L<sub>max</sub></i>	<i>L<sub>min</sub></i>	
5	Gate at East End of Roadrunner Lane	2:28 p.m.	40.1	51.9	34.7	Traffic on I-8
6	Roadrunner Lane and Ribbonwood Road	2:59 p.m.	48.8	71.5	34.7	Traffic on I-8

Source: See Appendix 2.6-2.

\* The site ID corresponds to locations shown in Figure 2.6-3.

*L<sub>eq</sub>*: Average noise level for the measurement period.

*L<sub>max</sub>*: Maximum noise level for the measurement period.

*L<sub>min</sub>*: Minimum noise level for the measurement period.

*L<sub>90</sub>*: Noise level exceeded 90% of the time during the measurement period.

**Table 2.6-5  
San Diego County Noise Ordinance Sound Level Limits**

Zone	Applicable Limit 1-Hour Average Sound Level (dB)		
	<i>7 a.m. to 7 p.m.</i>	<i>7 p.m. to 10 p.m.</i>	<i>10 p.m. to 7 a.m.</i>
(1) RS, RD, RR, RHM, A70, A72, S80, S81, S87, S90, S92, RV, and RU with a density of less than 11 dwelling units per acre	50	50	45
(2) RRO, RC, RM, C30, S86, V5 and RV and RU with a density of 11 or more dwelling units per acre	55	55	50
(3) S94, V4, all other commercial zones	60	60	55
(4) V1, V2	60	55	see below
V1	60	55	55
V2	60	55	50
V3	70	70	65
(5) M50, M52, M54	70	70	70
(6) S82, M56 and M58	75	75	75
(7) S88 (see note 4 below)			

Source: County of San Diego 2011.

**Notes:**

1. If the measured ambient level exceeds the applicable limit noted in the table, the allowable 1-hour average sound level would be the ambient noise level. The ambient noise level would be measured when the alleged noise violation source is not operating.
2. The sound-level limit at a location on a boundary between two zoning districts is the arithmetic mean of the respective limits for the two districts; provided, however, that the 1-hour average sound-level limit applicable to extractive industries, including but not limited to borrow pits and mines, would be 75 dB at the property line, regardless of the zone where the extractive industry is actually located.
3. Fixed-location, public utility distribution or transmission facilities located on or adjacent to a property line shall be subject to the noise-level limits of this section, measured at or beyond 6 feet from the boundary of the easement upon which the equipment is located.
4. S88 zones are Specific Planning Areas, which allow different uses. The sound level limits that apply in an S88 zone depend on the use being made of the property. The limits in subsection (1) apply to a property with a residential, agricultural, or civic use. The limits in subsection (3) apply to a property with a commercial use. The limits in subsection (5) apply to a property with an industrial use that would only be allowed in an M50, M52, or M54 zone. The limits in subsection (6) apply to all property with an extractive use or a use that would only be allowed in an M56 or M58 zone.

**Table 2.6-6  
Maximum Sound Level (Impulsive) Measured**

Occupied Property Use	Decibels (dBA)
Residential, village zoning or civic use	82
Agricultural, commercial, or industrial use	85

Source: County Noise Ordinance Section 36.409.

Note: The maximum sound level limitations shall apply to impulsive noise from construction equipment when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25% of the minutes in the measurement period.

**Table 2.6-7  
San Diego County Land Use Compatibility Guidelines**

Land Use Category	Exterior Noise Level (CNEL)		
	<i>Normally Acceptable</i>	<i>Conditionally Acceptable</i>	<i>Unacceptable</i>
Residential—single-family residences, mobile homes, senior housing, convalescent homes	Up to 60 dBA	60–75 dBA	Over 75 dBA
Residential—multifamily residences, mixed-use (commercial/residential)	Up to 65 dBA	65–75 dBA	Over 75 dBA
Transient lodging—motels, hotels, resorts	Up to 65 dBA	65–75 dBA	Over 75 dBA
Schools, churches, hospitals, nursing homes, child care facilities*	Up to 65 dBA	65–75 dBA	Over 75 dBA
Passive recreational parks, nature preserves, contemplative spaces, cemeteries*	Up to 65 dBA	65–75 dBA	Over 75 dBA
Active parks, golf courses, athletic fields, outdoor spectator sports, water recreation*	Up to 70 dBA	70–75 dBA	Over 75 dBA
Office/professional, government, medical/dental, commercial, retail, laboratories*	Up to 70 dBA	70–75 dBA	Over 75 dBA
Industrial, manufacturing, utilities, agriculture, mining, stables, ranching, warehouse, maintenance/repair*	Up to 70 dBA	Over 70 dBA	NA

Source: County of San Diego 2011, Table N-1.

Note: \* These facilities are used part of the day; therefore, an hourly standard would be used, rather than CNEL. For more information, refer to the General Plan Noise Element Table N-2.

**Table 2.6-8**  
**Guidelines for Determining the Significance of**  
**Groundborne Vibration and Groundborne Noise Impacts**

Land Use Category <sup>1</sup>	Groundborne Vibration Impact Levels (inches/second root mean square)		Groundborne Noise Impact Level (dB re 20 micropascals)	
	Frequent Events <sup>2</sup>	Occasional or Infrequent Events <sup>3</sup>	Frequent Events <sup>1</sup>	Occasional or Infrequent Events <sup>2</sup>
Category 1: Buildings where low ambient vibration is essential for interior operations (research and manufacturing facilities with special vibration constraints)	0.0018 <sup>4</sup>	0.0018 <sup>4</sup>	Not Applicable (N/A) <sup>5,6</sup>	N/A <sup>4,5</sup>
Category 2: Residences and buildings where people normally sleep (hotels, hospitals, residences, and other sleeping facilities)	0.0040	0.010	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use (schools, churches, libraries, other institutions, and quiet offices)	0.0056	0.014	40 dBA	48 dBA

Source: FTA 2006.

**Notes:**

1. "Frequent Events" is defined as more than 70 vibration events per day.
2. "Infrequent Events" is defined as fewer than 70 vibration events per day.
3. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research would require detailed evaluation to define acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
4. Vibration-sensitive equipment is not sensitive to groundborne noise.
5. There are some buildings, such as concert halls, TV and recording studios, and theaters that can be very sensitive to vibration and noise, but do not fit into any of the three categories.
6. For Categories 2 and 3 with occupied facilities, isolated events such as blasting are significant when the peak particle velocity (PPV) exceeds 1 inch per second. Non-transportation vibration sources such as impact pile drivers or hydraulic breakers are significant when their PPV exceeds 0.1 inch per second. More specific criteria for structures and potential annoyance were developed by Caltrans (2004) and would be used to evaluate these continuous or transient sources in the County of San Diego.

**Table 2.6-9**  
**Operational Noise Levels at Tierra del Sol Property Lines with Proposed Project**

Property Line	Ambient Noise Level (dBA L <sub>eq</sub> )	Project Noise Level (dBA L <sub>eq</sub> )	Exceed County daytime noise limit (50 dBA L <sub>eq</sub> )	Exceed County nighttime noise limit (45 dBA L <sub>eq</sub> )
North	40	50	No	Yes
West	40	49	No	Yes
East	40	48	No	Yes
South	40	55	Yes	Yes

Source: See Appendix 2.6-1.

**Table 2.6-10**  
**Panel Washing Noise Level at Adjacent Property Lines With Implementation of PDF-N-TDS-1**

Adjacent Property Line Direction	Panel Distance to Property Line	Noise Level, dB Hourly Leq			Impact (Day/Night)
		Ambient (Assumed)	Solar Panel Washing (Near Prop. Line)	Combined	
West	130	40	44	45	No/No
North <sup>1</sup>	140	40	43	45	No/No
East	100	40	44	45	No/No
South <sup>2</sup>	200	40	40	43	No/No

Source: See Appendix 2.6-1.

<sup>1</sup> Average noise from panel washing is based upon 20 minutes at 46 dBA, and 40 minutes at the existing ambient noise level.

<sup>2</sup> Average noise from panel washing is based upon 20 minutes at 40 dBA, and 40 minutes at the existing ambient noise level.

**Table 2.6-11**  
**Operational Noise at Rugged Solar Farm Property Boundaries with Proposed Project**

Adjacent Property Line	Panel Distance to Property Line (feet)	Ambient Noise Level (dBA Leq)	Project Noise Level (dBA Leq)	Exceed County daytime noise limit (50 dBA Leq)	Exceed County nighttime noise limit (45 dBA Leq)
#1	80	40	52	Yes	Yes
#2	100	40	48	No	Yes
#3	100	38	49	No	Yes
#4	100	40	52	Yes	Yes
#5	100	38	50	No	Yes
#6	80	38	49	No	Yes
#7	100	38	47	No	Yes
#8	100	38	50	No	Yes
#9	80	38	48	No	Yes
#10	80	40	51	Yes	Yes
#11	100	40	49	No	Yes
#12	80	40	49	No	Yes
#13	100	40	53	Yes	Yes
#14	80	40	49	No	Yes
#15	100	40	51	Yes	Yes
#16	80	40	50	Yes	Yes

Source: See Appendix 2.6-2.

**Table 2.6-12**  
**Panel Washing Noise Level at Adjacent Property Lines Based on All Design Features**

Adjacent Property Line	Property Line Direction	Noise Level, dB Hourly $L_{eq}$				Impact (Day/Night)
		Panel Distance to Property Line (feet)	Ambient Noise Level (dBA $L_{eq}$ )	Solar Panel Washing Noise Level at Property Line (dBA $L_{eq}$ )	Combined	
#1	south <sup>1</sup>	80	40	44	45	No/No
#2	east	100	40	44	45	No/No
#3	north <sup>2</sup>	100	38	43	44	No/No
#4	east	100	40	44	45	No/No
#5	north	100	38	43	44	No/No
#6	west	80	38	44	45	No/No
#7	north	100	38	43	44	No/No
#8	east	100	38	44	45	No/No
#9	west	80	38	44	45	No/No
#10	south	80	40	44	45	No/No
#11	west	100	40	45	45	No/No
#12	south	80	40	44	45	No/No
#13	east	100	40	45	45	No/No
#14	north	80	40	44	45	No/No
#15	east	100	40	44	45	No/No
#16	south	80	40	44	45	No/No

Source: See Appendix 2.6-2.

<sup>1</sup> For south-facing property lines at 80 feet from panels, the average noise from panel washing is based upon 20 minutes at 48 dBA and 40 minutes at the existing ambient noise level.

<sup>2</sup> For north-facing property lines at 100 feet from panels, the average noise from panel washing is based upon 20 minutes at 46 dBA, and 40 minutes at the existing ambient noise level.

**Table 2.6-13**  
**Construction Equipment Noise Emission Levels**

Equipment Type	"Typical" Equipment dBA at 50 feet
Air Compressor	81
Backhoe	85
Concrete Pump	82
Concrete Vibrator	76
Crane	88
Dozer	87
Generator	78
Loader	84
Paver	88
Pneumatic Tools	85
Water Pump	76
Power Hand Saw	78
Shovel	82
Trucks	88
Rock Drill	81

**Table 2.6-14**  
**Typical Construction Equipment Vibration Levels**

Equipment	PPV at 25 feet (in/sec) <sup>1</sup>	Approximate L <sub>v</sub> at 25 feet <sup>2</sup>
Large Bulldozer	0.089	87
Trucks	0.076	86
Vibratory Pile Driver	0.170	93
Small Bulldozer	0.003	58

Sources: Caltrans 2004, FTA 2006.

<sup>1</sup> PPV = peak particle velocity.

<sup>2</sup> L<sub>v</sub> is the velocity level in decibels (VdB) referenced to 1 microinch/second and based on the root mean square (RMS) velocity amplitude.

**Table 2.6-15**  
**Noise Levels at Tierra del Sol Solar Farm Property Lines With Mitigation (M-N-TDS-1)**

Property Line	Ambient Noise Level (dBA L <sub>eq</sub> )	Project Noise Level (dBA L <sub>eq</sub> )	Exceed County daytime noise limit (50 dBA L <sub>eq</sub> )	Exceed County nighttime noise limit (45 dBA L <sub>eq</sub> )
North	40	42	No	No
West	40	40	No	No
East	40	41	No	No
South	40	42	No	No

Source: See Appendix 2.6-1.

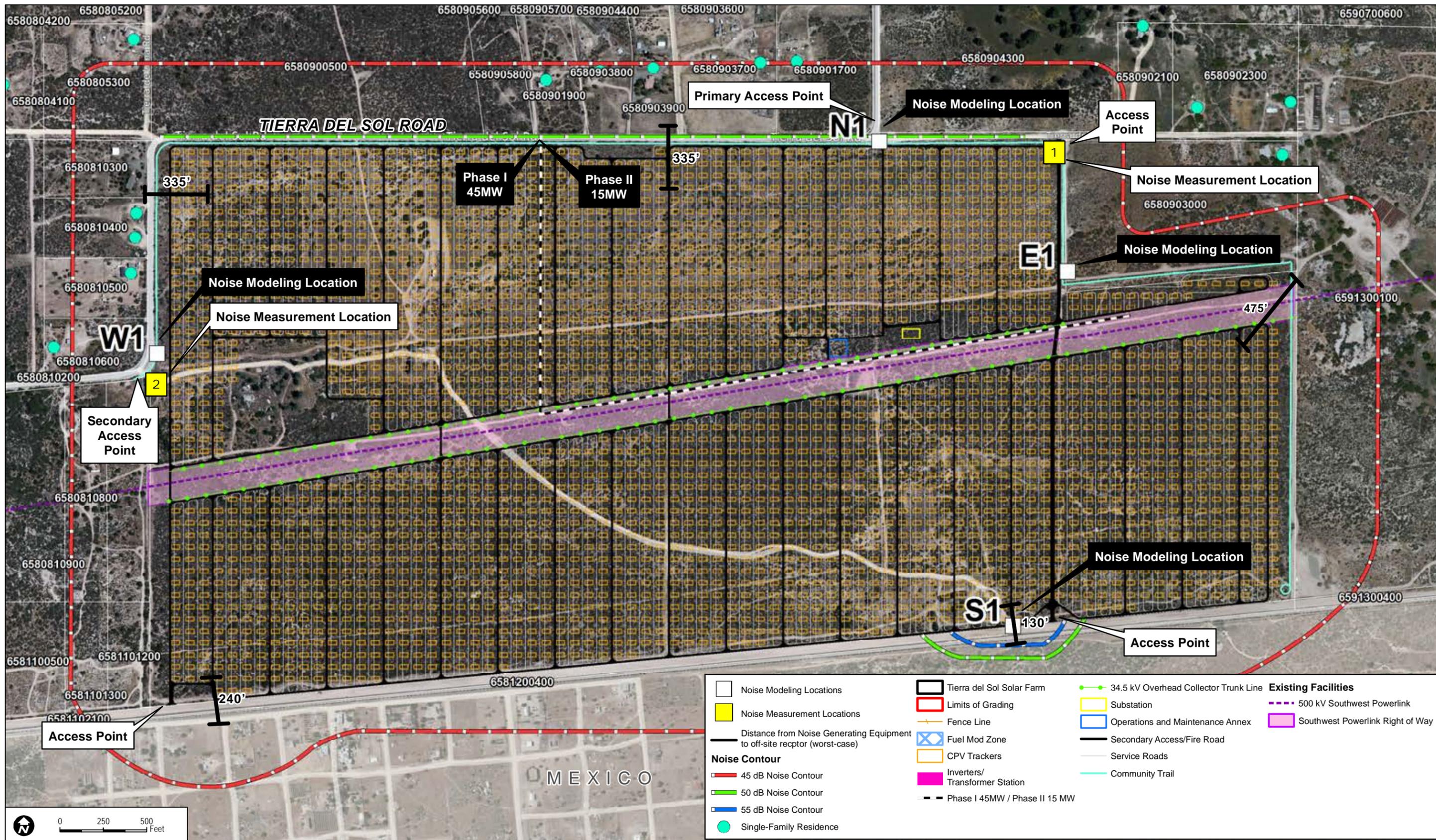
Note: Enclosure for inverter to achieve minimum of between 10–15 dB attenuation. See Appendix 2.6-1 for more information.

**Table 2.6-16**  
**Noise Levels at Rugged Solar Farm Property Lines With Mitigation (M-N-R-1)**

Property Line	Ambient Noise Level (dBA L <sub>eq</sub> )	Project Noise Level (dBA L <sub>eq</sub> )	Exceed County daytime noise limit (50 dBA L <sub>eq</sub> )	Exceed County nighttime noise limit (45 dBA L <sub>eq</sub> )
#1	40	44	No	No
#2	40	41	No	No
#3	38	42	No	No
#4	40	44	No	No
#5	38	45	No	No
#6	38	43	No	No
#7	38	41	No	No
#8	38	42	No	No
#9	38	42	No	No
#10	40	43	No	No
#11	40	42	No	No
#12	40	42	No	No
#13	40	44	No	No
#14	40	42	No	No
#15	40	43	No	No
#16	40	44	No	No

Source: See Appendix 2.6-2.

Note: Enclosure for inverter to achieve minimum of 10 dB attenuation.

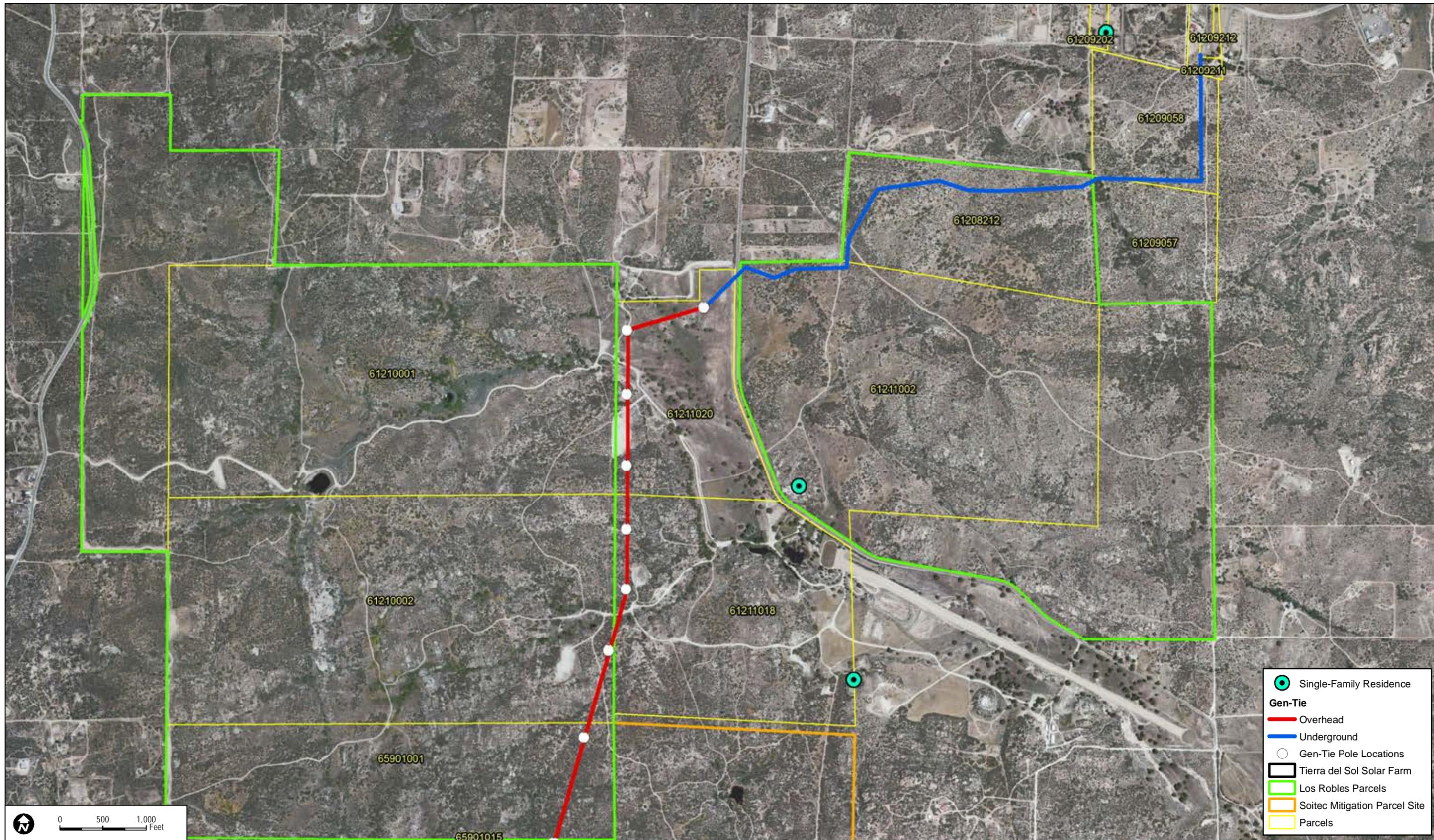


**DUDEK** SOURCE: SanGIS 2011; AECOM 2012; Soitec 2012; Bing Maps **FIGURE 2.6-1**

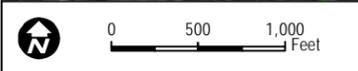
7345 **Tierra del Sol Solar Farm Site - Noise Sensitive Receptors and Noise Measurement Locations**

SOITEC SOLAR DEVELOPMENT PROGRAM EIR

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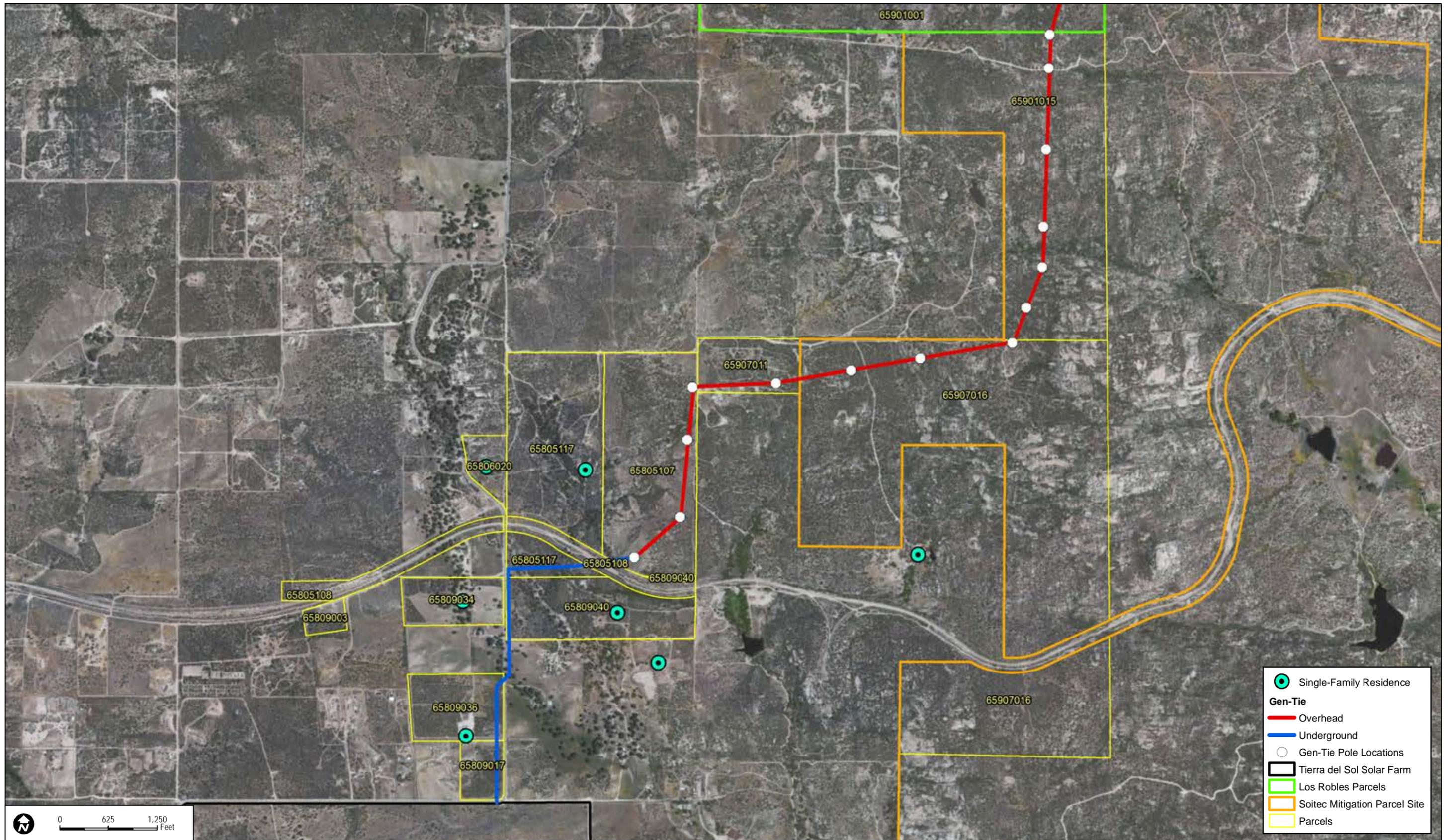


-  Single-Family Residence
- Gen-Tie**
-  Overhead
-  Underground
-  Gen-Tie Pole Locations
-  Tierra del Sol Solar Farm
-  Los Robles Parcels
-  Soitec Mitigation Parcel Site
-  Parcels



**FIGURE 2.6-2a**  
**Gen-Tie Alignment Map**

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- Single-Family Residence
- Gen-Tie**
- Overhead
- Underground
- Gen-Tie Pole Locations
- ▭ Tierra del Sol Solar Farm
- ▭ Los Robles Parcels
- ▭ Soitec Mitigation Parcel Site
- ▭ Parcels

0 625 1,250 Feet

**DUDEK**

SOURCE: SanGIS 2012; Bing Maps

7345

SOITEC SOLAR DEVELOPMENT PROGRAM EIR

**FIGURE 2.6-2b**  
**Gen-Tie Alignment Map**

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LanEast Project Boundary  
 LanWest Project Boundary  
● Potential Sensitive Receptors

**FIGURE 2.6-4**  
**LanEast and LanWest Project Sites - Potential Sensitive Receptors**

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