NOISE ASSESSMENT

RUGGED SOLAR PROJECT
PDS2017-MUP-12-007W1, PDS2017-MUP-12-007TE
PDS2017-ER-12-21-003A, PDS2017-ER-12-21-003B

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GLOSSARY OF COMMON TERMS

Sound Pressure Level (SPL): a ratio of one sound pressure to a reference pressure (L_{ref}) of 20 µPa. Because of the dynamic range of the human ear, the ratio is calculated logarithmically by 20 log (L/L_{ref}).

A-weighted Sound Pressure Level (dBA): Some frequencies of noise are more noticeable than others. To compensate for this fact, different sound frequencies are weighted more.

Minimum Sound Level (L_{min}): Minimum SPL or the lowest SPL measured over the time interval using the A-weighted network and slow time weighting.

Maximum Sound Level (L_{max}): Maximum SPL or the highest SPL measured over the time interval the A-weighted network and slow time weighting.

Equivalent sound level (L_{eq}): the true equivalent sound level measured over the run time. Leq is the A-weighted steady sound level that contains the same total acoustical energy as the actual fluctuating sound level.

Day Night Sound Level (Ldn): Representing the Day/Night sound level, this measurement is a 24 –hour average sound level where 10 dB is added to all the readings that occur between 10 pm and 7 am. This is primarily used in community noise regulations where there is a 10 dB "Penalty" for night time noise. Typically, Ldn's are measured using A weighting.

Community Noise Exposure Level (CNEL): The accumulated exposure to sound measured in a 24-hour sampling interval and artificially boosted during certain hours. For CNEL, samples taken between 7 pm and 10 pm are boosted by 5 dB; samples taken between 10 pm and 7 am are boosted by 10 dB.

Octave Band: An octave band is defined as a frequency band whose upper band-edge frequency is twice the lower band frequency.

Third-Octave Band: A third-octave band is defined as a frequency band whose upper band-edge frequency is 1.26 times the lower band frequency.

Response Time (F,S,I): The response time is a standardized exponential time weighting of the input signal according to fast (F), slow (S) or impulse (I) time response relationships. Time response can be described with a time constant. The time constants for fast, slow and impulse responses are 1.0 seconds, 0.125 seconds and 0.35 milliseconds, respectively.

EXECUTIVE SUMMARY

This noise study has been completed to determine the noise impacts associated with the development of the proposed Rugged Solar Project located on a nine parcels totaling approximately 765 gross acres. The Project is located in the unincorporated community of Rugged in eastern portion of San Diego County, CA.

The applicants are seeking an extension of and modification to Major Use Permit (PDS2017-MUP-12-007), which was approved by the County Board of Supervisors in 2015. The Rugged Solar Project is one of four individual solar energy projects analyzed in the Soitec Solar Development Program EIR (PEIR), certified by the County Board of Supervisors in 2015. The purpose of this analysis is to augment the Project's EIR's evaluation of potential environmental impacts associated with the proposed Project's noise levels in response to this requested modification to the MUP. This analysis includes the minor site plan modification and how they relate to the Noise Analysis prepared by Dudek for the Rugged Solar PEIR, 2015. All previously approved mitigation measures in the Project's 2015 PEIR will remain as conditions or approval and are incorporated within this analysis.

Operations

Based on the empirical data, the manufactures specifications and the distances to the property lines the cumulative noise levels from the proposed transformers, inverters and the PV trackers and substation were found to meet the most restrictive nighttime property line standard of 45 dBA at the nearest property lines. Additionally, all daytime activities (i.e., panel washing) will meet the daytime property line standard of 50 dBA at the nearest property lines. No impacts are anticipated and no additional mitigation is required above mitigation measure M-N-TDS-1 in the certified Soitec PEIR, 2015, which states any inverter pad installed within 800 feet or less of a property line would be enclosed in a structure capable of achieving a minimum 50 dB attenuation.

Construction

At a distance as close as 165 feet, the point source noise attenuation from the grading activities and the nearest property line is -10.4 dBA. This would result in an anticipated worst case eight-hour average combined noise level of 74.5 dBA at the property line. During the installation of the solar panels, a noise level of 74.9 dBA or less based on equipment separation would result at a distance of 275 feet. The installation equipment is anticipated to average a distance of more than 300 feet from the nearest property line. Given this and the spatial separation of the equipment over the large site area, the noise levels of the grading and panel installation are anticipated to comply with the County of San Diego's 75 dBA standard at all Project property lines.

Additionally, the County Noise Ordinance Section 36.410, states that no person shall produce or

cause to be produced an impulsive noise that exceeds the maximum sound level shown of 82 dBA (at residential uses), 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 percent of the minutes in the measurement period. To reduce the maximum noise level of 95 dBA to 82 dBA the pile driver would need to be located 215 feet from the nearest occupied residential property line or only operate 25% of the hourly or daily duration (15 minutes of any hour and 2 hours of a 8 hour work day) when located within that distance. Based on these duration and distance parameters the impulsive noise levels are anticipated to be below the County's most restrictive 82 dBA threshold and no impacts are anticipated and no mitigation measures are required. Currently, none of the adjacent properties have existing occupied structures and therefore are exempt from the Noise Ordinance Sections 36.408-36.410. If properties become occupied prior to or during the construction of the Project, then a 215 foot setback for the pile drivers or a 25% time restriction would apply.

1.0 INTRODUCTION

This noise study was completed to determine the noise impacts associated with the development of the proposed Rugged Solar Project. The Project is generally located at 32°41′ 38″ N and 116° 17′ 12″ W, near the town of Boulevard in in eastern San Diego County. The general location of the Project is shown on the Vicinity Map, Figure 1-A.

The applicants are seeking an extension of and modification to Major Use Permit (PDS2017-MUP-12-007), which was approved by the County Board of Supervisors in 2015. The Rugged Solar Project is one of four individual solar energy projects analyzed in the Soitec Solar Development Program EIR (PEIR), certified by the County Board of Supervisors in 2015. This purpose of this analysis is to augment the Project's EIR's evaluation of potential environmental impacts associated with the proposed Project's noise levels in response to this requested modification to the MUP. This analysis includes the minor site plan modification and how they relate to the Noise Analysis prepared by Dudek, 2015. All previously approved mitigation measures in the Project's 2015 PEIR will remain as conditions or approval and are incorporated within this analysis.

1.1 Project Description

The Rugged Solar Project (Proposed Project) encompasses a total of approximately 765 acres within the Mountain Empire Subregional Plan area in unincorporated San Diego County (see Figure 1-A). The Proposed Project would utilize photovoltaic (PV) electric generation system technology to produce solar energy at the utility-scale, and would produce up to 74 megawatts alternating current (MWac) of solar energy. Primary differences between the currently Proposed Project and the approved Soitec Rugged Solar Project (Approved Project) analyzed in the certified PEIR are as follows:

- The currently Proposed Project would utilize photovoltaic (PV) electrical generation system technology; the Approved Project would utilize dual-axis concentrating photovoltaic (CPV) technology.
- The development footprint would be reduced from 450 to 393.3 acres.
- The solar energy produced would be reduced from up to 80 MWac to up to 74 MWac.
- Water use during construction would be reduced due to different installation methods, such as pile-driving tracker support structures instead of concrete foundations;
- The tracker/panel height above ground would be reduced from 30 feet (approved project) to up to 12 feet).

This technology change from dual-axis concentrating trackers to single-axis trackers would require less land disturbance as compared to the previously Approved Project. The single-axis tracker design would require 56.7 acres less disturbance (13% reduction) compared to the dual axis concentrating tracker layout. In addition, single-axis trackers installation requires

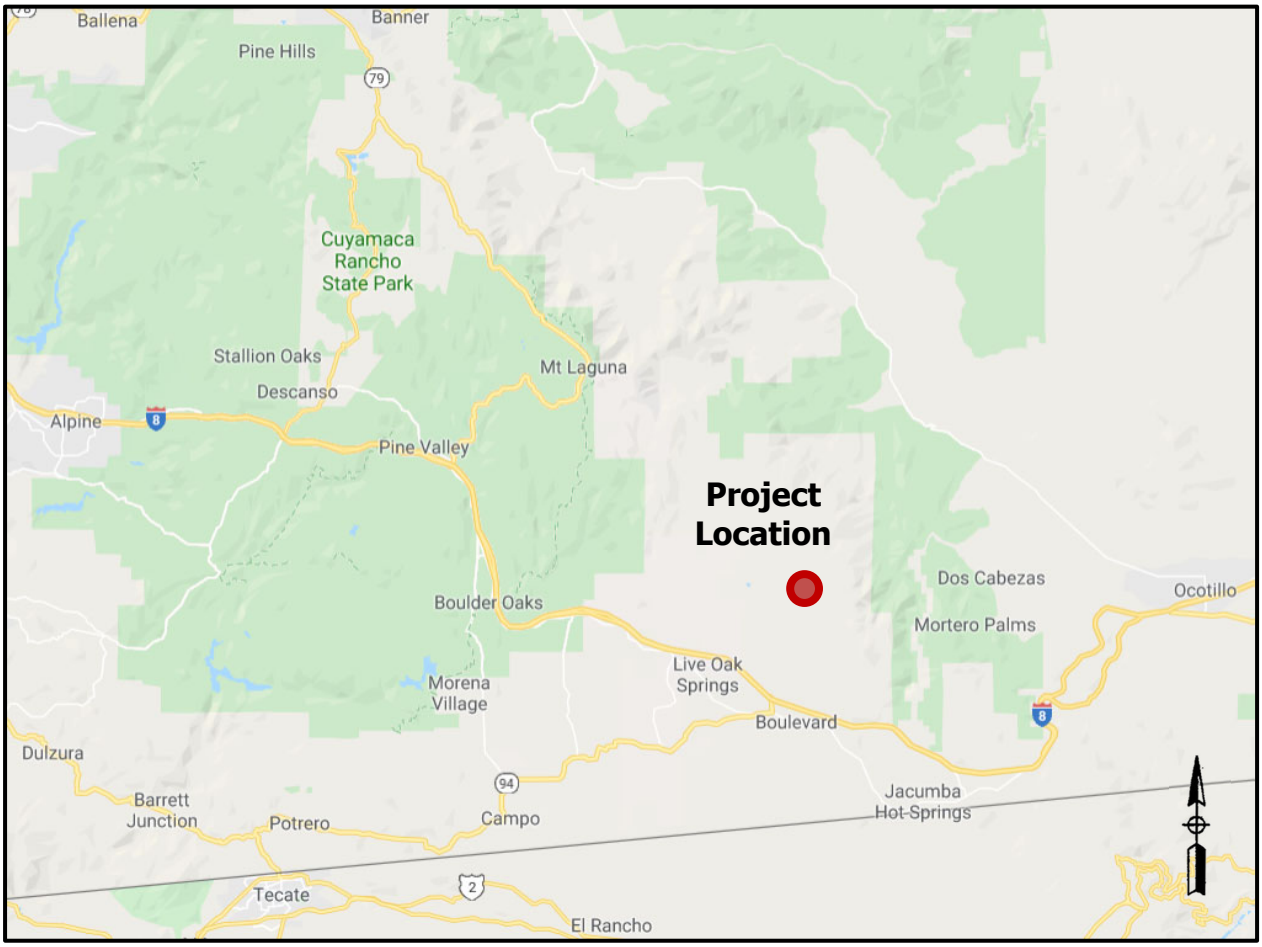
substantially less equipment to install, such as very limited use of machinery for concrete foundations. Each Soitec tracker had such a foundation. Single-axis trackers are also more reliable, and thus less maintenance would be required. Finally, single axis trackers using photovoltaic modules require less washing than the previously proposed dual-axis trackers; once per year instead of every 6 weeks.

The Proposed Project site encompasses a total of approximately 765 acres within the Mountain Empire Subregional Plan area in unincorporated San Diego County. Figure 1-A shows the location of the Proposed Project site. The Proposed Project site is located north of Interstate 8 (I-8) to the east of Ribbonwood Road and primarily west of McCain Valley Road. Regional access to the Project site would be provided by I-8. Access to the Project site would be provided by McCain Valley Road. As depicted in Figure, 1-B, the Project site would be divided into five array subareas. Four of the subareas would be located to the west of McCain Valley Road. On array subarea would be located to the east of the McCain Valley Road. The Proposed Project site includes the following parcels to west of McCain Valley Road: Assessor Parcel Number (APN) 611-060-04, 611-090-02, 611-090-04, 611-091-03, 611-091-07 (portion), 611-100-07, 612-030-01, and 612-030-19. One parcel (APN 611-110-01) is located to the east of McCain Valley Road.

The Proposed Project would produce up to 74 MWac generating capacity and would consist of approximately 229,032 PV modules. Each module would be 390W, or equivalent wattage of modules available at the time of final permitting. The project components would also include inverter stations, which convert the DC power from the PV modules to AC power which is compatible with the SDG&E system. The Proposed Project includes the following primary components:

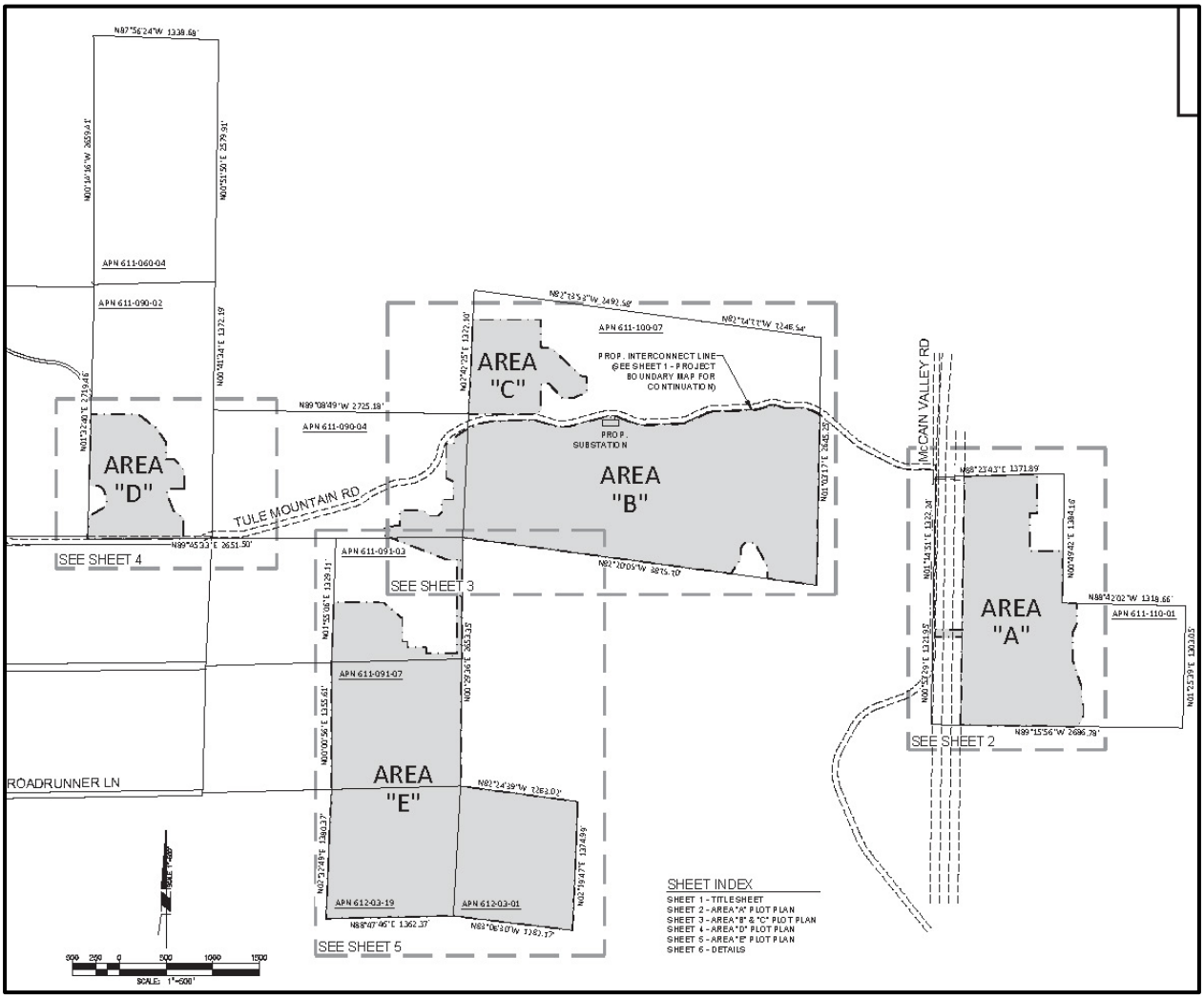
- A Photovoltaic Array, with photovoltaic modules mounted on trackers oriented towards the sun that rotate East-West to track the sun. Trackers would be arranged around inverter stations.
- A collection system linking the trackers to the on-site substation would consist of 1,000-volt (V) DC underground conductors leading to 34.5 kV underground and overhead AC conductors. The collection system would be located within the same development footprint as the Photovoltaic Array.
- A collector substation within a fenced area of approximately 6,000 square feet. The on-site substation would include a 450-square-foot control house.
- A 60-foot by 125 foot (4,500-square-foot) Operations and Maintenance (O&M) facility, which includes a 900 square foot storage and conference room. The O&M building would be used for employee operations, and maintenance of equipment.
- The on-site substation would include a 450-square-foot control house.

Figure 1-A: Project Vicinity Map



Source: Google Maps, 2019

Figure 1-B: Overall Project Layout



Source: Michael Baker International, 2019

Power from the on-site substation would be delivered to the 69 kV bus at SDG&E's Rebuilt Boulevard East Substation, which is located just west of Ribbonwood Road on the southern side of Old Highway 80. The power would be delivered via the existing overhead transmission line (gen-tie) for the Tule Wind Energy project. The 138 kV Tule gen-tie includes a 69 kV undersling line, which would be used to service the Proposed Project.

PV System (Trackers)

The PV system would use a single-axis tracking system. The components of the single-axis tracking system include modules, described below, that are placed on the tracking system, referred to as the trackers. The trackers consist of torque tubes mounted on driven piers, oriented in north-south trending rows, with motors allowing trackers to track the sun east-west throughout based upon algorithms, and inclinometers that would verify the trackers are working correctly. Tracking radius is 60 degrees from flat in either direction. Trackers would be installed on support masts in parallel rows, oriented north-south. Each Tracker row would be approximately 290 feet in length. The estimated spacing between tracker rows would be 5 feet north-south and 17 feet east–west. This spacing may change depending upon the ultimate power plant optimization and final electrical engineering. Trackers would be grouped into approximately 37 building blocks grouped around Inverter Stations.

Piers would be driven or vibrated into the ground to a depth specified by structural calculations based upon geo-technical investigations of the site. In some soil conditions, pre-drilling of pile holes may be necessary to break through bedrock. Impact from the vibration or predrilling would not extend beyond the post and machine because it is localized vibration.

Modules

Monocrystalline or Polycrystalline Silicon Solar Photovoltaic modules (PV Modules) would be utilized for the Proposed Project. If 390W modules are utilized, the Proposed Project would utilize approximately 229,032 modules. Module selection will be based upon available modules and pricing at the time of final design of the Project. Modules are connected together in series to form strings of modules. Positive and negative end of each strings are connected to combiner boxes or to the inverters. Modules are approximately 6.5 feet in length and 3.5 feet in width, and approximately 1.5 inches thick. PV Modules are designed to absorb sunlight and therefore reduce glare by design.

Overhead Collection System

The Proposed Project would require a combination of underground and overhead collector cable system to deliver power from the subareas of the Photovoltaic Array to the proposed on-site

collector substation. The overhead structures would be steel poles and would be approximately 50 to 75 feet high. The spacing between steel poles, minimum ground clearance of 34.5 kV lines and maximum hole dimensions of steel poles will be in accordance with all code requirements and standard industry approved practices. The exact details will be specified by a Professional Engineer pending final design.

Inverter Stations

An inverter is an electrical device which converts DC power to AC power. The PV modules produce DC power. The purpose of each inverter station is to convert the DC power from the PV modules to AC power, which is compatible with the SDG&E system and is the type of power that is sold to residential and commercial customers.

Each inverter station would accommodate up to three inverters and one transformer. This equipment would be installed on concrete pads. Central inverters would be utilized for the Proposed Project. Central Inverters are generally clustered in 2 to 3 MWac equipment pads. Power from the trackers would be delivered through a 1,500 Volt DC underground collection system to the inverters in the inverter stations. Each inverter station would be equipped with a step-up transformer to convert the power output from the inverters from 550–400 V AC on the "low side" to 34.5 kV on the "high side."

It is estimated that a total of 37 inverter stations would be required for the Proposed Project. The maximum dimensions of each station would 20 feet by 40 feet, and 12 feet in height. the total number of inverter stations and the overall dimensions of each inverter station depends on the number and capacity of inverters included in each inverter station, which would be determined during final design.

Any inverter pad installed within 800 feet or less of a property line would be enclosed in a structure capable of achieving a minimum 50 dB attenuation. No inverter pads would be installed within 130 feet of a residential property line, in order to comply with the approved mitigation measure M-N-TDS-1 in the certified Soitec PEIR, 2015.

Substation

The Proposed Project would include a 60-foot by 100-foot (6,000-square-foot) on-site collector substation that would be located within the central portion of the Project site. The substation would be located approximately 0.5 mile west of the proposed O&M building. The purpose of the substation is to collect the energy received from the overhead and underground collector system and increase the voltage from 34.5 kV to 69 kV. Once the voltage is stepped up to 69 kV, the power would be conveyed through a 35-foot-high dead-end structure (a fully self-supporting steel tower) that

connects the collector substation with the existing Tule gen-tie.

Access Roads

Access to the Project site would be from existing McCain Valley Road. No improvements to the existing roadways are proposed. Most of the proposed solar facility would be located to the east of McCain Valley Road, with access provided from Tule Mountain Road. One subarea would be located to the east of McCain Valley Road, and would be accessible via an access road leading from McCain Valley Road crossing beneath the Sunrise Powerlink. Subarrays would be connected via service roads designed to meet Fire and Safety Access requirements. The central subarray would also include an access road leading south crossing Tule Creek to provide access to the southern subarray. Permanent access would be provided from Ribbonwood Road and Tule Mountain Road.

New internal access road surfaces, widths and turning radii would be designed to meet San Diego County Fire Code Section 4903. Primary and Fire Access roads would be surfaced with decomposed granite or other aggregate base material as required to meet Fire and Emergency Access requirements. Primary Access roads are 24-feet wide, and used to operate the solar equipment. Fire Access roads are 20-feet wide, and provide additional access for fire engines. Permeable nontoxic soil binding agents would be used as required to meet San Diego County Air Pollution Control District Regulations.

The fire access roads would be constructed to a minimum width of 20 feet graded, designed, constructed, and maintained to support the imposed loads of fire apparatus (not less than 50,000 pounds), and would consist of an approved surface (D.G., Class II base, or gravel). The purpose of the fire access roads is to allow for two-way access of fire apparatus for ingress and egress of the project site in a looped fashion and to provide access to the on-site substation and O&M buildings. Access across the inundation area to the southernmost array subarea would be paved with asphaltic concrete.

1.2 Environmental Settings & Existing Conditions

Access to the Project site would be provided by McCain Valley Road. As depicted in Figure, 1-B, the Project site would be divided into five array subareas. Four of the subareas would be located to the west of McCain Valley Road. On array subarea would be located to the east of the McCain Valley Road. The Project site is within the Boulevard Community Planning Area of San Diego County's General Plan; the land use category is Multiple Rural Use with a permitted density of 1 dwelling unit per 4, 8 and/or 20 acres. Existing zoning is General Rural (S92) and Agriculture (A72). The properties surrounding the project site are zoned A72, S92, and S80 open space. The nearest noise-sensitive land uses (NSLUs) are single-family residences located around the Project site.

The Project is located approximately 0.8 miles north of Interstate 8 between McCain Valley Road and Ribbonwood Road. McCain Valley Road and Ribbonwood Road are unclassified roadways in the County of San Diego's Circulation Element. Existing noise occurs mainly from onsite and nearby agricultural activities and minor background noise from vehicular traffic traveling on Interstate 8 in the distance.

1.3 Methodology

Noise is defined as unwanted or annoying sound which interferes with or disrupts normal activities. Exposure to high noise levels has been demonstrated to cause hearing loss. The individual human response to environmental noise is based on the sensitivity of that individual, the type of noise that occurs and when the noise occurs. Sound is measured on a logarithmic scale consisting of sound pressure levels known as a decibel (dB). The sounds heard by humans typically do not consist of a single frequency but of a broadband of frequencies having different sound pressure levels. The method for evaluating all the frequencies of the sound is to apply an A-weighting to reflect how the human ear responds to the different sound levels at different frequencies. The A-weighted sound level adequately describes the instantaneous noise whereas the equivalent sound level depicted as Leq represents a steady sound level containing the same total acoustical energy as the actual fluctuating sound level over a given time interval.

The Community Noise Equivalent Level (CNEL) is the 24 hour A-weighted average for sound, with corrections for evening and nighttime hours. The corrections require an addition of 5 decibels to sound levels in the evening hours between 7 p.m. and 10 p.m. and an addition of 10 decibels to sound levels at nighttime hours between 10 p.m. and 7 a.m. These additions are made to account for the increased sensitivity during the evening and nighttime hours when sound appears louder.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiant in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt and hard pack dirt while soft site conditions exist in areas having grade changes, landscaped areas and vegetation. On the other hand, fixed/point sources radiate outward uniformly as it travels away from the source and the sound levels attenuate or drop off at a rate of 6 dBA for each doubling of distance.

The most effective noise reduction methods consist of controlling the noise at the source, blocking the noise transmission with barriers or relocating the receiver. Any or all of these methods could be required to reduce noise levels to an acceptable level.

2.0 OPERATIONAL ACTIVITIES

2.1 Guidelines for the Determination of Significance

Section 36.404 of the County of San Diego noise ordinance provides performance standards and noise control guidelines for determining and mitigating non-transportation, or stationary, noise source impacts to adjacent properties. The purpose of the noise ordinance is to protect, create and maintain an environment free from noise that may jeopardize the health or welfare, or degrade the quality of life.

The County Noise Ordinance states that it shall be unlawful for any person to cause or allow the creation of any noise to the extent that the one-hour average sound level, at any point on or beyond the boundaries of the property exceeds the applicable limits provided in Table 2-1.

Table 2-1: Sound Level Limits in Decibels (dBA)

ZONE		APPLICABLE LIMIT ONE-HOUR AVERAGE SOUND LEVEL (DECIBELS)
R-S, R-D, R-R, R-MH, A-70, A-72, S-80, S-81, S-87, S-88, S-90, S-92, R-V, and R-U Use Regulations with a density of less than 11 dwelling units per acre.	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	50 45
R-RO, R-C, R-M, C-30, S-86, R-V, R-U and V5. Use Regulations with a density of 11 or more dwelling units per acre.	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	55 50
S-94, V4, and all other commercial zones.	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	60 55
V1, V2 V1, V2 V1 V2	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m. 10 p.m. to 7 a.m.	60 55 55 50
V3	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	70 65
M-50, M-52, M-54	Anytime	70
S-82, M-58, and all other industrial zones.	Anytime	75

Source: County of San Diego Noise Ordinance Section 36.404

As stated above in Section 1, The Project site is within the Boulevard Community Planning Area of San Diego County's General Plan; the land use category is Multiple Rural Use with a permitted density of 1 dwelling unit per 4, 8 and/or 20 acres. Existing zoning is General Rural (S92) and Agriculture (A72). The properties surrounding the project site are zoned A72, S92, and S80 open space. The nearest noise-sensitive land uses (NSLUs) are single-family residences located around the Project site.

Section 36.404 of the Noise Ordinance sets a most restrictive operational exterior noise limit for the S-92 and residential noise sensitive land uses of 50 dBA Leq for daytime hours of 7 a.m. to 10 p.m. and 45 dBA Leq during the noise sensitive nighttime hours of 10 p.m. to 7 a.m. as shown in Table 2-1 above. Most of the Project components will only operate during the daytime hours but a few may operate during nighttime or early morning hours and therefore the most restrictive and conservative approach is to apply the 45 dBA Leq nighttime standard at the property lines.

2.2 Potential Operational Noise Impacts

This section examines the potential stationary noise source impacts associated with the operation of the proposed Rugged Solar Project. Specifically, noise levels from the proposed transformers, inverters, a substation and PV tracking motors. Panels would be electrically connected into panel strings using wiring attached to the racking. Panel strings would be electrically connected to each other via underground wiring. Wire depths would be in accordance with local, State, and Federal codes. Gathering lines would connect individual panel strings to one or more inverters/transformers and combiner boxes distributed throughout the facility. Wiring from the panel strings are connected to combiner boxes. The electrical current is then transferred to the inverters, which convert the Direct Current (DC) produced by the PV solar panels into Alternating Current (AC). A pad-mounted transformer next to the inverter would increase the voltage. The AC would then travel through underground gathering lines to the Project Substation.

Each inverter station would accommodate up to three inverters and one transformer. This equipment would be installed on concrete pads. Central inverters would be utilized for the Proposed Project. Central Inverters are generally clustered in 2 to 3 MWac equipment pads. Each inverter station would be equipped with a step-up transformer to convert the power output from the inverters from 550–400 V AC on the "low side" to 34.5 kV on the "high side." It is estimated that a total of 37 inverter stations would be required for the Proposed Project. The maximum dimensions of each station would 20 feet by 40 feet, and 12 feet in height. the total number of inverter stations and the overall dimensions of each inverter station depends on the number and capacity of inverters included in each inverter station, which would be determined during final design.

Any inverter pad installed within 800 feet or less of a property line would be enclosed in a

structure capable of achieving a minimum 50 dB attenuation. No inverter pads would be installed within 130 feet of a residential property line, in order to comply with the approved mitigation measure M-N-TDS-1 in the certified Soitec PEIR, 2015.

Inverters and Transformers

The single-axis rack system (PV) will be equipped with a tracker motor to rotate the PV panels. The proposed Xantrex Inverters have a noise level rating of 77 dB at 6 feet (Schneider Electric 2011). There will be a transformer along with set of inverters. The proposed transformers have an unshielded noise rating of less than 60 dBA at 5 feet *(Source: National Electric Manufactures Association (NEMA) Publication No. TR 1-1993)*.

The location of inverter/transformer stations on the site are illustrated on Figure 2-A. The inverter/transformer equipment represents the most substantial noise source in the panel array areas, compared to tracker and substation noise. The distance spacing between inverters/transformers is such that a given point on the project perimeter may be exposed to noise from more than a single inverter station. For this reason, property line noise exposure should evaluate the combined noise from the three closest inverter stations.

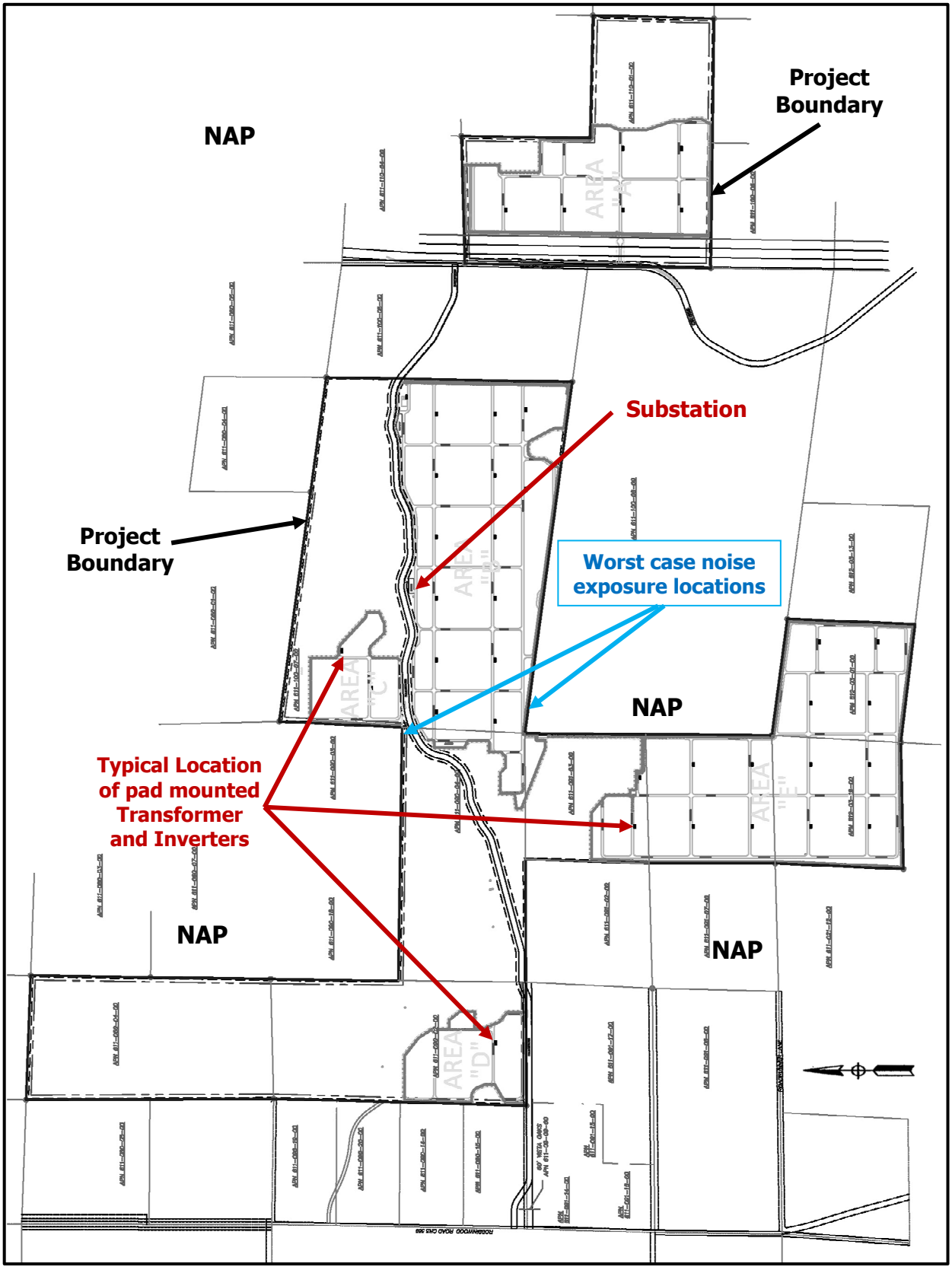
Substation Transformer

The Project requires the use of a private on-site collector substation 60 feet by 100 feet that would be located on a 2.0-acre site within the central portion of the Project site (refer to Figure 2-A). The purpose of the substation is to collect the energy received and increase the voltage from 34.5–138 kV. Once the voltage is stepped up to 138kV, the power would be conveyed through the gen-tie line to the Boulevard Substation. The transformer at the on-site substation would be either a 50 MVA or 70 MVA step up transformer. A transformer with 50 MVA or 70 MVA capacity has a noise level rating of 72 dB at 5 feet (Delta Star 2012 as provided in the certified Soitec PEIR, 2015).

Operations and Maintenance

An operations and maintenance (O&M) area is also proposed in the central area of the site and would contain parking, a 7,500-sf building, and other maintenance material and equipment. The O&M operations yard would potentially generate noise levels during daytime hours on the order of 70 dBA Leq at 50 feet (AECOM 2012). See Figure 6 for the proposed location of the O&M area, which Dudek used for evaluation of noise levels at the project property boundaries.

Figure 2-A: Proposed Equipment Locations



Tracker Motors

The noise levels from the proposed PV tracker motors combined with the dryers/blowers needed to remove condensation from the panels was found to be 44 dBA at 50 feet *(Source: Empirical data collected for the Rugged Solar Project – AECOM, September 30, 2011).* This noise level would be the hourly level if the equipment were to operate for an entire hour.

Panel Washing

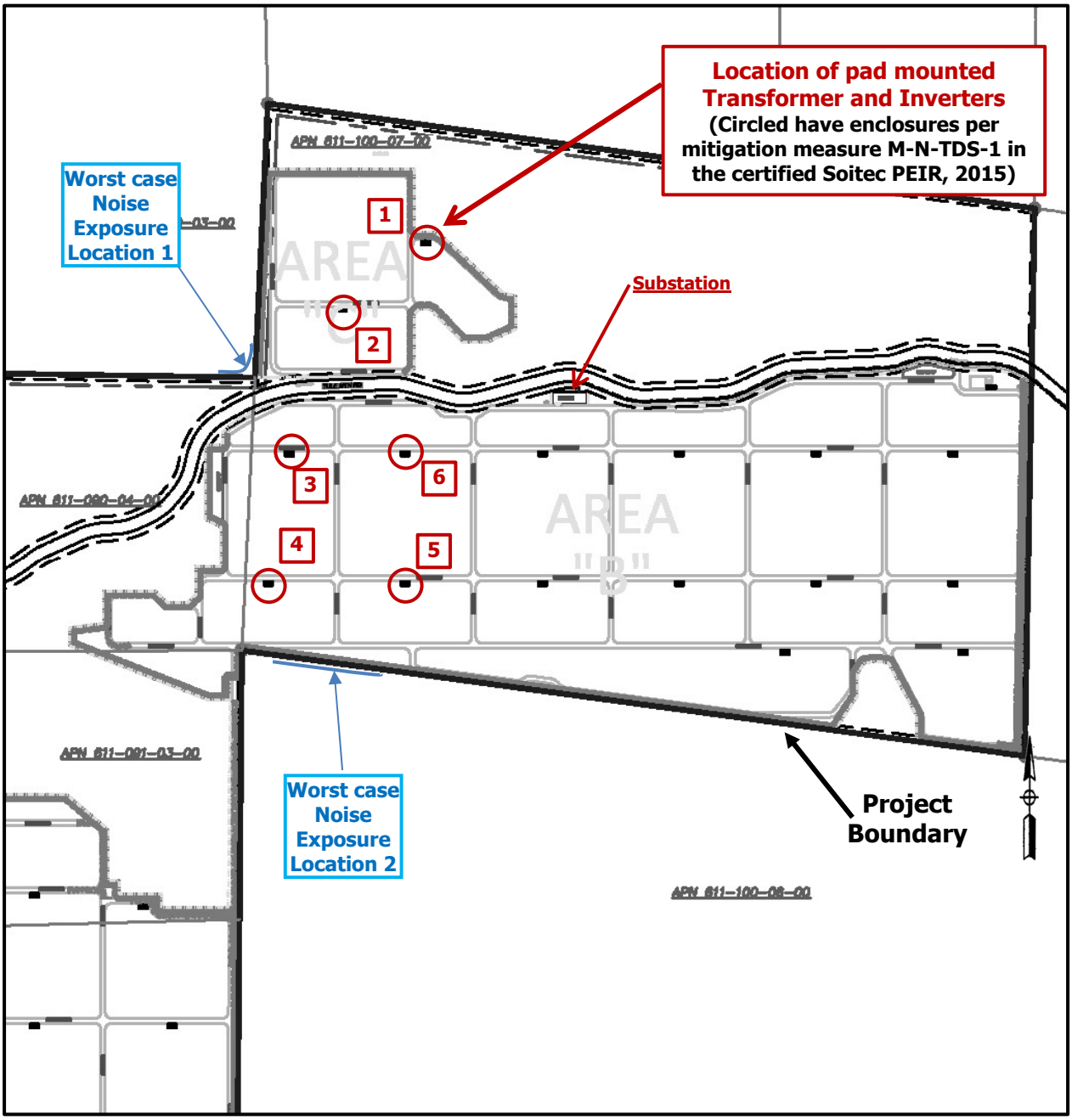
Panel washing is anticipated to occur approximately one time per year and would take approximately 4-8 weeks to complete. Washing of the photovoltaic panels/arrays would generally occur during the daytime hours of 7am -10pm. During panel/array washing times, the project's power system would still be operational. Therefore, the panel washing activity is addressed cumulatively with other operational noise sources.

Noise exposure from the proposed operation of the solar panel wash station was found to have a reference maximum sound power level of 99 dB at 9 feet. This would equate to a sound pressure level of 67 dBA at 9 feet (Source: Honda Engines, 2011). To reduce the noise level of 67 dBA to the County's most restrictive 50 dBA threshold the wash station would need to be located 65 feet from the nearest property line. At a distance of 65 feet, the panel washing would result in and property line noise level of 49.8 dBA.

<u>Cumulative Operational Noise Levels</u>

Based on the approved mitigation measure M-N-TDS-1 in the certified Soitec PEIR, 2015, any inverter pad installed within 800 feet or less of a property line would be enclosed in a structure capable of achieving a minimum 50 dB attenuation. Depending on the design, the enclosures would reduce the noise level by approximately 10-40 dB. No inverter pads would be installed within 130 feet of a residential property line. Therefore, it was determined based on the site configuration and equipment locations that the worst case noise exposure would occur at the northeastern and southern property lines of Area B. The remainder of the planned Areas have less equipment and more distance separation from the equipment to the associated property lines or the equipment will be enclosed to reduce the noise levels. The location and relationship to the worst case northeastern and southern property lines are identified in Figure 2-A above. Additional detail of the relationship of the proposed equipment and the nearest property lines is shown below in Figure 2-B.

Figure 2-B: PV Equipment and Property Line Orientation



The noise levels of the transformers, inverters and multiple PV tracker motors were combined and propagated out to the worst case property lines at a common location. The results of the propagated noise levels are shown in Tables 2-2 and 2-3 for the northeastern (Location 1) and southern (Location 2) property lines, respectively. The combined noise level at the nearest property lines were projected to be 45 dBA Leq or less based on the proposed site configuration and the proposed equipment as described above. Since not all equipment will be simultaneously operating no impacts are anticipated and the Project will comply with the most restrictive nighttime property line standard of 45 dBA Leq and no mitigation is needed.

Table 2-2: Operational Noise Levels – Northeastern Property Line Area B (Location 1)

Source	Distance from Source to Measurement Location (Feet)	Sources at that Common Distance	Noise Levels Combined (dBA)	Distance to Nearest Property Line (Feet)	Noise Reduction due to distance (dBA)	Resultant Noise Level @ Property Line (dBA Leq)
Transformer*	5	3	65	1,005	-46	19
Inverter	6	3	72	1,005	-44	27
Transformer*	5	3	65	405	-38	27
Inverter	6	3	72	405	-37	35
Transformer*	5	3	65	387	-38	27
Inverter	6	3	72	387	-36	36
Transformer*	5	3	65	988	-46	19
Inverter	6	3	72	988	-44	27
Transformer*	5	3	65	1,214	-48	17
Inverter	6	3	82	1,214	-46	26
Transformer*	5	3	65	792	-44	21
Inverter	6	3	72	792	-42	29
Substation	5	1	72	1,430	-49	23
Trackers	50	1	44	108	-7	37
Cumulative Noise Level @ Property Line (dBA Leq)						**42**

*Transformers are located within 800 feet of a Property Line, not necessarily this common property line to the northeast of Area B and are enclosed per mitigation measure in Rugged Solar PEIR, 2015

Table 2-3: Operational Noise Levels – Southern Property Line Area B (Location 2)

Source	Distance from Source to Measurement Location (Feet)	Sources at that Common Distance	Noise Levels Combined (dBA)	Distance to Nearest Property Line (Feet)	Noise Reduction due to distance (dBA)	Resultant Noise Level @ Property Line (dBA Leq)
Transformer*	5	3	65	1,005	-46	19
Inverter	6	3	72	1,005	-44	27
Transformer*	5	3	65	405	-38	27
Inverter	6	3	72	405	-37	35
Transformer*	5	3	65	387	-38	27
Inverter	6	3	72	387	-36	36
Transformer*	5	3	65	988	-46	19
Inverter	6	3	72	988	-44	27
Transformer*	5	3	65	1,214	-48	17
Inverter	6	3	82	1,214	-46	26
Transformer*	5	3	65	792	-44	21
Inverter	6	3	72	792	-42	29
Substation	5	1	72	1,430	-49	23
Trackers	50	1	44	68	-3	41
Cumulative Noise Level @ Property Line (dBA Leq)						**43**

*Transformers are located within 800 feet of a Property Line, not necessarily this common property line to the south of Area B and are enclosed per mitigation measure in Rugged Solar PEIR, 2015

Cumulatively, the panel washing noise level of 49.8 dBA combined with the transformer and inverter noise levels (as shown in Tables2-2 and 2-3 above) would result in and overall cumulative noise level of 50 dBA or less. Since the panel washing equipment would only operate during the daytime hours of 7 am and 7pm, the noise levels would not exceed the County's daytime threshold of 50 dBA. Additionally, the paneling washing will be moving farther away from the property line and washing is conducted no impacts are anticipated and no mitigation measures are required.

2.3 Conclusions

Based on the empirical data, the manufactures specifications and the distances to the property lines the cumulative noise levels from the proposed transformers, inverters and the PV trackers and substation were found to meet the most restrictive nighttime property line standard of 45 dBA at the nearest property lines. Additionally, all daytime activities (i.e., panel washing) will meet the daytime property line standard of 50 dBA at the nearest property lines. No impacts are anticipated and no additional mitigation is required above mitigation measure M-N-TDS-1 in the certified Soitec PEIR, 2015, which states any inverter pad installed within 800 feet or less of a property line would be enclosed in a structure capable of achieving a minimum 50 dB attenuation.

3.0 CONSTRUCTION ACTIVITIES

3.1 Guidelines for the Determination of Significance

Construction Noise: Noise generated by construction activities related to the project will exceed the standards listed in San Diego County Code Sections as follows.

SEC. 36.408: HOURS OF OPERATION OF CONSTRUCTION EQUIPMENT

Except for emergency work, it shall be unlawful for any person to operate or cause to be operated, construction equipment:

a. Between 7 p.m. and 7 a.m.

b. On a Sunday or a holiday. For purposes of this section, a holiday means January 1st, the last Monday in May, July 4th, the first Monday in September, December 25th and any day appointed by the President as a special national holiday or the Governor of the State as a special State holiday. A person may, however, operate construction equipment on a Sunday or holiday between the hours of 10 a.m. and 5 p.m. at the person's residence or for the purpose of constructing a residence for himself or herself, provided that the operation of construction equipment is not carried out for financial consideration or other consideration of any kind and does not violate the limitations in sections 36.409 and 36.410.

SEC. 36.409: SOUND LEVEL LIMITATIONS ON CONSTRUCTION EQUIPMENT

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.

SEC. 36.410: SOUND LEVEL LIMITATIONS ON IMPULSIVE NOISE

In addition to the general limitations on sound levels in section 36.404 and the limitations on construction equipment in section 36.409, the following additional sound level limitations shall apply:

(a) Except for emergency work or work on a public road project, no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown in Table 36.410A (provided below), 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 percent of the minutes in the measurement period, as described in subsection (c) below. The maximum sound level depends on the use being made of the occupied property. The uses in Table 36.410A are as described in the County Zoning Ordinance.

TABLE 36.410A: MAXIMUM SOUND LEVEL (IMPULSIVE) MEASURED AT OCCUPIED PROPERTY IN DECIBELS (dBA)

OCCUPIED PROPERTY USE	DECIBELS (dBA)
Residential, village zoning or civic use	82
Agricultural, commercial or industrial use	85

(b) Except for emergency work, no person working on a public road project shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown in Table 36.410B, 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 percent of the minutes in the measurement period, as described in subsection (c) below. The maximum sound level depends on the use being made of the occupied property. The uses in Table 36.410B are as described in the County Zoning Ordinance.

TABLE 36.410B: MAXIMUM SOUND LEVEL (IMPULSIVE) MEASURED AT OCCUPIED PROPERTY IN DECIBELS (dBA) FOR PUBLIC ROAD PROJECTS

OCCUPIED PROPERTY USE	dB(A)
Residential, village zoning or civic use	85
Agricultural, commercial or industrial use	90

(c) The minimum measurement period for any measurements conducted under this section shall be one hour. During the measurement period a measurement shall be conducted every minute from a fixed location on an occupied property. The measurements shall measure the maximum sound level during each minute of the measurement period. If the sound level caused by construction equipment or the producer of the impulsive noise exceeds the maximum sound level for any portion of any minute, it will be deemed that the maximum sound level was exceeded during that minute.

3.2 Potential Construction Noise Impacts

Construction noise represents a short-term impact on the ambient noise levels. Noise generated by construction equipment includes haul trucks, water trucks, graders, dozers, loaders and scrapers can reach relatively high levels. Grading activities typically represent one of the highest potential sources for noise impacts. The most effective method of controlling construction noise is through local control of construction hours and by limiting the hours of construction to normal weekday working hours.

The U.S. Environmental Protection Agency (U.S. EPA) has compiled data regarding the noise generating characteristics of specific types of construction equipment. Noise levels generated by heavy construction equipment at a distance of 50 feet can range from 60 dBA for a small tractor up to 100 dBA for rock breakers. However, these noise levels diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 87 dBA measured at 50 feet from the noise source would be reduced to 81 dBA at 100 feet from the source and be further reduced to 75 dBA at 200 feet from the source.

Using a point-source noise prediction model, calculations of the expected construction noise impacts were completed. The essential model input data for these performance equations include the source levels of each type of equipment, relative source to receiver horizontal and vertical separations, the amount of time the equipment is operating in a given day, also referred to as the duty-cycle and any transmission loss from topography or barriers. To determine the worst-case noise levels for the grading operations no topographic attenuation, duty-cycle reductions or barrier reductions were utilized.

According to the project applicant, the project site will be grubbed to remove vegetation and compacted in one phase followed by the installation of the solar panels. The project construction includes all site preparation, installation of the solar panels and all utilities. The grading or site preparation and subsequent installation of the PV panels are discussed separately below.

The clearing and site preparation operation will utilize two graders, two scrappers, four loaders/tractors and four water trucks. The noise levels utilized in this analysis based upon the anticipated list of equipment are shown in Table 3-1. Most of the construction activities will consist of clearing and grubbing the site for the preparation of the PV panels. The equipment is anticipated to be spread out over the entire site with some equipment potentially operating at or near the property line while the rest of the equipment may be located over 1,000 feet from the same property line. This would result in an acoustical center for the grading operation at approximately 500 feet from the nearest property line.

Additionally, a rock crusher may also be needed and the crushed material will be used for constructing internal roadways and building pads. When an adequate amount of crushed material has been generated, the rock crushing activities will cease and the equipment disassembled and moved offsite. The entire rock crushing operations for the site are anticipated to take less than 30 days to complete. It should be noted that the rock crushing activities are temporary and permitted with an approved grading plan for on-site uses only. The rock crusher would be located in the centroid of the project site near the proposed substation location of Area B, with the closest property line at a distance of 1,200 feet. The typical noise emission levels from a rock crusher range between 85 and 88 dBA at 50 feet based upon previous analysis conducted by Ldn Consulting, Inc. The worst-case noise level of 88 dBA at 50 feet will be reduced to 60 dBA at a distance of 1,200 feet.

Therefore, the rock crushing activities would not add to the overall cumulative construction noise levels (i.e., 74.5 dBA from construction equipment plus 60.4 dBA from a rock crusher at 1,200 feet equals 74.5 dBA).

As can be seen in Table 3-1, if all the equipment was operating in the same location, which is not physically possible, at a distance as close as 165 feet from the nearest property line the point source noise attenuation from construction activities is -10.4 dBA. This would result in an anticipated worst case eight-hour average combined noise level of 74.5 dBA at the property line. Given this and the spatial separation of the equipment, the noise levels will comply with the County of San Diego's 75 dBA standard at all Project property lines.

Table 3-1: Construction Grading/Site Preparation Noise Levels

Construction Equipment	Quantity	Duty Cycle (Hours/Day)	Source Level @ 50-Feet (dBA)	Cumulative Noise Level @ 50-Feet (dBA Leq-8h)
Grader	2	8	74	81.0
Water Truck	4	8	70	76.0
Scrappers	2	8	75	78.0
Loader	4	8	73	79.0
			Cumulative Levels @ 50 Feet (dBA)	84.9
			Distance to Property Line	165
			Noise Reduction Due to Distance	-10.4
			NEAREST PROPERTY LINE NOISE LEVEL	**74.5**

The installation of the solar panels may utilize a total of two small pile drivers to install the panel stands, two mobile cranes to move the panels in position and two pneumatic tools to secure the panels to the stands. The noise levels utilized in this analysis based upon the anticipated list of equipment are shown in Table 3-2. Based upon normal installation procedures the equipment is anticipated to be spread out over the entire site with pile driving occurring first and then the installation of the panels with a crane and pneumatic tool. Some equipment may be operating at a distance of 70-120 feet from the property line while the rest of the equipment may be located over 500-1,000 feet from the other equipment and same property line. This would result in an acoustical center from the installation operations of at least 300 feet to the nearest property line around the perimeter of the site. The distance to the property lines would increase as the interior panels are installed and the noise levels would decrease due to distance.

As can be seen in Table 3-2, if all the equipment was operating in the same location, which is not

physically possible, at a distance as close as 275 feet from the nearest property line the point source noise attenuation from construction activities is -14.8 dBA. This would result in an anticipated worst case eight-hour average combined noise level of 74.9 dBA at the property line . Given this and the spatial separation of the equipment, the noise levels will comply with the County of San Diego's 75 dBA standard at all Project property lines.

Table 3-2: PV Panel Installation Noise Levels

Construction Equipment	Quantity	Duty Cycle (Hours/Day)	Source Level @ 50-Feet (dBA)	Cumulative Noise Level @ 50-Feet (dBA Leq-8h)
Pneumatic Tool	2	8	82	85.0
Mobile Crane	2	8	78	81.0
Pile Driver	2	8	84	87.0
			Cumulative Levels @ 50 Feet (dBA)	89.8
			Distance To Property Line	275
			Noise Reduction Due To Distance	-14.8
			NEAREST PROPERTY LINE NOISE LEVEL	**74.9**

Additionally, the County Noise Ordinance Section 36.410, states that except for emergency work or work on a public road project, no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown of 82 dBA (at residential uses), 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 percent of the minutes in the measurement period. The maximum sound level and uses are shown above in Table 36.410A as described in the County Zoning Ordinance.

The installation of the solar panels may utilize two small pile drivers to install the panel stands that could produce impulsive noise. Based upon normal installation procedures the two pile drivers are anticipated to be separated on the site. A single pile driver would be operating at a distance of 50 feet from the property line for a short time to install a single panel stand. The pile driver would then move further from the property line to set another panel stand and continue is this fashion. Each panel stand installation process is only anticipated to last 5 minutes or less.

Pile drivers can produce maximum noise levels (Lmax) of 95 dBA at a distance of 50 feet when the drive head is operating (Source: Central Artery/Tunnel (CA/T) project in Boston, Massachusetts). Typically, a pile drive is not continuously operating at full power; this is referred to as the usage factor. The usage factor is the percentage of time during a construction noise

operation that a piece of construction equipment is operating at full power. Based on empirical data collected CA/T project which was used to develop the Road Construction Noise Model (RCNM), a pile driver has a usage factor of 20%. Since the maximum noise level from a pile driver exceeds the County's maximum noise level threshold of 82 dBA the following recommendations are presented. To reduce the maximum noise level of 95 dBA to 82 dBA the pile driver would need to be located 215 feet from the nearest occupied residential property line or only operate 25% of the hourly or daily duration (15 minutes of any hour and 2 hours of a 8 hour work day) when located within that distance. Based on these duration and distance parameters the impulsive noise levels are anticipated to be below the County's most restrictive 82 dBA threshold and no impacts are anticipated and no mitigation measures are required.

3.2 Construction Conclusions

At a distance as close as 165 feet the point source noise attenuation from the grading activities and the nearest property line is -10.4 dBA. This would result in an anticipated worst case eight-hour average combined noise level of 74.5 dBA at the property line. During the installation of the solar panels at a distance of 275 feet would result in a noise level of 74.9 dBA or less based on equipment separation. The installation equipment is anticipated to average more than 300 feet from the nearest property line. Given this and the spatial separation of the equipment over the large site area, the noise levels of the grading and panel installation are anticipated to comply with the County of San Diego's 75 dBA standard at all Project property lines.

Additionally, the County Noise Ordinance Section 36.410, states that no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown of 82 dBA (at residential uses), 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 percent of the minutes in the measurement period. To reduce the maximum noise level of 95 dBA to 82 dBA the pile driver would need to be located 215 feet from the nearest occupied residential property line or only operate 25% of the hourly or daily duration (15 minutes of any hour and 2 hours of a 8 hour work day) when located within that distance. Based on these duration and distance parameters the impulsive noise levels are anticipated to be below the County's most restrictive 82 dBA threshold and no impacts are anticipated and no mitigation measures are required.

The County Noise Ordinance pertains to a property having an occupied structure. Currently, none of the adjacent properties have existing occupied structures and therefore are exempt from the Noise Ordinance Sections 36.408-36.410. If properties become occupied prior to or during the construction of the Project then a 215 foot setback for the pile drivers or a 25% time restriction would apply.

4.0 SUMMARY OF PROJECT IMPACTS, MITIGATION & CONCLUSIONS

- Operational Noise Analysis

  Based on the empirical data, the manufactures specifications and the distances to the property lines the cumulative noise levels from the proposed transformers, inverters and the PV trackers and substation were found to meet the most restrictive nighttime property line standard of 45 dBA at the nearest property lines. Additionally, all daytime activities (i.e., panel washing) will meet the daytime property line standard of 50 dBA at the nearest property lines. No impacts are anticipated and no additional mitigation is required above mitigation measure M-N-TDS-1 in the certified Soitec PEIR, 2015, which states any inverter pad installed within 800 feet or less of a property line would be enclosed in a structure capable of achieving a minimum 50 dB attenuation.

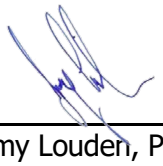
- Construction Noise Analysis

  At a distance as close as 165 feet the point source noise attenuation from the grading activities and the nearest property line is -10.4 dBA. This would result in an anticipated worst case eight-hour average combined noise level of 74.5 dBA at the property line. During the installation of the solar panels at a distance of 275 feet would result in a noise level of 74.9 dBA or less based on equipment separation. The installation equipment is anticipated to average more than 300 feet from the nearest property line. Given this and the spatial separation of the equipment over the large site area, the noise levels of the grading and panel installation are anticipated to comply with the County of San Diego's 75 dBA standard at all Project property lines.

  Additionally, the County Noise Ordinance Section 36.410, states that no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown of 82 dBA (at residential uses), 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 percent of the minutes in the measurement period. To reduce the maximum noise level of 95 dBA to 82 dBA the pile driver would need to be located 215 feet from the nearest occupied residential property line or only operate 25% of the hourly or daily duration (15 minutes of any hour and 2 hours of a 8 hour work day) when located within that distance. Based on these duration and distance parameters the impulsive noise levels are anticipated to be below the County's most restrictive 82 dBA threshold and no impacts are anticipated and no mitigation measures are required. Currently none of the adjacent properties have existing occupied structures and therefore are exempt from the Noise Ordinance Sections 36.408-36.410. If properties become occupied prior to or during the construction of the Project then a 215 foot setback for the pile drivers or a 25% time restriction would apply.

5.0 CERTIFICATIONS

The contents of this report represent an accurate depiction of the existing and future acoustical environment and impacts within the proposed Rugged Solar Project development. The report was prepared by Jeremy Louden; a County approved CEQA Consultant for Acoustics.



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