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Acoustical Assessment Report
for the
Jacumba Solar Energy Project
Major Use Permit PDS2014-MUP-14-041
Environmental Review Project Number PDS2014-MPA-14-015
Jacumba, San Diego County, California

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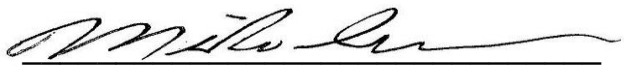

APRIL 2015

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EXECUTIVE SUMMARY

Dudek has prepared this acoustical assessment report for the Jacumba Solar Energy Project, evaluating operational noise impacts associated with outdoor mechanical equipment and short-term construction noise to sensitive land uses located within the vicinity of the Proposed Project.

The Proposed Project would produce up to 20 megawatts of solar energy on approximately 290 acres of private lands in southeastern San Diego County near the unincorporated community of Jacumba Hot Springs, California.

The proposed equipment associated with the storage battery system would result in a significant noise impact at the adjacent eastern property boundary unless mitigated. Additionally, the PV inverters nearest the eastern, southern and western boundaries (within 1,200 feet) would result in a significant noise impact unless mitigated. The noise associated with the storage battery system could be mitigated by configuring the storage battery enclosures so as to provide barrier shielding to the east from the heating, ventilation, and air conditioning (HVAC); step-up transformers and power inverters; and specifying quieter HVAC systems. The photovoltaic inverters nearest the Project boundaries (within 1,200 feet) could be mitigated by specification of quieter inverters, or technology with equivalent or lower noise emission levels.

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1 INTRODUCTION

1.1 Project Description

The Proposed Project encompasses a total of approximately 290 acres within the Mountain Empire Subregional Plan Area in unincorporated San Diego County (see Figure 1, Regional Location Map). The solar facility comprising the Proposed Project (shown on Figure 2, Specific Location Map) would use photovoltaic (PV) fixed tilt rack electric generation system technology to produce solar energy at the utility scale. Figure 3, Project Site Plan, and Figure 4, Project Environmental Setting – South of Interstate 8 (I-8), show the location of the Proposed Project in the context of local geography, major landforms, and points of interest.

The Proposed Project would produce up to 20 megawatts (MW) of alternating current (AC) generating capacity and would consist of approximately 81,108 PV modules fitted on 2,253 fixed tilt rack panels. The Proposed Project is located approximately 3.5 miles to the east of the community of Jacumba Hot Springs and immediately north of the U.S./Mexico International Border. In addition to the panels and direct current (DC) to AC conversion equipment (i.e., inverter and transformer units), Jacumba Solar would include the following primary components:

- A 1,000-volt DC underground collection system and a 34.5-kilovolt (kV) underground collection system linking the panels to the on-site Project substation.
- A 110- by 215-foot on-site private collector substation site encompassing a fenced pad area and a maximum height of 35 feet to house equipment, including metal-clad switchgear.
- A dual circuit 138 kV underground transmission line (gen-tie) would connect the Project substation to the East County (ECO) Substation.
- An energy storage facility that would be located within the collector substation fenced boundaries.

The Jacumba Solar substation and gen-tie interconnection facilities, would be sized to accommodate the full 20 MW. The Proposed Project would be located entirely on private lands within unincorporated San Diego County, including the gen-tie. Upon completion, Jacumba Solar would be monitored both on site at the Operations and Maintenance (O&M) building and off site through a supervisory control and data acquisition (SCADA) system. See Sections 1.2.1 and 1.2.2 for further details.

Primary access to the Jacumba Solar site would be provided via an improved access road from Old Highway 80, as shown on Figure 3. Two additional points of emergency egress/ingress

would be provided at the Project's southwestern point and northeastern point to facilitate U.S. Customs and Border Patrol access and to provide an alternate fire access point, respectively.

Power from the on-site private substation would be delivered to the 138 kV bus at the adjacent SDG&E ECO Substation via a less than quarter-mile dual circuit 138 kV transmission line within a 125-foot private ROW if constructed aboveground and a 60-foot easement when underground. The Jacumba Solar gen-tie line would extend directly east form the on-site substation to the ECO Substation. A transition pole would be constructed at the interconnection point at the ECO Substation.

1.2 Environmental Settings and Existing Conditions

1.2.1 Regional and Local Setting

The Proposed Project is located approximately 3.5 miles to the east of the community of Jacumba Hot Springs and immediately north of the U.S./Mexico International Border.

The Proposed Project is subject to the General Plan Rural Lands Regional Category and contains lands within the Rural Lands 80 (RL-80) Land Use Designation. The Project is also subject to the policies of the Mountain Empire Subregional Plan and Jacumba Subregional Group Community Plan. The Project site is zoned as General Rural (S92). The proposed use can only be allowed with the approval of a major use permit on the Project site.

1.2.2 Existing Noise Conditions

The Project site is located approximately 1,200 feet south of Old Highway 80, a two-lane road. Existing noise sources in the area include distant traffic noise, distant construction noise, rustling leaves and distant electrical corona noise from adjacent energy facilities.

Noise measurements were conducted on June 25, 2014. The noise measurements were conducted for 20 minutes at the locations depicted as Sites M1 through M5 on Figure 5 (Noise Measurement Locations). The measured average, maximum and minimum noise levels are shown in Table 1. The measured average ambient noise levels ranged from approximately 53 dBA L_{eq} at Site M1, located near the southwest boundary of the Project site, to 65 dBA L_{eq} at Site M4, located adjacent to the nearest noise-sensitive land use (a residence), located 0.7 mile north of the Project site. At Site M4 the dominant noise source was traffic from I-8.

Table 1
Measured Noise Level

Site	Location	Start Time	Noise Level (dB)		
			L_{eq}[1]	L_{max}[2]	L_{min}[3]
M1	Southwest side of Project site	2:50 p.m.	53	68	40
M2	Northwest side of Project site	1:45 p.m.	56	67	39
M3	East side of Project site	2:20 p.m.	61	73	43
M4	Adjacent to nearest residence, approx. 3,700 feet north of Project site	12:34 p.m.	65	76	45
M5	Adjacent to next-nearest residence, approx. 7,300 feet west of Project site.	1:07 a.m.	63	74	42

Notes:
1 Equivalent Continuous Sound Level (Time-Average Sound Level)
2 Maximum Sound Level
3 Minimum Sound Level

1.3 Methodology and Equipment

1.3.1 Noise Measuring Methodology and Procedures

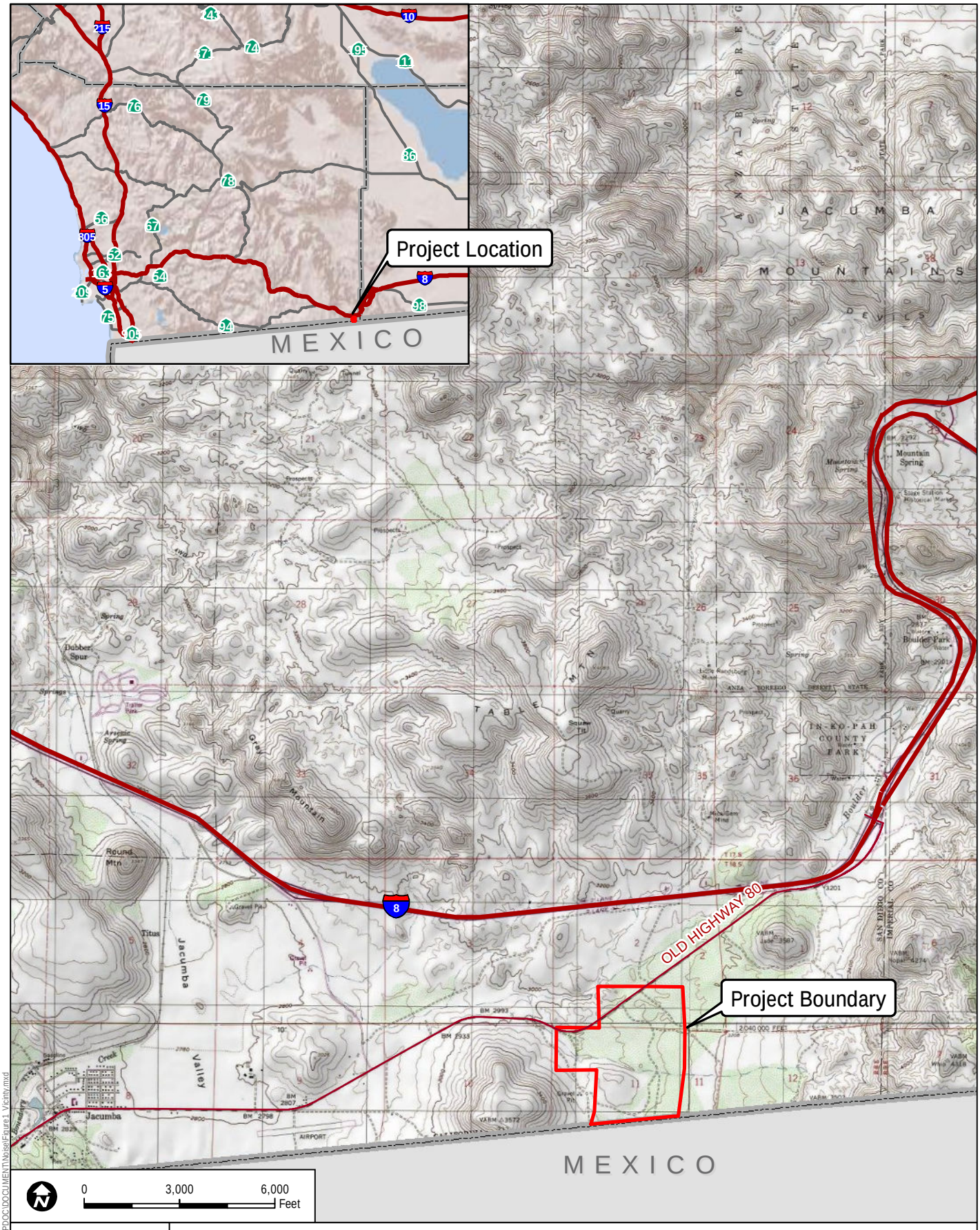
Noise measurements were conducted at the site and at nearby noise-sensitive land uses to determine the existing noise levels. The measurements were made using a calibrated SoftdB Piccolo integrating sound level meter equipped with 0.5-inch pre-polarized condenser microphone with pre-amplifier. The sound level meter meets the current American National Standards Institute standard for a Type 2 (General Purpose) sound level meter. The sound level meter was positioned on a tripod at a height of approximately 5 feet above the ground, and fitted with a wind screen.

Noise levels resulting from the outdoor mechanical equipment is based on manufacturer's data or published noise levels. Noise levels associated with the proposed construction activities have been obtained from reports prepared by the Federal Transit Administration (2006) and field data from files. The noise impact assessment utilized criteria established in the County of San Diego General Plan Noise Element (County of San Diego 2006) and Noise Ordinance (County of San Diego 2009).

1.3.2 Noise Calculations – Community Noise Equivalent Level

Community sound levels are measured in terms of the A-weighted sound level. The A-weighted scale measures sound levels corresponding to the human frequency response. All sound levels discussed in this report are A-weighted. In community noise, it is necessary to use a noise scale that averages varying noise exposure over time and quantifies the results using a single number descriptor. Units of measure to evaluate the long-term characteristics of sound that are applicable

to this analysis are the equivalent continuous sound level (Leq) and the Community Noise Equivalent Level (CNEL). The Leq is a single-number representing the fluctuating sound level in decibels (dB) over a specified period of time. It is a sound energy average of the fluctuating level and is equal to a constant unchanging sound level of that dB level. CNEL is a 24-hour average A-weighted sound level with 10 dB added to noise during the nighttime hours from 10:00 p.m. to 7:00 a.m., and 5 dB added to the noise during the evening hours from 7:00 p.m. to 10:00 p.m. The 5 and 10 dB penalties are applied to account for increased noise sensitivity during the evening and nighttime hours. Appendix A contains definitions of acoustical terms used in this report.



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SOURCE: Bing 2014

FIGURE 1

Regional Location Map

Jacumba Solar

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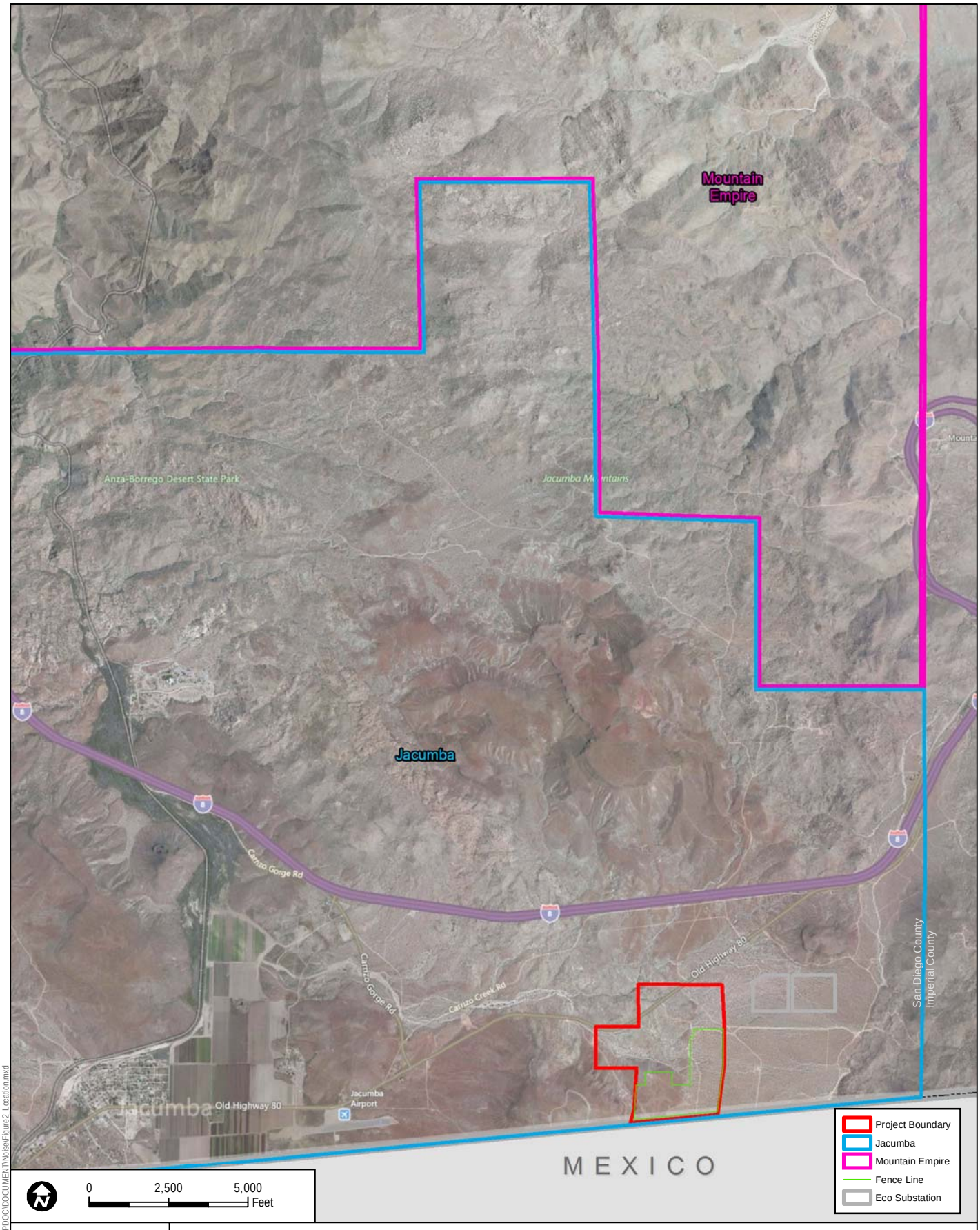

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FIGURE 2

Specific Location Map

Jacumba Solar

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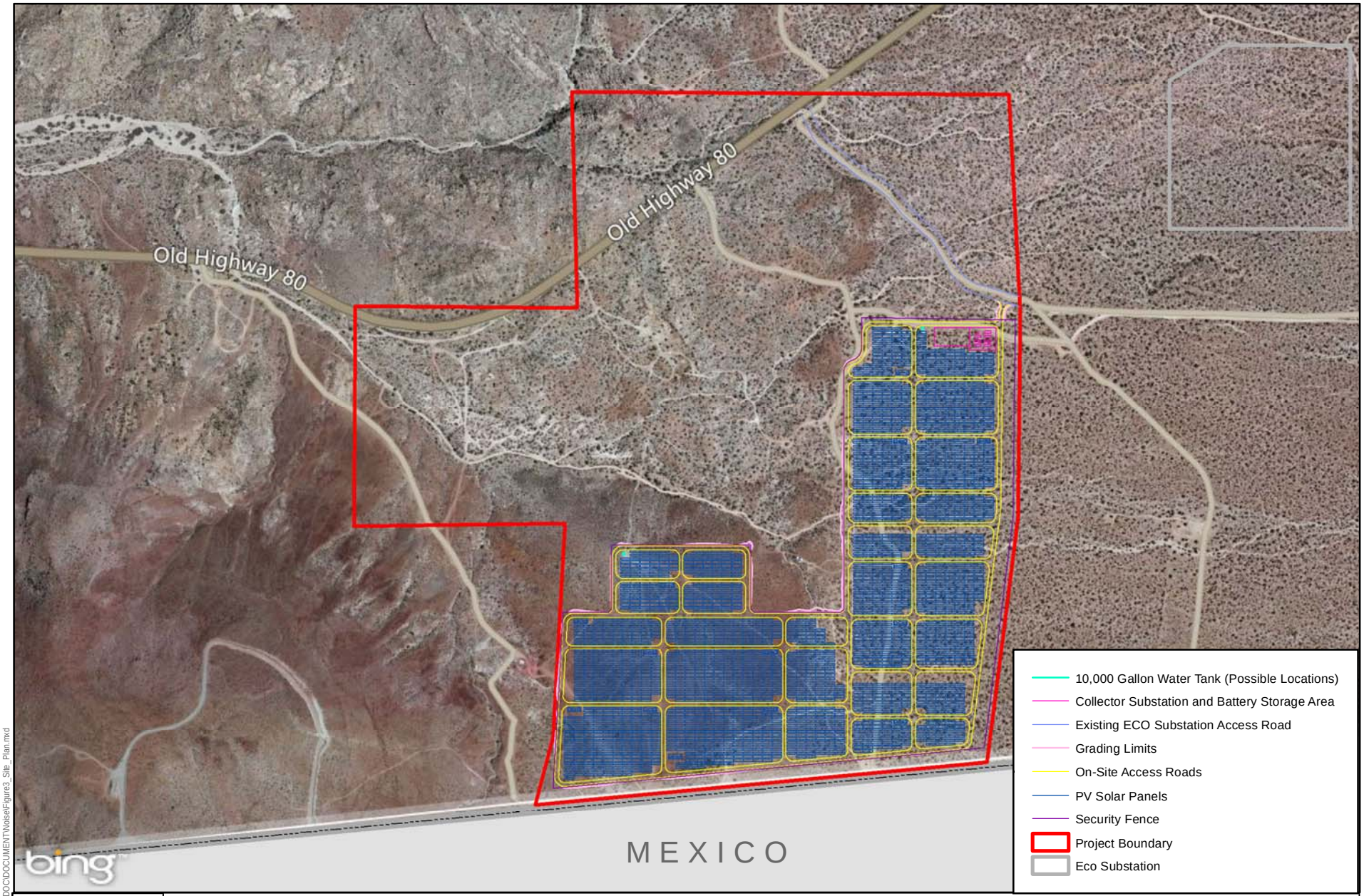

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FIGURE 3

Project Site Plan

Jacumba Solar

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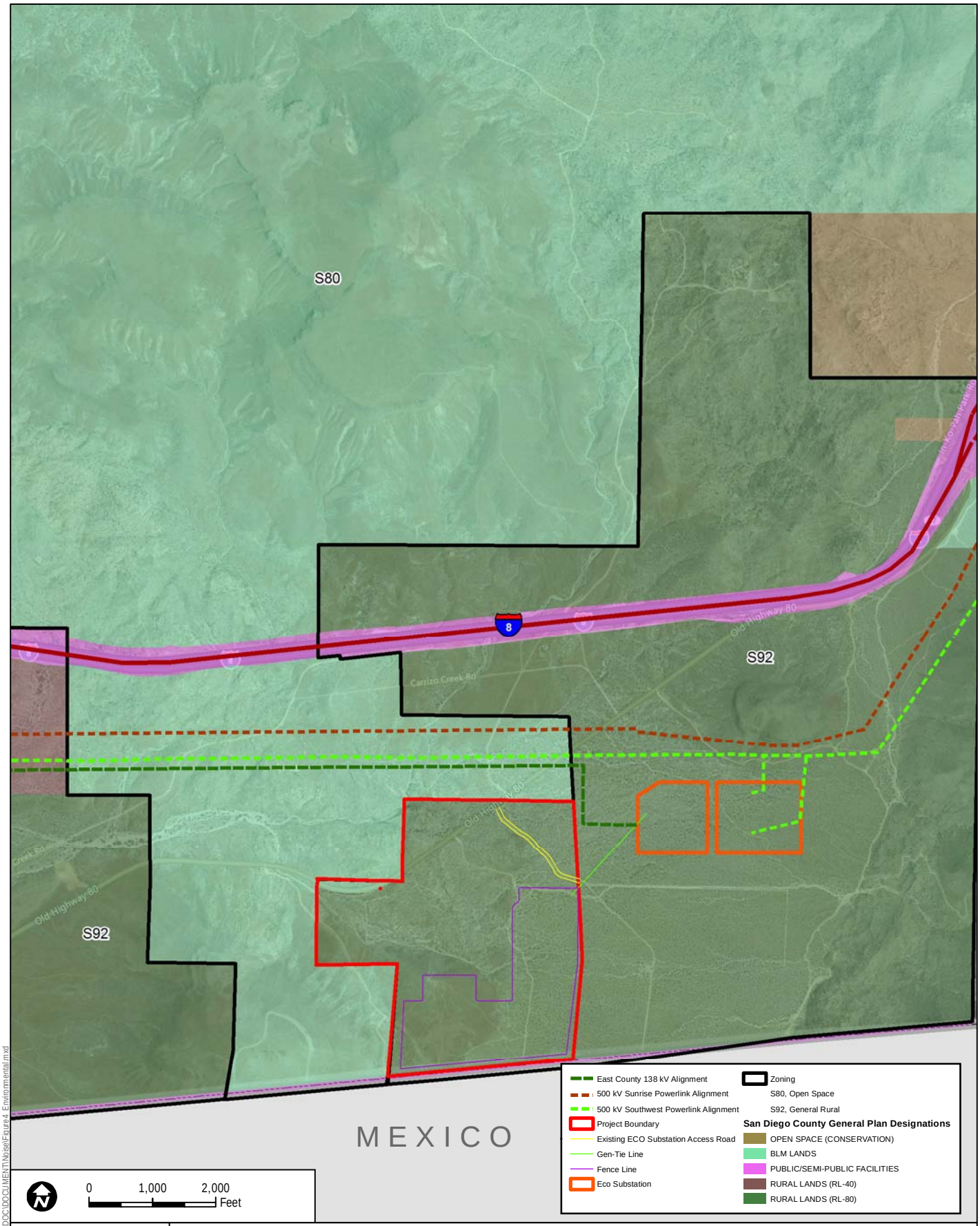

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FIGURE 4

Project Environmental Setting

Jacumba Solar

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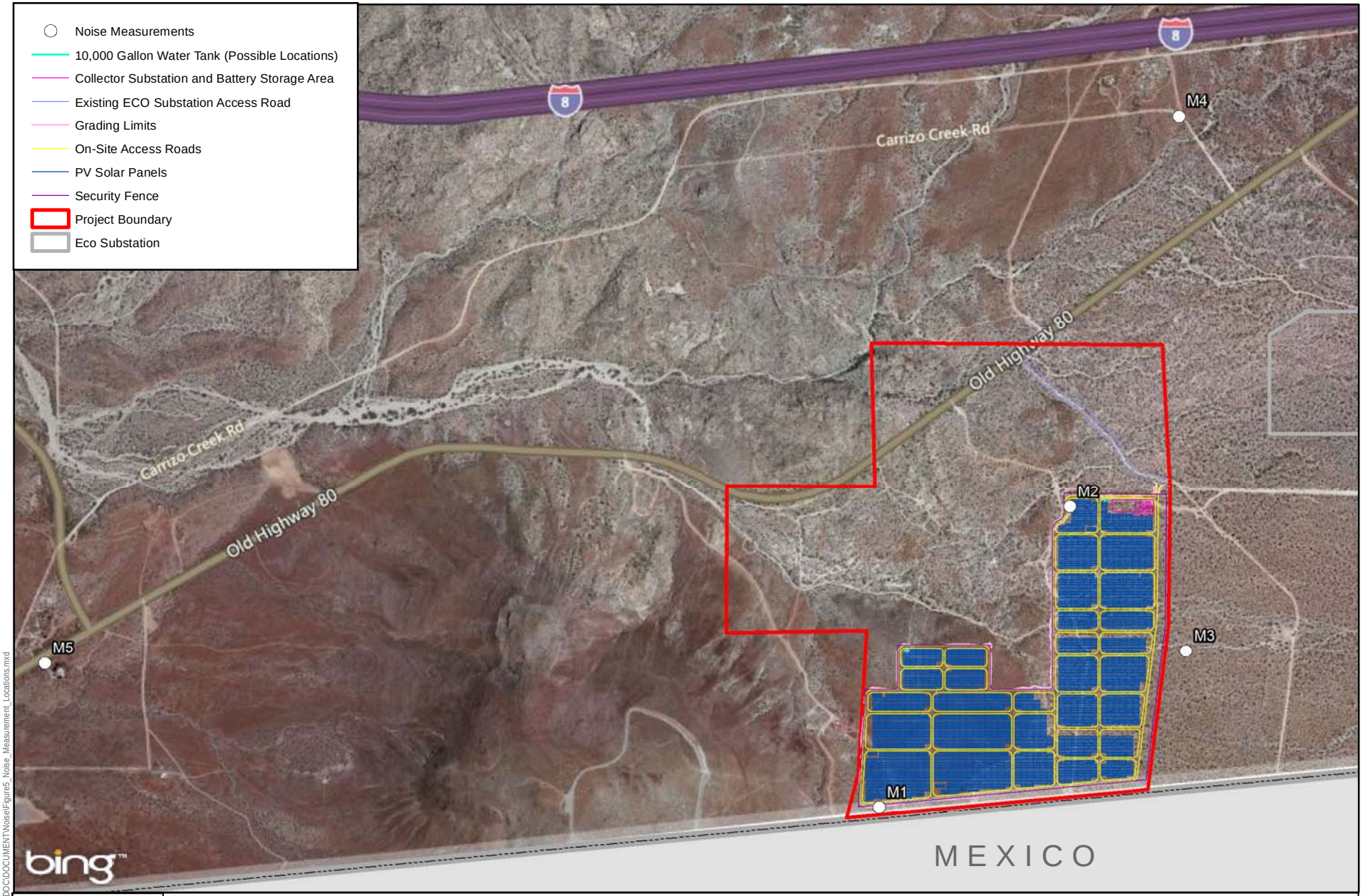

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FIGURE 5

Noise Measurement Locations

Jacumba Solar

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2 NOISE-SENSITIVE LAND USES AFFECTED BY AIRBORNE NOISE

2.1 Potential Noise Impacts

The Proposed Project consists of a solar energy collection/generation facility with neither dedicated office space nor any related residential components. As such, no portion of the Proposed Project would involve noise sensitive land uses. The nearest residence is located approximately 3,700 feet to the north.

2.2 Off-Site Direct and Cumulative Noise Impacts

The proposed Project would have a short-term construction-related potential to generate noise impacts to off-site locations. Construction is estimated to take approximately 4 months. The grading for the Project is designed to be balanced, thus, there would be no import or export of dirt. However, there would be worker vehicles and truck material deliveries to the site. It is anticipated that on average approximately 60 trips per day would be generated during construction (including truck trips). The Project's worker vehicles and delivery trucks would generate an annual CNEL of less than 60 dB beyond the local roadway rights-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 the local roads associated with the construction vehicles would be less than 60 dB CNEL.

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3 PROJECT-GENERATED AIRBORNE NOISE

3.1 Guidelines for the Determination of Significance

The County of San Diego has adopted various noise policies and standards contained within the County's General Plan Noise Element and the County Noise Ordinance.

County of San Diego – General Plan Noise Element

The County has established exterior noise guidelines in the Noise Element of its adopted General Plan (County of San Diego 2011). These guidelines identify compatible exterior noise levels for various land use types. "Exterior noise" means noise measured at an outdoor living area that meets specified minimum area requirements for single-family detached dwelling projects, and for other projects it means noise measured at all exterior areas that are provided for group or private usable open space.

The Noise Element states that an acoustical study is required if it appears that an NSLU would be subject to noise levels of CNEL equal to 60 dB or greater. An "NSLU" is defined as any residence, hospital, school, hotel, resort, library, or any other facility where quiet is an important attribute of the environment.

County of San Diego – Noise Ordinance

Noise thresholds for stationary sources and construction noise are regulated through the County's Noise Ordinance, Chapter 4, "Noise Abatement and Control." Section 36.404 includes sound level limits for non-construction-related stationary noise sources, and Section 36.409 includes time and noise limitations for construction equipment. Section 36.410 includes noise restrictions for impulsive construction equipment. All of these sections are summarized in the following paragraphs.

Section 36.404 Sound Level Limits – Non-Construction Activities

This section in the County's Noise Ordinance includes 1-hour average sound level limits applicable to the Project's operation-related (non-construction) noise sources, such as mechanical equipment (inverters, transformers, etc.), operation-related traffic (vehicle movement, engine noise), and outdoor human activity in defined limited areas.

The allowable noise limits depend upon the zoning district and time of day. The Project site's zoning is Rural (RL-80). The County's noise standard that applies to RL-80 zoning is depicted in Table 2. Thus, as established in Section 36.404 of the County's noise ordinance, the one-hour

average sound level limit is 50 dB between the hours of 7:00 a.m. to 10:00 p.m. and 45 dB between the hours of 10:00 p.m. and 7:00 a.m. Because the noise-generating components of the Project (PV inverters, battery storage system) may operate during the early morning hours before 7 a.m., the Project would be subject to the more restrictive nighttime noise standard (i.e., one-hour 45 dB average at the property boundaries)).

Table 2
County of San Diego Exterior Noise Standards

Zone	Time	One-Hour Sound Level Limits (dB)
(1) R-S, R-D, R-R, R-MH, A-70, A-72, S-80, S-81, S-87, S-90, S-92 and R-V and R-U with a density of less than 11 dwelling units per acre	7:00 a.m. to 10:00 p.m.	50
	10:00 p.m. to 7:00 a.m.	45

Source: County of San Diego Noise Ordinance, Section 36.404.

Section 36.409 – Construction Equipment

Section 36.409 in this 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 as follows:

- 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 holiday.

In addition, the code requires that no equipment shall be operated so as to cause an 8-hour average construction noise level in excess of 75 dB between the hours of 7:00 a.m. and 7:00 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.

Section 36.410 Sound 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 3, 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, as described in subsection (c), below. The maximum sound

level depends on the use being made of the occupied property. The uses in Table 3 are as described in the County Zoning Ordinance.

Table 3
County of San Diego Code Section 36.410, 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 9, 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, as described in subsection (c) below. The maximum sound level depends on the use being made of the occupied property. The uses in Table 4 are as described in the County Zoning Ordinance.

c. The minimum measurement period for any measurements conducted under this section shall be 1 hour. During the measurement period, a measurement shall be conducted every 1 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 would be deemed that the maximum sound level was exceeded during that minute.

Table 4
County of San Diego Code Section 36.410, Maximum Sound Level (Impulsive) Measured at Occupied Property in Decibels (dBA) for Public Road Projects

Occupied Property Use	Decibels (dBA)
Residential, village zoning or civic use	85
Agricultural, commercial or industrial use	90

3.2 Potential Operational Noise Impacts (Non-Construction Noise)

On-site noise sources associated with the Project would include pad-mounted inverters and transformers, substation transformers, the DC underground collection systems linking the panels to

the on-site Project substation, the collector substation site, and the energy storage facility located within the collector substation boundaries. Each of these noise sources are discussed below:

3.2.1 Building Block Inverters and Transformers

The PV modules would be electrically connected to adjacent modules to form module "strings" using wiring attached to the support structures. PV module strings would be electrically connected to each other via underground wiring, which would terminate at PV module array combiner boxes (lockable electrical boxes mounted on an array's support structure). The output wires from combiner boxes would be routed along an underground trench system approximately 3.5 feet deep and 1 foot wide, including trench and disturbed area, to the inverters and transformers.

Inverters are a key component of solar PV power-generating facilities because they convert the DC generated by the PV module array into AC that is compatible for use with the transmission network. The inverters within the electrical enclosures would convert the DC power to AC power and the medium-voltage transformers would step up the voltage to collection-level voltage (34.5 kV).

The inverters, medium-voltage transformers, and other electrical equipment are proposed to be housed in up to 14 enclosures throughout the Project site. The electrical enclosures would be up to 14 feet wide by 44 feet long and would sit on-site.

The proposed Sunny Central 750W (24) and 500W (4) inverters have a noise level rating of 60 dB at 10 meters (SMA Solar Technology 2014). The transformer has a sound rating of 60 dB at 5 feet based on National Electric Manufactures Association (NEMA) ratings for the size of transformer anticipated to be used with inverters (NEMA 2000).

3.2.2 Energy Storage Facility and Connector Line

An energy storage facility is proposed adjacent to the on-site substation in the northeast section of the Proposed Project. It would consist of seven connex boxes equipped with batteries that will be capable of storing approximately 10 MW of energy. Each connex box would include an air conditioning unit for cooling purposes and a self-extinguishing fire system. The Project would interconnect to the ECO Substation project, which is owned and operated by SDG&E. A 138 kV line interconnecting from the ECO Substation project to the Jacumba Solar Energy Project would be constructed above-grade.

With respect to potential long-term operational noise associated with the energy storage component, the HVAC unit for each storage trailer would be a primary source of noise generation. Standard literature for one mass energy storage vendor indicates a typical installation

of one step up transformer for each pair of trailers. Thus, a total of seven HVAC units, seven power inverters, and 4 transformers would be associated with the storage trailers.

Information from the vendor for a similar energy storage project (Rugged LLC 2014) indicates the HVAC unit which is supplied as standard equipment for the storage containers produces 68 dBA at a distance of 50 feet during full operation (NACO Model 30RB120). An alternate HVAC unit with the same capacity is available from another vendor, which has a much lower sound rating of 60 dBA at a distance of 30 feet during full operation (Daikin McQuay 025D). The anticipated step-up transformer has a sound rating of 60 dB at 5 feet based on National Electric Manufactures Association (NEMA) ratings for the size of transformer anticipated to be used with storage battery systems (NEMA 2000). The anticipated power inverter is a Xantrex model, or equivalent, which has a noise level rating of 77 dB at 6 feet (Schneider Electric 2011).

3.2.3 Equipment Noise Levels at Property Lines

The inverter and transformer pads would be distributed throughout the site among the PV modules, and the energy storage and substation area would be located in the northeastern corner of the Project site, as shown in Figure 6. Also depicted in Figure 6 are the noise modeling locations selected to determine the worst-case cumulative noise levels at the eastern, southern and western property boundaries, resulting from the inverters and transformers, and the energy storage facility. Because of the large distance from the equipment to the northern property boundary (more than 1,400 feet) the noise levels were not calculated along this boundary. The noise levels from all the noted equipment were combined and calculated for the eastern, southern and western property line without any shielding. The one-hour average sound levels would range up to approximately 64 dBA along the eastern property line near the northeast corner of the Project site (E1), 56 dBA along the eastern property line nearer the east-central portion of the Project (E2), and 47 dBA along the eastern property line near the southern side of the Project site (E3). Along the southern property line (S1) the one-hour average sound level would be approximately 50 dBA, and along the western property line the one-hour average sound level would be approximately 53 dBA. The results of the cumulative noise levels are included in Tables 5a, 5b, 5c, 5d and 5e. The primary noise source along the eastern property line would be the HVAC units associated with the storage batteries, as well as the power inverters associated with the storage batteries. The PV inverters[1] nearest the project property lines (within 1,200 feet) would also contribute to the cumulative project-related noise levels. The primary noise source along the southern and western property

[1] As shown in Tables 5a, 5b and 5c, the noise levels from the transformers which are paired with the inverters is in every case substantially lower than the inverter noise, and would not result in an exceedance of the noise ordinance. The noise levels from the transformers are so much lower than the inverters that they do not effectively contribute to the combined overall noise level, and as such are not addressed as part of the mitigation strategy in Section 3.2.5.

lines would be the PV inverters. The noise levels would exceed the County's noise ordinance criteria of 45 dBA L_{eq} at the Project property boundaries.

Table 5a
Noise Levels at Eastern Property Line near the Northeast Corner of the Project Site (E1)

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	2510	37.7	25.3
Transformer	60	5	1	2510	54.0	6.0
Inverter	60	32.8	2	3060	39.4	23.6
Transformer	60	5	1	3060	55.7	4.3
Inverter	60	32.8	2	2820	38.7	24.3
Transformer	60	5	1	2820	55.0	5.0
Inverter	60	32.8	2	3405	40.3	22.7
Transformer	60	5	1	3405	56.7	3.3
Inverter	60	32.8	2	3070	39.4	23.6
Transformer	60	5	1	3070	55.8	4.2
Inverter	60	32.8	2	2310	37.0	26.1
Transformer	60	5	1	2310	53.3	6.7
Inverter	60	32.8	2	2610	38.0	25.0
Transformer	60	5	1	2610	54.4	5.6
Inverter	60	32.8	2	3175	39.7	23.3
Transformer	60	5	1	3175	56.1	3.9
Inverter	60	32.8	2	690	26.5	36.6
Transformer	60	5	1	690	42.8	17.2
Inverter	60	32.8	2	915	28.9	34.1
Transformer	60	5	1	915	45.2	14.8
Inverter	60	32.8	2	1150	30.9	32.1
Transformer	60	5	1	1150	47.2	12.8
Inverter	60	32.8	2	1460	33.0	30.0
Transformer	60	5	1	1460	49.3	10.7

Table 5a
Noise Levels at Eastern Property Line near the Northeast Corner of the Project Site (E1)

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	1770	34.6	28.4
Transformer	60	5	1	1770	51.0	9.0
Inverter	60	32.8	2	2330	37.0	26.0
Transformer	60	5	1	2330	53.4	6.6
Inverter	60	32.8	2	600	25.2	37.8
Transformer	60	5	1	600	41.6	18.4
Storage battery HVAC Module	68	50	1	245	13.8	54.2
Step-up Transformer	60	5	1	245	33.8	26.2
Power Inverter	77	6	1	245	32.2	44.8
Storage battery HVAC Module	68	50	1	240	13.6	54.4
Step-up Transformer	60	5	1	240	33.6	26.4
Power Inverter	77	6	1	240	32.0	45.0
Storage battery HVAC Module	68	50	1	240	13.6	54.4
Step-up Transformer	60	5	1	240	33.6	26.4
Power Inverter	77	6	1	240	32.0	45.0
Storage battery HVAC Module	68	50	1	215	12.7	55.3
Step-up Transformer	60	5	1	215	32.7	27.3
Power Inverter	77	6	1	215	31.1	45.9
Storage battery HVAC Module	68	50	1	205	12.3	55.7
Step-up Transformer	60	5	1	205	32.3	27.7
Storage battery HVAC Module	68	50	1	200	12.0	56.0
Step-up Transformer	60	5	1	200	32.0	28.0
Storage battery HVAC Module	68	50	1	200	12.0	56.0
Step-up Transformer	60	5	1	200	32.0	28.0
					Combined Noise Level	**64**

Table 5b
Noise Levels at Eastern Property Line near the East-Central Portion of the Project Site (E2)

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	2220	36.6	26.4
Transformer	60	5	1	2220	52.9	7.1
Inverter	60	32.8	2	2780	38.6	24.4
Transformer	60	5	1	2780	54.9	5.1
Inverter	60	32.8	2	2475	37.6	25.5
Transformer	60	5	1	2475	53.9	6.1
Inverter	60	32.8	2	3055	39.4	23.6
Transformer	60	5	1	3055	55.7	4.3
Inverter	60	32.8	2	2675	38.2	24.8
Transformer	60	5	1	2675	54.6	5.4
Inverter	60	32.8	2	1870	35.1	27.9
Transformer	60	5	1	1870	51.5	8.5
Inverter	60	32.8	2	2130	36.3	26.8
Transformer	60	5	1	2130	52.6	7.4
Inverter	60	32.8	2	2735	38.4	24.6
Transformer	60	5	1	2735	54.8	5.2
Inverter	60	32.8	2	760	27.3	35.7
Transformer	60	5	1	760	43.6	16.4
Inverter	60	32.8	2	705	26.6	36.4
Transformer	60	5	1	705	43.0	17.0
Inverter	60	32.8	2	775	27.5	35.5
Transformer	60	5	1	775	43.8	16.2
Inverter	60	32.8	2	980	29.5	33.5
Transformer	60	5	1	980	45.8	14.2

Table 5b
Noise Levels at Eastern Property Line near the East-Central Portion of the Project Site (E2)

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	1245	31.6	31.4
Transformer	60	5	1	1245	47.9	12.1
Inverter	60	32.8	2	1770	34.6	28.4
Transformer	60	5	1	1770	51.0	9.0
Inverter	60	32.8	2	205	15.9	47.1
Transformer	60	5	1	205	32.3	27.7
Storage battery HVAC Module	68	50	1	665	22.5	45.5
Step-up Transformer	60	5	1	665	42.5	17.5
Power Inverter	77	6	1	665	40.9	36.1
Storage battery HVAC Module	68	50	1	630	22.0	46.0
Step-up Transformer	60	5	1	630	42.0	18.0
Power Inverter	77	6	1	630	40.4	36.6
Storage battery HVAC Module	68	50	1	600	21.6	46.4
Step-up Transformer	60	5	1	600	41.6	18.4
Power Inverter	77	6	1	600	40.0	37.0
Storage battery HVAC Module	68	50	1	680	22.7	45.3
Step-up Transformer	60	5	1	680	42.7	17.3
Power Inverter	77	6	1	680	41.1	35.9
Storage battery HVAC Module	68	50	1	650	22.3	45.7
Step-up Transformer	60	5	1	650	42.3	17.7
Storage battery HVAC Module	68	50	1	615	21.8	46.2
Step-up Transformer	60	5	1	615	41.8	18.2
Storage battery HVAC Module	68	50	1	585	21.4	46.6
Step-up Transformer	60	5	1	585	41.4	18.6
					Combined Noise Level	**56**

Table 5c
Noise Levels at Eastern Property Line near the South Side of the Project Site (E3)

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	2000	35.7	27.3
Transformer	60	5	1	2000	52.0	8.0
Inverter	60	32.8	2	2445	37.4	25.6
Transformer	60	5	1	2445	53.8	6.2
Inverter	60	32.8	2	1990	35.7	27.4
Transformer	60	5	1	1990	52.0	8.0
Inverter	60	32.8	2	2405	37.3	25.7
Transformer	60	5	1	2405	53.6	6.4
Inverter	60	32.8	2	1955	35.5	27.5
Transformer	60	5	1	1955	51.8	8.2
Inverter	60	32.8	2	1875	35.1	27.9
Transformer	60	5	1	1875	51.5	8.5
Inverter	60	32.8	2	2130	36.3	26.8
Transformer	60	5	1	2130	52.6	7.4
Inverter	60	32.8	2	2735	38.4	24.6
Transformer	60	5	1	2735	54.8	5.2
Inverter	60	32.8	2	2015	35.8	27.2
Transformer	60	5	1	2015	52.1	7.9
Inverter	60	32.8	2	1655	34.1	29.0
Transformer	60	5	1	1655	50.4	9.6
Inverter	60	32.8	2	1345	32.3	30.8
Transformer	60	5	1	1345	48.6	11.4
Inverter	60	32.8	2	1010	29.8	33.2
Transformer	60	5	1	1010	46.1	13.9

Table 5c
Noise Levels at Eastern Property Line near the South Side of the Project Site (E3)

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	735	27.0	36.0
Transformer	60	5	1	735	43.3	16.7
Inverter	60	32.8	2	505	23.7	39.3
Transformer	60	5	1	505	40.1	19.9
Inverter	60	32.8	2	1565	33.6	29.4
Transformer	60	5	1	1565	49.9	10.1
Storage battery HVAC Module	68	50	1	2205	32.9	35.1
Step-up Transformer	60	5	1	2205	52.9	7.1
Power Inverter	77	6	1	2205	51.3	25.7
Storage battery HVAC Module	68	50	1	2170	32.7	35.3
Step-up Transformer	60	5	1	2170	52.7	7.3
Power Inverter	77	6	1	2170	51.2	25.8
Storage battery HVAC Module	68	50	1	2135	32.6	35.4
Step-up Transformer	60	5	1	2135	52.6	7.4
Power Inverter	77	6	1	2135	51.0	26.0
Storage battery HVAC Module	68	50	1	2240	33.0	35.0
Step-up Transformer	60	5	1	2240	53.0	7.0
Power Inverter	77	6	1	2240	51.4	25.6
Storage battery HVAC Module	68	50	1	2205	32.9	35.1
Step-up Transformer	60	5	1	2205	52.9	7.1
Storage battery HVAC Module	68	50	1	2170	32.7	35.3
Step-up Transformer	60	5	1	2170	52.7	7.3
Storage battery HVAC Module	68	50	1	2135	32.6	35.4
Step-up Transformer	60	5	1	2135	52.6	7.4
					Combined Noise Level	**47**

Table 5d
Noise Level at Southern Property Line (S1)

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	1229	31.5	31.5
Transformer	60	5	1	1229	47.8	12.2
Inverter	60	32.8	2	1155	30.9	32.1
Transformer	60	5	1	1155	47.3	12.7
Inverter	60	32.8	2	860	28.4	34.6
Transformer	60	5	1	860	44.7	15.3
Inverter	60	32.8	2	729	26.9	36.1
Transformer	60	5	1	729	43.3	16.7
Inverter	60	32.8	2	489	23.5	39.5
Transformer	60	5	1	489	39.8	20.2
Inverter	60	32.8	2	1058	30.2	32.8
Transformer	60	5	1	1058	46.5	13.5
Inverter	60	32.8	2	787	27.6	35.4
Transformer	60	5	1	787	43.9	16.1
Inverter	60	32.8	2	210	16.1	46.9
Transformer	60	5	1	210	32.5	27.5
Inverter	60	32.8	2	2847	38.8	24.2
Transformer	60	5	1	2847	55.1	4.9
Inverter	60	32.8	2	2487	37.6	25.4
Transformer	60	5	1	2487	53.9	6.1
Inverter	60	32.8	2	2213	36.6	26.4
Transformer	60	5	1	2213	52.9	7.1
Inverter	60	32.8	2	1930	35.4	27.6
Transformer	60	5	1	1930	51.7	8.3

Table 5d
Noise Level at Southern Property Line (S1)

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	1697	34.3	28.7
Transformer	60	5	1	1697	50.6	9.4
Inverter	60	32.8	2	1417	32.7	30.3
Transformer	60	5	1	1417	49.0	11.0
Inverter	60	32.8	2	2790	38.6	24.4
Transformer	60	5	1	2790	54.9	5.1
Storage battery HVAC Module	68	50	1	3280	36.3	31.7
Step-up Transformer	60	5	1	3280	56.3	3.7
Power Inverter	77	6	1	3280	54.8	22.2
Storage battery HVAC Module	68	50	1	3251	36.3	31.7
Step-up Transformer	60	5	1	3251	56.3	3.7
Power Inverter	77	6	1	3251	54.7	22.3
Storage battery HVAC Module	68	50	1	3222	36.2	31.8
Step-up Transformer	60	5	1	3222	56.2	3.8
Power Inverter	77	6	1	3222	54.6	22.4
Storage battery HVAC Module	68	50	1	3332	36.5	31.5
Step-up Transformer	60	5	1	3332	56.5	3.5
Power Inverter	77	6	1	3332	54.9	22.1
Storage battery HVAC Module	68	50	1	3303	36.4	31.6
Step-up Transformer	60	5	1	3303	56.4	3.6
Storage battery HVAC Module	68	50	1	3274	36.3	31.7
Step-up Transformer	60	5	1	3274	56.3	3.7
Storage battery HVAC Module	68	50	1	3245	36.2	31.8
Step-up Transformer	60	5	1	3245	56.2	3.8
					Combined Noise Level	**50**

Table 5e
Noise Level at Western Property Line (W1)

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	1006	29.7	33.3
Transformer	60	5	1	1006	46.1	13.9
Inverter	60	32.8	2	569	24.8	38.2
Transformer	60	5	1	569	41.1	18.9
Inverter	60	32.8	2	682	26.4	36.6
Transformer	60	5	1	682	42.7	17.3
Inverter	60	32.8	2	120	11.3	51.7
Transformer	60	5	1	120	27.6	32.4
Inverter	60	32.8	2	570	24.8	38.2
Transformer	60	5	1	570	41.1	18.9
Inverter	60	32.8	2	1348	32.3	30.7
Transformer	60	5	1	1348	48.6	11.4
Inverter	60	32.8	2	1295	31.9	31.1
Transformer	60	5	1	1295	48.3	11.7
Inverter	60	32.8	2	771	27.4	35.6
Transformer	60	5	1	771	43.8	16.2
Inverter	60	32.8	2	2878	38.9	24.1
Transformer	60	5	1	2878	55.2	4.8
Inverter	60	32.8	2	2583	37.9	25.1
Transformer	60	5	1	2583	54.3	5.7
Inverter	60	32.8	2	2389	37.2	25.8
Transformer	60	5	1	2389	53.6	6.4
Inverter	60	32.8	2	2211	36.6	26.4
Transformer	60	5	1	2211	52.9	7.1

Table 5e
Noise Level at Western Property Line (W1)

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	2094	36.1	26.9
Transformer	60	5	1	2094	52.4	7.6
Inverter	60	32.8	2	2021	35.8	27.2
Transformer	60	5	1	2021	52.1	7.9
Inverter	60	32.8	2	2990	39.2	23.8
Transformer	60	5	1	2990	55.5	4.5
Storage battery HVAC Module	68	50	1	3356	36.5	31.5
Step-up Transformer	60	5	1	3356	56.5	3.5
Power Inverter	77	6	1	3356	55.0	22.0
Storage battery HVAC Module	68	50	1	3333	36.5	31.5
Step-up Transformer	60	5	1	3333	56.5	3.5
Power Inverter	77	6	1	3333	54.9	22.1
Storage battery HVAC Module	68	50	1	3309	36.4	31.6
Step-up Transformer	60	5	1	3309	56.4	3.6
Power Inverter	77	6	1	3309	54.8	22.2
Storage battery HVAC Module	68	50	1	3409	36.7	31.3
Step-up Transformer	60	5	1	3409	56.7	3.3
Power Inverter	77	6	1	3409	55.1	21.9
Storage battery HVAC Module	68	50	1	3386	36.6	31.4
Step-up Transformer	60	5	1	3386	56.6	3.4
Storage battery HVAC Module	68	50	1	3363	36.6	31.4
Step-up Transformer	60	5	1	3363	56.6	3.4
Storage battery HVAC Module	68	50	1	3340	36.5	31.5
Step-up Transformer	60	5	1	3340	56.5	3.5
					Combined Noise Level	**53**

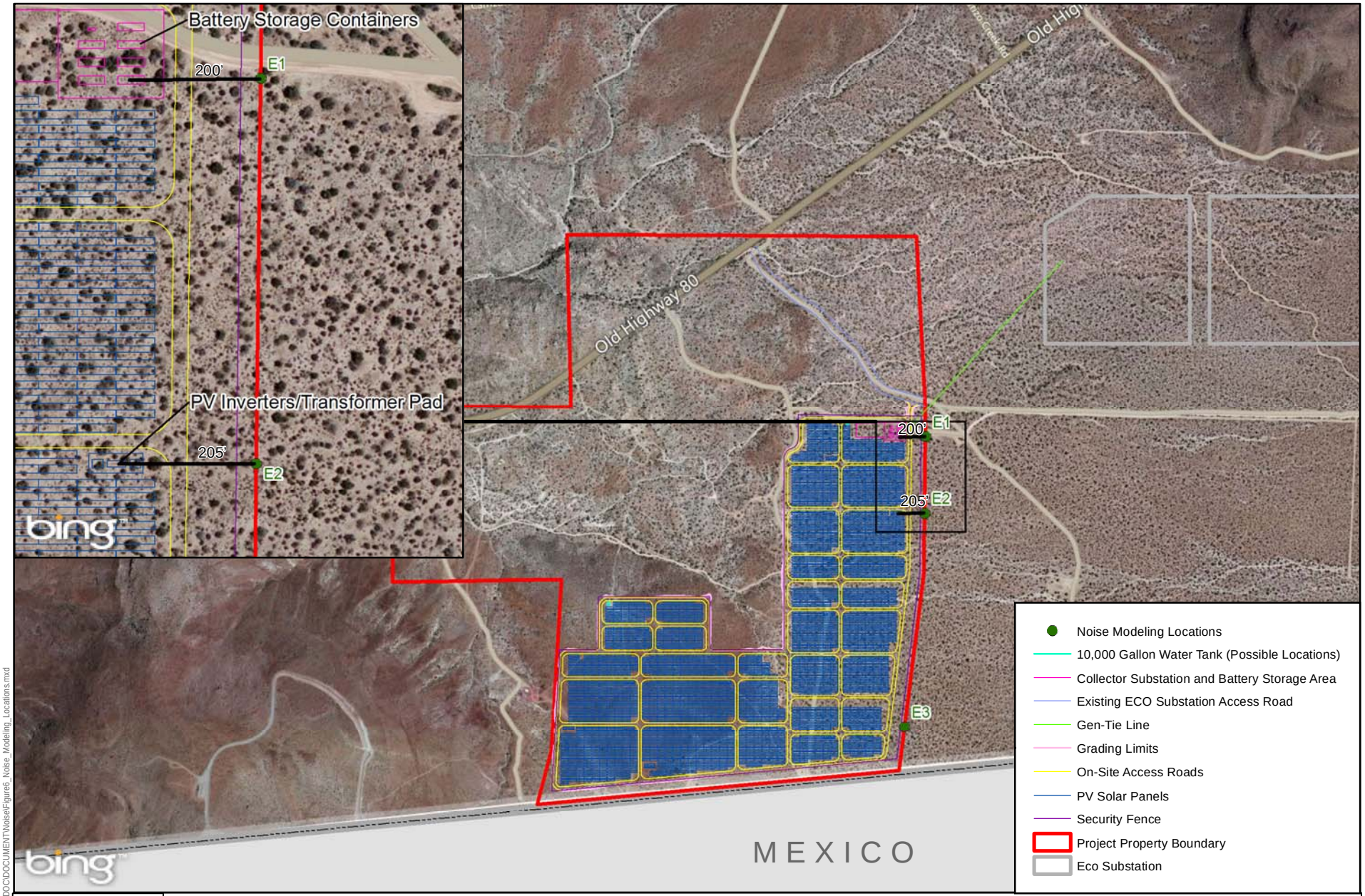

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FIGURE 6

Noise Modeling Locations

Jacumba Solar

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3.2.4 Equipment Noise Levels at Nearest NSLU

The nearest NSLU (a residence) is located approximately 3,700 feet to the north. Using the same methodology as shown above[2], the equipment noise levels at the nearest NSLU would be approximately 42.2 dBA CNEL.

3.2.5 Design Considerations and Mitigation Measures

Significant noise impacts would result from the PV inverters, as well as the HVAC and power inverters associated with the storage battery units. Implementation of the following mitigation measures would reduce the noise impact to a level below significance.

1. For the PV inverters within 1,200 feet of the property lines: Selection of PV inverters that do not exceed 45 dBA L_{eq} noise emission level at the property boundary, such as the GE 4 MVA 1500V inverter, which according to the product engineers produces a noise level of 61.5 dB(A) at a distance of 1 meter, or equivalent device / technology producing this noise level or lower. The proposed inverters shall be located at a distance no closer than shown on the approved plot plan.
2. The Project applicant not install an HVAC system that exceeds 60 dBA at 30 feet.
3. The enclosures containing the storage batteries should be configured in a north-south direction, so as to provide acoustical barrier shielding to the boundary on the east side of the Project. The HVAC units, step-up transformers and power inverters should be located on the west side of the enclosures (estimated to be 8 feet in height) at ground level so as to be completely shielded from a direct line of site to the eastern Project boundary. As shown in Table 6, the barrier shielding from this measure is estimated to provide 12 decibels noise reduction.
4. If new information is provided to prove and certify that the equipment being used is different than what is proposed currently (because of updates in solar technology and the associated equipment choices), than a new analysis which addresses these proposed changes may be prepared and reviewed to the satisfaction of the [PDS, PCC]. The supplemental analysis shall be prepared by a County Approved Noise Consultant and the report shall comply with the Noise Report Format and Content Requirements of the County of San Diego. Any proposed alternative methods, and/or the addition, modification, reduction of the noise measures may be approved if the activities will not result in noise levels greater than 45 dB at the property line (N.O. 36.404). The applicant may be subject to obtaining deviation or modification contingent of the new information provided.

[2] Conservatively neglects additional noise reduction effects from atmospheric absorption and excess attenuation.

Figure 7 presents the re-orientation of the energy storage facility layout to achieve the desired noise reduction.

Tables 7a, 7b and 7c, 7d and 7e present the noise levels with mitigation applied (i.e., quieter PV inverters, quieter HVAC units, reorientation of storage battery enclosures and relocating HVAC, step-up transformers and power inverters such that the enclosures provide acoustical shielding to the eastern Project boundary). As shown, the resultant noise levels would range from 40 dBA at E2 and E3 to 43 dBA at E1; thus, the mitigation measures listed above would result in noise levels below the County's 45 dBA L_{eq} noise ordinance.

Table 6
Barrier Shielding Calculations from Storage Containers[3]

Ray Trace Number/Description	Source-Receiver Distance (ft.)	Source Base Elev. (ft.)	Source Height above Ground (ft.)	Receiver Base Elev. (ft.)	Receiver Height above Ground (ft.)	Horizontal Barrier Dist. (in ref. to source) (ft.)	Barrier Base Elev. (ft.)	Barrier Height (ft.)	Barrier Attenuation (dB)
1. Source -HVAC, Inverter, Transformer	200.0	100.0	5.0	100.0	5.0	5.0	100.0	8.0	12.0
2. Source -HVAC, Inverter, Transformer	205.0	100.0	5.0	100.0	5.0	5.0	100.0	8.0	12.0
3. Source -HVAC, Inverter, Transformer	210.0	100.0	5.0	100.0	5.0	5.0	100.0	8.0	12.0
4. Source -HVAC, Inverter, Transformer	250.0	100.0	5.0	100.0	5.0	5.0	100.0	8.0	12.0
5. Source -HVAC, Inverter, Transformer	255.0	100.0	5.0	100.0	5.0	5.0	100.0	8.0	12.0
6. Source -HVAC, Inverter, Transformer	600.0	100.0	5.0	100.0	5.0	5.0	100.0	8.0	11.9
7. Source -HVAC, Inverter, Transformer	660.0	100.0	5.0	100.0	5.0	5.0	100.0	8.0	11.9
8. Source -HVAC, Inverter, Transformer	675.0	100.0	5.0	100.0	5.0	5.0	100.0	8.0	11.9
9. Source -HVAC, Inverter, Transformer	695.0	100.0	5.0	100.0	5.0	5.0	100.0	8.0	11.9
10. Source -HVAC, Inverter, Transformer	725.0	100.0	5.0	100.0	5.0	5.0	100.0	8.0	11.9

[3] Using the Fresnel equation (Ref. Pg.174, L.L. Beranek)

Table 7a

Noise Level at Eastern Property Line near the Northeast Corner of the Project Site (E1) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	2510	37.7	n/a	25.3
Transformer	60	5	1	2510	54.0	n/a	6.0
Inverter	60	32.8	2	3060	39.4	n/a	23.6
Transformer	60	5	1	3060	55.7	n/a	4.3
Inverter	60	32.8	2	2820	38.7	n/a	24.3
Transformer	60	5	1	2820	55.0	n/a	5.0
Inverter	60	32.8	2	3405	40.3	n/a	22.7
Transformer	60	5	1	3405	56.7	n/a	3.3
Inverter	60	32.8	2	3070	39.4	n/a	23.6
Transformer	60	5	1	3070	55.8	n/a	4.2
Inverter	60	32.8	2	2310	37.0	n/a	26.1
Transformer	60	5	1	2310	53.3	n/a	6.7
Inverter	60	32.8	2	2610	38.0	n/a	25.0
Transformer	60	5	1	2610	54.4	n/a	5.6
Inverter	60	32.8	2	3175	39.7	n/a	23.3
Transformer	60	5	1	3175	56.1	n/a	3.9
Inverter	61.5	3.28	2	690	46.5	n/a	18.1
Transformer	60	5	1	690	42.8	n/a	17.2
Inverter	61.5	3.28	2	915	48.9	n/a	15.6
Transformer	60	5	1	915	45.2	n/a	14.8
Inverter	61.5	3.28	2	1150	50.9	n/a	13.6
Transformer	60	5	1	1150	47.2	n/a	12.8

Table 7a

Noise Level at Eastern Property Line near the Northeast Corner of the Project Site (E1) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	1460	33.0	n/a	30.0
Transformer	60	5	1	1460	49.3	n/a	10.7
Inverter	60	32.8	2	1770	34.6	n/a	28.4
Transformer	60	5	1	1770	51.0	n/a	9.0
Inverter	60	32.8	2	2330	37.0	n/a	26.0
Transformer	60	5	1	2330	53.4	n/a	6.6
Inverter	61.5	3.28	2	600	45.2	n/a	19.3
Transformer	60	5	1	600	41.6	n/a	18.4
Storage battery HVAC Module	60	30	1	245	18.2	12.0	29.8
Step-up Transformer	60	5	1	245	33.8	12.0	14.2
Power Inverter	77	6	1	245	32.2	12.0	32.8
Storage battery HVAC Module	60	30	1	240	18.1	12.0	30.0
Step-up Transformer	60	5	1	240	33.6	12.0	14.4
Power Inverter	77	6	1	240	32.0	12.0	33.0
Storage battery HVAC Module	60	30	1	240	18.1	12.0	30.0
Step-up Transformer	60	5	1	240	33.6	12.0	14.4
Power Inverter	77	6	1	240	32.0	12.0	33.0
Storage battery HVAC Module	60	30	1	215	17.1	12.0	30.9
Step-up Transformer	60	5	1	215	32.7	12.0	15.4
Power Inverter	77	6	1	215	31.1	12.0	33.9
Storage battery HVAC Module	60	30	1	205	16.7	12.0	31.3
Step-up Transformer	60	5	1	205	32.3	12.0	15.8
Storage battery HVAC Module	60	30	1	200	16.5	12.0	31.5
Step-up Transformer	60	5	1	200	32.0	12.0	16.0

Table 7a
Noise Level at Eastern Property Line near the Northeast Corner of the Project Site (E1) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Storage battery HVAC Module	60	30	1	200	16.5	12.0	31.5
Step-up Transformer	60	5	1	200	32.0	12.0	16.0
						Combined Noise Level	**43**

Table 7b
Noise Level at Eastern Property Line near the East-Central Portion of the Project Site (E2) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	2220	36.6	n/a	26.4
Transformer	60	5	1	2220	52.9	n/a	7.1
Inverter	60	32.8	2	2780	38.6	n/a	24.4
Transformer	60	5	1	2780	54.9	n/a	5.1
Inverter	60	32.8	2	2475	37.6	n/a	25.5
Transformer	60	5	1	2475	53.9	n/a	6.1
Inverter	60	32.8	2	3055	39.4	n/a	23.6
Transformer	60	5	1	3055	55.7	n/a	4.3
Inverter	60	32.8	2	2675	38.2	n/a	24.8
Transformer	60	5	1	2675	54.6	n/a	5.4
Inverter	60	32.8	2	1870	35.1	n/a	27.9
Transformer	60	5	1	1870	51.5	n/a	8.5
Inverter	60	32.8	2	2130	36.3	n/a	26.8
Transformer	60	5	1	2130	52.6	n/a	7.4

Table 7b

Noise Level at Eastern Property Line near the East-Central Portion of the Project Site (E2) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	2735	38.4	n/a	24.6
Transformer	60	5	1	2735	54.8	n/a	5.2
Inverter	61.5	3.28	2	760	47.3	n/a	17.2
Transformer	60	5	1	760	43.6	n/a	16.4
Inverter	61.5	3.28	2	705	46.6	n/a	17.9
Transformer	60	5	1	705	43.0	n/a	17.0
Inverter	61.5	3.28	2	775	47.5	n/a	17.0
Transformer	60	5	1	775	43.8	n/a	16.2
Inverter	61.5	3.28	2	980	49.5	n/a	15.0
Transformer	60	5	1	980	45.8	n/a	14.2
Inverter	60	32.8	2	1245	31.6	n/a	31.4
Transformer	60	5	1	1245	47.9	n/a	12.1
Inverter	60	32.8	2	1770	34.6	n/a	28.4
Transformer	60	5	1	1770	51.0	n/a	9.0
Inverter	61.5	3.28	2	205	35.9	n/a	28.6
Transformer	60	5	1	205	32.3	n/a	27.7
Storage battery HVAC Module	60	30	1	665	26.9	11.9	21.2
Step-up Transformer	60	5	1	665	42.5	11.9	5.6
Power Inverter	77	6	1	665	40.9	11.9	24.2
Storage battery HVAC Module	60	30	1	630	26.4	11.9	21.6
Step-up Transformer	60	5	1	630	42.0	11.9	6.1
Power Inverter	77	6	1	630	40.4	11.9	24.7
Storage battery HVAC Module	60	30	1	600	26.0	11.9	22.1
Step-up Transformer	60	5	1	600	41.6	11.9	6.5
Power Inverter	77	6	1	600	40.0	11.9	25.1

Table 7b
Noise Level at Eastern Property Line near the East-Central Portion of the Project Site (E2) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Storage battery HVAC Module	60	30	1	680	27.1	11.9	21.0
Step-up Transformer	60	5	1	680	42.7	11.9	5.4
Power Inverter	77	6	1	680	41.1	11.9	24.0
Storage battery HVAC Module	60	30	1	650	26.7	11.9	21.4
Step-up Transformer	60	5	1	650	42.3	11.9	5.8
Storage battery HVAC Module	60	30	1	615	26.2	11.9	21.8
Step-up Transformer	60	5	1	615	41.8	11.9	6.3
Storage battery HVAC Module	60	30	1	585	25.8	11.9	22.3
Step-up Transformer	60	5	1	585	41.4	11.9	6.7
						Combined Noise Level	**40**

Table 7c
Noise Level at Eastern Property Line near the South Side of the Project Site (E3) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	2000	35.7	n/a	27.3
Transformer	60	5	1	2000	52.0	n/a	8.0
Inverter	60	32.8	2	2445	37.4	n/a	25.6
Transformer	60	5	1	2445	53.8	n/a	6.2
Inverter	60	32.8	2	1990	35.7	n/a	27.4
Transformer	60	5	1	1990	52.0	n/a	8.0

Table 7c
Noise Level at Eastern Property Line near the South Side of the Project Site (E3) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	2405	37.3	n/a	25.7
Transformer	60	5	1	2405	53.6	n/a	6.4
Inverter	60	32.8	2	1955	35.5	n/a	27.5
Transformer	60	5	1	1955	51.8	n/a	8.2
Inverter	60	32.8	2	1875	35.1	n/a	27.9
Transformer	60	5	1	1875	51.5	n/a	8.5
Inverter	60	32.8	2	2130	36.3	n/a	26.8
Transformer	60	5	1	2130	52.6	n/a	7.4
Inverter	60	32.8	2	2735	38.4	n/a	24.6
Transformer	60	5	1	2735	54.8	n/a	5.2
Inverter	60	32.8	2	2015	35.8	n/a	27.2
Transformer	60	5	1	2015	52.1	n/a	7.9
Inverter	60	32.8	2	1655	34.1	n/a	29.0
Transformer	60	5	1	1655	50.4	n/a	9.6
Inverter	60	32.8	2	1345	32.3	n/a	30.8
Transformer	60	5	1	1345	48.6	n/a	11.4
Inverter	61.5	3.28	2	1010	49.8	n/a	14.7
Transformer	60	5	1	1010	46.1	n/a	13.9
Inverter	61.5	3.28	2	735	47.0	n/a	17.5
Transformer	60	5	1	735	43.3	n/a	16.7
Inverter	61.5	3.28	2	505	43.7	n/a	20.8
Transformer	60	5	1	505	40.1	n/a	19.9
Inverter	60	32.8	2	1565	33.6	n/a	29.4
Transformer	60	5	1	1565	49.9	n/a	10.1

Table 7c
Noise Level at Eastern Property Line near the South Side of the Project Site (E3) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Storage battery HVAC Module	60	30	1	2205	37.3	n/a	22.7
Step-up Transformer	60	5	1	2205	52.9	n/a	7.1
Power Inverter	77	6	1	2205	51.3	n/a	25.7
Storage battery HVAC Module	60	30	1	2170	37.2	n/a	22.8
Step-up Transformer	60	5	1	2170	52.7	n/a	7.3
Power Inverter	77	6	1	2170	51.2	n/a	25.8
Storage battery HVAC Module	60	30	1	2135	37.0	n/a	23.0
Step-up Transformer	60	5	1	2135	52.6	n/a	7.4
Power Inverter	77	6	1	2135	51.0	n/a	26.0
Storage battery HVAC Module	60	30	1	2240	37.5	n/a	22.5
Step-up Transformer	60	5	1	2240	53.0	n/a	7.0
Power Inverter	77	6	1	2240	51.4	n/a	25.6
Storage battery HVAC Module	60	30	1	2205	37.3	n/a	22.7
Step-up Transformer	60	5	1	2205	52.9	n/a	7.1
Storage battery HVAC Module	60	30	1	2170	37.2	n/a	22.8
Step-up Transformer	60	5	1	2170	52.7	n/a	7.3
Storage battery HVAC Module	60	30	1	2135	37.0	n/a	23.0
Step-up Transformer	60	5	1	2135	52.6	n/a	7.4
						Combined Noise Level	**40**

Table 7d
Noise Level at Southern Property Line (S1) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	1229	31.5	n/a	31.5
Transformer	60	5	1	1229	47.8	n/a	12.2
Inverter	61.5	3.28	2	1155	50.9	n/a	13.6
Transformer	60	5	1	1155	47.3	n/a	12.7
Inverter	61.5	3.28	2	860	48.4	n/a	16.1
Transformer	60	5	1	860	44.7	n/a	15.3
Inverter	61.5	3.28	2	729	46.9	n/a	17.6
Transformer	60	5	1	729	43.3	n/a	16.7
Inverter	61.5	3.28	2	489	43.5	n/a	21.0
Transformer	60	5	1	489	39.8	n/a	20.2
Inverter	61.5	3.28	2	1058	50.2	n/a	14.3
Transformer	60	5	1	1058	46.5	n/a	13.5
Inverter	61.5	3.28	2	787	47.6	n/a	16.9
Transformer	60	5	1	787	43.9	n/a	16.1
Inverter	61.5	3.28	2	210	36.1	n/a	28.4
Transformer	60	5	1	210	32.5	n/a	27.5
Inverter	60	32.8	2	2847	38.8	n/a	24.2
Transformer	60	5	1	2847	55.1	n/a	4.9
Inverter	60	32.8	2	2487	37.6	n/a	25.4
Transformer	60	5	1	2487	53.9	n/a	6.1
Inverter	60	32.8	2	2213	36.6	n/a	26.4
Transformer	60	5	1	2213	52.9	n/a	7.1

Table 7d
Noise Level at Southern Property Line (S1) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	1930	35.4	n/a	27.6
Transformer	60	5	1	1930	51.7	n/a	8.3
Inverter	60	32.8	2	1697	34.3	n/a	28.7
Transformer	60	5	1	1697	50.6	n/a	9.4
Inverter	60	32.8	2	1417	32.7	n/a	30.3
Transformer	60	5	1	1417	49.0	n/a	11.0
Inverter	60	32.8	2	2790	38.6	n/a	24.4
Transformer	60	5	1	2790	54.9	n/a	5.1
Storage battery HVAC Module	68	50	1	3280	36.3	n/a	31.7
Step-up Transformer	60	5	1	3280	56.3	n/a	3.7
Power Inverter	77	6	1	3280	54.8	n/a	22.2
Storage battery HVAC Module	68	50	1	3251	36.3	n/a	31.7
Step-up Transformer	60	5	1	3251	56.3	n/a	3.7
Power Inverter	77	6	1	3251	54.7	n/a	22.3
Storage battery HVAC Module	68	50	1	3222	36.2	n/a	31.8
Step-up Transformer	60	5	1	3222	56.2	n/a	3.8
Power Inverter	77	6	1	3222	54.6	n/a	22.4
Storage battery HVAC Module	68	50	1	3332	36.5	n/a	31.5
Step-up Transformer	60	5	1	3332	56.5	n/a	3.5
Power Inverter	77	6	1	3332	54.9	n/a	22.1
Storage battery HVAC Module	68	50	1	3303	36.4	n/a	31.6
Step-up Transformer	60	5	1	3303	56.4	n/a	3.6
Storage battery HVAC Module	68	50	1	3274	36.3	n/a	31.7
Step-up Transformer	60	5	1	3274	56.3	n/a	3.7

Table 7d
Noise Level at Southern Property Line (S1) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Storage battery HVAC Module	68	50	1	3245	36.2	n/a	31.8
Step-up Transformer	60	5	1	3245	56.2	n/a	3.8
						Combined Noise Level	**43**

Table 7e
Noise Level at Western Property Line (W1) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	61.5	3.28	2	1006	49.7	n/a	14.8
Transformer	60	5	1	1006	46.1	n/a	13.9
Inverter	61.5	3.28	2	569	44.8	n/a	19.7
Transformer	60	5	1	569	41.1	n/a	18.9
Inverter	61.5	3.28	2	682	46.4	n/a	18.1
Transformer	60	5	1	682	42.7	n/a	17.3
Inverter	61.5	3.28	2	120	31.3	n/a	33.2
Transformer	60	5	1	120	27.6	n/a	32.4
Inverter	61.5	3.28	2	570	44.8	n/a	19.7
Transformer	60	5	1	570	41.1	n/a	18.9
Inverter	60	32.8	2	1348	32.3	n/a	30.7
Transformer	60	5	1	1348	48.6	n/a	11.4

Table 7e
Noise Level at Western Property Line (W1) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Inverter	60	32.8	2	1295	31.9	n/a	31.1
Transformer	60	5	1	1295	48.3	n/a	11.7
Inverter	61.5	3.28	2	771	47.4	n/a	17.1
Transformer	60	5	1	771	43.8	n/a	16.2
Inverter	60	32.8	2	2878	38.9	n/a	24.1
Transformer	60	5	1	2878	55.2	n/a	4.8
Inverter	60	32.8	2	2583	37.9	n/a	25.1
Transformer	60	5	1	2583	54.3	n/a	5.7
Inverter	60	32.8	2	2389	37.2	n/a	25.8
Transformer	60	5	1	2389	53.6	n/a	6.4
Inverter	60	32.8	2	2211	36.6	n/a	26.4
Transformer	60	5	1	2211	52.9	n/a	7.1
Inverter	60	32.8	2	2094	36.1	n/a	26.9
Transformer	60	5	1	2094	52.4	n/a	7.6
Inverter	60	32.8	2	2021	35.8	n/a	27.2
Transformer	60	5	1	2021	52.1	n/a	7.9
Inverter	60	32.8	2	2990	39.2	n/a	23.8
Transformer	60	5	1	2990	55.5	n/a	4.5
Storage battery HVAC Module	68	50	1	3356	36.5	n/a	31.5
Step-up Transformer	60	5	1	3356	56.5	n/a	3.5
Power Inverter	77	6	1	3356	55.0	n/a	22.0

Table 7e
Noise Level at Western Property Line (W1) with Mitigation Measures

Source	Source Noise Level (dB)	Source Reference Distance (ft.)	Number of Units	Distance to Nearest Property Line (ft.)	Distance Attenuation (dB)	Shielding Attenuation (dB)	One-Hour Average Noise Level at Property Line (dB)
Storage battery HVAC Module	68	50	1	3333	36.5	n/a	31.5
Step-up Transformer	60	5	1	3333	56.5	n/a	3.5
Power Inverter	77	6	1	3333	54.9	n/a	22.1
Storage battery HVAC Module	68	50	1	3309	36.4	n/a	31.6
Step-up Transformer	60	5	1	3309	56.4	n/a	3.6
Power Inverter	77	6	1	3309	54.8	n/a	22.2
Storage battery HVAC Module	68	50	1	3409	36.7	n/a	31.3
Step-up Transformer	60	5	1	3409	56.7	n/a	3.3
Power Inverter	77	6	1	3409	55.1	n/a	21.9
Storage battery HVAC Module	68	50	1	3386	36.6	n/a	31.4
Step-up Transformer	60	5	1	3386	56.6	n/a	3.4
Storage battery HVAC Module	68	50	1	3363	36.6	n/a	31.4
Step-up Transformer	60	5	1	3363	56.6	n/a	3.4
Storage battery HVAC Module	68	50	1	3340	36.5	n/a	31.5
Step-up Transformer	60	5	1	3340	56.5	n/a	3.5
						Combined Noise Level	**43**

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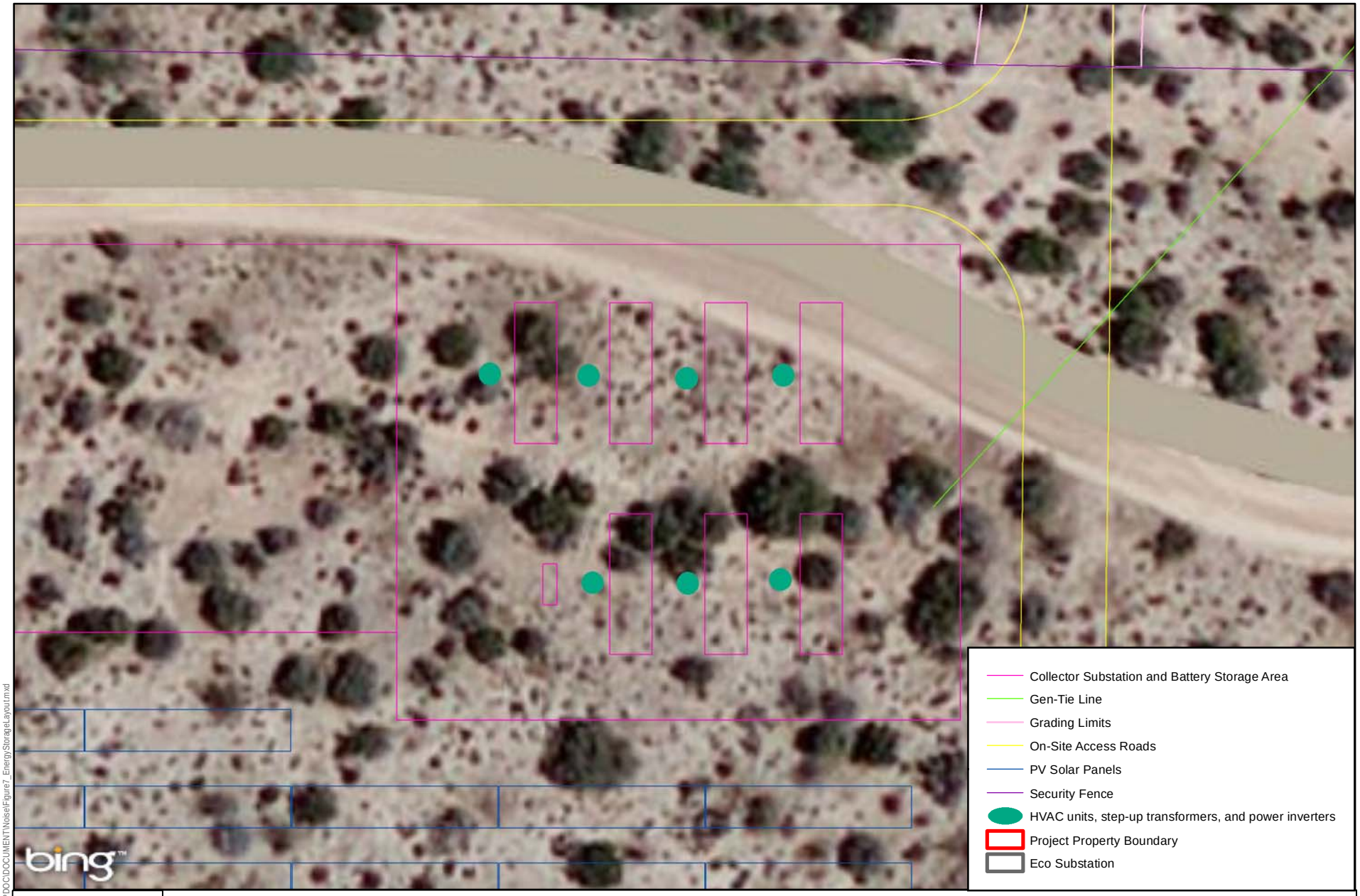

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FIGURE 7

Re-Oriented Energy Storage Facility Layout

Jacumba Solar

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3.3 Construction Noise and Impacts

The construction of the solar facility would consist of several phases, including site preparation (described below), development of staging areas and site access roads, solar array assembly and installation, and construction of electrical transmission facilities.

Clearing and Grading. Construction of the Proposed Project would involve clearing and grubbing of the existing vegetation; grading necessary for the construction of access and service roads and the installation of solar arrays; trenching for the electrical DC and AC collection system including the telecommunication lines; installation of the inverter stations; construction of underground 34.5 kV collection systems leading to the Project substation; and construction of the Project substation and the gen-tie line from the Project substation to the adjacent ECO Substation. Major Grading Permits would be required, and would be obtained once grading quantities are finalized. There would be approximately 6,300 cubic yards of imported soils to the Proposed Project site.

Collection System Trenching. Trenching requirements for the DC electrical collection system and telecommunication lines would consist of a trench up to approximately 3 to 4 feet deep and 1 to 2 feet wide. The trenches may be filled with sand or another inert material to provide insulation and heat dissipation for the direct buried cable within the collection system. The topsoil from trench excavation would be set aside before the trench is backfilled and would ultimately comprise the uppermost layer of the trench. Excessive material from the foundation and trench excavations would be used for site leveling.

PV System Construction Overview. Project construction would include several phases occurring simultaneously with the construction of: (1) PV systems assembly consisting of pile driving of support racks and the placement of panels on support racks, (2) trenching and installation of the DC and AC collection system; (3) point of interconnection upgrades; and (4) the grading of access roads.

Soil Stabilization. In order to reduce fugitive dust and erosion, the disturbed areas on each site would either be treated in one of the following methods, or a combination of both: treatment with a permeable nontoxic soil binding agent (preferred method), and/or placement of decomposed granite or other base material.

Off-Site Construction Work Connecting to the ECO SubStation Project. Project construction would include a 138 kV overhead transmission line (gen-tie) to connect the project substation to the ECO Substation (approximately 1,500 feet) within a 125 foot wide right-of-way (ROW). The Jacumba Solar gen-tie line would extend overhead directly northeast from the on-

site substation to the ECO Substation, and would consist of two or three overhead steel poles that would be up to 150 feet in height. Span lengths would generally be between 400 and 800 feet. Each pole pad would require an approximately 20-foot by 20-foot permanent impact area (<0.01 acre) and an approximately 100-foot by 100-foot temporary impact area (0.23 acres per pole pad) that could be used as an equipment laydown area during construction. A transition pole would be constructed at the interconnection point at the ECO Substation.

Construction Personnel, Traffic, and Equipment. The number of workers expected on the site during construction would vary over the construction period and is expected to average up to approximately 120 each day, generating about 60 daily round trips. Deliveries of equipment and supplies to the site would also vary over the construction period but are expected to average about 5 to 7 daily trips.

It is assumed that all employees would arrive within the morning peak hour and depart within the evening peak hour, and delivery truck trips would be distributed evenly throughout a 12-hour-shift day, between the hours of 7 a.m. and 7 p.m. Since the surrounding area is rural, traffic is very low on the local roads surrounding the Project site(s). Implementation of the Proposed Project would result in a temporary increase in traffic along these roads, but not to the level of the road carrying capacity or to such an extent as to result in a significant noise impact at a NSLU. No road closures are anticipated during Project construction. A Traffic Control Plan to ensure safe and efficient traffic flow in the area and on the Project sites would be prepared prior to construction. The Traffic Control Plan would be prepared in consultation with the County of San Diego and would contain project-specific measures for noticing, signage, policy guidelines, and the limitation of lane closures to off-peak hours (although it is noted that no requirement for lane closures has been identified).

During the peak of construction, a typical day would include the transportation of parts, movement of heavy equipment, and transportation of materials.

Noise from Construction

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. The maximum noise level ranges for various pieces of construction equipment at a distance of 50 feet are depicted in Table 7. 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. 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).

Table 7
Construction Equipment Noise Emission Levels

Equipment Type	"Typical" Equipment dBA at 50 feet	"Quiet"[1] Equipment dBA at 50 feet
Air compressor	81	71
Backhoe	85	80
Concrete pump	82	80
Concrete vibrator	76	70
Crane	88	80
Dozer	87	83
Generator	78	71
Loader	84	80
Paver	88	80
Pneumatic tools	85	75
Water pump	76	71
Power hand saw	78	70
Shovel	82	80
Trucks	88	83

The property boundaries of the closest residences are located approximately 3,700 feet north of the Project site. 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 2,000 to 3,500 feet from the same property perimeter. With the exception of the pile driving activities discussed in Section 3.4, Impulsive Noise Impacts, the construction activities would comply with the County's 75 dB standard at the property lines.

As an example, the most intense noise generation from construction is expected to be associated with earthmoving activity to produce level ground for the installation. A combination of dozer and loader working together would generate a maximum noise level of approximately 88 dB at a distance of 50 feet. At a distance of 3,700 feet, which is the shortest distance between

earthmoving activity and the property boundary of any occupied residence, the maximum noise level from earthmoving would be approximately 50 dB.

Assuming earthmoving along any single property boundary abutting the site occurs for not more than 50% of an hour, the average hourly noise level would be approximately 85 dB at 50 feet from the equipment or 47 dB[4] at 3,700 feet, the distance to the closest residential property boundaries. Similarly, the 138 kV gen-tie line work would be approximately 3,300 feet or greater from the closest residential property. Assuming a conservative average hourly noise level of 85 dB at 50 feet, the resultant noise level would be approximately 49 dB. Thus, construction noise would be compliant with the County's construction noise criterion and would result in a less than significant noise impact.

3.4 Potential Impulsive Noise Impacts

Each tracker would be installed on 4- to 6-inch diameter pipes or beams. The beams would be driven into the soil using a pile/vibratory/rotary driving technique similar to that used to install freeway guardrails. Most foundations would be driven to approximate depths of 10 to 15 feet deep.

It is anticipated that a RGT Model RG21T vibratory pile driver or comparable would be used. 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 also allows for complications in a more rocky terrain. Based upon data provided by the equipment vendor for this product and prior project experience, this size and type of equipment is anticipated to generate a maximum noise level of approximately 85 to 92 dBA at a distance of 50 feet. At a distance of 3,700 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 47 to 54 dB.[5]

Assuming pile driving occurs for approximately 20% of an hour at each tracker site, the average hourly noise level would be approximately 78 to 85 dB at 50 feet from the pile driver or 41 to 48 dB[2] at 3,700 feet, the distance to the closest residential property boundaries to the pile driving locations. Thus, noise from pile driving would comply with the County's impulsive noise criterion and would result in a less than significant noise impact.

Impulsive Noise at Non-Conforming Use/Structure. An unauthorized, non-conforming land use in the form of a residential trailer exists approximately 300 feet northwest of the Project site boundary, within the Project property. Using the same assumptions as above (i.e., maximum noise level of approximately 92 dB at 50 feet and 20% duty cycles, construction noise at this

[4] Neglecting additional noise reduction from atmospheric absorption, terrain shielding, etc.
[5] Neglecting additional noise reduction from atmospheric absorption, terrain shielding, etc.

location would be approximately 69 dBA and thus construction noise would be compliant with the County's impulsive noise criterion and would result in a less-than-significant noise impact.

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4 SUMMARY OF PROJECT IMPACTS, DESIGN CONSIDERATIONS, NOISE MITIGATION, AND CONCLUSIONS

Noise impacts associated with the Proposed Project include outdoor mechanical equipment noise. The proposed equipment associated with the storage battery system would result in a significant noise impact at the adjacent eastern property boundary unless mitigated. Additionally, the PV inverters nearest the project boundaries (within 1,200 feet) would result in a significant noise impact unless mitigated. The noise associated with the storage battery system could be mitigated by configuring the storage battery enclosures so as to provide barrier shielding to the east from the HVAC, step-up transformers and power inverters and specifying quieter HVAC systems. The PV inverters/within 1,200 feet of the Project boundaries could be mitigated by specifying transformers with a lower noise emission level or quieter technology with similarly lower noise levels.

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5 CERTIFICATION

This report has been prepared by Mike Greene, a County of San Diego-approved CEQA Consultant for Acoustics.

Mike Greene, INCE Bd. Cert.
Environmental Specialist/Acoustician

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APPENDIX A

Definitions

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Definitions

Term	Definition
ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-weighted sound level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
community noise equivalent level (CNEL)	CNEL is the A-weighted equivalent continuous sound exposure level for a 24-hour period with a 10 dB adjustment added to sound levels occurring during the nighttime hours (10 p.m. to 7 a.m.) and 5 dB added to the sound during the evening hours (7 p.m. to 10 p.m.).
decibel (dB)	A unit for measuring sound pressure level and is equal to 10 times the logarithm to the base 10 of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micropascals.
equivalent continuous sound level (L_{eq})	The sound level corresponding to a steady state sound level containing the same total energy as a varying signal over a given sample period. L_{eq} is designed to average all of the loud and quiet sound levels occurring over a time period.
maximum A-weighted sound level (L_{max})	The greatest sound level measured on a sound level (L_{max}) meter during a designated time interval or event using fast time-averaging and A-weighting.

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