ACOUSTICAL ASSESSMENT REPORT
Rugged Solar LLC Project
Environmental Review Project Number 3910-120005
Major Use Permit 3300-12-007
Boulevard, San Diego County, California

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EXECUTIVE SUMMARY

Dudek has prepared this noise analysis report for the Rugged Solar LLC 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 Rugged Solar LLC project would produce up to 80 megawatts (MW) of solar energy on 765 acres in southeastern San Diego County near the unincorporated community of Boulevard, California. The project would include a limited length gen-tie electrical transmission line from the Rugged Solar LLC site to the Boulevard rebuilt substation.

Noise impacts associated with the proposed project include outdoor mechanical equipment noise and short-term construction activities. The proposed inverters would result in a significant noise impact at the adjacent property lines, as would the operations and maintenance building. The inverter noise could be mitigated by placing all the inverters within an enclosure, or placing them a minimum distance of 800 feet from the adjacent property lines. Noise from the operations and maintenance building would be within the County noise standards. The project includes several design features to address noise from panel washing activity, including retrofit of the proposed IPC Eagle Wash Station to include an acoustic enclosure for the engine, panel washing operations in a north-south direction, and prohibition of the wash station itself within a specified distance (130 feet) from any adjacent eastern or western property lines with occupied residences.

The proposed use of vibratory pile driver, with pre-drilling where bedrock occurs, to install support masts for panel arrays would generate noise levels which would comply with applicable portions of the County's noise ordinance. Noise abatement measures pertinent to construction nuisance noise avoidance have been incorporated for general project construction.

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1.0 INTRODUCTION

1.1 Project Description

The proposed Rugged Solar LLC Project (Project) would produce up to 80 megawatts (MW) of solar energy and would consist of approximately 3,588 concentrating photovoltaic (CPV) trackers on 765 acres in southeastern San Diego County near the unincorporated community of Boulevard, California. The project includes a Major Use Permit (MUP) to authorize a Major Impact Utility Pursuant to Sections 1350, 2705, and 2926 of the Zoning Ordinance.

Individual tracker dimensions are approximately 48 feet across by 25 feet tall. Each CPV Tracker unit would be mounted on a 28-inch steel mast (steel pole), which would be supported by either: (1) inserting the mast into a hole up to 20 feet deep and encasing it in concrete, (2) vibrating the mast into the ground up to 20 feet deep, or (3) attaching the mast to a concrete foundation sized to adequately support the trackers based on wind loading and soil conditions at the site.

In its most vertical position and depending on foundation design, the top of each tracker would not exceed 30 feet above grade, and the lower edge would not be less than 1 foot above ground level. In its horizontal "stow" mode (for high winds), each tracker would have a minimum ground clearance of 13 feet 6 inches.

The Rugged solar farm project includes total installation of 3,588 trackers installed in groups or building blocks, with any of the following inverter combinations: two 630 kW inverters, and either two 680 kW inverters or three 680 kW inverters, and either a 1.5 MVA or 2.0 MVA transformer. Trackers on the site are grouped into approximately 59 building blocks.

Power from the CPV system in each Building Block would be delivered from each tracker to a conversion station through a 1,000 volt DC underground collection system. The underground 1,000 V DC collection system construction footprint would include a trench of one to two feet in width and a depth of up to approximately four feet.. Each set of inverters would be equipped with a step-up transformer to convert the power from 350 V AC on the "low side" to 34,500 V (34.5 kV) on the "high side." An alternative inverter and transformer configuration may be used, with negligible difference in appearance. It is uncertain if a two 680 kV inverter configuration or a three 680 kV inverter configuration would be utilized. Therefore, the project has been sized to accommodate the larger of the two configurations, which is 10 feet by 40 feet (400 square feet), with an approximate height of 12 feet (including inverter enclosure). The smaller option is 10 feet by 25 feet (250 square feet). The inverter stations would include a 7-foot by 7-foot UPS cabinet.

Power from the on-site private substation would be delivered to the 69 kV bus at SDG&E's proposed Rebuilt Boulevard Substation via the Tule Wind Energy project (MUP 3300-09-019) gen-tie alignment (Tule gen-tie) as adopted by the Board of Supervisors on August 8, 2012. The 138 kV gen-tie for the Tule Wind Energy project includes a 69 kV undersling line, which will be used to service the Rugged solar farm. The Tule gen-tie will run south along the east side of McCain Valley Road and SDG&E's Sunrise Powerlink and across I-8, after which it will cross McCain Valley Road and run parallel to Old Highway 80 along the north side until it crosses Old Highway 80 at the proposed new SDG&E Boulevard East Substation. Both the Rebuilt Boulevard Substation and Tule gen-tie were subject to prior environmental analysis. Rugged Solar LLC and Tule Wind LLC have a joint-use agreement in place for use of the gen-tie line, associated transmission towers, and access road.

The major components of the on-site substation are as follows:

- One 52.8/70.4/88 MVA rated step-up transformer. The cooling system for the transformer is as follows: Oil Assist/Fan Assist/Fan Assist (OA/FA/FA), respectively.
- One circuit breaker used to protect equipment from an electrical short circuit.
- One disconnect switch.
- Wire, cables, and aluminum bus work used to connect and isolate the major pieces of equipment.
- One 15-foot by 30-foot (450-square-foot) control house that would contain relays used to detect short circuits, equipment controls, communication equipment used to monitor system performance remotely, and the meters used to measure electrical power generated from the project.

A 4-acre O&M annex site would be located in the north-central portion of the site and would house operations and maintenance supplies, telecommunications equipment and restroom facilities all within a single-story building. It is anticipated that in-place tracker washing would occur every 6–8 weeks during evening or nighttime hours, between sunset and sunrise, when all tracker assemblies are aligned in a westerly facing direction (i.e., overnight storage position). Tracker washing will be undertaken using an IPC Eagle Wash Station. On-site water storage tanks may be installed to facilitate washing.

Project construction would consist of several phases including site preparation, development of staging areas and site access roads, solar CPV assembly and installation, and construction of on-site electrical transmission facilities. After site preparation, initial project construction would include the development of the staging and assembly areas, and the grading of site access roads

for initial CPV installation. The construction period would be 12 months and add approximately 160 average daily trips (ADT) to the local roadway system. Construction staging and material lay-down areas would be distributed across the Project site evenly to allow for efficient distribution of components to different parts of the Project. One staging and material lay-down area is typically set up for every 250 acres of a project site.

The construction of the proposed facilities would require a substantial concrete supply; therefore, a temporary portable concrete batch plant would be established on the project site to minimize truck transport of concrete from a permanent concrete plant, which would be a substantial distance away due the project site's remote location. The concrete batch plant complex will consist of a mixing plant, areas for sand and gravel stockpiles, an access road, and truck load out and truck turnaround areas. The mixing plant itself will consist of cement storage silos, water and mixture tanks, rock crushers, gravel hoppers, and conveyors to deliver different materials. The Applicant would crush existing aggregate materials obtained from within the development footprint.

The temporary batch plant and rock crushing facility will be located on approximately 10 acre portion of the project site, location as yet undetermined. The concrete batch plant and rock crushing facility is proposed to operate throughout the construction of the proposed project and will be decommissioned following installation of project facilities. The plant footprint following decommissioning is ultimately anticipated to consist of solar trackers. The facility will operate in accordance with the County of San Diego Noise Ordinance, which limits construction noise to the hours of 7:00 a.m.–7:00 p.m., Monday through Saturday. Temporary lights may be used if the plant needs to operate at night within the allowable construction hours permitted by the County. Lamps and their location will be designed to reduce light pollution to off-site land uses.

Heavy equipment employed in this batch plant/rock crushing facility will include front end loaders, bottom dump trucks, rap bins, conveyor belts, collectors, scalping screen, feeders and drum mixer. Stockpiles will be located throughout the site consisting of fine and course aggregate. Either one temporary pond or up to ten 12,000-gallon temporary water storage tanks may be installed to support water needs for the batch plant.

1.2 Environmental Settings and Existing Conditions

1.2.1 Regional and Local Setting

The project site is located approximately 1.25 miles north of I-8, extending roughly 2 miles between Ribbonwood Road and McCain Valley Road. Figure 1 depicts the regional location and Figure 2 depicts the project vicinity. The project site encompasses approximately 765 acres; property in the vicinity of the project site also consists of larger parcels, as depicted in Figure 3.

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, see Figure 4. The nearest noise-sensitive land uses (NSLUs) are single-family residences located around the Project site. Four NSLUs have been identified as the most likely to be impacted by Project operations. Refer to Figure 4 and Table 1, below.

Table 1
Project Vicinity Noise-Sensitive Land Uses

ID	Address	Type	Distance from Project Site
NSLU 1	Southwest Boundary	Single-Family Residence	Adjoining (structure 475 feet)
NSLU 2	Southwest Boundary	Single-Family Residence	Adjoining (structure 350 feet)
NSLU 3	Northwest Boundary	Single-Family Residence	Adjoining (structure 725 feet)
NSLU 4	Northeast Corner	Single-Family Residence	Adjoining (structure 600 feet)

1.2.2 Existing Noise Conditions

The Rugged solar electrical generation site is located along the north side of Interstate 8 (I-8) within approximately 2,000 feet of this freeway facility. In order to characterize the ambient noise environmental surrounding and containing the project site, a total of six ambient noise measurements were taken on October 25 and 26, 2011, by AECOM (AECOM 2012). The locations of the noise measurements are shown in Figure 5. A summary of the measurements is presented in Table 2. All six measurements were taken at, or adjacent to, the Project site (see Figure 5). Noise Measurement (NM) 1 (NM1) was taken at the Central Rugged Site, at the southwest end of the runway. NM2 was taken on McCain Valley Road at the north end of the site. NM3 was taken on McCain Valley Road at the south end of the site. NM4 was taken approximately 250 feet west of NM3 on the southeast side of the Project site. NM5 was taken at the gate at the east end of Roadrunner Lane. NM6 was taken at the intersection of Roadrunner Lane and Ribbonwood Road.

Table 2
Noise Measurement Data

Site ID*	Location	Start Time	dBA				Noise Sources
			L_{eq}	L_{max}	L_{min}	L_{90}	
NM1	Central Rugged Site, Southwest End of Runway	11:19 a.m.	39.8	52.7	34.3	34.6	Traffic on I-8
NM2	McCain Valley Road, North End of Site	12:05 p.m.	38.8	50.4	34.0	34.4	Traffic on I-8
NM3	McCain Valley Road, South End of Site	12:36 p.m.	50.0	65.1	34.6	38.8	Traffic on I-8

Table 2
Noise Measurement Data

Site ID*	Location	Start Time	dBA				Noise Sources
			L_{eq}	L_{max}	L_{min}	L_{90}	
NM4	250 Feet West of McCain Valley Road, Southeast Site	1:49 p.m.	45.5	58.0	38.1	41.4	Traffic on I-8
NM5	Gate at East End of Roadrunner Lane	2:28 p.m.	40.1	51.9	34.7	35.3	Traffic on I-8
NM6	Roadrunner Lane and Ribbonwood Road	2:59 p.m.	48.8	71.5	34.7	41.0	Traffic on I-8

* The Site ID corresponds to locations shown in Figure 5.
L_{eq}: Average noise level for the measurement period
L_{max}: Maximum noise level for the measurement period
L_{min}: Minimum noise level for the measurement period
L_{90}: Noise level exceeded 90% of the time during the measurement period

Source: AECOM 2011

The dominant noise source at the Project site is traffic noise from I-8, with additional traffic noise attributed to local roadways. Ranges in background noise levels can be determined based on the L90 measurements for each location. Background noise levels at the Project site measured between 34–41 dBA L90.

1.3 Methodology and Equipment

1.3.1 Noise Measuring Methodology and Procedures

Noise measurements were conducted at the site to determine the existing noise level. The measurements were made using a calibrated Larson-Davis Model 820 sound-level meter 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 1 precision sound level meter. The sound level meter was positioned at a height of approximately 5 feet above the ground.

Noise levels resulting from the outdoor mechanical equipment are 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.–7:00 a.m., and 5 dB added to the noise during the evening hours from 7:00 p.m.–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: AECOM 2012

FIGURE 1
Regional Map

Rugged Solar LLC Project–Acoustical Assessment Report

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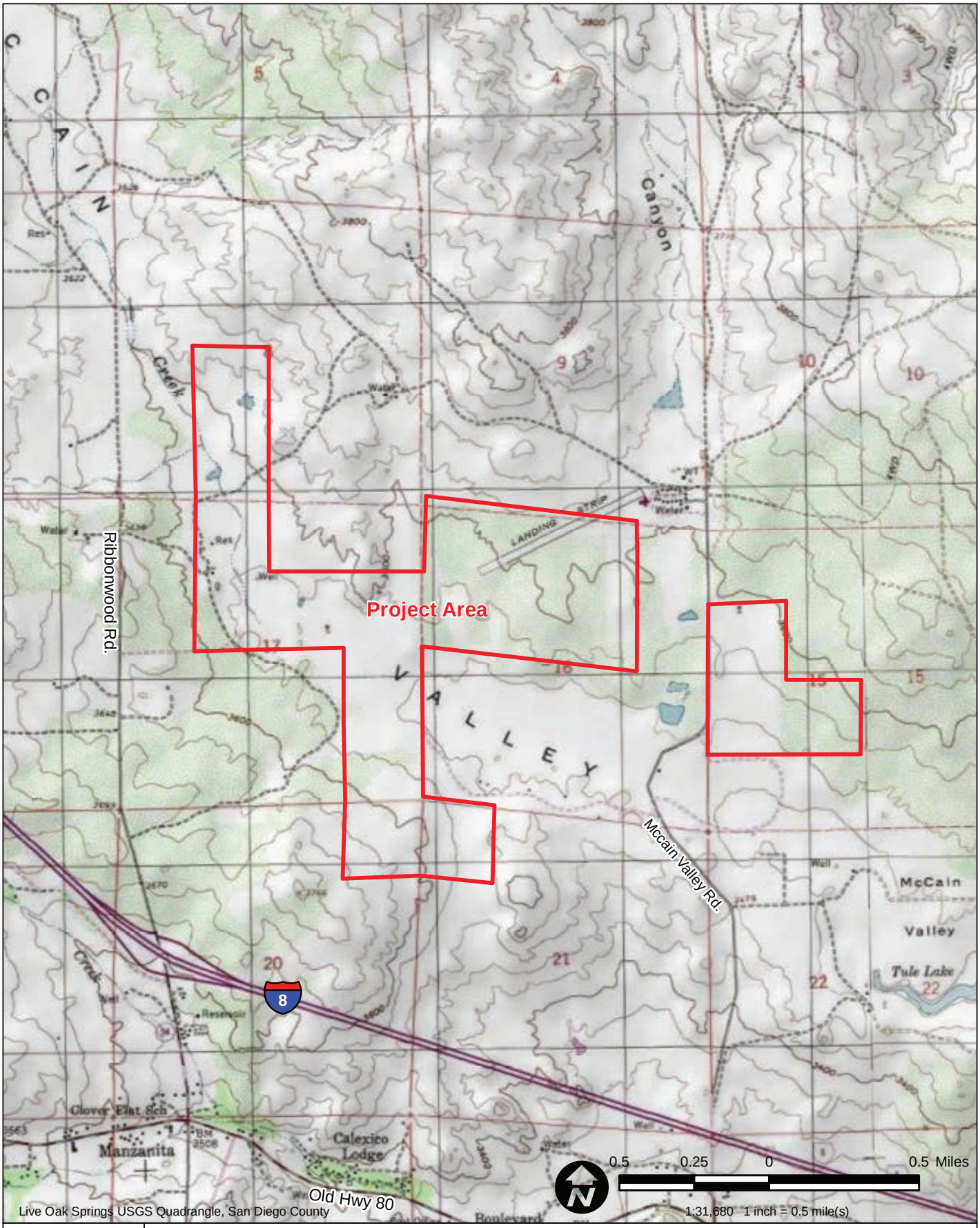

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SOURCE: AECOM 2012

FIGURE 2
Vicinity Map

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Rugged Solar LLC Project–Acoustical Assessment Report

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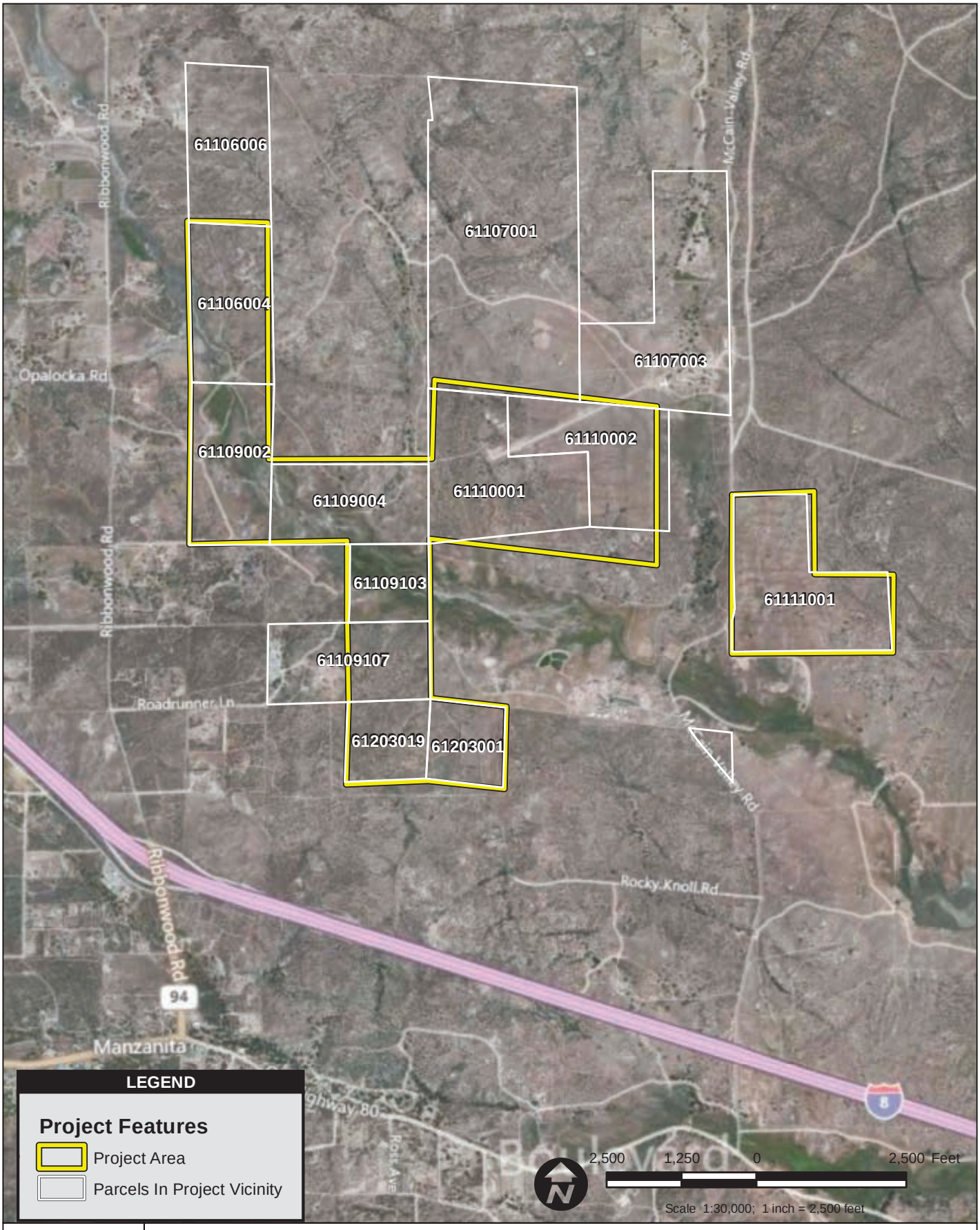

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SOURCE: AECOM 2012

FIGURE 3

Aerial View of Project Area

Rugged Solar LLC Project–Acoustical Assessment Report

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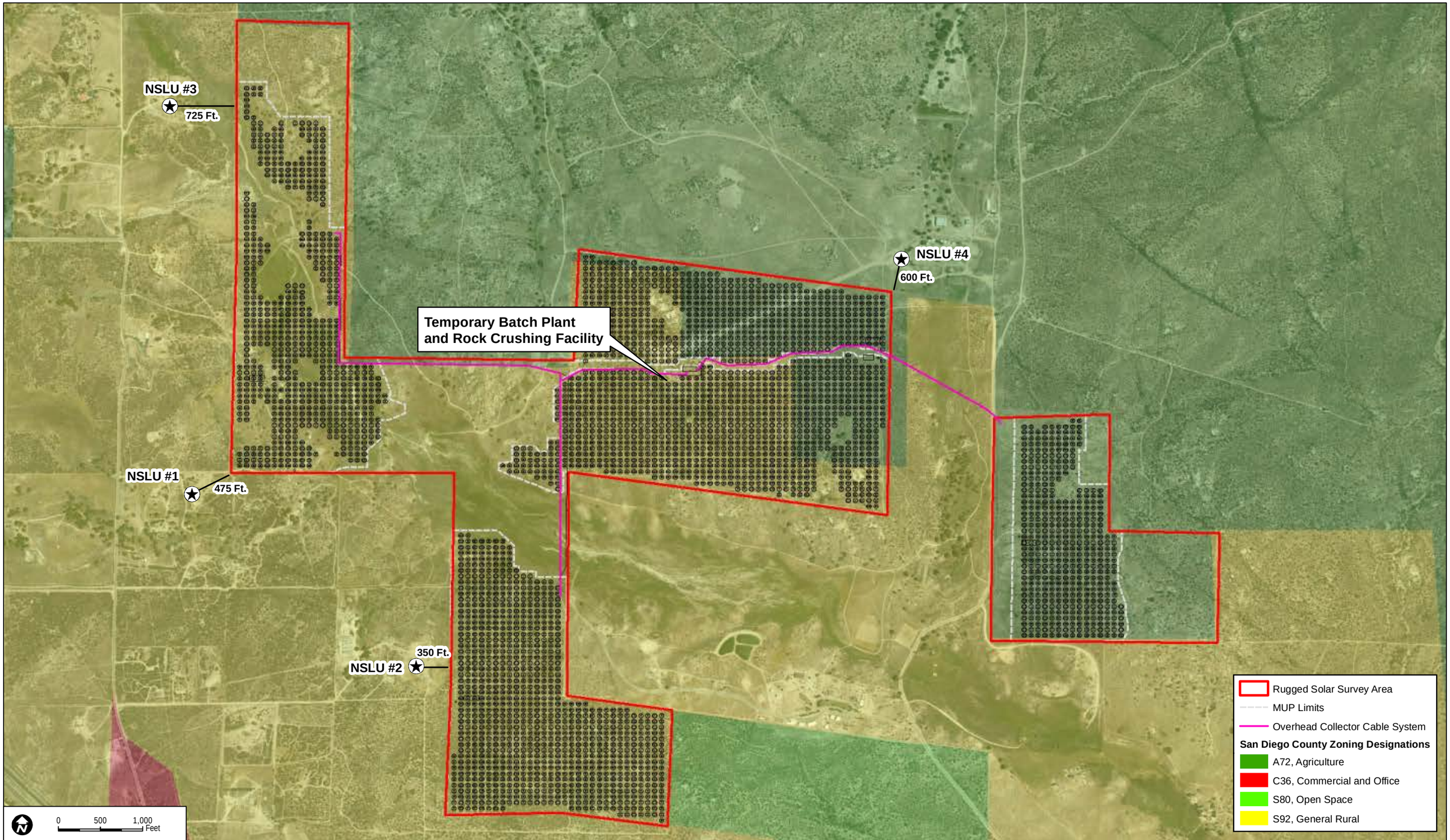

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SOURCE: AECOM 2012; Soitec 2012; SanGIS 2012; Bing Maps

FIGURE 4

Surrounding Zoning and NSLU Locations

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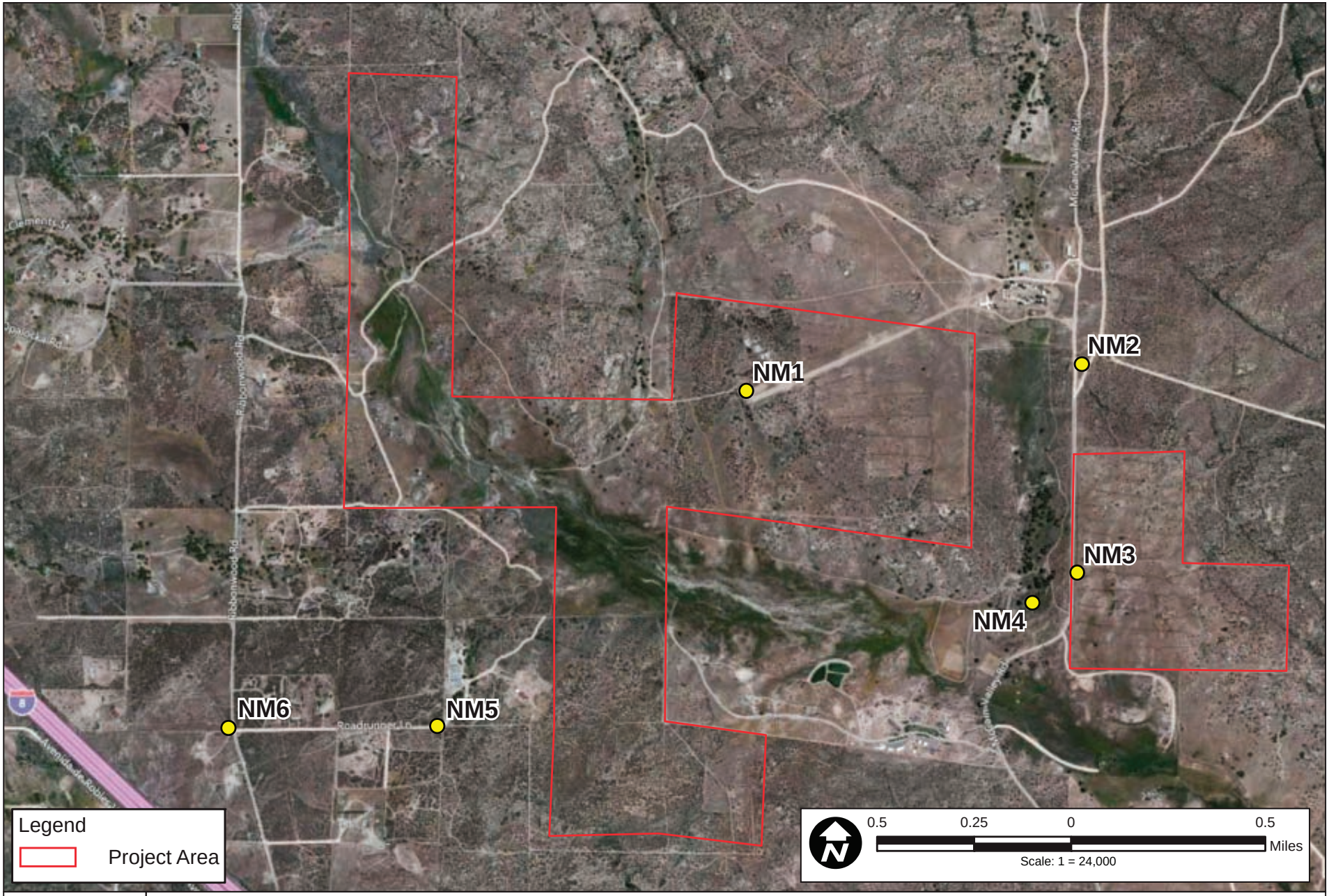

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SOURCE: AECOM 2012

FIGURE 5

Noise Measurement Locations

Rugged Solar LLC Project–Acoustical Assessment Report

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2.0 NOISE SENSITIVE LAND USES AFFECTED BY AIRBORNE NOISE

2.1 Guidelines for the Determination of Significance

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). 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. Noise Element policies are specified within Tables N-1 and N-2 of the Noise Element.

County of San Diego – Guidelines for Determining Significance (Noise)

The following threshold has been developed to apply to long-term operational noise generated by a proposed new development.

> *An affirmative response to the following guideline will generally be considered a significant impact related to noise as a result of project implementation, in the absence of scientific evidence to the contrary:*
>
> *4.1 Noise Sensitive Land Uses Affected by Airborne Noise*
>
> *Project implementation will result in the exposure of any on- or off-site, existing or reasonably foreseeable future NSLU to exterior or interior noise (including noise generated from the project, together with noise from roads [existing and planned Circulation Element roadways], railroads, airports, heliports and all other noise sources) in excess of any of the following:*
>
> *A. Exterior Locations:*
>
> *i. 60 dB (CNEL); or*
>
> *ii. An increase of 10 dB (CNEL) over pre-existing noise.*

In the case of single-family residential detached NSLUs, exterior noise shall be measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum area:

- *Net lot area up to 4,000 square feet: 400 square feet*
- *Net lot area 4,000 sq. ft. to 10 acres: 10% of net lot area*
- *Net lot area over 10 acres: 1 acre*

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

2.2 Potential Noise Impacts

The proposed project consists of a solar energy collection/generation facility with neither dedicated office space nor any related residential components. Also, no on-site NSLUs currently exist. As such, no portion of the proposed Rugged Solar LLC project would involve the proposal of noise sensitive land uses.

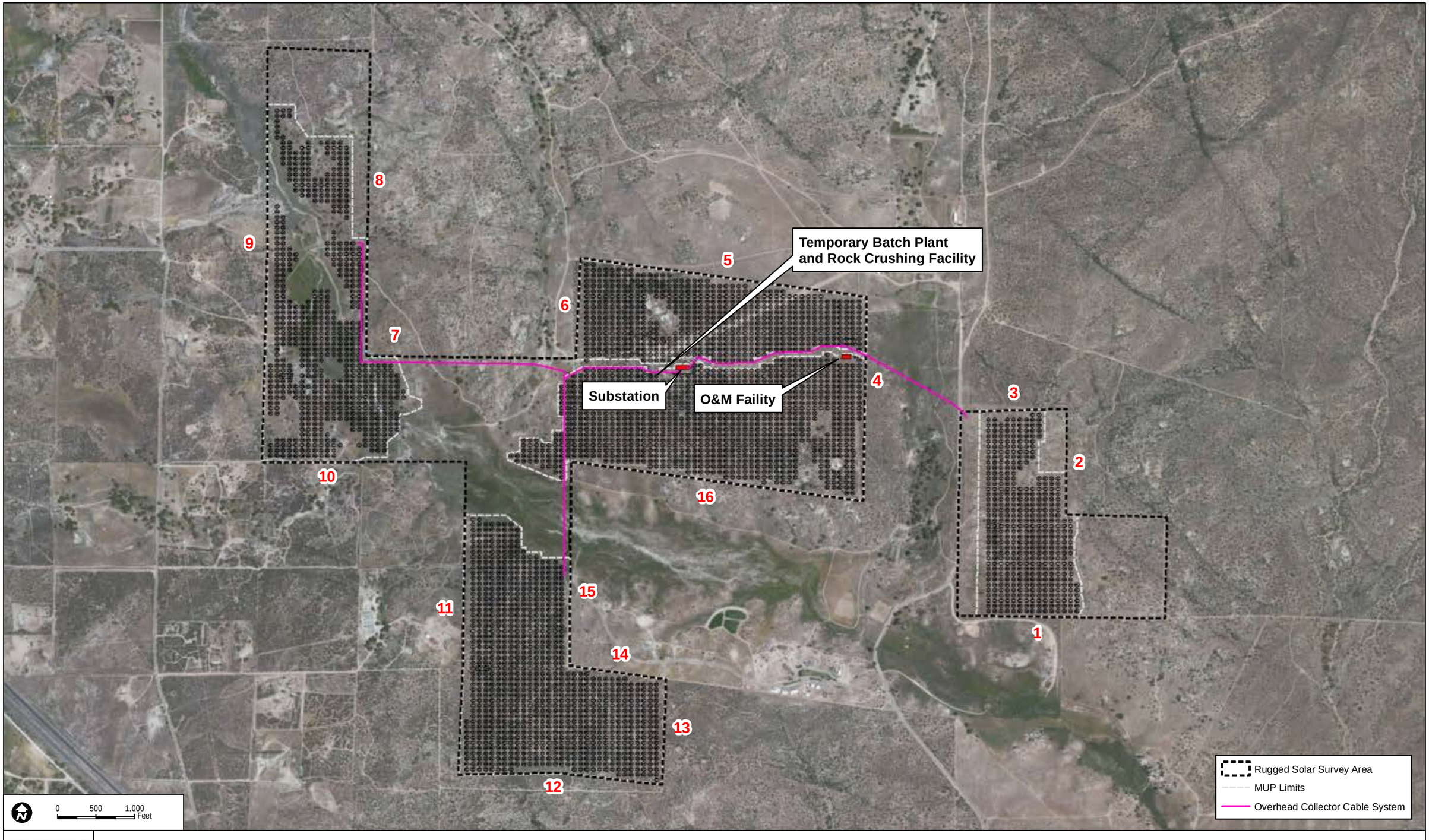
2.2.1 Solar Farm Operation Noise Sources

On-site noise sources associated with the project would include pad-mounted inverters and transformers, substation transformers, tracker array motors and dryers/blowers. Maintenance of the solar panels, involving periodic washing by specialized equipment, would be an additional on-site operational noise source. Off-site operational noise sources would include increased vehicle trips by employees. Each of these noise sources is discussed below.

2.2.1.1 Building Block Inverters and Transformers

The Project includes a total installation of 3,422 CPV Trackers. The CPV Trackers would be arranged into a building block that consists of Soitec Concentrix CX-S530 dual-axis trackers that would feed into an inverter station. The proposed Xantrex Inverter, or equivalent, has a noise level rating of 77 dB at 6 feet (Schneider Electric 2011). The proposed 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).

The location of inverter/transformer stations on the site are illustrated on Figure 6. The inverter/transformer equipment represents the most substantial noise source in the panel array areas, compared to tracker and blower 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.



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SOURCE: AECOM 2012; Soitec 2012; SanGIS 2012; Bing Maps

FIGURE 6

Project Site Property Lines

RUGGED ACOUSTICAL ASSESSMENT TECHNICAL REPORT

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2.2.1.2 Substation Transformer

The Project requires the use of a private on-site collector substation 60feet by 100 feet that would be located on a 2.0-acre site within the central portion of the Project site (refer to Figure 6). The purpose of the substation is to collect the energy received from the overhead and underground collector system and increase the voltage from 34.5–138 kV. Once the voltage is stepped up to 138kV, the power would be conveyed through a 35-foot high deadened structure that terminates the gen-tie within the on-site collector substation. The power would then 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). See Figure 6 for the proposed location of the substation, which Dudek used for evaluation of noise levels at the project property boundaries.

2.2.1.3 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.

2.2.1.4 Tracker Motors and Dryers/Blowers

Individual tracker dimensions are approximately 48 feet across by 25 feet tall. Each CPV Tracker unit would be mounted on a steel pole. Noise associated with the trackers would be from the motors and dryers/blowers. Field noise measurements of the tracker indicates the tracker motor generates a noise level of 37 dB at 50 feet and the dryers/blowers generate a noise level of 43 dB at 50 feet (AECOM 2012).

2.2.2 Resulting Operational Noise

The nearest occupied properties to the Rugged Solar project site were identified in Section 1.2.1 (Regional and Local Setting) and are illustrated on Figure 5. Based upon the labels depicted on Figure 5, the resulting project operational noise levels are identified in Table 3. Calculation worksheets for determining CNEL values are included in Appendix B. The CNEL calculation represents a worst-case scenario where the hourly average noise levels for all equipment operation are assumed to occur each hour of a 24-hour period. This is overly conservative in that

much of the equipment would not be operating in the overnight period. However, this approach eliminates uncertainty in the actual operating schedule.

As can be seen from Table 3, the four NSLU properties would experience noise levels ranging from 55–58 dB CNEL at the property boundary closest to the solar LLC property, which would be within the County exterior living area criterion limit of 60 dB CNEL. Ambient noise exposure at the closest noise sensitive receptors to the project is approximately 40 dB CNEL. Therefore, the County's development-related land use compatibility limit for these uses would be 50 dB CNEL (10 dB above ambient). For exterior use areas on the identified NSLU residential properties that are relatively close to the property boundary, these exterior use areas could be subjected to a project-resultant CNEL greater than 50 dB CNEL; consequently, noise exposure in exterior use areas of the NSLU residential parcels would be a significant noise impact unless mitigation is provided.

Table 3
Project Operational Noise Levels (CNEL)
Property Boundary of Noise-Sensitive Land Uses

ID	Address	Type	Project Operational Noise Level (CNEL)
NSLU 1	Southwest Boundary	Single-Family Residence	58
NSLU 2	Southwest Boundary	Single-Family Residence	56
NSLU 3	Northwest Boundary	Single-Family Residence	55
NSLU 4	Northeast Corner	Single-Family Residence	57

2.2.3 Design Considerations and Mitigation Measures

Significant noise impacts would result from the inverters. A significant noise impact would also result along Property Line #4 due to the proximity of the proposed operations and maintenance building to this property boundary. Implementation of the following mitigation measures would reduce the noise impact to a level below significance, including compliance with the County's CNEL based exterior noise exposure criterion (i.e., project resultant noise levels less than 60 dB CNEL and less than 10 dB CNEL over ambient).

PDF-N[1]: Final engineering/design/building plans shall conform to the County Noise Ordinance standards for operational noise (Section 36.404 Sound Level Limits). Prior to approval of the Building Plans, a noise analysis shall be prepared that

[1] Note that this is the same noise mitigation measure described below in Section 3.2.5.

demonstrates that the inverters and operations and maintenance building comply with the ordinance. The inverter noise could be mitigated by placing all the inverters situated within approximately 800 feet of the adjacent property lines within enclosures. Depending on the design, the enclosures would reduce the noise level by approximately 10–40 dB. Operations and maintenance building noise impacts could be mitigated by shifting the operations and maintenance building west, to a point not closer than 1,250 feet from the property line.

Residual Impact Level

Table 4 demonstrates the noise levels with mitigation applied (i.e., inverters setback 800 feet or more to adjacent residential property lines, or inverters placed in enclosures, and operations and maintenance located not closer than 1,250 feet from adjacent residential property lines). Inverter enclosure must be capable of achieving a minimum of 10 dB attenuation. This level of attenuation performance for the inverter enclosures should be feasible employing standard construction materials and techniques. As shown below in Table 4, with mitigation implemented, the resulting project generated noise levels at the property boundaries of NSLUs is anticipated to be at or below the County's development-related land use compatibility limit of 50 dB CNEL (10 dB above existing ambient noise levels of 40 dB) as described in the County's Guidelines for Determining Noise Significance, and noise impacts would be considered less than significant with mitigation implemented.

Table 4
Project Operational Noise Levels (CNEL)
Property Boundary of Noise-Sensitive Land Uses with Mitigation Applied

ID	Address	Type	Project Operational Noise Level with Mitigation Applied (CNEL)
NSLU 1	Southwest Boundary	Single-Family Residence	50
NSLU 2	Southwest Boundary	Single-Family Residence	49
NSLU 3	Northwest Boundary	Single-Family Residence	48
NSLU 4	Northeast Corner	Single-Family Residence	49

2.2.4 Solar Panel Washing Activity

Periodic washing of the solar panels would be achieved using the IPC Eagle Wash Station. Washing of the photovoltaic panels/arrays using the IPC Eagle Wash Station would generally occur during evening and nighttime hours, or between sunset and sunrise, when all panels/arrays are aligned in a westerly direction (i.e., overnight storage position). It is expected

that panel/array washing for the entire project site would take several consecutive days to complete, but would only occur once every 6–8 weeks. Additionally, during panel/array washing times, project panel/array tracking systems would not be operational (i.e., panels in stored position), and power inverters would have limited operations due to limited or no sunlight. Therefore, it is expected that neither tracker nor inverter noise would occur while the panel washing operation is in progress; this means the panel washing may be assessed by itself as an overnight noise source, and that it would not add to project-related noise exposure during the day (i.e., normal operating period). Therefore, the panel washing activity is addressed separately from other operational noise sources.

Ambient noise exposure at the closest noise sensitive receptors to the project is approximately 40 dB CNEL. Therefore, the County's land use compatibility limit for these uses would be either 50 dB CNEL (10 dB above ambient), or the County's Municipal Code limits of 50 dB Hourly Leq (daytime) and 45 dB Hourly Leq (nighttime) at the project property lines. Because the panel washing activity is proposed to occur from sunset to sunrise, the nighttime Municipal Code limit of 45 dB Hourly Leq would be applicable. Consequently, the County's Municipal Code criteria are the most restrictive for application to project on-site sources of noise, and are the only criteria applied as specified in Section 3.2.7.

Therefore, permanent noise sources associated with the project would incorporate the following measures to ensure impacts to existing noise sensitive receptors are exposed to levels of less than significant:

PDF-N All proposed inverter/(transformer) stations shall be set back at a minimum of 800 feet. These stations within 800 feet from the project property line shall be enclosed, primarily to screen the project property lines from the proposed noise generating equipment.

A noise enclosure shall be incorporated to house the IPC Eagle wash station to reduce washing activities to a sound pressure level of 67 dBA at a reference distance of 9 feet.

Washing activities shall be limited to 6 solar panels per hour. Washing patterns would occur to limit noise exposure to the project property line with the best practices feasible as mentioned in Section 3.2.6.1

2.2.5 Solar Panel Washing Activity

Periodic washing of the solar panels would be achieved using the IPC Eagle Wash Station. Washing of the photovoltaic panels/arrays using the IPC Eagle Wash Station would generally occur during evening and nighttime hours, or between sunset and sunrise, when all

2.3 Off-Site Direct and Cumulative Noise Impacts

The proposed Rugged Solar LLC Project would have a short-term construction-related potential to generate noise impacts to off-site locations. There are no identified construction projects proposed to occur contemporaneously with the Tierra Del Sol project, that would have the potential to contribute to cumulative short-term noise impacts upon the same off-site receptors. Mitigation measures have been identified to address short-term potential noise impacts (Section 3.3).

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3.0 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 Guidelines for Determining Significance (Noise) and the County Noise Ordinance.

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 and surrounding area are zoned General Rural (S-92) and Agriculture (A-72). The County's noise standards that apply to S-92 and A-72 zones are depicted in *Table 36.404*. 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.–10:00 p.m. and 45 dB between the hours of 10:00 p.m.–7:00 a.m. Most of the project components would only operate during the daytime hours, but a few may operate during the nighttime or early morning hours. Therefore, the most restrictive limit is to apply the 1-hour average 45 dB nighttime standard at the property lines.

Table 36.404
County of San Diego Exterior Noise Standards

Zone	Time	One-Hour Sound Level Limits (dB)
General Rural (S-92)	7:00 a.m.–10:00 p.m.	50
Agriculture (A-72)	10:00 p.m.–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.–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.–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 36.410A, 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 36.410A are as described in the County Zoning Ordinance.

Table 36.410A
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 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% 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.

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 36.410B
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, tracker array motors and dryers/blowers. Maintenance of the solar panels, involving periodic washing by specialized equipment, would be an additional on-site operational noise source. Off-site operational noise sources would include increased vehicle trips by employees. Each of these noise sources is discussed above in Section 2.2.1.

3.2.1 Equipment Noise Levels at Property Lines

The inverter stations would be located throughout the 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 property lines, resulting from the building block inverters and transformers, substation transformer, operations and maintenance yard, tracker motors and dryers/blowers. The noise levels from all the noted equipment were combined and calculated for the nearest property line without any shielding from proposed buildings. (See Appendix C for calculation worksheets.) The 1-hour average sound levels would range from 48–53 dBA. The results of the cumulative noise levels are included in Table 5 and include the contribution of the closest 3

building block inverters/transformers that have the potential to be close enough to the other equipment to contribute to the overall noise level. Each cumulative noise level also includes contribution from the substation transformer, operations yard, and tracker and blower motors. The primary noise source at the property lines would be the inverters. The noise level would exceed the County's noise ordinance criteria during the daytime hours (i.e., 7 a.m.–7 p.m.) at 6 of the 16 modeled property boundaries; the noise level would exceed the County's noise ordinance criteria during nighttime hours (i.e., 7 p.m.–7 a.m.) at all project property boundaries; thus, the operational noise would result in a significant noise impact.

Table 5
Summary of Project Noise Levels at Property Lines

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

3.2.2 Design Considerations and Mitigation Measures

Significant noise impacts would result from the inverters. A significant noise impact would also result along Property Line #4 due to the proximity of the proposed operations and maintenance building to this property boundary. Implementation of the following mitigation measures would reduce the noise impact to a level below significance, including compliance with the County's daytime and nighttime hourly Leq standards.

PDF-N[2] Final engineering/design/building plans shall conform to the County Noise Ordinance standards for operational noise (Section 36.404 Sound Level Limits). Prior to approval of the Building Plans, a noise analysis shall be prepared that demonstrates that the inverters and operations and maintenance building comply with the ordinance. The inverter noise could be mitigated by placing all the inverters situated within approximately 800 feet of the adjacent property lines within enclosures. Depending on the design, the enclosures would reduce the noise level by approximately 10–40 dB. Operations and maintenance building noise impacts could be mitigated by shifting the operations and maintenance building west, to a point not closer than 1,250 feet from the property line.

Residual Impact Level

Table 6 demonstrates the noise levels with mitigation applied (i.e., inverters setback 800 feet or more to adjacent residential property lines, or inverters placed in enclosures, and operations and maintenance located not closer than 1,250 feet from adjacent residential property lines). Inverter enclosure must be capable of achieving 10 dB attenuation. This level of attenuation performance for the inverter enclosures should be feasible employing standard construction materials and techniques.

Table 6
Summary of Mitigated Project Noise Levels at Property Lines

Property Line	Project Noise Level (dBA Leq)	Exceed County daytime noise limit (50 dBA Leq)	Exceed County nighttime noise limit (45 dBA Leq)
#1	44	No	No
#2	41	No	No
#3	42	No	No
#4	44	No	No
#5	45	No	No
#6	43	No	No
#7	41	No	No
#8	42	No	No
#9	42	No	No
#10	43	No	No
#11	42	No	No
#12	42	No	No
#13	44	No	No
#14	42	No	No

[2] Note that this is the same noise mitigation measure described above Section 2.2.3.

Table 6
Summary of Mitigated Project Noise Levels at Property Lines

Property Line	Project Noise Level (dBA Leq)	Exceed County daytime noise limit (50 dBA Leq)	Exceed County nighttime noise limit (45 dBA Leq)
#15	43	No	No
#16	44	No	No

3.2.3 Solar Panel Washing Activity

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

3.2.3.1 Project Design Features

Wash Station Gasoline Engine Enclosure

The proposed IPC Eagle wash station has a reference noise level of 99 dBA, at 9 feet from the engine. The wash station incorporates a new generation Honda GX-160 gasoline powered engine. In the factory configuration, this engine is mounted to an open frame on the wash station. A number of manufacturers produce acoustic panels suitable for exterior use, fabricated with steel casing and foam insulation, which have a sound transmission class rating up to 40. Acoustic-rated louvers are also available to permit air circulation while dampening sound propagation; such louvers can achieve an STC rating up to approximately 25. A cubic enclosure constructed with solid panels on 5 sides, and an acoustic louver on the remaining face, would achieve a composite STC of 32. Such an enclosure would reduce the operational sound level of the wash station to 67 dBA at 9 feet. As a design feature, the applicant is proposing to employ a sound enclosure for the wash station engine to achieve a sound level of not greater than 67 dBA at 9 feet; as along as this maximum noise level is respected, other equipment may be substituted.

North/South Panel Washing Operations

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

Wash Station Operations Setback Distance

Using simple distance attenuation formulas, it was determined that continuous operation of the wash station within 130 feet of a property line with adjacent residential use would exceed the applicable portion of the San Diego County Noise ordinance (Section 36.404 Sound Level Limits). For eastern and western property lines, the distance from panel washing activity would remain constant, as the equipment moves parallel to the property line; therefore a design feature is to place the IPC Eagle Wash Station a minimum of 130 feet from the eastern and western property lines. This would equate to following the center-line of the service road on the interior side of the solar panel row closest to the east and west property lines.

3.2.3.2 Solar Panel Washing Activity Noise Levels

Noise exposure from the proposed operation of the solar panel wash station was calculated at the identified project property lines based on reference noise level with engine sound enclosure, approximate solar panel/array placement/spacing provided by Figure 6, a north-/south washing pattern, solar panel/array distances from neighboring property lines, the proposed wash station setback restriction of 130 feet from east and west property lines, and a noise attenuation rate of 6 dB per doubling of distance (i.e., standard spherical divergence). The noise produced by the water spray nozzle itself was not calculated because the noise level is anticipated to be at least 10 dBA less than the enclosed engine (and would therefore not contribute to the composite noise level of the wash station). Property boundaries at the modeling points selected for property boundaries 1–16 (see Figure 6) vary in distance from approximately 80–100 feet from the closest panels. Noise attenuation due to excess ground absorption, air absorption, and shielding from intervening solar panels/arrays and other structures was not included in the calculations in order to provide a conservative assessment of project-related noise exposure. Basic noise calculation data applicable to the photovoltaic panel/array washing is as follows:

- IPC Eagle wash station with engine enclosure reference noise level at 9 feet is 67 dBA (Please refer to the detailed discussion under 3.2.7.1 Project Design Features,

Wash Station Gasoline Engine Enclosure, and IPC Eagle Wash Station Specifications included in Appendix C)

- Approximate solar panel spacing: 75 feet.
- Approximate solar panel washing rate: 6 solar panels/hour.

Calculated noise exposure from project solar panel/array washing is summarized in Table 7. For the calculations, with respect to eastern and western property lines, the wash station was assumed to clean the column(s) of panels/arrays closest to the applicable property line over a continuous 8-hour period. For the east/west oriented property lines, the wash station was assumed to clean the panel at the end of a row (closest to the property line) for 10 minutes, then wash the next panel at the end of the next row for 10 minutes, then proceed down the row away from the panel. Therefore, the calculations account for the worst case scenario for noise impacts along all property boundaries.

Table 7
Panel Washing Noise Level at Adjacent Property Lines Based on All Design Features

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

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

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

As seen in Table 7, solar panel washing activity incorporating all of the project design features would comply with the applicable portion of the San Diego County Noise ordinance (Section 36.404 Sound Level Limits).

3.2.4 Corona Discharge Noise

Corona discharge results from the partial breakdown of the electrical insulating properties of the air surrounding electricity conductors. When the intensity of the electric field at the surface of the conductor exceeds the insulating strength of the surrounding air, a corona discharge occurs at the conductor surface, representing a small dissipation of heat and energy. Some of the energy may dissipate in the form of small local pressure changes that result in audible noise, or in radio or television interference. Audible noise generated by corona discharge is characterized as a hissing or crackling sound that may be accompanied by a hum.

Slight irregularities or water droplets on the conductor and/or insulator surface accentuate the electric field strength near the conductor surface, making corona discharge and the associated audible noise more likely. Therefore, audible noise from transmission lines is generally a foul weather (wet conductor) phenomenon. Based on precipitation data from the Western Regional Climate Center, eastern San Diego County receives approximately 17.5 inches of precipitation a year, with daily highs of less than 0.10 inch per day (WRCC 2011). Because the number of days and amount of precipitation per year would be minimal, corona events would be rare and intermittent.

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

The proposed transmission means for the Project would involve a new limited length aerial gen-tie line connecting the project site with the Boulevard Substation. The Project would install polymer (silicon rubber) insulators on any new transmission line connections. This material is hydrophobic (repels water) and minimizes the accumulation of surface contaminants such as soot and dirt, which in turn reduces the potential for corona noise to be generated at the insulators. With consideration of these standard practices, noise from coronal discharge would not represent a substantial increase in noise levels in the project vicinity.

3.3 Construction Noise and Impacts

3.3.1 On-Site Construction

Construction of the Project would involve clearing and grubbing of the existing vegetation; grading necessary for construction of access roads and CPV foundations; trenching for the electrical collection system and communication lines; installation of a small concrete footing at each pair of inverters; construction of an overhead 34.5 kV "trunk line" for the collection system leading to the Project substation; and construction of the 34.5/138 kV substation, and an operations and maintenance building. Construction of the Rugged Solar LLC Project would employ up to 146 workers per day. During the peak of construction, a typical day would include the transportation of trackers, movement of heavy equipment, and transportation of materials.

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 8. 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 75–80 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 (7.5 dB for sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees) (Caltrans 2004).

Table 8
Construction Equipment Noise Emission Levels

Equipment	Noise Level at 50 Feet (dBA)	Typical Duty Cycle
Auger Drill Rig	85	20%
Backhoe	80	40%
Blasting	94	1%
Chain Saw	85	20%
Clam Shovel	93	20%
Compactor (ground)	80	20%
Compressor (air)	80	40%
Concrete Mixer Truck	85	40%
Concrete Pump	82	20%
Concrete Saw	90	20%
Crane (mobile or stationary)	85	20%
Dozer	85	40%
Dump Truck	84	40%
Excavator	85	40%
Front End Loader	80	40%
Generator (25 KVA or less)	70	50%
Generator (more than 25 KVA)	82	50%
Grader	85	40%
Hydra Break Ram	90	10%
Impact Pile Driver (diesel or drop)	95	20%
In Situ Soil Sampling Rig	84	20%
Jackhammer	85	20%
Mounted Impact Hammer (hoe ram)	90	20%
Paver	85	50%
Pneumatic Tools	85	50%
Pumps	77	50%
Rock Drill	85	20%
Rock Crusher	95	50%
Scraper	85	40%
Tractor	84	40%
Vacuum Excavator (vac-truck)	85	40%
Vibratory Concrete Mixer	80	20%
Vibratory Pile Driver	95	20%

Source: FHWA 2008

Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g., demolition/land clearing, grading and excavation, erection). Construction noise in any one particular area of the Project site would be temporary and short term, and would

include noise from activities such as site preparation, material delivery, concrete preparation and pouring, solar panel installation, transmission line and inverter/transformer installation, and use of power tools. Vibratory pile driving would be required for panel/tracker pole installation. Construction activities would only take place during County restricted daytime hours.

Although noise ranges are generally similar for all construction phases, the grading and trenching phase tends to involve the most equipment. The noisiest equipment types operating at construction sites typically range from 88–91 dB Lmax at 50 feet; see Table 8. Typical operating cycles may involve 2 minutes of full power, followed by 3 or 4 minutes at lower settings. Average noise levels at construction sites typically range from approximately 65–88 dB Leq at 50 feet, depending on the activities performed.

The simultaneous operation of on-site construction equipment could result in combined intermittent maximum noise levels up to 85 dBA Lmax at 50 feet from the Project site. Hourly average noise levels would be approximately 78 dBA Leq at 50 feet. Based on these noise levels, exterior noise levels within 68 feet from construction operations could exceed 75 dBA Leq (County standard) without feasible noise controls. The nearest property line to proposed construction areas is 100 feet (see Figure 6).

Project construction would also result in a short-term increase in traffic on the local area's roadway network, but this increase would not be sufficient to increase traffic noise levels a substantial amount. Typically, traffic volumes must double to create an increase in perceptible (3 dBA) traffic noise (Caltrans 2009). The addition of 99 construction-related trips to the roadway network would not double existing traffic levels and, therefore, would not increase traffic noise by 3 dBA.

The nearest property line to construction activities on the Project site is 100 feet (all property lines are approximately 100 feet from the nearest on-site construction activities). Based on the noise levels presented above, general construction noise at Project property lines would be 70.4 dBA Leq and 77.1 dBA Lmax. Therefore, because noise generated by general construction activities would be less than 75 dBA Leq 8-hour average at the nearest property line during daytime hours, no impact would occur during daytime hours. Therefore, this impact would be less than significant.

However, construction activities could still be considered a nuisance. Therefore, noise abatement measures were created that would reduce potential annoyance associated with construction noise.

3.3.2 Vibratory Pile Driving

Each tracker would be installed on a 28-inch-diameter steel mast. The masts would be emplaced using a vibratory driver.

It is anticipated that a RG Model RG21T vibratory pile driver 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 the pile driving location. This time estimation is broken down into the following sub-activities: 3 minutes for pile driver setup; 12 minutes of pile driving; 3 minutes to move to the next pile location. Thus, for a given pile location, there would be 12 minutes of pile driving activity (or full-power operation of the driver), which equates to 20% of an hour. This time also allows for complications in a more rocky terrain. Equipment noise levels are not available for the RGT RG21T vibratory pile driver. However, this size and type of equipment is anticipated to generate a maximum noise level of approximately 85–90 dB at a distance of 50 feet. At a distance of 100 feet, which is the shortest distance between the pile driving activity and the property boundary of any occupied residence, the maximum noise level from pile driving would be approximately 82–86 dBA.

Assuming pile driving occurs for approximately 20% of an hour at each tracker site, the average hourly noise level would be approximately 83 dB at 50 feet from the pile driver or 76 dB at 100 feet, the distance to the closest residential property boundaries to the pile driving locations. Given an 8-hour workday (or 480 minutes), and 18 minutes required for pile driving and movement between each pile location, a pile driver could complete approximately 27 piles per day. The 27 closest tracker masts would be located between 100–200 feet from the nearest property line with an occupied residence. The worst-case noise exposure for adjacent residences assumes that pile driving at the 27 closest tracker masts to the nearest property line are completed in one day.

The total distance along the northern property boundary represented by 27 tracker masts is 2200 feet, which would be covered in a single day under the worst-case pile driver noise scenario; dividing this distance by 8, the average distance the pile driver would move along the property boundary per hour is 275 feet. This means the distance from active pile driving to a given adjacent residential property line would increase by 275 feet per hour, resulting in a reduction each hour of the average pile driver noise level at that property line. For a property line immediately adjacent to the pile driving operation at the start of the day (and at an initial distance of 100 feet from the operations), the hourly average noise levels from pile driving during the 8-hour day (due to increasing distance from pile driving to a given property line) would be: 76 dBA (Hour 1); 65 dBA (Hour 2); 58 dBA (Hour 3); 53 dBA (Hour 4); 50 dBA (Hour 5); 47 dBA (Hour 6); 45 dBA (Hour 7); and 43 dBA (Hour 8). Consequently, under this scenario, pile driving would generate an 8-hour average noise level

of 70 dB at the nearest property line with an occupied residence (i.e., any of the property lines for the NSLU properties discussed in this report, where adjacent occupied residential property boundaries are situated 100 feet away). Thus, noise from vibratory pile driving would comply with the County's noise criterion, thereby maintaining pile driving noise at a level that is less than significant.

If we look at the scenario where the pile driving is performed in a direction perpendicular to the property boundary, and using the same 2,200 feet covered during one construction day, the worst-case would be for the pile driving to commence 1,100 feet from the property line (1,200 feet to the closest adjacent residential property boundary), moving toward the property line for the first half day, moving over one row space at the project property boundary, and reversing direction away from the property line. The hourly average for pile driving would then be: 53 dBA (Hour 1); 58 dBA (Hour 2); 65 dBA (Hour 3); 76 dBA (Hour 4); 76 dBA (Hour 5); 65 dBA (Hour 6); 58 dBA (Hour 7); and 53 dBA (Hour 8). Under this scenario as well, pile driving would generate an 8-hour average noise level of 70 dB at the nearest property line with an occupied residence. Consequently, whether pile driving occurs parallel or perpendicular to the property boundary, worst-case noise levels at the closest occupied residential property boundary would comply with the County's noise criterion.

3.3.3 Pre-Drilling for Mast Emplacement

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

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

Based upon bedrock drilling information from a construction industry handbook (McGraw, 2002), drilling up to 20 feet through granitic rock would require approximately 16 minutes.

Allowing 7 minutes to set up the rig, and 7 minutes to move to the next site, two holes could be drilled per hour. Thus, for a given pile location, there would be 16 minutes of drilling activity (or full-power operation of the drill), which equates to 26% of an hour. From Table 10, a rock drill produces 85 dBA at a distance of 50 feet. At a distance of 100 feet, which is the shortest distance between the pile driving activity and the property boundary of any occupied residence, the maximum noise level from rock drilling would be approximately 79 dBA.

Assuming rock drilling occurs for approximately 16 minutes of an hour at each tracker site, the average hourly noise level would be approximately 79 dB at 50 feet from the drill or 73 dB at 100 feet, the distance to the closest residential property boundaries to the rock drilling locations. Given an 8-hour workday (or 480 minutes), and 30 minutes required for rock drilling and movement between each pile location, a rock drill could complete approximately 16 pilot holes per day. The 16 closest tracker masts would be located between 100–200 feet from the nearest property line with an occupied residence. The worst-case noise exposure for adjacent residences assumes that pile driving at the 16 closest tracker masts to the nearest property line are completed in one day. In this scenario, rock drilling would generate an 8-hour average noise level of 73 dB at the nearest property line with an occupied residence (i.e., any of the property lines for the NSLU properties discussed in this report, where adjacent occupied residential property boundaries are situated 100 feet away). Thus, noise from bedrock drilling in preparation for emplacement of masts would comply with the County's noise criterion, thereby maintaining rock drilling noise levels at less than significant. As with vibratory pile driving operations, drilling performed in a row perpendicular to a property boundary would also comply with the County's noise criterion.

3.3.4 Concrete Batch Plant and Rock Crushing

Rock crushing of aggregate rock material may occur on-site for site development including the concrete batch plant. A rock crusher generates higher noise levels than typical construction equipment as noise is generated by the breaking of rocks as well as the diesel engine operating the crusher. However, because rock crushing does not move and the material stockpiles can be located in proximity, the work area is easier to define for a rock crushing operation. Rock crushing would typically include the use of a dozer and a loader for loading the rock crusher. The combined noise level from all these pieces of equipment would be approximately 95 dBA Lmax at 50 feet, which averages approximately 92 dBA Leq at 50 feet.

The proposed location for the rock crusher / batch plant is near the central portion of the Rugged Site (Refer to Figures 4 and 6). This location has the following distances to the nearest project property lines: 1,400 feet (north); 2,680 feet (east); 1,200 feet (south); and 1,200 feet (west). Based on a conservative attenuation rate of 6 dBA per doubling of distance, noise levels from rock crushing activities would attenuate to 75 dBA Leq at approximately 350 feet; the closest

property line is more than three times this distance from the rock crusher location. Thus, the rock crushing operations would be well below the construction noise limit of 75 dBA Leq at the closest property lines to the proposed rock crusher location, and hence would comply with the County's noise level limit for construction noise. .

The proposed concrete batch plant for the project would be located in the centroid of the project site, with the closest property line at a distance of 1,200 feet. Typical concrete batch plant equipment includes conveyors, elevators, elevated storage bins and silos, weight hoppers, and mixers. Assembly of the mobile concrete batch plant would generate noise levels of typical construction, as previously identified above. Operation of the batch plant would potentially generate maximum noise levels of 96 dBA Lmax at 50 feet, and average noise levels of 92 dBA Leq at 50 feet. Using the same calculations as the rock crushing operations (since average noise levels are approximately equivalent), the average hourly noise level as close as 350 feet from the batch plant would meet the County construction noise limit of 75 dBA hourly Leq; at the nearest property line from batch plant, noise from batch plant operations would be 64 dBA Leq. Thus batch plant operations would comply with the County's noise limit for construction noise.

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

Construction Noise Abatement Measures

Though the noise generated from general construction activities would be in compliance with the County standard and would not be considered a significant impact, temporary construction noise would still be audible to nearby residences. To reduce the temporary construction noises audible at nearby residences the following noise abatement measures are recommended:

PDF-N Whenever feasible, electrical power should be used to run air compressors and similar power tools.

Equipment staging areas should be located as far as feasible from occupied residences or schools.

3.4 Potential Impulsive Noise Impacts

3.4.1 On-Site Impulsive Noise

According to the Federal Highway Administration (FHWA 2011a), neither a vibratory pile driver nor a rock drill are considered to be sources of impulsive noise. Therefore, construction of the project would not involve impulsive noise.

3.5 Vibration (Groundborne Noise) Effects

3.5.1 Vibration – Long Term Operation

No operational components of the Proposed Project include significant groundborne noise or vibration sources, and no significant vibrations sources currently exist, or are planned, in the Project area. Thus, no significant groundborne noise or vibration impacts would occur with operation of the Proposed Project.

3.5.2 Vibration – Project Construction

Construction activities produce varying degrees of ground vibration, depending on the equipment and methods employed. While ground vibrations from typical construction activities rarely reach levels high enough to cause damage to structures, special consideration must be made when sensitive or historic land uses are near the construction site. The construction activities that typically generate the highest levels of vibration are blasting and impact pile driving. Neither blasting nor impact pile driving are proposed or anticipated for project construction. The project would include the use of a vibratory pile driver.

On-site construction equipment that would cause the most noise and vibration would be associated with site grading and driving of pylons for tracking machinery. According to the Federal Transit Administration (FTA), vibration levels associated with the use of bulldozers (from the smallest to the largest available models, representing differing weight measured in the tons) range from approximately 0.003–0.089 inch/second PPV and 58–87 vibration decibels (VdB referenced to 1 micro-inch per second [µin/sec] and based on the root mean square [RMS] velocity amplitude) at 25 feet, as shown in Table 9.

Table 9
Typical Construction Equipment Vibration Levels

Equipment	PPV at 25 feet (inch/second)[1]	Approximate Lv at 25 feet[2]
Large Bulldozer	0.089	87
Trucks	0.076	86
Vibratory Pile Driver	0.170	93

Table 9
Typical Construction Equipment Vibration Levels

Equipment	PPV at 25 feet (inch/second)[1]	Approximate Lv at 25 feet[2]
Small Bulldozer	0.003	58

1 PPV = peak particle velocity
2 Lv is the velocity level in decibels (VdB) referenced to 1 microinch/second and based on the root mean square (RMS) velocity amplitude.

Sources: Caltrans 2004; FTA 2006

Table 10 provides a reference to the FTA thresholds for construction-related vibration significance determination, which the County has adopted.

Table 10
Guidelines for Determining the Significance of Groundborne Vibration and Impacts

	Frequent Events[1]	Infrequent Events[2]
Category 2: Residences and buildings where people normally sleep (hotels, hospitals, residences, and other sleeping facilities)	0.0040 inch/sec. RMS [3]	0.010 inch/sec. RMS

1. "Frequent Events" is defined as more than 70 vibration events per day, applicable to bull dozer and truck operations.
2. "Infrequent Events" is defined as fewer than 70 vibration events per day, applicable to vibratory pile driving.
3. RMS = root mean squared velocity, expressed in inch/second.

Sources: Caltrans 2004; FTA 2006

Using FTA's recommended procedure for applying a propagation adjustment to the reference levels in Table 10, vibration levels would exceed FTA-recommended thresholds (0.0040 inch/second RMS for residential structures subject to frequent vibration events) within 80 feet of bulldozers and 75 feet of trucks. For vibratory pile driving, vibration levels would exceed County-recommended thresholds (0.010 inch/second RMS for residential structures subject to infrequent vibration) within 100 feet of pile driving. The nearest residence to these activities would be a minimum of 350 feet across property lines from potential construction activities. Therefore, vibration levels would not exceed applicable thresholds for residential structures for general construction activity or pile driving the nearest residcnces. This impact would be less than significant. No mitigation is necessary.

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

Noise impacts associated with the project proposed include outdoor mechanical equipment noise and short-term construction activities. The proposed inverters would result in a significant noise impact at the adjacent property lines, as would equipment noise associated with the on-site operations and maintenance building. Additionally, a proposed electrical sub-station for the project is located at a distance from all property boundaries that would avoid significant noise generation at the property boundaries. The inverter noise could be mitigated by placing all the inverters no closer than approximately 800 feet of the adjacent property lines, or for inverters less than this setback distance, placing them within enclosures. Noise from the operations and maintenance building would not exceed County standards. The project includes design features to address noise associated with panel washing activity. The proposed IPC Eagle Wash Station would be retrofitted with an acoustic enclosure for the gasoline engine, solar panel washing would occur using a north/south washing pattern, and operation of the wash station itself is prohibited within a specified distance from any east or west property line with adjacent occupied residence.

The proposed use of vibratory pile driver, with pre-drilling where bedrock occurs, to install support masts for panel arrays would generate noise levels which would comply with applicable portions of the County's noise ordinance. Noise abatement measures pertinent to construction nuisance noise avoidance have been incorporated for general project construction.

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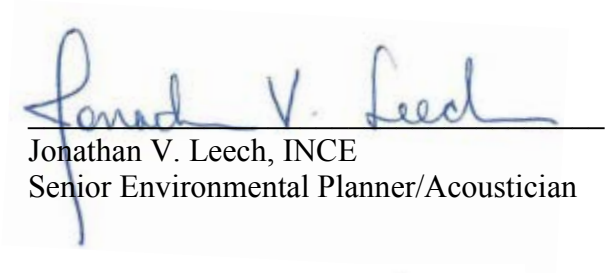
5.0 CERTIFICATION

This report has been prepared by Mr. Jonathan V. Leech and Mr. Mike Greene. Mike Greene is a County of San Diego approved CEQA Consultant for Acoustics.



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APPENDIX A

Definitions

APPENDIX A
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.–7 a.m.) and 5 dB added to the sound during the evening hours (7 p.m.–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 (Leq)	The sound level corresponding to a steady state sound level containing the same total energy as a varying signal over a given sample period. Leq is designed to average all of the loud and quiet sound levels occurring over a time period.
Maximum A-weighted Sound Level, (Lmax)	The greatest sound level measured on a sound level (Lmax) meter during a designated time interval or event using fast time-averaging and A-weighting.
Sound Transmission Class, STC	A single number rating of the noise reduction of a building element.

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APPENDIX B

CNEL Calculation of Operational Noise Levels at NSLUs

Leq	Time	Adjustment					
51.1	Midnight	10	61.1	61.1			
51.1	1	10	61.1	61.1			
51.1	2	10	61.1	61.1			
51.1	3	10	61.1	61.1			
51.1	4	10	61.1	61.1			
51.1	5	10	61.1	61.1			
51.1	6	10	61.1	61.1			
51.1	7am		51.1	51.1			
51.1	8		51.1	51.1			
51.1	9		51.1	51.1			
51.1	10		51.1	51.1			
51.1	11		51.1	51.1			
51.1	noon		51.1	51.1			
51.1	1		51.1	51.1			
51.1	2		51.1	51.1			
51.1	3		51.1	51.1			
51.1	4		51.1	51.1			
51.1	5		51.1	51.1			
51.1	6		51.1	51.1			
51.1	7	5	56.1	51.1			
51.1	8	5	56.1	51.1			
51.1	9	5	56.1	51.1			
51.1	10	10	61.1	61.1			
51.1	11	10	61.1	61.1			
			57.8	57.5			
			CNEL	LDN			

Leq	Time	Adjustment					
49.4	Midnight	10	59.4	59.4			
49.4	1	10	59.4	59.4			
49.4	2	10	59.4	59.4			
49.4	3	10	59.4	59.4			
49.4	4	10	59.4	59.4			
49.4	5	10	59.4	59.4			
49.4	6	10	59.4	59.4			
49.4	7am		49.4	49.4			
49.4	8		49.4	49.4			
49.4	9		49.4	49.4			
49.4	10		49.4	49.4			
49.4	11		49.4	49.4			
49.4	noon		49.4	49.4			
49.4	1		49.4	49.4			
49.4	2		49.4	49.4			
49.4	3		49.4	49.4			
49.4	4		49.4	49.4			
49.4	5		49.4	49.4			
49.4	6		49.4	49.4			
49.4	7	5	54.4	49.4			
49.4	8	5	54.4	49.4			
49.4	9	5	54.4	49.4			
49.4	10	10	59.4	59.4			
49.4	11	10	59.4	59.4			
			56.1	55.8			
			CNEL	LDN			

Leq	Time	Adjustment					
48.2	Midnight	10	58.2	58.2			
48.2	1	10	58.2	58.2			
48.2	2	10	58.2	58.2			
48.2	3	10	58.2	58.2			
48.2	4	10	58.2	58.2			
48.2	5	10	58.2	58.2			
48.2	6	10	58.2	58.2			
48.2	7am		48.2	48.2			
48.2	8		48.2	48.2			
48.2	9		48.2	48.2			
48.2	10		48.2	48.2			
48.2	11		48.2	48.2			
48.2	noon		48.2	48.2			
48.2	1		48.2	48.2			
48.2	2		48.2	48.2			
48.2	3		48.2	48.2			
48.2	4		48.2	48.2			
48.2	5		48.2	48.2			
48.2	6		48.2	48.2			
48.2	7	5	53.2	48.2			
48.2	8	5	53.2	48.2			
48.2	9	5	53.2	48.2			
48.2	10	10	58.2	58.2			
48.2	11	10	58.2	58.2			
			54.9	54.6			
			CNEL	LDN			

Leq	Time	Adjustment					
49.9	Midnight	10	59.9	59.9			
49.9	1	10	59.9	59.9			
49.9	2	10	59.9	59.9			
49.9	3	10	59.9	59.9			
49.9	4	10	59.9	59.9			
49.9	5	10	59.9	59.9			
49.9	6	10	59.9	59.9			
49.9	7am		49.9	49.9			
49.9	8		49.9	49.9			
49.9	9		49.9	49.9			
49.9	10		49.9	49.9			
49.9	11		49.9	49.9			
49.9	noon		49.9	49.9			
49.9	1		49.9	49.9			
49.9	2		49.9	49.9			
49.9	3		49.9	49.9			
49.9	4		49.9	49.9			
49.9	5		49.9	49.9			
49.9	6		49.9	49.9			
49.9	7	5	54.9	49.9			
49.9	8	5	54.9	49.9			
49.9	9	5	54.9	49.9			
49.9	10	10	59.9	59.9			
49.9	11	10	59.9	59.9			
			56.6	56.3			
			CNEL	LDN			

Leq	Time	Adjustment					
43.0	Midnight	10	53	53			
43.0	1	10	53	53			
43.0	2	10	53	53			
43.0	3	10	53	53			
43.0	4	10	53	53			
43.0	5	10	53	53			
43.0	6	10	53	53			
43.0	7am		43	43			
43.0	8		43	43			
43.0	9		43	43			
43.0	10		43	43			
43.0	11		43	43			
43.0	noon		43	43			
43.0	1		43	43			
43.0	2		43	43			
43.0	3		43	43			
43.0	4		43	43			
43.0	5		43	43			
43.0	6		43	43			
43.0	7	5	48	43			
43.0	8	5	48	43			
43.0	9	5	48	43			
43.0	10	10	53	53			
43.0	11	10	53	53			
			49.7	49.4			
			CNEL	LDN			

Leq	Time	Adjustment					
41.8	Midnight	10	51.8	51.8			
41.8	1	10	51.8	51.8			
41.8	2	10	51.8	51.8			
41.8	3	10	51.8	51.8			
41.8	4	10	51.8	51.8			
41.8	5	10	51.8	51.8			
41.8	6	10	51.8	51.8			
41.8	7am		41.8	41.8			
41.8	8		41.8	41.8			
41.8	9		41.8	41.8			
41.8	10		41.8	41.8			
41.8	11		41.8	41.8			
41.8	noon		41.8	41.8			
41.8	1		41.8	41.8			
41.8	2		41.8	41.8			
41.8	3		41.8	41.8			
41.8	4		41.8	41.8			
41.8	5		41.8	41.8			
41.8	6		41.8	41.8			
41.8	7	5	46.8	41.8			
41.8	8	5	46.8	41.8			
41.8	9	5	46.8	41.8			
41.8	10	10	51.8	51.8			
41.8	11	10	51.8	51.8			
			48.5	48.2			
			CNEL	LDN			

Leq	Time	Adjustment					
41.3	Midnight	10	51.3	51.3			
41.3	1	10	51.3	51.3			
41.3	2	10	51.3	51.3			
41.3	3	10	51.3	51.3			
41.3	4	10	51.3	51.3			
41.3	5	10	51.3	51.3			
41.3	6	10	51.3	51.3			
41.3	7am		41.3	41.3			
41.3	8		41.3	41.3			
41.3	9		41.3	41.3			
41.3	10		41.3	41.3			
41.3	11		41.3	41.3			
41.3	noon		41.3	41.3			
41.3	1		41.3	41.3			
41.3	2		41.3	41.3			
41.3	3		41.3	41.3			
41.3	4		41.3	41.3			
41.3	5		41.3	41.3			
41.3	6		41.3	41.3			
41.3	7	5	46.3	41.3			
41.3	8	5	46.3	41.3			
41.3	9	5	46.3	41.3			
41.3	10	10	51.3	51.3			
41.3	11	10	51.3	51.3			
			48.0	47.7			
			CNEL	LDN			

Leq	Time	Adjustment					
42.1	Midnight	10	52.1	52.1			
42.1	1	10	52.1	52.1			
42.1	2	10	52.1	52.1			
42.1	3	10	52.1	52.1			
42.1	4	10	52.1	52.1			
42.1	5	10	52.1	52.1			
42.1	6	10	52.1	52.1			
42.1	7am		42.1	42.1			
42.1	8		42.1	42.1			
42.1	9		42.1	42.1			
42.1	10		42.1	42.1			
42.1	11		42.1	42.1			
42.1	noon		42.1	42.1			
42.1	1		42.1	42.1			
42.1	2		42.1	42.1			
42.1	3		42.1	42.1			
42.1	4		42.1	42.1			
42.1	5		42.1	42.1			
42.1	6		42.1	42.1			
42.1	7	5	47.1	42.1			
42.1	8	5	47.1	42.1			
42.1	9	5	47.1	42.1			
42.1	10	10	52.1	52.1			
42.1	11	10	52.1	52.1			
			48.8	48.5			
			CNEL	LDN			

APPENDIX C

Operating Noise Levels at Adjacent Property Boundaries

Hydro Station

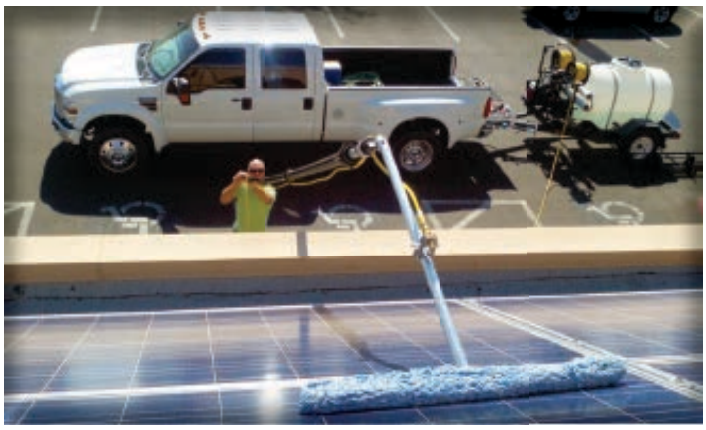
IPC Eagle

Pure Water Cleaning System NEW!

The Hydro Station is a compact and portable Pure Water Cleaning System. The Hydro Station has the unique ability to produce a high volume of pure water for multiple remote applications. The possibilities are endless and the system can be upgraded at any time to fit the application. This includes a 4 stage filtration system which includes reverse osmosis, and deionization process to produce mineral free water providing for incredible cleaning action and spot free windows.

Product applications for this system include the following:

- Window Cleaning
- Solar Panels
- House & Wall Washing
- Mobile Car Washing
- Pressure Washing
- Soft Wash Roof Cleaning
- More!



Great for the following industries:

- School Districts
- Universities
- Municipalities
- Contractors
- Landscapers
- Window Cleaners
- Facility Maintenance
- Car/RV/ATV/Motorcycle/Boat Dealerships
- Police Stations
- Property Management

Technical Data

Dimensions	51"W x 23" D x 26.5 H
Weight	250 Lbs.
Engine	Honda GX160, 5.5 hp pump

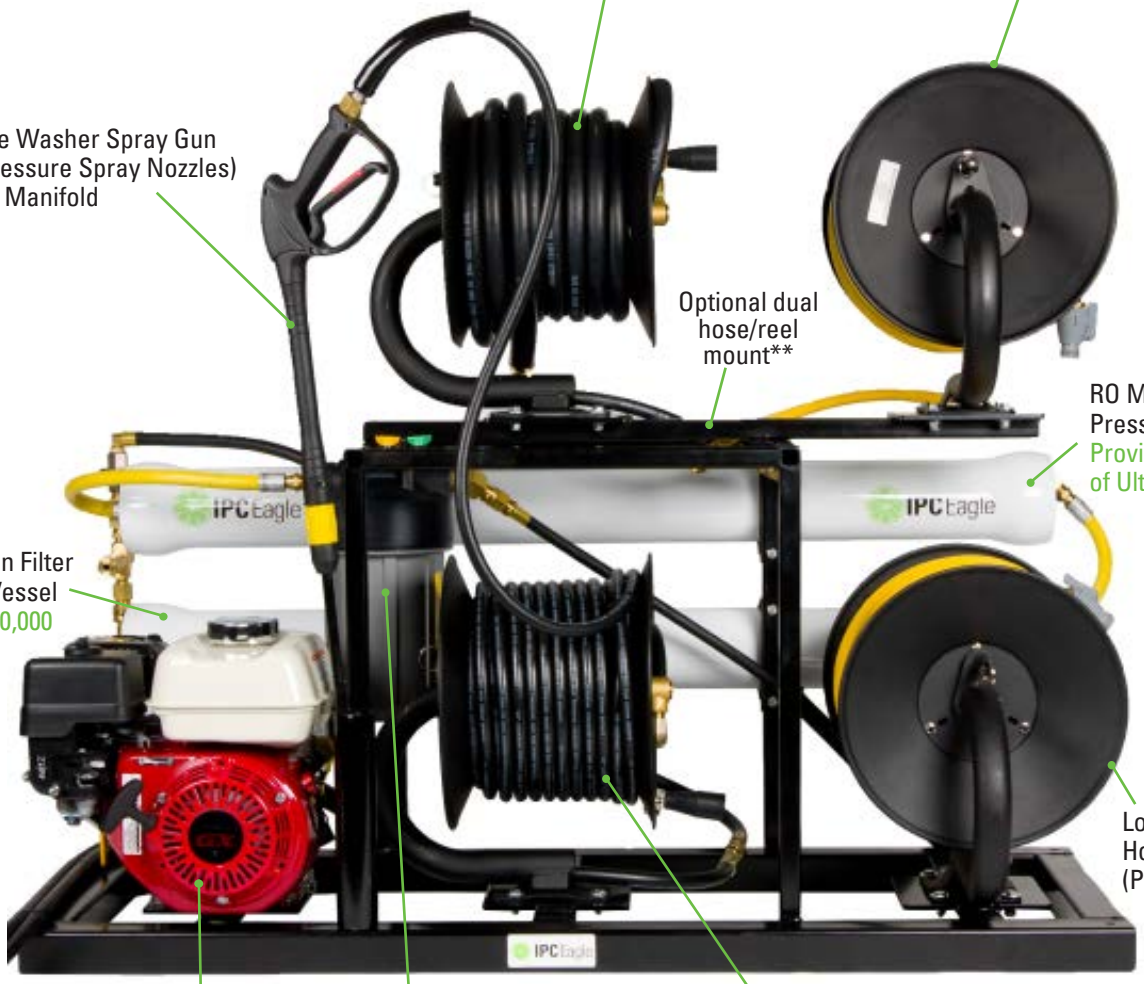
Pressure Washer

Flow	4 gpm
Pressure	1500 psi
Max temp	160 degrees F
Feed	Pressure or Suction

RO System Specs

Pure Water Prod. Rate	1.25 - 3 gpm (depending on supply water temp)
Pure Water Pressure	60 psi (average working pressure at hose reel inlet)
Rejection Rate	99%
Recovery Rate	50-70%
Operating Pressure	200 psi
Pre-Filter Service	@ 20,000 gallons

Single Unit Assembly for Ease of Use*



Hydro Station can be mounted in an open or enclosed trailer. (Tank and trailer not included)

* Comes standard with 1 High Pressure Hose/Reel and 1 Low Pressure Hose/Reel
** Shown with optional dual hose reel mount on top of unit

IPC Eagle

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For Immediate Release

Honda Launches All-New Mid GX Engine Lineup

New Models for Commercial Power Equipment Market Designed with Technologically Advanced Features for Lower Emissions, Lower Noise, Lower Vibration

ALPHARETTA, Ga., January 18, 2011 – At the 2011 World of Concrete trade venue, an international event dedicated to the commercial concrete and masonry construction industries, Honda today announced the launch of its all-new mid GX engines line. Completely redesigned for 2011, the new GX120, the GX160 and the GX200 are single-cylinder, horizontal-shaft engines that replace the existing GX120, GX160 and GX200 models. The lineup is an ideal fit for an array of commercial turf applications and equipment including generators; construction/industrial equipment; agricultural equipment; water pumps; and pressure washers.

The new Honda mid GX engines, while being dimensionally equivalent and having the same power output of the models they replace, boast increased performance resulting, in part, from the incorporation of these innovative features:

- improved fuel economy through changes in valve timing, compression ratio, carburetor settings, and cooling system modifications;
- new, more stringent emissions standards met through changes in valve timing; carburetor settings; and other proprietary components;
- low noise levels achieved via a change in muffler structure design, breather valve, push rod materials, and crank/case cover rigidity; reduced vibration accomplished through use of a lighter engine piston.

The new mid GX engines also are equipped with a number of design enhancements, including a new carburetor chamber coating; a recoil rope design change; the addition of a

-more-

carburetor filter; and an improved fuel tank guard – all of which improve their fuel economy, reliability and durability.

"As a global environmental leader, Honda developed our new mid GX engines with technologically advanced features that contribute to lower emissions, lower noise, lower vibration and nearly 100 percent installation capability for OEMs in the commercial power equipment market," said Mike Rudolph, senior manager, Honda Engines. "Because the new engines essentially match the dimensions of the existing GX models they replace, original equipment manufacturers will not have to modify the designs of their commercial equipment."

A Closer Look at Emissions Standards in 2011 and Beyond

The new Honda GX120, GX160 and GX200 mid GX engines meet EPA Phase 3 exhaust and evaporative emissions standards – the most stringent emission regulations in the world. As background, the EPA has finalized a new emission control program to reduce hydrocarbon emissions from small spark-ignition engines by approximately 35 percent. These new exhaust emissions standards will take effect in 2011 or 2012, depending on the size of the engine. The final rule also includes new standards to reduce evaporative emissions from these fuel systems. Ultimately, these standards will serve to reduce the ozone and carbon monoxide levels produced by these engines.

The design configuration of the new Honda mid GX models reduces pollutants such as hydrocarbons (HCs) and nitrous oxide (NOx) while maintaining the same level of output power as the previous Honda GX models they replace. "The engines reduce HCs by reducing oil consumption via a redesigned piston shape and piston ring along with a modified carburetor setting. In addition, the engine designs reduce NOx emissions through an adjustment in ignition timing which reduces combustion temperature and pressure," explained Rudolph.

Reduction of Noise and Vibration and in the New Honda Mid GX Models

In the new mid range GX160 engines, the composition of the push rods has been changed from steel to aluminum. Because the cylinder heads also are constructed from aluminum, this design change equalizes the linear expansion coefficient (the ratio at which the length of the push rod changes from reaction to engine heat) of the push rods. This improvement reduces the valve clearance (caused by the thermal expansion of the push rods and the cylinders) which reduces the tappet noise. The new engines also exhibit three primary design enhancements that contribute to class-leading low noise operations. Enhancements to the muffler, the breather valve and the case cover (GX160/200 models only) result in lower noise levels:

Current Honda GX120: 101 dBA	**New Honda GX120:** 99 dBA – dual silent spec
Current Honda GX160: 102 dbA	**New Honda GX160:** 99 dBA – dual silent spec
Current Honda GX200: 103 dbA	**New Honda GX200:** 101 dBA – dual silent spec

* Noise levels at rated load to reflect maximum noise level possible, measured at 9 Feet (3 Meters)

Turning to the issue of vibration, any engine generates vibration through the reciprocal movement of the pistons. In the new mid GX models, the piston weight has been reduced and the crank weight has been adjusted according to the piston weight and connecting rod weight. As a result, the crankshaft rotates to counterbalance the reciprocal movement force of the pistons – reducing primary engine vibration.

All three new mid GX models – the GX120, the GX160 and the GX200 – carry the Honda industry-competitive, three-year warranty. Comprehensive details about this warranty offering and other consumer information can be found at www.honda.com.

Honda is the world's largest manufacturer of engines, producing and marketing more than 23 million units globally in 2009 for a diverse array of automotive, motorcycle, marine, and power equipment products. Honda Engines offers a complete line of small, general purpose engines for commercial, rental industry, and consumer applications. Honda engines

supply smooth and dependable power for more than 3,000 different product applications including pressure washers, lawnmowers, and rescue and construction equipment.

Specifications for Honda Mid GX Engines			
	GX120	***GX160***	***GX200***
Engine Type	Air-cooled, 4-stroke, OHV, single cylinder		
Bore X Stroke (inches/mm)	2.4" X 1.7" (60 mm X 42 mm)	2.7" X 1.8" (68 mm X 45 mm)	2.7" X 2.1" (68 mm x 54 mm)
Displacement	7.2 cubic in. (118 cm^3)	9.9 cubic in. (163 cm^3)	12 cubic in. (196 cm^3)
Compression Ratio	8.5 : 1	9.0 : 1	8.5 : 1
Net Power (kW/rpm)*	3.5 hp (2.6 kW)	4.8 hp (3.6 kW)	5.5 hp (4.1 kW)
Net Torque*	5.4 lbs. ft. (7.3 Nm)	7.6 lbs. ft. (10.3 Nm)	9.1 lbs. ft. (12.4 Nm)
PTO Shaft Rotation	Counterclockwise (from PTO shaft side)		
Ignition System	Transistor Magneto		
Starting System	Recoil Starter		
Carburetor	Butterfly		
Lubrication System	Splash		
Governor System	Mechanical		
Air Cleaner	Dual Element		
Oil Capacity	0.59 US qt. (0.56 L)	0.61 US qt. (0.58 L)	0.63 US qt. (0.60 L)
Fuel Tank Capacity	2.1 US qt. (2.0 L)	3.3 US qt. (3.1 L)	3.3 US qt. (3.1 L)
Evaporative Emissions	Low permeation hose and purge joint provided		
Exhaust Emissions	Certified for use in all 50 states		
Dimensions (L X W X H)	12.0" (305 mm) X 13.4" (341 mm) X 13.0" (329 mm)	12.3" (312 mm) X 13.6" (346 mm) X 13.6" (346 mm)	12.6" (321 mm) X 14.8" (376 mm) X 13.6" (346 mm)
Dry Weight	29 lbs. (13.0 kg)	33 lbs. (15.1 kg)	35 lbs. (16.1 kg)

* The power rating of the engines indicated in this document measures the net power output at 3600 rpm (7000 rpm for model GXH50, GXV50, GX25 and GX35) and net torque at 2500 rpm, as tested on a production engine. Mass production engines may vary from this value. Actual power output for the engine installed in the final machine will vary depending on numerous factors, including the operating speed of the engine in application, environmental conditions, maintenance and other variables.

Editor's Note:

Honda Power Equipment, a division of American Honda Motor Co., Inc., markets a complete range of outdoor power equipment, including outboard marine engines, general purpose engines, generators, lawnmowers, pumps, snowblowers, tillers and trimmers for commercial, rental and residential applications. Its comprehensive product line is powered exclusively by environmentally advanced 4-stroke engines.

Information for media regarding Honda products is available at www.hondanews.com.
Consumer information regarding Honda products is available at www.honda.com.

APPENDIX D

IPC Eagle Wash Station Specifications

Scenario: Property Line 1

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	240	32.0	49.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	77	6	3	425	37.0	44.8
Transformer (pad mounted)	60	5	1	425	38.6	21.4
Inverter	77	6	3	805	42.6	39.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	7250	63.2	8.8
O&M Yard	70	50	1	5500	40.8	29.2
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	51.6

Scenario: Property Line 2

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	380	36.0	45.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	77	6	3	665	40.9	40.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	77	6	3	950	44.0	37.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	6810	62.7	9.3
O&M Yard	70	50	1	4375	38.8	31.2
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	48.0

Scenario: Property Line 3

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	285	33.5	48.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	77	6	3	805	42.6	39.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Inverter	77	6	3	1470	47.8	34.0
Transformer (pad mounted)	60	5	1	1470	49.4	10.6
Substation Transformer	72	5	1	5625	61.0	11.0
O&M Yard	70	50	1	3000	35.6	34.4
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	49.4

Scenario: Property Line 4

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	380	36.0	45.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	77	6	3	330	34.8	47.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	77	6	3	855	43.1	38.7
Transformer (pad mounted)	60	5	1	855	44.7	15.3
Substation Transformer	72	5	1	3065	55.7	16.3
O&M Yard	70	50	1	625	21.9	48.1
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	52.2

Scenario: Property Line 5

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	285	33.5	48.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	77	6	3	570	39.6	42.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	77	6	3	1140	45.6	36.2
Transformer (pad mounted)	60	5	1	1140	47.2	12.8
Substation Transformer	72	5	1	1750	50.9	21.1
O&M Yard	70	50	1	2250	33.1	36.9
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	50.0

Scenario: Property Line 6

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	400	36.5	45.3
Transformer (pad mounted)	60	5	1	400	38.1	21.9
Inverter	77	6	3	520	38.8	43.0
Transformer (pad mounted)	60	5	1	520	40.3	19.7
Inverter	77	6	3	665	40.9	40.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	2000	52.0	20.0
O&M Yard	70	50	1	4625	39.3	30.7
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	48.9

Scenario: Property Line 7

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	475	38.0	43.8
Transformer (pad mounted)	60	5	1	475	39.6	20.4
Inverter	77	6	3	665	40.9	40.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	77	6	3	805	42.6	39.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	5125	60.2	11.8
O&M Yard	70	50	1	8000	44.1	25.9
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	47.1

Scenario: Property Line 8

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	285	33.5	48.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	77	6	3	615	40.2	41.6
Transformer (pad mounted)	60	5	1	615	41.8	18.2
Inverter	77	6	3	710	41.5	40.3
Transformer (pad mounted)	60	5	1	710	43.0	17.0
Substation Transformer	72	5	1	5625	61.0	11.0
O&M Yard	70	50	1	8375	44.5	25.5
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	49.9

Scenario: Property Line 9

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	380	36.0	45.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	77	6	3	805	42.6	39.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Inverter	77	6	3	950	44.0	37.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	7250	63.2	8.8
O&M Yard	70	50	1	10000	46.0	24.0
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	47.9

Scenario: Property Line 10

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	240	32.0	49.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	77	6	3	665	40.9	40.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	77	6	3	950	44.0	37.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	6250	61.9	10.1
O&M Yard	70	50	1	9315	45.4	24.6
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	50.9

Scenario: Property Line 11

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	330	34.8	47.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	77	6	3	570	39.6	42.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	77	6	3	665	40.9	40.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	5500	60.8	11.2
O&M Yard	70	50	1	7750	43.8	26.2
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	49.3

Scenario: Property Line 12

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	330	34.8	47.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	77	6	3	710	41.5	40.3
Transformer (pad mounted)	60	5	1	710	43.0	17.0
Inverter	77	6	3	805	42.6	39.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	7625	63.7	8.3
O&M Yard	70	50	1	9125	45.2	24.8
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	49.0

Scenario: Property Line 13

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	190	30.0	51.8
Transformer (pad mounted)	60	5	1	190	31.6	28.4
Inverter	77	6	3	760	42.1	39.7
Transformer (pad mounted)	60	5	1	760	43.6	16.4
Inverter	77	6	3	665	40.9	40.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	6310	62.0	10.0
O&M Yard	70	50	1	7060	43.0	27.0
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	52.5

Scenario: Property Line 14

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	425	37.0	44.8
Transformer (pad mounted)	60	5	1	425	38.6	21.4
Inverter	77	6	3	665	40.9	40.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	77	6	3	520	38.8	43.0
Transformer (pad mounted)	60	5	1	520	40.3	19.7
Substation Transformer	72	5	1	5375	60.6	11.4
O&M Yard	70	50	1	6750	42.6	27.4
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	48.6

Scenario: Property Line 15

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	240	32.0	49.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	77	6	3	570	39.6	42.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	77	6	3	665	40.9	40.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	4375	58.8	13.2
O&M Yard	70	50	1	6250	41.9	28.1
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	51.2

Scenario: Property Line 16

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	77	6	3	285	33.5	48.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	77	6	3	640	40.6	41.2
Transformer (pad mounted)	60	5	1	640	42.1	17.9
Inverter	77	6	3	760	42.1	39.7
Transformer (pad mounted)	60	5	1	760	43.6	16.4
Substation Transformer	72	5	1	1940	51.8	20.2
O&M Yard	70	50	1	3375	36.6	33.4
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	50.1

Scenario: Property Line 1 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	240	32.0	39.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	67	6	3	425	37.0	34.8
Transformer (pad mounted)	60	5	1	425	38.6	21.4
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	7250	63.2	8.8
O&M Yard	70	50	1	6250	41.9	28.1
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	43.8

Scenario: Property Line 2 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	380	36.0	35.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	950	44.0	27.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	6810	62.7	9.3
O&M Yard	70	50	1	5500	40.8	29.2
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	41.1

Scenario: Property Line 3 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Inverter	67	6	3	1470	47.8	24.0
Transformer (pad mounted)	60	5	1	1470	49.4	10.6
Substation Transformer	72	5	1	5625	61.0	11.0
O&M Yard	70	50	1	4250	38.6	31.4
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	42.0

Scenario: Property Line 4 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	380	36.0	35.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	67	6	3	330	34.8	37.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	67	6	3	855	43.1	28.7
Transformer (pad mounted)	60	5	1	855	44.7	15.3
Substation Transformer	72	5	1	3065	55.7	16.3
O&M Yard	70	50	1	1625	30.2	39.8
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	44.1

Scenario: Property Line 5 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	570	39.6	32.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	67	6	3	1140	45.6	26.2
Transformer (pad mounted)	60	5	1	1140	47.2	12.8
Substation Transformer	72	5	1	1750	50.9	21.1
O&M Yard	70	50	1	1375	28.8	41.2
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	44.6

Scenario: Property Line 6 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	400	36.5	35.3
Transformer (pad mounted)	60	5	1	400	38.1	21.9
Inverter	67	6	3	520	38.8	33.0
Transformer (pad mounted)	60	5	1	520	40.3	19.7
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	2000	52.0	20.0
O&M Yard	70	50	1	3315	36.4	33.6
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	42.8

Scenario: Property Line 7 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	475	38.0	33.8
Transformer (pad mounted)	60	5	1	475	39.6	20.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	5125	60.2	11.8
O&M Yard	70	50	1	6625	42.4	27.6
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	40.6

Scenario: Property Line 8 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	615	40.2	31.6
Transformer (pad mounted)	60	5	1	615	41.8	18.2
Inverter	67	6	3	710	41.5	30.3
Transformer (pad mounted)	60	5	1	710	43.0	17.0
Substation Transformer	72	5	1	5625	61.0	11.0
O&M Yard	70	50	1	7125	43.1	26.9
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	42.1

Scenario: Property Line 9 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	380	36.0	35.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Inverter	67	6	3	950	44.0	27.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	7250	63.2	8.8
O&M Yard	70	50	1	8750	44.9	25.1
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	41.9

Scenario: Property Line 10 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	240	32.0	39.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	950	44.0	27.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	6250	61.9	10.1
O&M Yard	70	50	1	8000	44.1	25.9
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	43.4

Scenario: Property Line 11 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	330	34.8	37.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	67	6	3	570	39.6	32.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	5500	60.8	11.2
O&M Yard	70	50	1	6625	42.4	27.6
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	41.8

Scenario: Property Line 12 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	330	34.8	37.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	67	6	3	710	41.5	30.3
Transformer (pad mounted)	60	5	1	710	43.0	17.0
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	7625	63.7	8.3
O&M Yard	70	50	1	8375	44.5	25.5
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	42.4

Scenario: Property Line 13 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	190	30.0	41.8
Transformer (pad mounted)	60	5	1	190	31.6	28.4
Inverter	67	6	3	760	42.1	29.7
Transformer (pad mounted)	60	5	1	760	43.6	16.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	6310	62.0	10.0
O&M Yard	70	50	1	6625	42.4	27.6
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	43.9

Scenario: Property Line 14 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	425	37.0	34.8
Transformer (pad mounted)	60	5	1	425	38.6	21.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	520	38.8	33.0
Transformer (pad mounted)	60	5	1	520	40.3	19.7
Substation Transformer	72	5	1	5375	60.6	11.4
O&M Yard	70	50	1	6000	41.6	28.4
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	42.3

Scenario: Property Line 15 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	240	32.0	39.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	67	6	3	570	39.6	32.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	4375	58.8	13.2
O&M Yard	70	50	1	5250	40.4	29.6
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
					Cumulative	43.0

Scenario: Property Line 16 MITIGATED

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	640	40.6	31.2
Transformer (pad mounted)	60	5	1	640	42.1	17.9
Inverter	67	6	3	760	42.1	29.7
Transformer (pad mounted)	60	5	1	760	43.6	16.4
Substation Transformer	72	5	1	1940	51.8	20.2
O&M Yard	70	50	1	2375	33.5	36.5
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
					Cumulative	43.7