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5.7 NOISE

5.7.1 Introduction

This Application for Certification (AFC) for the Rio Mesa Solar Electric Generating Facility (Rio Mesa SEGF or Project) has been prepared in accordance with the California Energy Commission's (CEC) Power Plant Site Certification Regulations (CEC-140-2008-001-REV1, current as of July 2008). In addition, this AFC includes elements necessary for the United States (U.S.) Bureau of Land Management (BLM) to permit the Project through the National Environmental Policy Act (NEPA). The "Applicant" for purposes of this AFC comprises Rio Mesa Solar I, LLC, Rio Mesa Solar II, LLC, and Rio Mesa Solar III, LLC, owners of the three separate solar plants and certain shared facilities being proposed. These three Delaware limited liability companies will hold equal one-third shares in the ownership of shared facilities and will separately own their respective plants. They are wholly owned by Rio Mesa Solar Holdings, LLC (a Delaware limited liability company) which is in turn wholly owned by BrightSource Energy, Inc. (BrightSource) a Delaware corporation and the ultimate parent company. The Applicant will use BrightSource's solar thermal technology for the Rio Mesa SEGF.

The proposed project site is situated on the Palo Verde Mesa in Riverside County, California, 13 miles southwest of the City of Blythe, and is located partially on private land and partially on public land administered by BLM. The project will include three solar concentrating thermal power plants and a shared common area to include shared systems. The first plant, a 250-megawatt (MW) (nominal) facility known as Rio Mesa I, will be constructed at the south end of the project and owned by Rio Mesa Solar I, LLC. The second plant, another 250-megawatt (MW) (nominal) facility known as Rio Mesa II, will be located in the central portion of the project site and owned by Rio Mesa Solar II, LLC. Rio Mesa III, a third 250-megawatt (MW) (nominal) facility, will be constructed in the northern portion of the Project site and owned by Rio Mesa Solar III, LLC. These three plants will be connected via a common overhead 220 kilovolt (kV) generator tie-line (gen-tie line) to the Southern California Edison (SCE) Colorado River Substation (CRS) approximately 9.7 miles to the north.

Each plant will utilize a solar power boiler (referred to as a solar receiver steam generator or SRSG), located on top of a dedicated concrete tower, and solar field based on proprietary heliostat mirror technology developed by BrightSource. The reflecting area of an individual heliostat (which includes two mirrors) is about 19 square meters [205 square feet (sq. ft.)]. The heliostat (mirror) fields will focus solar energy onto the SRSG which converts the solar energy to superheated steam. In each plant, a Rankine cycle non-reheat steam turbine receiving this superheated will be directly connected to a rotating generator that generates and pushes the electricity onto the transmission system. Each plant will generate electricity using solar energy as its primary fuel source. However, auxiliary boilers will be used to operate in parallel with the solar field during partial load conditions and occasionally in the afternoon when power is needed after the solar energy has diminished to a level that no longer will support solar generation of electricity. These auxiliary boilers will also assist with daily start-up of the power generation equipment and night time preservation.

5.7.2 Laws, Ordinances, Regulations, and Standards

The following are the LORS that apply to noise generated by the Project. They are discussed below and summarized in Table 5.7-1.

Table 5.7-1
Laws, Ordinances Regulations and Standards (LORS)

LORS	Applicability	AFC Sections Explaining Conformance
Federal		
NEPA of 1969	NEPA establishes a public, interdisciplinary framework for federal decision-making and ensures that Federal agencies take environmental factors into account when considering federal actions.	Section 5.7.2.1
Occupational Health and Safety Act	Exposure of workers over 8-hour shift limited to 90 decibels A-weighted (dBA).	Section 5.7.2.1
State		
Warren-Alquist State Energy Resources Conservation and Development Act, California Public Resources Code, §§ 25000, et seq.	Gives the CEC licensing authority in lieu of state, regional, and local permits and requirements.	Section 5.7.2.2
California Environmental Quality Act (CEQA) California Public Resources Code, Division 13, §§ 21000-21177, as amended 2010.	Requires all agencies of State government that regulate activities of private individuals, corporations, and public agencies, which are found to affect the quality of the environment, shall regulate such activities so that major consideration is given to preventing environmental damage.	Section 5.7.2.2
California Occupational Safety and Health Administration (Cal-OSHA) 8 California Code of Regulations (CCR) Article 105 §§ 5095 et seq.	Exposure of workers over 8-hour shift limited to 90 dBA.	Section 5.7.2.2
California Vehicle Code §§ 23130 and 23130.5	Regulates vehicle noise limits on California highways	Section 5.7.2.2
California Government Code § 65302	Requires local government to prepare plans that contain noise provisions.	Section 5.7.2.2
Local		
Riverside County General Plan	The County General Plan establishes acceptable levels for noise based on land use.	Sections 5.7.2.3., 5.7.5.1 and 5.7.5.2.
Riverside County Ordinance 847	The County Code established exemption with regard to construction and maximum allowable decibel level by land uses.	Sections 5.7.2.3., 5.7.5.1 and 5.7.5.2.

AFC = Application for Certification
Cal-OSHA = California Occupational Health and Safety Administration
CCR = California Code of Regulations
CEC = California Energy Commission
CEQA = California Environmental Quality Act
dBA = decibels A-weighted
NEPA = National Environmental Policy Act

5.7.2.1 Federal

National Environmental Policy Act of 1969

NEPA establishes a public, interdisciplinary framework for Federal agencies reviewing projects under their jurisdiction to consider environmental impacts. NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment.

The BLM, as lead Federal agency for the Project, is responsible for preparation of an Environmental Impact Statement (EIS) in compliance with NEPA to evaluate the environmental impacts of the portions of the Rio Mesa SEGF on federal lands. The Rio Mesa Solar III plant and the Project gen-tie line are located on lands administered and managed by the BLM. NEPA compliance is required for these portions of the Project through preparation of a Draft and Final EIS. BLM is also responsible for Native American consultation, including government to government consultation.

The President's Council on Environmental Quality (CEQ) developed guidelines and procedures to assist Federal agencies with NEPA procedures so that environmental justice concerns are effectively identified and addressed. This includes guidelines for public participation, alternatives, and mitigation.

Occupational Safety and Health Act

Onsite occupational noise exposure levels set by the Occupational Safety and Health Act of 1970 (OSHA) are regulated via California Occupational Safety and Health Administration (Cal-OSHA). The maximum time-weighted average noise exposure level of workers is 90 decibels (dB), A-weighted (dBA), over an eight-hour work shift (29 Code of Federal Regulations [CFR] § 1910.95).

5.7.2.2 State

Warren-Alquist Act

The California Public Resources Code (PRC) establishes the CEC as the decision-making authority over land use decisions and environmental determinations during the AFC process. This is in accordance with the Warren-Alquist Act, codified in §§ 25000 et seq. of the PRC. The CEC has exclusive jurisdiction over thermal power plant siting (50 MW or greater), including California Environmental Quality Act (CEQA) implementation. The Project will demonstrate conformity with state, regional, and local laws, including land use laws.

Under the Warren-Alquist Act, the CEC's licensing process is legally equivalent to CEQA and is guided by CEQA regulations.

California Environmental Quality Act

The CEC will be the lead agency enforcing CEQA for the Project. Under California law, the CEC is responsible for reviewing the AFCs filed for projects, and also has the role of lead agency for the environmental review of these projects under CEQA (PRC, §§ 25500 et seq; PRC, §§21000 et seq.). The CEC conducts this review in accordance with the administrative adjudication provisions of the

Administrative Procedure Act (5 United States Code, §§ 500 et. seq.) and its own regulations governing site certification proceedings (CCR, Title 20, §§ 1701 et seq.). These provisions require the staff to conduct an independent analysis of AFCs and prepare an independent assessment of a project's potential environmental impacts, feasible mitigation measures, and alternatives as part of this process.

The CEC considers the Staff Assessment(s), along with the environmental analysis provided by the Applicant, as well as input from interested local, regional, State, and Federal agencies, intervenors, and interested Native American tribes, in developing its final decision on whether to issue a license for a proposed project. The CEC has a certified regulatory program under CEQA that exempts the agency from having to draft an Environmental Impact Report (EIR) and, instead, requires a Final Staff Assessment (FSA), evidentiary hearings, and a decision based on the hearing record, which includes the staff's and other parties' assessments.

CEQA compliance for the Project will be achieved through a combined NEPA/CEQA document, which will be prepared jointly by the BLM and CEC.

California Occupational Safety and Health Administration

The California Department of Industrial Relations, Division of Occupational Safety and Health, enforces Cal-OSHA regulations, which are the same as the Federal OSHA regulations described previously. The regulations are contained in Title 8 of the California Code of Regulations (CCR), General Industrial Safety Orders, Article 105, Control of Noise Exposure, §§ 5095, *et seq.*

California Vehicle Code

Noise limits for highway vehicles are regulated under the California Vehicle Code, §§ 23130 and 23130.5. The limits are enforceable on the highways by the California Highway Patrol and the County Sheriff's Office.

California State Planning Law

The State of California requires local jurisdictions (via California Government Code § 65302(f)) to develop general plans that include "Noise Elements." The Noise Element identifies objectives, policies, and implementation measures used to guide development of land use and compatibility with respect to noise.

A key component of determining land use compatibility is defining appropriate noise thresholds and where such standards apply. "Noise-sensitive" land use classifications in the State of California include residential areas, schools, convalescent and acute care hospitals, parks and recreational areas, and churches. For exterior living areas (e.g., yards and patios), the noise threshold guideline for new residential land uses is 55 dBA Community Noise Equivalent Level (CNEL) and must not exceed 65 dBA CNEL.

5.7.2.3 Local

The aforementioned California State Planning Law (California Government Code § 65302) requires that all cities, counties, and entities (such as multi-city port authorities) prepare and adopt a General Plan to

guide community change. The following subsections include the General Plan and Ordinance for Riverside County.

Riverside County General Plan

The Noise Element of the Riverside County General Plan includes noise compatibility guidance, which is based on the California State Planning Law. The Land Use Compatibility for Community Noise Exposure, included in the noise element, indicates that residential-low density, single family, duplex, and mobile homes are normally acceptable up to 60 dBA of day-night average sound level (Ldn) or CNEL.

Ordinance 847

Riverside County's Ordinance No. 847, § 4, lists maximum nighttime and daytime sound levels for occupied property by General Plan land use designation (Riverside County, 2011). The most restrictive limit that would apply at the nearest occupied receptors along State Route 78 are classified as Rural Residential. Table 1 of this ordinance indicates the maximum decibel level allowed in Rural Residential is a daytime and nighttime limit of 45 dBA Lmax when measured at the exterior of an occupied property.

Section 2 of Ordinance No. 847 does, however, exempt from its provisions the following construction activities:

- Private construction projects located one-quarter of a mile or more from an inhabited dwelling; or,
- Private construction projects located within one-quarter of a mile from an inhabited dwelling, provided that:
  - Construction does not occur between the hours of 6 p.m. and 6 a.m. during the months of June through September, and
  - Construction does not occur between the hours of 6 p.m. and 7 a.m. during the months of October through May.

5.7.3 Fundamentals of Sound and Noise

Noise: Whether something is perceived as a noise event is influenced by the type of sound, the perceived importance of the sound, and its appropriateness in the setting, the time of day and the type of activity during which the noise occurs and the sensitivity of the hearer.

Sound: Sound for the purposes of this chapter is a physical phenomenon generated by minute vibrations that result in waves that travel through a medium, such as air, and result in auditory perception by the human brain. Sound is measured in different ways, including the frequency of the wave (acoustical) or intensity/loudness (perceptual). Frequency is measured in Hertz (Hz), while intensity is measured in Decibels (dB). dB are measured using a logarithmic scale. A sound level of zero dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above approximately 110 dB begin to be felt inside the human ear as discomfort and eventually pain at 120 dB and higher levels.

Due to the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically; however, some simple rules are useful in dealing with sound levels. For instance, if a sound's energy is doubled, the sound level increases by 3 dB, regardless of the initial sound level. By way of example, 60 dB + 60 dB = 63 dB; and 80 dB + 80 dB = 83 dB.

Sound level is usually expressed by reference to a known standard. This report refers to sound pressure level (SPL, or Lp) and sound power level (PWL, or Lw). In expressing sound pressure on a logarithmic scale, the sound pressure is compared to a reference value of 20 micropascals (µPa). SPL depends not only on the power of the source, but also on the distance from the source and on the acoustical characteristics of the space surrounding the source. PWL, on the other hand, is independent of these environmental factors. Hertz (Hz) is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. When the drum skin vibrates 100 times per second it generates a sound pressure wave that is oscillating at 100 Hz, and this pressure oscillation is perceived by the ear/brain as a tonal pitch of 100 Hz. Sound frequencies between 20 and 20,000 Hz are within the range of sensitivity of the best human ear.

Sound from a tuning fork contains a single frequency (a pure tone), but most sounds one hears in the environment do not consist of a single frequency and instead are composed of a broad band of frequencies differing in sound level. The method commonly used to quantify environmental sounds consists of evaluating all frequencies of a sound according to a weighting system that reflects the typical frequency-dependent sensitivity of average healthy human hearing. This is called "A-weighting," and the decibel level measured is referred to as dBA. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA "curve" of decibel adjustment per octave band center frequency (OBCF) from a "flat" or unweighted SPL.

Although sound level value may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a mixture of noise from distant sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor, the (Leq, may be used to describe sound that is changing in level. Leq is the energy-mean dBA during a measured time interval. It is the "equivalent" constant sound level that would have to be produced by a given source to equal the acoustic energy contained in the fluctuating sound level measured. In addition to the energy-average level, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the maximum Leq (Lmax) and minimum Leq (Lmin) indicators that represent the root-mean-square maximum and minimum noise levels measured during the monitoring interval. The Lmin value obtained for a particular monitoring location is often called the acoustic floor for that location.

To describe time-varying character of environmental noise, the statistical noise descriptors L10, L50, and L90 are commonly used. They are the noise levels exceeded 10 percent, 50 percent, and 90 percent of the measured time interval. Sound levels associated with the L10 typically describe transient or short-term events. Half of the sounds during the measurement interval are softer than L50 and half are louder, so it is often called the "median" sound level. Levels associated with L90 often describe background noise conditions and/or continuous, steady-state sound sources.

Finally, Ldn is defined as the dBA for a 24-hour day with a 10 dB penalty added to nighttime sound levels (10:00 p.m. to 7:00 a.m.) in order to compensate for increased sensitivity to noise during usually quieter evening and nighttime hours. The CNEL is also defined as the dBA for a 24-hour day. It is calculated by adding a 5 dB penalty to sound levels in the evening (7:00 p.m. to 10:00 p.m.) and a 10 dB penalty to sound levels at night (10:00 p.m. to 7:00 a.m.), thus providing somewhat greater compensation than Ldn for increased sensitivity during such time periods when a quiet environment is expected. The CNEL is used by various agencies to define acceptable land use compatibility with respect to vehicular traffic noise.

Sound levels of typical noise sources and environments are provided in Table 5.7-2 to provide the reader a frame of reference.

Table 5.7-2
Sound Pressure Levels of Typical Noise Sources and Noise Environments

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Jet Fly-over at 1000 ft (300 m)	110-100	Rock Band
Gas Lawn Mower at 3 ft (1 m)	100-90	
Diesel Truck at 50 ft (15 m), at 50 mph (80 km/hr)	90-80	Food Blender at 3 ft (1 m)
Commercial Area, Gas Lawn Mower at 100 ft (30 m)	70	Vacuum Cleaner at 10 ft (3 m)
Heavy Traffic at 300 ft (90 m)	60	Normal Speech at 3 ft (1 m)
Quiet Urban Daytime	50-40	Large Business Office
Quiet Urban/Suburban Nighttime	40-30	Theater, Large Conference Room (Background)
Quiet Rural Nighttime	30-20	Library, Bedroom at Night, Concert Hall (Background)
	20-10	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	0	

Source: Caltrans, 2009.
dBA = A-weighted decibel
ft = feet
m = meter
mph = miles per hour
km/hr = kilometer per hour

5.7.4 Affected Environment

This section presents the existing pre-Project sound environment based on ambient noise measurements and field observation. The project vicinity largely comprises agricultural uses with rural residential land use. The dominant sound sources are farm equipment and vehicular traffic on State Route 78.

The following subsections describe the methodology used to measure and document the outdoor sound levels that serve as a representative baseline characterization of the pre-Project ambient sound environment prior to predictive Project noise analysis and impact assessment.

5.7.4.1 Noise Sensitive Receptors

The noise sensitive receptors identified in the project vicinity include residential properties along State Route 78 between Lugo Road and 32nd Avenue, and a small cluster of mobile homes located northwest of the intersection of Palo Verde Road and Spencer Road. There are no schools or hospitals within a two-mile distance from the project boundary, a buffer zone that should be large enough to include per CEC Siting Regulations Appendix B (g)(4)(a) an area "where, during either construction or operation, there is a potential increase of 5 dBA or more, over existing background levels." Figure 5.7-1 illustrates the locations of these sensitive receptors with respect to proposed Project features and their surroundings.

5.7.4.2 Sound Level Measurements

To determine ambient sound levels at representative receptors, four long-term (LT) measurements and two short-term (ST) measurements were conducted using laboratory-calibrated American National Standards Institute (ANSI) Type 1 and Type 2 sound level meters (SLM). ST measurements are, for purposes of this study, one continuous hour in duration. LT measurements have continuous durations of at least 25 sequential hours. Each LT SLM was placed in a weatherproof environmental case, with an external microphone (connected via cable to the SLM within the case) positioned approximately four feet above the ground. Each ST SLM, with its directly-attached microphone, was placed on a tripod approximately five feet above the ground. Each SLM was equipped with a field-appropriate 3.5-inch diameter windscreen for its microphone and set for slow time-response and A-weighting. Each SLM was field-calibrated before and after each measurement period with an acoustic field calibrator. All sound level measurements were conducted in a practical manner that reflected accordance with (or consideration of) applicable portions of International Organization for Standardization (ISO) 1996-1, 2 and part 3 standards.

Weather conditions during the survey period were generally hot with clear sky and no precipitation. The air temperature ranged from 88 degrees Fahrenheit (°F) at night to 108°F during the day, with approximately forty percent relative humidity. When observed and measured with a hand-held anemometer, winds were calm during the daytime hours and ranging from zero to 12 miles per hour (mph) average speed from the south during the nighttime hours. Observed weather conditions during the measurement periods were considered seasonally appropriate and thus representative of the area.

Tables 5.7-3 and 5.7-4 present summaries of the LT and ST SPL measurements, respectively. Values presented are for the entire 25-hour measurement period. See Appendix 5.7A for further details. Field Noise Measurement Data Forms containing detailed information for each of the measurement locations are included in Appendix 5.7B. Appendix 5.7A contains detailed sound metrics and statistical information for each sequential one hour portion of each LT measurement. The measurement locations are described as follows:

- **LT1** was located at northwestern corner of Palo Verde Road and Spencer Road. There were a few mobile homes in this area, clustered with some non-residential and unoccupied structures. This location is approximately 7,500 feet to the closest project boundary, approximately 8,200 feet to the closest Project heliostat and 13,770 feet to the closest power block (Rio Mesa I). Three LT measurements were conducted in this area as follows:

- *LT1**a*** was placed at the western end of this area (closest to the Project);
- *LT1**b*** was placed by the mobile home at the northern end of this area; and,
- *LT1**c*** was placed at the eastern end of this area.

Due to the proximity of occupied mobile homes at LT1a and LT1b, the measurements were affected by air conditioning operation sound. LT1c was placed approximately 200 feet east of the nearest mobile home, in an attempt to measure ambient sound with reduced influence from this seasonally operating equipment sound source (i.e., by relying on sound attenuation due to geometric divergence).

- **LT2** was placed in the open space at the southeastern corner of 32nd Avenue and State Route 78, where State Route 78 changes direction. The SLM was located approximately 125 feet east of State Route 78 and 230 feet south of 32nd Avenue. This location is approximately 5,700 feet to the closet project boundary, approximately 9,180 feet to the closest project heliostat and 13,120 feet to the closest power block (Rio Mesa III). The dominant sound source was vehicular traffic on State Route 78. Other sound sources include rustling leaves and vocalizing birds. Note that the SLM was located in a privately-owned open space to safely conduct measurement of the State Route 78 traffic-dominated representative ambient sound environment for multiple nearby occupied residences.
- **ST1** was placed in the town of Palo Verde in Imperial County. The SLM was located north of the residential property at the southeastern corner of 3rd Street and Alley Way. It was approximately 40 feet from Alley Way and 200 feet from State Route 78. This location is approximately 9,900 feet to the closest project boundary, approximately 10,720 feet to the closest project heliostat and 16,400 feet to the closest power block (Rio Mesa I). The dominant sound source was vehicular traffic on State Route 78. Other sound sources include dogs barking, birds vocalizing, and leaves rustling.
- **ST2** was placed north of the mobile home located at the southwestern corner of 35th Avenue and State Route 78 in Riverside County. The SLM was approximately 125 feet from State Route 78. This location is approximately 5,700 feet to the closest project boundary, approximately 9,840 feet to the closest project heliostat and 15,250 feet to the closest power block (Rio Mesa I). The dominant sound source was vehicular traffic on State Route 78. Other sound sources included occasional traffic on 35th Avenue and rustling leaves.

Table 5.7-3
Summary of Long-Term Measurements (dBA)

Location	Start Date & Time	End Date & Time	Leq	Lmax	Lmin	L(10)	L(50)	L(90)
LT1a	7/25 12:00	7/26 13:00	46	70	23	44	40	38
LT1b	8/1 10:00	8/2 11:00	51	75	35	49	47	46
LT1c	8/1 10:00	8/2 11:00	39	63	26	38	35	33
LT2	8/1 9:00	8/2 10:00	54	84	37	52	41	38

Notes:
LT1a, LT1b, and LT1c are within Imperial County. LT2 is within Riverside County.
Three LT measurements were conducted in the area characterized as LT1.
At LT1a, the air conditioning unit was running between 17:00 and 4:00.
At LT1b, the air conditioning unit was running between 10:00 and 20:00, and 5:00 and 11:00 on the following morning.

dBA = A-weighted decibel
LT = Long Term
Leq = Equivalent Sound Level
Lmax = Maximum Sound Level
Lmin = Minimum Sound Level
L10 = Sound Level exceeded 10% of the measurement period
L50 = Sound Level exceeded 50% of the measurement period
L90 = Sound Level exceeded 90% of the measurement period

Table 5.7-4
Summary of Short-Term Measurements (dBA)

Location	Date	Start Time	End Time	Leq	L10	L50	L90
ST1	7/25/11	15:15	16:15	48	47	41	39
	7/26/11	1:40	2:40	40	41	39	38
	7/26/11	10:20	11:20	46	48	41	38
ST2	7/25/11	16:25	17:25	59	61	42	35
	7/26/11	0:25	1:25	54	46	35	33
	7/26/11	9:15	10:15	60	63	47	40

Note: ST1 is within Imperial County. ST2 is within Riverside County.
dBA = A-weighted decibel
ST = Short Term
Leq = Equivalent Sound Level
L10 = Sound Level exceeded 10% of the measurement period
L50 = Sound Level exceeded 50% of the measurement period
L90 = Sound Level exceeded 90% of the measurement period

Comparison of sound metrics and statistics among measurement locations LT1a, LT1b and LT1c demonstrate that considerable variance in decibel levels can occur and is apparently due to factors such as proximity of continuous sound sources like the aforementioned air conditioning units. One key difference between the set of LT1 measurement positions and that for LT2, ST1 and ST2 is that the former is over a half mile away from vehicular traffic on State Route 78, an apparent dominant contributor to ambient sound at the latter.

5.7.5 Environmental Analysis

Sound will be produced at the proposed project site during construction, operation, and maintenance of the Project. Potential noise impacts from these activities are assessed in this section. Federal, State, and local LORS considered applicable to the Project are included in Section 5.7.2 and form the basis for indicators of environmental consequences caused by the Project, which would be considered significant if:

- Private construction projects are located within one-quarter of a mile from an inhabited dwelling and construction occurs:
  - between the hours of 6 p.m. and 6 a.m. during the months of June through September; and,
  - between the hours of 6 p.m. and 7 a.m. during the months of October through May.
- Sound from Project operations exceeds 45 dBA Lmax throughout a day at a noise sensitive receptor.

5.7.5.1 Construction Noise

Prediction Methodology

Construction of the Project is expected to be similar to other power plants in terms of schedule, equipment used, and related activities. A centralized power block of electro-mechanical systems and high-pressure fluid-handling equipment associated with a typical steam turbine generator will be installed at each of the three plants. The overall noise level will vary during the construction period, depending upon the phasing and concurrence of different construction activities and their general locations or zones of the project area.

The Empire State Electric Energy Research Company (ESERC) extensively studied noise from individual pieces of construction equipment as well as from construction sites of power plants and other types of facilities (Bolt Beranek & Newman, Inc., 1977). In general, the construction of power plants can be divided into five phases that use different types of construction equipment: site preparation, concrete pouring, steel erection, mechanical, and site clean-up.

More recently, the Federal Highway Administration (FHWA) released its Roadway Construction Noise Model (RCNM), which contains empirically determined reference sound level data for a large variety of equipment types (FHWA, 2006).

Since specific information on types, quantities, and operating schedules of equipment expected for Project construction is not available at this point in the project development, information from these aforementioned reference documents for similarly sized industrial projects will be used to estimate construction noise associated with this Project.

Consistent with the approach adopted by the BLM (2005), construction noise can reasonably be estimated from the two loudest equipment types generally operating at a site. As these types may differ depending on the phase of construction, Table 5.7-5 below presents the Applicant's anticipated loudest two types of

equipment for each distinct phase of construction activity. Also, shown separately is the line for a vibratory pile driver, which is expected to be the main method of installing numerous posts (i.e., not concrete pads) across the project site onto which heliostat hardware will be installed. The composite site noise level represents the logarithmic sum of the indicated equipment, adjusted by acoustical usage factor (i.e., the percentage of time during which the equipment is actually operating and thus producing sound). For purposes of predictive analysis conservatism, three dBA is then algebraically added to this result.

Table 5.7-5
Typical Construction Phases and Composite Noise Levels Expected for Project

Construction Phase or *Special Activity*	Anticipated Loudest Construction Equipment *	Equipment Noise Level (Lmax, dBA) at 50 feet **	Acoustical Usage Factor (%) **	Composite Site Noise Level (hourly Leq, dBA) at 50 feet
Site Clearing and Excavation	Dump truck Scraper	84 85	40 40	87
Concrete Pouring	Concrete pump truck Concrete mixer	82 85	20 40	85
Steel Erection	Crane Pneumatic tools	85 85	16 20	84
Mechanical	Crane Pneumatic tools	85 85	16 50	86
Cleanup	Rock drill Truck	85 84	20 40	85
Concrete Batch Plant	Concrete Batch Plant**	83	15	78
Heliostat post installation	Vibratory pile driver ***	95	20	91

Sources: * Bechtel, 2011; ** FHWA, 2006; *** URS, 2011.
dBA = A-weighted decibel
Leq = Equivalent Sound Level
Lmax = Maximum Sound Level

The difference between the composite site noise level at 50 feet and a level at some greater distance away is due largely to naturally occurring sound attenuation as noise propagates away from a source (a.k.a., geometric divergence, or the "six dB per doubling" rule of thumb). Added to this attenuation from geometric divergence, and although affected by temperature and humidity, atmospheric acoustical absorption offers attenuation at a rate of about one dBA per thousand feet of horizontal distance that a sound travels. Conservatively, attenuation from linearly-occluding terrain and acoustical absorption from ground effects (i.e., porous soils or dense vegetative cover) is ignored.

As the Project includes power blocks, surrounding arrays of heliostats, and temporary concrete batch plant sites within the project boundary, predicted construction noise is evaluated at a noise-sensitive receptor from generalized aggregate sound sources having "acoustic centers" as follows:

- The geographic central point of each power block(where Site Clearing and Excavation would be the loudest of the five construction phases to occur here);
- The geographic central point of each concrete batch area (where Concrete Batch Plant would be sourced); and,
- A project property boundary location nearest to the receptor at which heliostats are to be installed.

Note that construction is expected to occur 24 hours a day, 7 days a week, particularly during the summer when high daytime temperatures will require night-time concrete pours and other activities.

Steam blows could occur during the construction period. However, steam blow activity will be infrequent. Other project construction includes erection of permanent facilities (e.g., structures) at the common area that are located at the eastern project boundary. For purposes of this analysis, construction activity here is assumed to be located at the nearest project heliostat and generate noise not louder than the vibratory pile driving activity. Likewise, construction of the new gen-tie line is not anticipated to involve activities or equipment that are louder than vibratory pile driving.

With these conditions in mind, anticipated construction noise that might be measured at representative noise-sensitive receptors can be estimated for reasonable worst cases and are presented below.

Estimated Construction Noise at the Representative NSRs

Using the methodology described in Section 5.7.5.1, Table 5.7-6 presents the distances from each receptor to construction activities and Table 5.7-7 presents the estimated construction noise levels for each construction activity at the representative noise-sensitive receptors under consideration. Aggregate construction noise levels in Table 5.7-7 represent the estimated logarithmic sum of sound from all six identified individual construction activities.

Table 5.7-6
Distance between Noise Sensitive Receptors and Each Construction Activity Site (feet)

Receptor	Closest Heliostat post installation	Rio Mesa I Power Block	Rio Mesa II Power Block	Rio Mesa III Power Block	Concrete Batch Plant Units 1&2	Concrete Batch Plant Unit 3
LT1	8,200	13,770	20,130	23,810	17,000	19,200
LT2	9,180	18,040	19,680	13,120	14,710	11,460
ST1	10,720	16,400	22,460	24,860	18,800	20,360
ST2	9,840	15,250	19,250	17,610	14,600	13,900

LT = Long Term
ST = Short Term

Table 5.7-7
Estimated Construction Noise at Representative Noise Sensitive Receptors
(average hourly Leq in dBA)

Receptor	Closest Project Boundary	Rio Mesa I Power Block	Rio Mesa II Power Block	Rio Mesa III Power Block	Concrete Batch Plant Units 1&2	Concrete Batch Plant Unit 3	Aggregate Construction Noise Level
LT1	39	24	<20	<20	<20	<20	39
LT2	37	<20	<20	26	<20	22	37
ST1	34	<20	<20	<20	<20	<20	34
ST2	35	<20	<20	<20	<20	21	35

Leq = Equivalent Sound Level
LT = Long Term
ST = Short Term

Table 5.7-6 reveals that the distance between all identified construction activities and the sensitive receptors are much greater than a quarter mile; therefore, noise from the construction activities is exempt from Riverside County Ordinance 824 limits and correspondingly not considered an impact.

With respect to CEC siting guidelines, the comparison of estimated aggregate construction noise levels from Table 5.7-7 with existing ambient sound levels are shown in Tables 5.7-8 and 5.7-9.

Table 5.7-8
Comparison of Aggregate Daytime Construction Noise with Existing Daytime Ambient at Representative Noise-Sensitive Receptors

Noise-Sensitive Receptor Identification	Existing Ambient (hourly Leq, dBA) [1]	Project as Designed		
		Loudest Aggregate Construction Noise (ACN) [2] (hourly Leq, dBA)	Existing + ACN [3] (Leq, dBA)	Increase Over Existing (Leq, dBA)
LT1a	41	39	43	2
LT1b	46	39	47	1
LT1c	35	39	40	5
LT2	53	37	53	0
ST1	46	34	46	0
ST2	59	35	59	0

[1] Quieter measured daytime hour (for ST1 and ST2), or algebraic average of 4 quietest daytime (7 a.m. to 10 p.m.) hours at LTs.
[2] Loudest level among the three solar power towers under construction, from Table 5.7-7.
[3] This is a logarithmic sum of Existing and Calculated, not algebraic.
Leq = Equivalent Sound Level LT = Long Term ACN = Aggregate Construction Noise
dBA = A-weighted decibel ST = Short Term

Because all increases over existing daytime ambient sound are anticipated to be five dBA or less, daytime aggregate construction noise is expected to be less than significant.

Table 5.7-9
Comparison of Aggregate Nighttime Construction Noise with Existing Nighttime Ambient at Representative Noise-Sensitive Receptors

Noise-Sensitive Receptor Identification	Existing Ambient (hourly Leq, dBA) [1]	Project as Designed		
		Loudest Aggregate Construction Noise (ACN) [2] (hourly Leq, dBA)	Existing + ACN [3] (Leq, dBA)	Increase Over Existing (Leq, dBA)
LT1a	46	39	47	1
LT1b	40	39	43	3
LT1c	34	39	40	6
LT2	48	37	48	0
ST1	40	34	41	1
ST2	54	35	54	0

[1]Measured nighttime hour (for ST1 and ST2), or algebraic average of 4 quietest nighttime (10 p.m. to 7 a.m.) hours at LTs.
[2] Loudest level among the three solar power towers under construction, from Table 5.7-7.
[3] This is a logarithmic sum of Existing and Calculated, not algebraic.

Leq = Equivalent Sound Level LT = Long Term ACN = Aggregate Construction Noise
dBA = A-weighted decibel ST = Short Term

Because all increases over existing nighttime ambient sound are anticipated to be six dBA or less, nighttime aggregate construction noise is expected to be less than significant.

Piping Steam Blows

One of the loudest, but temporary, proposed construction activities will likely be the steam blows required to prepare the SRSG, steam turbine, and associated piping for startup during the final construction phase before operation. This process cleans the piping and tubing which carry steam to the turbines; starting the turbines without cleaning these systems can damage the turbine. Either a series of high-pressure bursts (lasting no more than a few minutes duration each), or a continuous low-pressure technique can be used for steam blows. The noise level of un-muffled high-pressure bursts is estimated to result in 125 dBA at 50 feet (Bolt Beranek and Newman Inc., 1997) Table 5.7-10 presents estimated steam blow noise, sourced at the power blocks (i.e., where the piping is located), at the representative noise-sensitive receptors.

Table 5.7-10
Comparison of Un-muffled high pressure Steam Blow Noise with Existing Daytime Ambient at Representative Noise Sensitive Receptors

Noise-Sensitive Receptor Identification	Existing Ambient (Leq, dBA) [1]	Project as Designed		
		High-pressure Steam Blow Noise [2] (hourly Leq, dBA)	Existing + ACN [3] (Leq, dBA)	Increase Over Existing (Leq, dBA)
LT1a	41	66	66	25
LT1b	46	66	66	20
LT1c	35	66	66	31
LT2	53	65	65	12
ST1	46	64	64	18
ST2	59	67	67	8

1 Quieter measured daytime hour (for ST1 and ST2), or algebraic average of 4 quietest daytime (7 a.m. to 10 p.m.) hours at LTs.
2 Sample loudest hour, calculated from each of the three power blocks.
3 This is a logarithmic sum of Existing and Calculated, not algebraic.

Leq = Equivalent Sound Level LT = Long Term ACN = Aggregate Construction Noise
dBA = A-weighted decibel ST = Short Term

Assumed to occur only during the day, estimated un-muffled steam blow noise levels would all be greater than 60 dBA hourly Leq at receptors and expected to cause an increase over the existing ambient sound levels of up to 31 dBA. While considered construction noise and thus exempt from Riverside County noise ordinance thresholds, these un-muffled sound level estimates and their increases over pre-Project ambient sound indicate a noise impact with respect to CEC siting guidance and a clear need for industry-standard sound muffling devices for high pressure steam blows. This analysis therefore assumes that the Project design and construction process will incorporate such typical sound abatement measures, so that the resulting expected sound level will not cause more than a 10 dBA increase over pre-project ambient sound level. Based on Table 5.7-10, such measures would need to demonstrate (or be designed to perform) at least 21 dBA of noise reduction with respect to receptor LT1c. With such measures installed, steam blow noise is expected to be a less than significant impact.

Construction Occupational Noise Exposure

Outdoor sound levels within the project boundary during construction may exceed the OSHA 90 dBA threshold near certain operating or idling powered mobile and stationary equipment, but these levels will diminish with distance from these sources as described in section 5.7.5.1. Consistent with OSHA/Cal-OSHA guidance and regulatory compliance requirements, project contractors will post warnings with respect to areas that may be noise level hazards and provide construction workers with OSHA approved hearing protection devices (HPD) as part of an applicable hearing conservation program.

Construction Laydown, Staging, and Parking Areas

Per Section 2.2.16, the construction laydown and parking areas will be located in and around the common area and at each of the three power blocks. Contractors and equipment suppliers will use the laydown areas during construction to coordinate delivery of equipment and materials, construction, and construction worker parking and processing. The primary noise concern for the construction laydown areas would be the truck staging area, where a truck may idle with its engine running. If one then assumes this truck (reference SPL at 50 feet = 84 dBA Leq, and 40 percent acoustical usage factor, per Table 5.7-5) and an operating forklift (85 dBA Leq at 50 feet, with 50 percent acoustical usage, per FHWA) are the loudest two types of equipment at this location, the composite noise level would be 88 dBA Leq at 50 feet. Since the closest representative noise-sensitive receptor to the common areas is LT2 and approximately 8,200 feet away, the expected noise level would be no greater than 36 dBA. This level complies with local LORS and would cause no increase to the 53 dBA Leq daytime ambient at LT2. Therefore, the noise effect from the construction laydown area is anticipated to be less than significant.

Construction Traffic

During the construction period, there would be traffic increase on State Route 78, along which some representative noise-sensitive receptors are located. Based on hour-long traffic counts taken as part of the ambient noise field survey, State Route 78 currently sees the following traffic volumes by vehicle type at the indicated locations in Table 5.7-11.

Table 5.7-11
Sample Pre-Project hourly State Route 78 Traffic Counts

Location	Date of Count	Time (hh:mm)	Speed Limit	Passenger Cars	Medium Trucks	Heavy Trucks
ST1	7/26/11	10:20 to 11:20	35 mph	52	2	18
ST2	7/26/11	09:15 to 10:15	60-70 mph	59	7	24
Average morning counts				*55*	*5*	*21*
ST1	7/25/11	15:15 to 16:15	35 mph	88	1	20
ST2	7/25/11	16:25 to 17:25	60-70 mph	79	5	15
Average afternoon counts				*84*	*3*	*18*
ST1	7/26/11	01:40 to 02:40	35 mph	2	0	2
ST2	7/26/11	00:25 to 01:25	60-70 mph	8	2	7
Average nighttime counts				*5*	*1*	*5*

According to Caltrans data from 2009, the total average annual daily traffic (AADT) recorded at 28th Avenue and Neighbors Boulevard is 1,800 vehicles and 216 for trucks (Caltrans, 2010). Dividing these values by 24 yields averages of 75 and nine, respectively, which appear to reasonably fall within the value ranges (i.e., daytime and nighttime) from the observed counts.

Table 5.12-8 from Section 5.12.3 indicates that the construction-caused change in average daily traffic volumes on segments of State Route 78 will not exceed 67 percent; thus, the corresponding daily noise level should not increase by more than 3 dBA and thereby be considered a less than significant impact.

5.7.5.2 Operational Noise

Prediction Methods

The Cadna/A® Noise Prediction Model (Version 4.1.137) was used to estimate the aggregate sound pressure levels from nominal project operations at the noise-sensitive receptors, which are illustrated for a worst-case scenario (i.e., all three solar power towers at full rated operation) in Figure 5.7-1. Cadna/A® is a Windows® based software program that predicts noise levels near industrial noise sources based on ISO 9613-2 standards for outdoor sound propagation calculation. The model uses these industry-accepted propagation algorithms and accepts sound power levels (Lw, in dB re: one pico Watt) provided by the equipment manufacturer and other sources. In the case of this operational noise analysis, Lw for nominal steady-state operation at OBCF resolution was confidentially provided by the Applicant's design engineer, Bechtel Corporation. The software's calculations account for classical sound wave geometric divergence, plus attenuation factors resulting from air absorption, basic ground effects, and barrier/shielding. In order to account for ground effects, the topographical data was incorporated into Cadna/A® as part of the model space.

From the Applicant's supplied Lw values for various equipment located in each power block, the noise sources are divided into four approximate elevation groups for the full operation:

- The SRSG, which is located approximately 750 feet above the ground;
- The Air Cooled Condenser (ACC) rectangular fan array, which is planar and parallel with the ground surface at a relative height of 60 feet (i.e., above grade) and contains a total of 30 fans;
- The Auxiliary Boiler stack discharge at 135 feet; and
- All other noise sources approximately 10 feet above the ground.

Table 5.7-12 summarizes the A-weighted overall Lw for each noise source elevation group, for three model scenarios as follows:

- "Full" operation – either relying solely on insolation (and thus, the SRSG) for 100 percent of the plant's thermal source, or the Auxiliary Boilers (i.e., burning natural gas for thermal energy). Assumed to occur, at most, during the entire 15-hour "daytime" period (7 p.m. to 10 p.m.) plus as much as one additional hour at night (e.g., from 10 p.m. to 11 p.m.).
- "Startup" operation – a set of systems, smaller in quantity than the "full" operation scenario above and in some cases involving unique equipment (e.g., Startup Boiler). Assumed to occur, at most, during two early morning "nighttime" hours (e.g., 5 a.m. to 7 a.m.).
- "Nighttime preservation" operation – like Startup, a small set of equipment intended to maintain minimal plant operation when needed. Assumed to occur, at least, during six "nighttime" hours (e.g., 11 p.m. to 5 p.m.).

The suggested timeframes during the day are consistent with the high end of the eight to 16 hour range expected for full operation capacity as described in Section 2.0. Additional model configuration settings and assumptions are as follows:

- *Outdoor temperature*: 20 degrees Celsius (ºC)
- *Relative humidity*: 50 percent
- *Average wind speed*: zero (i.e., the analysis considers a wind-neutral scenario)
- *Average ground absorption*: 0.5 (representing a conservative blend of hard, reflective surfaces that tend towards zero, and highly absorptive ground cover that approaches unity)
- *Heliostat actuators*: while there are large numbers of these potential sources, they are spread across the vast project area and are expected to operate infrequently. However, they are not considered a significant aggregate noise source to model.
- *Common area*: while there are a few permanent buildings at this general location that will have operating HVAC systems, they are not considered a significant aggregate noise source to model.
- *Gas metering stations*: since natural gas transmission equipment and piping within the common area is not expected to involve pressure reduction or other typical noise-producing processes that would emit sound levels greater than building HVAC systems, they are not considered a significant aggregate noise source to model.

Table 5.7-12
Operational Noise Sources per Power Block

Noise Sources	Model Source Height (ft)	Aggregate Sound Power Level (dBA)
Full Operation		
SRSG	750	109
ACC Fans (30 Fans)	60	121
Auxiliary Boilers	135	106
Other Sources Combined[1]	10	127
Startup/Shutdown Operation		
Start-up Boiler	10	104
Start-up Vents	10	125
Other Sources Combined[2]	10	113

Table 5.7-12
Operational Noise Sources per Power Block

Noise Sources	Model Source Height (ft)	Aggregate Sound Power Level (dBA)
Nighttime Preservation Operation		
All Sources Combined[3]	10	107

Source: Bechtel 2011
1. Noise Sources include approximately 20 different equipment pieces, such as pumps, fans, and transformers.
2. Noise Sources includes pumps, fans, and start-up vents.
3. Noise Sources include pumps, fans, and preservation boiler.

ACC = Air Cooled Condenser
dBA = A-weighted decibel
ft = feet
SRSG = Solar Receiver Steam Generator

Predicted Operation Noise at Sensitive Receptors

Predictive Cadna/A-based noise levels during operation are shown and included in Figure 5.7-1. The figure depicts iso-dB level contours for the Project in decrements of five dB, at an assumed typical receptor height of five feet. The results of the predictive Cadna/A-based calculations are summarized in Table 5.7-13 and are compared against ambient noise levels as measured during the summer of 2011.

Table 5.7-13
Predicted Full Operation Levels at Representative Noise-Sensitive Receptors

Noise-Sensitive Receptor Identification	Existing Ambient (hourly L90, dBA) [1]	Existing Ambient (hourly Leq, dBA) [1]	Project as Designed		
			Predicted Operation (hourly Leq, dBA)	Existing + Predicted [2] (hourly Leq, dBA)	Increase Over Existing (Leq, dBA)
LT1a	30	41	29	41	0
LT1b	38	40	29	40	0
LT1c	31	34	29	35	1
LT2	37	48	35	48	0
ST1	38	40	31	41	1
ST2	35	54	33	54	0

Notes:
[1] Quietest daytime or nighttime hour (of those actually measured for ST1 and ST2), or algebraic average of 4 quietest daytime or nighttime hours at LTs.
[2] This is a logarithmic sum of Existing and Calculated, not algebraic.

dBA = A-weighted decibel
LT = Long Term
Leq = Equivalent Sound Level
L90 = Sound Level exceeded 90% of the measurement period

The nighttime or daytime quietest hour (or average of four consecutive hours, for the LTs) is used as the existing ambient baseline because the worst-case full operation mode will occur through all 15 daytime hours and at least one nighttime hour.

For an electricity generation facility like the Project that is expected to operate essentially under "steady-state" conditions, and for which equipment sound power data representing nominal steady-state operation was available and used as input parameters for the Cadna/A-based prediction model, this analysis assumes that the predicted operation sound values in Table 5.7-13 represent hourly Leq but would not be substantially different from an Lmax during that same hour-long period. Ideally, true steady-state operation would mean that the same Lmax operation sound level would occur continuously and thus make for an equivalent Leq. In the real world, some variance between Lmax and Leq occurs, but this analysis further assumes that the anticipated difference between the two metrics over a given nominal hour is no greater than 5 dBA. In other words, if measurable at a receptor, aggregate sound from project operations may reach 45 dBA Lmax during a given hour when steady-state operation is anticipated, but the Leq may be as low as 40 dBA.

Utilizing this assumed relationship between Lmax and Leq to represent project operation sound and thus allow indirect comparison with the Riverside County impact indicator of 45 dBA Lmax, the predicted full operation noise levels from Table 5.7-13 do not exceed 40 dBA hourly Leq at noise-sensitive receptors nor cause an increase greater than 5 dBA over the existing ambient sound levels. For both of these reasons, full power generation operation noise from the Project is expected to be a less than significant impact.

For "Startup" and "Nighttime preservation" operation scenarios, predicted aggregate noise levels from the three power blocks is expected to be less than the full operation predicted noise levels at each noise-sensitive receptor; thus, neither of these operation modes will result in a significant noise impact.

Plant Maintenance Noise

For most nighttime hours, when "full" plant power generation will not occur, "Startup" and "Nighttime Preservation" operation modes will generate less than significant noise impacts. However, it is during this time when routine plant maintenance may occur, including activities such as mirror washing. Because this activity can occur as close to a representative noise-sensitive receptor as the nearest project boundary, nighttime maintenance noise should be considered and analyzed in a manner similar to construction noise, where sound from two probable loudest sources propagates to the receptors. Table 5.7-14 presents predicted maintenance noise using this technique.

Table 5.7-14
Predicted Nighttime Maintenance Noise Levels
at Representative Noise-Sensitive Receptors

Noise-Sensitive Receptor Identification	Existing Ambient (hourly Leq, dBA) [1]	Project as Designed		
		Composite Maintenance Source (hourly Leq, dBA)	Existing + Composite [2] (hourly Leq, dBA)	Increase Over Existing (Leq, dBA)
LT1a	46	32	46	0
LT1b	40	32	41	1
LT1c	34	32	36	2
LT2	48	30	48	0
ST1	40	27	40	0
ST2	54	28	54	0

Notes:
[1] Measured nighttime hour (for ST1 and ST2), or algebraic average of 4 quietest nighttime hours at LTs.
[2] This is a logarithmic sum of Existing and Calculated, not algebraic.
dBA = A-weighted decibel
LT = Long Term
Leq = Equivalent Sound Level

Based on a combined reference noise level of 84 dBA at 50 feet, which assumes a pressure washer pump operates continuously (i.e., 77 dBA at 100 percent usage factor) and a truck idles or moves the washer up to a cumulative third of a given hour (i.e., 84 dBA at 33 percent usage factor), the predicted composite maintenance source noise levels do cause an expected increase over existing ambient, but not beyond the CEC siting guideline for potential noise impacts. (For purposes of predictive analysis conservatism, and as was done for construction noise prediction, three dBA was algebraically added to the logarithmic sum of these two assumed loudest sources for this maintenance activity.) Additionally, the composite maintenance sound source is less than 40 dBA hourly Leq, and if considered "steady-state" due to the continuous operation of the pressure washer pump, would on the basis of the assumed Lmax to Leq relationship described in Section 5.7.5.2 thus comply with the Riverside County threshold. Hence, for both reasons, project maintenance noise is considered to be less than significant.

Occupational Noise

Based upon the noise level data, the noise levels inside and very near the Project would be similar in magnitude to comparably sized large industrial projects, such as another conventional steam power plant.. Noise levels within the project site may require the use of hearing protection as specified by Federal OSHA and Cal-OSHA guidelines for worker noise exposure. Compliance with Cal-OSHA regulations will ensure that personnel are adequately protected from potential noise hazards. The noise exposure level to protect hearing of workers is regulated at 90 dBA over an 8-hour work shift. Areas above 85 dBA will be posted as high noise level areas and hearing protection will be required. The Applicant will implement a hearing conservation program for applicable employees as outlined in Cal-OSHA

regulations. The survey will be conducted after the facility is in full operation, and will be conducted by a qualified person in accordance with the provisions of Title 29, CFR, Part 1910.95 (reviewed in Section 5.12.6.1) and Title 8, CCR, §§5095-5100 (Article 105) (reviewed in Section 5.12.6.2). Therefore, occupational noise will be less than significant.

Power Transmission

Noise sources associated with power transmission include occasional breaker operation in the substation, corona noise, and very low magnetostriction hum from the conductors. Breaker noise is considered impulsive in nature, lasting a very short duration and may occur only a few times per year. Corona noise is characterized as a buzz or hums and is usually worse when the conductors are wet, such as in rain or fog.

The Electric Power Research Institute (EPRI) has conducted noise tests and studies and has published reference material on transmission line noise. Consistent with all acoustic textbooks' discussion of propagation of noise from a line source, EPRI states that noise produced by a conductor decreases at a rate of three dB per doubling of distance from the source. The EPRI Transmission Line Reference Book indicates that the audible noise from a typical 525 kV line with two conductors per phase would likely be less than 40 dBA at a distance of 40 feet from the outside conductor at ground level. If only one conductor per phase is used, the noise level will be less. Consistent with the project description (see Section 2.0), the levels are expected to be less than described above because the gen-tie line used in the Project is 220 kV (i.e., far less than 525 kV).

The new power transmission equipment for the Project is therefore predicted to have no audible sound contribution to the representative noise-sensitive receptors. Additionally, the new power transmission equipment is predicted to have inaudible contribution with respect to the site's dominant operational noise sources (e.g., ACCs). Due to this lack of audible contribution, the impact from the proposed power transmission is expected to be less than significant.

Tonal Noise

At the representative noise-sensitive receptors considered in this analysis, no significant tones are anticipated. It is the Applicant's intention to anticipate the potential for audible tones in the design and specification of the plant's equipment and take necessary steps to prevent sources from emitting tones that might be disturbing at the nearest receptors.

Ground and Airborne Vibration

The project heavy equipment (e.g., steam turbine generator) are balanced and designed to produce very low vibration levels throughout the life of the Project. While an imbalance could contribute to ground vibration levels in the vicinity of the equipment, typically vibration monitoring and vibration isolating mounting systems installed in such equipment are designed to ensure that the equipment remains balanced or has its operation suspended for inspection and service as required.

5.7.6 Cumulative Effects

The Project is not expected to result in significant cumulative effects related to noise during construction or operation. Construction noise will be temporary and will conclude on completion of construction activities. Although operation of the Project will add noise to the ambient sound environment, the magnitude will dissipate with increasing distance from the Project boundary and noise levels will not be significant at any sensitive noise receptor. No projects, including the RSEP, BSPP, PSPP, DSSF, GSEP, and the Devers-Palo Verde No. 2 transmission line including the new CRS are located close enough to the project site to increase or compound the noise effects associated with the Rio Mesa SEGF.

5.7.7 Mitigation Measures

Although noise impacts will be less than significant, the following mitigation measures will be included in the Project.

5.7.7.1 Noise Mitigation Measure #1

The Applicant shall establish a telephone hot-line for use by the public to report any significant adverse noise conditions associated with the construction and operation of the Project. If the telephone is not staffed 24 hours per day, the Applicant shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This hot-line telephone number shall be posted at the project site during construction in a manner visible to passersby. This telephone number shall be maintained until the Project has been operational for at least one year.

5.7.7.2 Noise Mitigation Measure #2

Throughout the construction and operation of the Project, the Applicant shall document, investigate, evaluate, and attempt to resolve all legitimate Project-related noise complaints. The Applicant or its authorized agent shall:

- Use the Noise Complaint Resolution Form typically suggested by CEC or functionally equivalent procedure to document and respond to each noise complaint;
- Attempt to contact the person(s) making the noise complaint within 24 hours;
- Conduct an investigation to attempt to determine the source of noise related to the complaint; and
- If the noise complaint is legitimate, take all reasonable measures to reduce the noise at its source.

5.7.8 Involved Agencies and Agency Contacts

Agencies with jurisdiction to enforce LORS related to noise are shown in Table 5.12-15.

Table 5.7-15
Agency Contacts

Agency	Contact	Address	Telephone
Bureau of Land Management	Cedric Perry	Bureau of Land Management 22835 Calle San Juan de Los Lagos Moreno Valley, CA 92553-9046	(951) 697-5200
California Occupational Safety and Health Administration	Victoria Heza	7575 Metropolitan Dr #400 San Diego, CA 92108	(619) 767-2060
California Energy Commission	Pierre Martinez	1516 Ninth Street Sacramento, CA 95814	(916)-651-3765
Riverside County Public Health Department, Office of Industrial Hygiene	Steve Hinde	4065 County Circle Drive, #304Riverside, CA 92503	(951) 358-5096

5.7.9 Permits Required and Permit Schedule

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

5.7.10 References

Bolt Beranek and Newman, Inc., *Power Plant Construction Noise Guide*, BBN Report No. 3321, Cambridge, MA, May 1977.

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Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Noise** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (1)	...provide a discussion of the existing site conditions, the expected direct, indirect and cumulative impacts due to the construction, operation and maintenance of the project, the measures proposed to mitigate adverse environmental impacts of the project, the effectiveness of the proposed measures, and any monitoring plans proposed to verify the effectiveness of the mitigation.	Page 5.7-7, 5.7.4; Page 5.7-11, 5.7.5; Page 5.7-23, 5.7.6; Page 5.7-23, 5.7.7		
Appendix B (g) (4) (A)	A land use map which identifies residences, hospitals, libraries, schools, places of worship, or other facilities where quiet is an important attribute of the environment within the area impacted by the proposed project. The area potentially impacted by the proposed project is that area where, during either construction or operation, there is a potential increase of 5 dB(A) or more, over existing background levels.	Figure 5.7-1		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

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Project: ____

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Project Manager: ____

Docket: ____

Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (4) (B)	A description of the ambient noise levels at those sites identified under subsection (g)(4)(A) which the applicant believes provide a representative characterization of the ambient noise levels in the project vicinity, and a discussion of the general atmospheric conditions, including temperature, humidity, and the presence of wind and rain at the time of the measurements. The existing noise levels shall be determined by taking noise measurements for a minimum of 25 consecutive hours at a minimum of one site. Other sites may be monitored for a lesser duration at the applicant's discretion, preferably during the same 25-hour period. The results of the noise level measurements shall be reported as hourly averages in Leq (equivalent sound or noise level), Ldn (day-night sound or noise level) or CNEL (Community Noise Equivalent Level) in units of dB(A). The L10, L50, and L90 values (noise levels exceeded 10 percent, 50 percent, and 90 percent of the time, respectively) shall also be reported in units of dB(A).	Page 5.7-8, 5.7.4.2; Appendices A and B		
Appendix B (g) (4) (C)	A description of the major noise sources of the project, including the range of noise levels and the tonal and frequency characteristics of the noise emitted.	Page 5.7-11, 5.7.5.1; Page 5.7-18, 5.7.5.2		
Appendix B (g) (4) (D)	An estimate of the project noise levels, during both construction and operation, at residences, hospitals, libraries, schools, places of worship or other facilities where quiet is an important attribute of the environment, within the area impacted by the proposed project.	Page 5.7-11, 5.7.5.1; Page 5.7-18, 5.7.5.2		
Appendix B (g) (4) (E)	An estimate of the project noise levels within the project site boundary during both construction and operation and the impact to the workers at the site due to the estimated noise levels.	Page 5.7-11, 5.7.5.1; Page 5.7-18, 5.7.5.2		

Adequacy Issue: Adequate ____ Inadequate ____

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SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (4) (F)	The audible noise from existing switchyards and overhead transmission lines that would be affected by the project and estimates of the future audible noise levels that would result from existing and proposed switchyards and transmission lines. Noise levels shall be calculated at the property boundary for switchyards and at the edge of the rights-of-way for transmission lines.	Page 5.7-18, 5.7.5.2		
Appendix B (i) (1) (A)	Tables which identify laws, regulations, ordinances, standards, adopted local, regional, state, and federal land use plans, leases, and permits applicable to the proposed project, and a discussion of the applicability of, and conformance with each. The table or matrix shall explicitly reference pages in the application wherein conformance, with each law or standard during both construction and operation of the facility is discussed; and	Page 5.7-1, 5.7.2, Table 5.7-1		
Appendix B (i) (1) (B)	Tables which identify each agency with jurisdiction to issue applicable permits, leases, and approvals or to enforce identified laws, regulations, standards, and adopted local, regional, state and federal land use plans, and agencies which would have permit approval or enforcement authority, but for the exclusive authority of the commission to certify sites and related facilities.	Page 5.7-24, 5.7.8, Table 5.7-15		
Appendix B (i) (2)	The name, title, phone number, address (required), and email address (if known), of an official who was contacted within each agency, and also provide the name of the official who will serve as a contact person for Commission staff.	Page 5.7-24, 5.7.8, Table 5.7-15		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

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Project: ____

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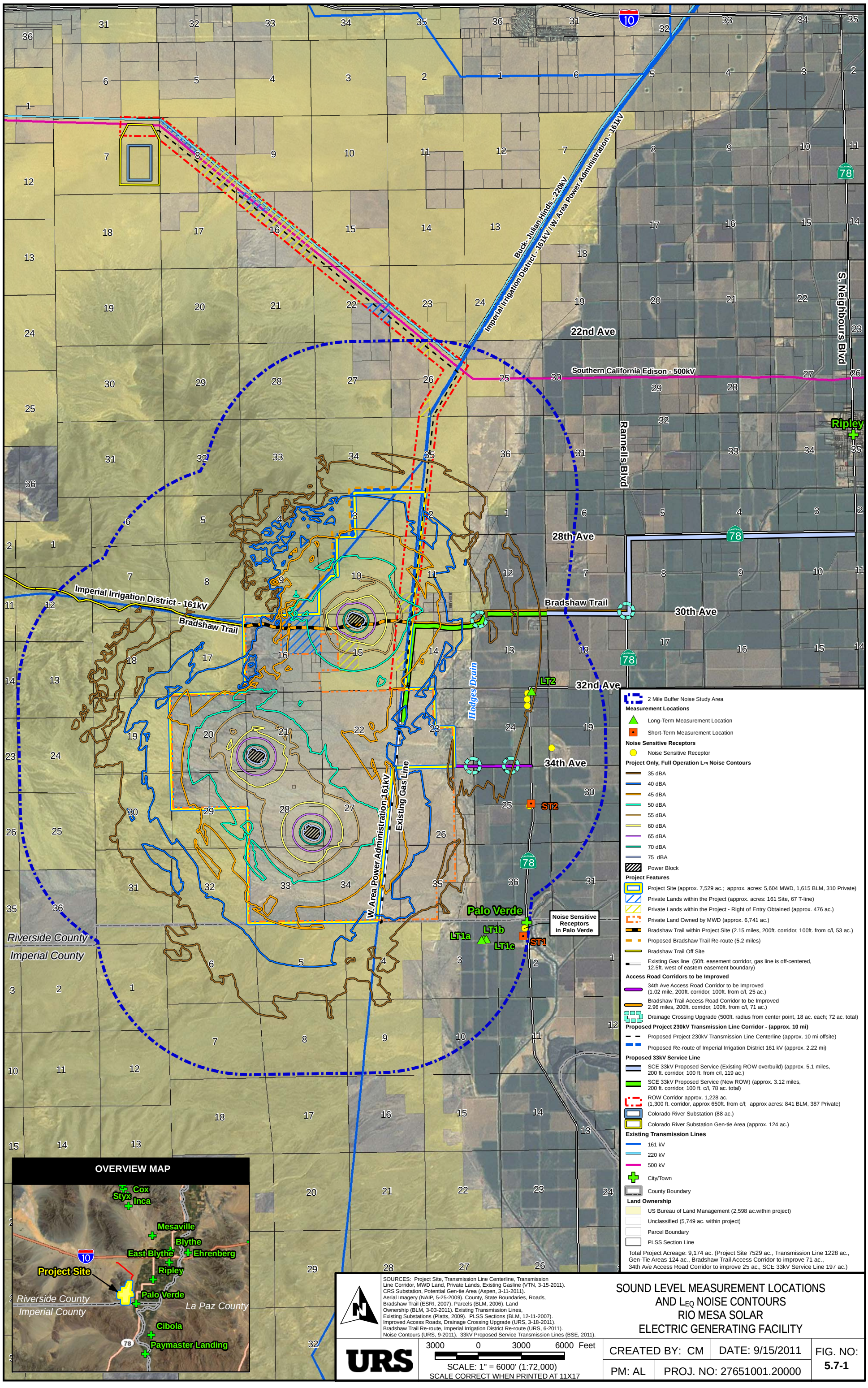
SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (i) (3)	A schedule indicating when permits outside the authority of the commission will be obtained and the steps the applicant has taken or plans to take to obtain such permits.	Page 5.7-24, 5.7.9		


Buck-Julian-Hinds - 220kV
Imperial Irrigation District - 161kV / W. Area Power Administration - 161kV
22nd Ave
Southern California Edison - 500kV
S. Neighbours Blvd
Ripley
Rannells Blvd
28th Ave
Imperial Irrigation District - 161kV
Bradshaw Trail
30th Ave
Hodges Drain
LT2
32nd Ave
34th Ave
ST2
W. Area Power Administration 161kV
Existing Gas Line
Palo Verde
Noise Sensitive Receptors in Palo Verde
LT1a
LT1b
LT1c
ST1
Riverside County
Imperial County
OVERVIEW MAP
Cox
Styx
Inca
Mesaville
Blythe
East Blythe
Ehrenberg
Ripley
Project Site
Palo Verde
Riverside County
Imperial County
La Paz County
Cibola
Paymaster Landing
2 Mile Buffer Noise Study Area
Measurement Locations
Long-Term Measurement Location
Short-Term Measurement Location
Noise Sensitive Receptors
Noise Sensitive Receptor
Project Only, Full Operation Leq Noise Contours
35 dBA
40 dBA
45 dBA
50 dBA
55 dBA
60 dBA
65 dBA
70 dBA
75 dBA
Power Block
Project Features
Project Site (approx. 7,529 ac.; approx. acres: 5,604 MWD, 1,615 BLM, 310 Private)
Private Lands within the Project (approx. acres: 161 Site, 67 T-line)
Private Lands within the Project - Right of Entry Obtained (approx. 476 ac.)
Private Land Owned by MWD (approx. 6,741 ac.)
Bradshaw Trail within Project Site (2.15 miles, 200ft. corridor, 100ft. from c/l, 53 ac.)
Proposed Bradshaw Trail Re-route (5.2 miles)
Bradshaw Trail Off Site
Existing Gas line (50ft. easement corridor, gas line is off-centered, 12.5ft. west of eastern easement boundary)
Access Road Corridors to be Improved
34th Ave Access Road Corridor to be Improved (1.02 mile, 200ft. corridor, 100ft. from c/l, 25 ac.)
Bradshaw Trail Access Road Corridor to be Improved 2.96 miles, 200ft. corridor, 100ft. from c/l, 71 ac.)
Drainage Crossing Upgrade (500ft. radius from center point, 18 ac. each; 72 ac. total)
Proposed Project 230kV Transmission Line Corridor - (approx. 10 mi)
Proposed Project 230kV Transmission Line Centerline (approx. 10 mi offsite)
Proposed Re-route of Imperial Irrigation District 161 kV (approx. 2.22 mi)
Proposed 33kV Service Line
SCE 33kV Proposed Service (Existing ROW overbuild) (approx. 5.1 miles, 200 ft. corridor, 100 ft. from c/l, 119 ac.)
SCE 33kV Proposed Service (New ROW) (approx. 3.12 miles, 200 ft. corridor, 100 ft. c/l, 78 ac. total)
ROW Corridor approx. 1,228 ac. (1,300 ft. corridor, approx 650ft. from c/l; approx acres: 841 BLM, 387 Private)
Colorado River Substation (88 ac.)
Colorado River Substation Gen-tie Area (approx. 124 ac.)
Existing Transmission Lines
161 kV
220 kV
500 kV
City/Town
County Boundary
Land Ownership
US Bureau of Land Management (2,598 ac.within project)
Unclassified (5,749 ac. within project)
Parcel Boundary
PLSS Section Line
Total Project Acreage: 9,174 ac. (Project Site 7529 ac., Transmission Line 1228 ac., Gen-Tie Areas 124 ac., Bradshaw Trail Access Corridor to improve 71 ac., 34th Ave Access Road Corridor to improve 25 ac., SCE 33kV Service Line 197 ac.)
SOURCES: Project Site, Transmission Line Centerline, Transmission Line Corridor, MWD Land, Private Lands, Existing Gasline (VTN, 3-15-2011). CRS Substation, Potential Gen-tie Area (Aspen, 3-11-2011). Aerial Imagery (NAIP, 5-25-2009). County, State Boundaries, Roads, Bradshaw Trail (ESRI, 2007). Parcels (BLM, 2006). Land Ownership (BLM, 3-03-2011). Existing Transmission Lines, Existing Substations (Platts, 2009). PLSS Sections (BLM, 12-11-2007). Improved Access Roads, Drainage Crossing Upgrade (URS, 3-18-2011). Bradshaw Trail Re-route, Imperial Irrigation District Re-route (URS, 6-2011). Noise Contours (URS, 9-2011). 33kV Proposed Service Transmission Lines (BSE, 2011).
URS
3000 0 3000 6000 Feet
SCALE: 1" = 6000' (1:72,000)
SCALE CORRECT WHEN PRINTED AT 11X17
SOUND LEVEL MEASUREMENT LOCATIONS AND LEQ NOISE CONTOURS
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY
CREATED BY: CM
DATE: 9/15/2011
FIG. NO: 5.7-1
PM: AL
PROJ. NO: 27651001.20000
Path: G:\gis\projects\1577\27651002\map_docs\mxd\AFC\Noise\Project_Features_Noise_Map.mxd, paul_moreno, 9/15/2011, 3:26:05 PM