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5.11 NOISE

This section describes the existing noise environment on site and near the proposed SSU6 Project and assesses potential noise impacts associated with the proposed project. Noise-sensitive receptors that may be affected by noise are identified, as well as the laws, ordinances, regulations, and standards (LORS) that regulate noise levels at those receptors. The following discussion describes the fundamentals of acoustics, the results of a detailed site reconnaissance, sound level measurements, acoustical calculations, and assessment of potential noise impacts from construction and plant operations. Where appropriate, mitigation measures are proposed to reduce potential project-related noise impacts to acceptable levels.

Section 5.11.1 describes the environmental setting of the project area, presents the existing conditions of the noise environment, describes the sound level measurements taken at the proposed plant site, well pad sites, and closest sensitive receptor; Section 5.11.2 assesses the potential environmental impacts of construction and subsequent operation of the project on the noise environment of the area and to sensitive receptors; Section 5.11.3 addresses the cumulative impacts of the proposed project in relation to other cumulative projects identified in Section 5.17; Section 5.11.4 presents the mitigation measures proposed to minimize potential impacts of the project; and Section 5.11.5 addresses pertinent LORS. References are presented in Section 5.11.6. Tables and figures are found at the end of this section.

5.11.1 Affected Environment

5.11.1.1 Fundamentals of Acoustics

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, perceived importance of the noise and its appropriateness in the setting, time of day and type of activity during which the noise occurs, and sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound's pitch and is measured in Hertz (Hz), while intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 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 about 120 dB begin to be felt inside the human ear as discomfort and eventually as pain at still higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, and this relation holds true for loud sounds and quieter sounds.

Because of 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. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Therefore, for example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB.

Sound from a tuning fork (a pure tone) contains a single frequency, but most sounds one hears in the environment do not consist of a single frequency, but rather 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 that human hearing is less sensitive at low frequencies and extremely high frequencies than at mid-range frequencies. This is called "A" weighting, and the decibel level measured is called the A-weighted sound level (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.

Although the A-weighted sound level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor called the L_{eq} (equivalent sound level) is used. L_{eq} is the energy-mean A-weighted sound level 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 fluctuating level measured. Additionally, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the L_{max} and L_{min} indicators, which represent the RMS (or root-mean-square) maximum and minimum obtainable noise levels during the monitoring interval. The L_{min} 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 L_5, L_{10}, L_{50}, and L_{90} are commonly used. They are the noise levels equaled or exceeded during 5, 10, 50, and 90 percent of a stated time, respectively. Sound levels associated with the L_{10} typically describe transient or short-term events, while levels associated with the L_{90} describe the steady-state (or most prevalent) noise conditions.

Finally, another sound measure known as the Community Noise Equivalence Level (CNEL) is defined as the "A" weighted average sound level for a 24-hour day. It is calculated by adding a 5 decibel penalty to sound levels in the evening (7:00 P.M. to 10:00 P.M.) and a 10 decibel penalty to sound levels in the night (10:00 P.M. to 7:00 A.M.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours. The CNEL is used by the State of California and Imperial County to define acceptable land use compatibility regarding noise. Sound levels of typical noise sources and environments are provided in Table 5.11-1 to provide a frame of reference.

5.11.1.2 Project Components

5.11.1.2.1 Power Plant Facility

The proposed 160-acre SSU6 Project is south of the Salton Sea. This region of the Imperial Valley is used mostly for agriculture and geothermal power production. Nine geothermal power plants are currently within 2 miles of the project area. The town of Niland is about 7.5 miles northeast and the town of Calipatria is a little over 6 miles southeast of the project. The Sonny Bono National Wildlife Refuge (the Refuge) Headquarters is approximately 2,500 feet from the nearest well pad (Production Well Pad OB1).

Some land uses are considered sensitive to noise. Noise-sensitive receptors are land uses associated with indoor and outdoor activities that may be subject to stress or significant interference from noise. They often include residential dwellings, mobile homes, hotels, motels, hospitals, nursing homes, educational facilities, and libraries.

The closest sensitive receptor from the plant site is one residence in the Refuge, approximately 4,000 feet north of the plant site (see Figure 5.8-3A). The next closest receptor is approximately 1.25 miles south of the plant site on Lack Road. Noise sources at the closest receptor are vehicular traffic on Sinclair Road, traffic to and from the refuge headquarters, farm equipment on the nearby agricultural fields, and geothermal power plants in the surrounding area. Noise sources at the residence on Lack Road are vehicular traffic on Lack Road, distant traffic on State Route 86 (SR 86), and farm equipment on the nearby agricultural fields.

5.11.1.2.2 L-Line Interconnection Transmission Route

The proposed L-Line Interconnection transmission line will tie in to Imperial Irrigation District's (IID) existing "L" transmission line west of the SSU6 plant site. From the SSU6 switchyard, the transmission line continues approximately 16 miles south along Lack Road toward the existing "L" line southwest of the junction of SR 86 and Bannister Road. The line will cross approximately 3 miles of BLM land after passing the intersection of Bannister Road and SR 86.

The noise-sensitive receptors along the transmission line route are residences along Lack and Bannister Roads. There are three residences ranging from 150 feet to 0.5 miles from Lack Road and six residences ranging from 150 feet to 0.5 miles from Bannister Road. There are other scattered residences throughout the area farther than 0.5 miles from the transmission line. See Figures 5.8-3A through 5.8-3E in Section 5.8 for locations of residential receptors along the transmission corridor. Noise sources at these receptors include vehicular traffic on adjacent roadways, farm equipment in adjacent agricultural fields, and birds vocalizing.

5.11.1.2.3 IID Midway Interconnection

In addition to the L-Line Interconnection discussed above, an IID Midway Interconnection transmission line is proposed to connect the SSU6 facility to the Midway Substation to the east. The proposed IID Midway Interconnection would be approximately 15 miles long and generally run along Hoober Road eastward to the existing Midway Substation (see Figure 3.1-2).

The noise-sensitive receptors along the IID Midway Interconnection are three scattered residences east of the Calipatria prison. These residences range from 0.5 to 1.5 miles from the proposed transmission corridor. See Figures 5.8-3A through 5.8-3E in Section 5.8 for locations of residential receptors along the transmission corridor. Noise sources at these receptors include vehicular traffic on adjacent roadways, farm equipment in adjacent agricultural fields, and birds vocalizing.

5.11.1.2.4 Well Pads

Extraction of the geothermal production fluids required for plant operation would be provided by 10 production wells on five new well pads. The well pads are shown on Figure 5.11-1 and are west, north, and south of the SSU6 site.

The closest sensitive receptor to the well pad sites is the same as that identified for the plant site, the residence at the Refuge headquarters. The northernmost well pad (OB1) is approximately 2,500 feet from the receptor.

5.11.1.2.5 Production and Injection Pipelines

Both production and injection fluid processes associated with the SSU6 facility would require use of transmission pipelines from the production well pads to the facility and injection well pads. The proposed pipeline material to be used would be cement-lined carbon steel pipes.

The closest sensitive receptor to the production and injection pipeline sites is the same as that identified for the plant site, the residence at the Refuge headquarters.

5.11.1.2.6 Water Supply Pipeline

A proposed new 500-foot carbon steel waterline will be built along the southern boundary of the plant site. The new water supply line will be used to convey supplementary water for process and domestic use at the SSU6 facility. The water source will be canal water from the existing Vail 4A lateral (gate 460).

The closest sensitive receptor to the water supply pipeline is the same as that identified for the plant site, the residence at the Refuge headquarters.

5.11.1.3 Ambient Sound Levels

A series of sound level measurements were taken on June 7, 2001, and January 10 and 11, 2002, at the proposed site, well pad sites, and closest residence to quantify the existing noise environment near the proposed SSU6 project. Two Larson Davis Model 720 American National Standards Institute (ANSI) Type 2 integrating sound level meters were used as data-collection devices. The meters were mounted on a tripod approximately 5 feet above ground level to simulate the average height of the human ear. The sound level meters were calibrated before and after the measurement period.

5.11.1.3.1 Measurement Locations

The measurement results are summarized in Tables 5.11-2 and 5.11-3 and correspond to the measurement locations ML1 through ML10 as shown on Figure 5.11-1. Sound levels measured at ML1 (the proposed plant site) consisted of two 1-hour measurements during the daytime and nighttime periods. The daytime L_{eq} at this site was 59.6 dBA, and the nighttime L_{eq} was 60.3 dBA. Noise sources at this location consisted of farm equipment on nearby agricultural fields, operations of nearby power plants, vehicular traffic on Gentry Road, birds, and an irrigation pump on the northwest portion of the property.

Sound levels measured at ML2 through ML9 consisted of 10-minute measurements during the daytime at the well pad sites. Sound levels ranged from 48.6 to 71.9 dBA. Noise sources at these locations were similar to those described for ML1.

Sound levels measured at ML10 consisted of 25 consecutive 1-hour measurements at the closest noise-sensitive receptor (Refuge headquarters residence) approximately 2,500 feet northeast of the proposed power plant. The lowest measured L_{90} was 34.9 dBA and occurred between 5:30 a.m. and 6:30 a.m. The hourly L_{eq} ranged from 39.0 dBA to 56.7 dBA. The calculated CNEL based on the measured hourly L_{eq} at this location is 52.0 dBA. The primary noise sources at this location included vehicular traffic on Sinclair and Gentry Roads, traffic to and from the refuge headquarters, farm equipment on nearby agricultural fields, bird vocalizations, and people talking.

5.11.2 Environmental Consequences

Noise would be produced at the site during both the construction and operational phases of the project. Potential noise impacts from both activities are assessed in this section. (Potential biological effects of noise are discussed in Section 5.5.) Additionally, potential noise impacts from construction and operation associated with well pad sites and transmission lines are assessed.

5.11.2.1 Significance Criteria

For this analysis, the following criteria were used to determine the magnitude of noise impacts:

- Noise impacts would be considered significant if the power plant project-related operations activities increased noise by 5 dBA above the lowest measured L_{90} at any noise-sensitive receptor.
- Noise impacts would be considered significant if project operation activities conflicted with the Geothermal and Transmission Element of the Imperial County General Plan by exceeding the sound level of 60 dBA CNEL at the nearest noise-sensitive receptor.
- Construction noise would be considered significant if the sound level exceeded 75 dBA L_{eq} when measured over an eight-hour period at any residential receptor.

5.11.2.2 Power Plant Facility

5.11.2.2.1 Construction Impacts

Plant facility construction would result in a short-term, temporary increase in the ambient noise level. Noise would result from the operation of construction equipment. The increase in noise level would be primarily experienced close to the noise source. The magnitude of the impact would depend on the type of construction activity, noise level generated by various pieces of construction equipment, duration of the construction phase, and distance between the noise source and receiver. Figure 5.11-2 shows average noise levels generated by individual pieces of construction equipment. Sound levels of typical construction equipment will range from 70 dBA to 90 dBA at 50 feet from the source (U.S. Environmental Protection Agency [U.S. EPA], 1972). Sound levels from pile driving may be as high as 105 dBA at 50 feet (U.S. EPA, 1972). Based on this range of values, the sound level would be approximately 41 dBA to 56 dBA for typical construction equipment and 71 dBA for pile driving at the Refuge residence (ML10). Noise from the construction was assumed to have point-source acoustical characteristics. Strictly speaking, a point source sound decays at a rate of 6 dB per doubling of distance from the source-receiver pair. This is a logarithmic relationship describing the acoustical spreading of a pure, undisturbed spherical wave in air. The rule applies to the propagation of sound waves with no ground interaction.

The projected sound level resulting from construction of the plant facility at the Refuge residence would be below the threshold limit of 75 dBA averaged over eight hours; therefore, it would not result in a significant noise impact. Nighttime construction may occur if approved by the County.

Steam Blows

During plant commissioning, a method used to clean piping called "steam blows" creates substantial noise. A steam blow results when high-pressure steam is allowed to escape into the atmosphere through the steam piping to clean the piping. The steam blow is expected be continuous over a period of approximately 72 hours. The steam blow is necessary after erection and assembly of the systems because the piping and tubing that comprise the steam path accumulate dirt, rust, scale, and construction debris. It prevents debris from entering the steam turbine.

The steam blow would produce noise as loud as approximately 118 dBA at a distance of 100 feet. The project proposes to include a silencer, designed by Fluid Kinetics Corporation that would provide 44 dBA of attenuation. The resultant sound level at the Refuge residence would be approximately 50 dBA and result in a short-term adverse impact during the nighttime. The residents would be relocated during the steam blow process, mitigating this potentially significant impact.

Construction Traffic

Construction of the plant would result in a temporary increase in vehicular traffic on local roads and area highways (see Section 5.10, Traffic and Transportation). The California Department of

Transportation (Caltrans) Sound32 Vehicular Traffic Noise Prediction Model, based on the FHWA-RD-77-108 report, was used to estimate the change in sound levels along SR 86, SR 111, and Sinclair and Gentry Roads (roadways with residences). The sound levels would increase by less than 0.5 dBA along SR 86 and SR 111. The sound level on Sinclair and Gentry Roads would increase by less than 1.5 dBA. Sound levels variations of less than 3.0 dBA are not detectable by the human ear; therefore, construction traffic noise would not result in a significant impact.

5.11.2.2.2 Operation Impacts

Noise is produced during the operation of a geothermal power plant. The primary noise sources at the proposed plant include the turbine/generator and cooling towers. The emergency diesel generators generate significant noise; however, the generators will be housed in a modular enclosure with an acoustical guarantee of 70 dBA at 50 feet. Miscellaneous noise sources include pumps and nonmechanical sources near the crystallizer and separator. The overall noise level generated by these components would depend on the physical layout of the facility, numbers of individual equipment units, and mitigation measures incorporated into the facility design.

The Cadna A Noise Prediction Model was used to estimate the project-generated sound level at the Refuge residence and in the Yuma clapper rail habitat (see Section 5.5, Biological Resources). Cadna A is a Windows-based software program that predicts and assesses noise levels near industrial noise sources. The model uses industry-accepted propagation algorithms and accepts sound power levels (in decibels re 1 pico Watt) provided by the equipment manufacturer and other sources based on ISO 3740 standards. The calculations account for classical sound wave divergence, plus attenuation factors resulting from air absorption, basic ground effects, and barrier/shielding. Air absorption was under "standard day" conditions of 59° F and 70 percent relative humidity. The site and surrounding areas were assumed to be flat, therefore, no intervening topographical barrier effects were considered. However, major buildings, tanks, and large equipment (such as the control building, clarifiers, and elevated brine ponds) were included as barriers.

Calculations were performed using linear octave band sound power levels as inputs from each noise source. The model outputs are in terms of octave band and overall A-weighted sound pressure levels. The modeled noise sources and source sound levels are summarized in Table 5.11-4. Source sound levels were obtained from vendor data, databases of previous projects, and industry-standard acoustical estimation techniques. Sound pressure levels presented in the table were converted into sound power levels. The project site configuration was imported into Cadna A from the project CAD files. The plant was assumed to operate 24 hours per day, so the noise output would be constant regardless of time of day.

Project-related noise contours at 5 dBA increments between 40 dBA L_{eq} and 60 dBA L_{eq} are depicted in Figure 5.11-3. The estimated sound level at the Refuge residence is 39 dBA L_{eq} (45 dBA CNEL). The project would increase the sound level at this location by approximately 4 dBA above the lowest measured L_{90} of 34.9 dBA. Because project-related sound levels will not result in a 5 dBA increase at the residence, and because the CNEL would be well below 60 dBA, no significant impacts would occur.

Low frequency groundborne vibration would be imperceptible at approximately 300 feet from the plant. Airborne low frequency vibration would be imperceptible at approximately 1000 feet

from the plant. Because the closest noise sensitive receptor is approximately 2,500 from the plant, no significant low frequency noise or vibration impacts would occur. Additionally, the project would result in broadband sound levels without any particular frequency detectable to noise sensitive receptors.

Operation Traffic

Operation of the plant would result in an increase in vehicular traffic on local roads and area highways (see Section 5.10). Assuming the unlikely scenario in which all staff would be on site at the same time, each employee will drive a separate vehicle to work, and each employee will make one round trip from home to work per day, operation of the plant will generate approximately 138 vehicle trips per day. It is assumed that most of the permanent workforce will reside in the Calipatria, Niland, Brawley, El Centro and adjacent communities (see Section 5.10.2.1), and that their preferred route to work will be through Sinclair Road, Gentry Road, McKendry Road and Boyle Road. The Caltrans Sound32 Vehicular Traffic Noise Prediction Model, based on the FHWA-RD-77-108 report, was used to estimate the change in sound levels along SR 86, SR 111, and Sinclair and Gentry Roads (roadways with residences). The sound levels would increase by less than 0.5 dBA along SR 86 and SR 111. The sound level on Sinclair and Gentry Roads would increase by less than 0.5 dBA. Sound levels variations of less than 3.0 dBA are not detectable by the human ear; therefore, operation traffic noise would not result in a significant impact.

Worker Effects

Occupational Safety and Health Association (OSHA) and Cal/OSHA regulate occupational exposure to noise. The standard stipulates that protection against the effects of noise exposure shall be provided when sound levels exceed 90 dBA over an eight-hour exposure period. The employer must institute a Hearing Conservation Program whenever employee noise exposure equals or exceeds the Action Level of an eight-hour time-weighted average (TWA) sound level of 85 dBA. Sound levels within the plant may exceed the OSHA 85 decibel threshold for action within 3 feet of the turbine/generator, cooling towers, crystallizer, separator, and miscellaneous pumps. Sound levels will attenuate at various rates when moving away from the noise source.

Occupational noise exposure of employees within the plant cannot be evaluated until the project has been constructed and employee jobs and routines determined. At that time, a noise evaluation will be conducted and a Hearing Conservation Program will be developed and implemented to ensure that employees are adequately protected in accordance with OSHA and Cal/OSHA.

5.11.2.3 L-Line Interconnection Transmission Route

Potential noise impacts associated with the L-Line Interconnection transmission line route would occur during construction activities. Noise-sensitive receptors along Lack and Bannister Roads range from 150 feet to 0.5 miles from the transmission line corridor. Sound levels will typically range from 70 dBA to 90 dBA at 50 feet from the source (U.S. EPA, 1972). Based on this range of values, the sound level would be approximately 60 dBA to 80 dBA at residences 150 feet from the corridor and 50 dBA to 60 dBA at residences 0.5 miles from the corridor. Sound levels may

be 10 dBA to 20 dBA less than predicted when averaged over eight hours because of the intermittent nature of the type of activity. These projected levels would be below the County's required construction limit of 75 dBA L_{eq}, would occur during the daytime, and would be temporary; therefore, there would be no significant impact resulting from construction noise along the transmission line.

5.11.2.4 IID Midway Interconnection Transmission Route

Potential noise impacts associated with the IID Midway Interconnection transmission route would occur during construction activities. Noise-sensitive receptors are along Hoober Road east of the Calipatria State Prison, ranging from 0.5 to 1.5 miles from the proposed IID Midway Interconnection transmission route. Sound levels will typically range from 70 dBA to 90 dBA at 50 feet from the source (U.S. EPA, 1972). Based on this range of values, the sound level would be approximately 35 dBA to 55 dBA at the closest residences. These projected levels would be below the County's required construction limit of 75 dBA Leq over an eight-hour period, would occur during the daytime hours, and would be temporary; therefore, there would be no significant impact resulting from construction noise along the proposed IID Midway Interconnection transmission route.

5.11.2.5 Well Pads

Well pad development would result in a short-term, temporary increase in the ambient noise level immediately near the construction activity. Drill site preparation, well drilling, well flow testing, and well cleanout would generate noise. Sound levels associated with these activities are summarized in Table 5.11-5. Sound levels range from approximately 75 to 79 dBA L_{eq} at 100 feet from the source. The closest receptor to the well pad sites is the residence at the Refuge headquarters approximately 2,500 feet to the north. Based on this range of values, the sound level would be approximately 46 dBA to 51 dBA at the Refuge residence. Assuming that the activity occurs over a 24-hour period, the CNEL for well pad development at the refuge would be approximately 58 dBA. This is below the 60 dBA CNEL standard for well pad development identified in the Imperial County Geothermal and Transmission Element. Consequently, no significant impact would result from well pad development.

Noise at the production wells results from a change in pressure as steam moves through valves. Source sound level measured at 5 feet from the existing Vonderhae-2 and IID-16 well pads was 75 dBA. The equipment measured is similar to the equipment for the SSU6 Project. There are no other mechanical noise sources at the well pads that generate noise. Sound levels will be less than 70 dBA at the well pad boundary and less than 25 dBA at the Refuge residence. No significant impacts would result from well pad.

5.11.2.6 Production and Injection Pipelines

Noise associated with the production and injection pipelines would be limited to construction. Project construction would result in a short-term, temporary increase in the ambient noise level immediately near the construction activity. Construction would be limited to daytime hours. Periodic sound levels would be expected to be as high as 85 dBA at 50 feet from the source. The closest receptor to the production and injection pipelines is the residence at the Refuge

headquarters approximately 2,500 feet to the north. The sound level would be approximately 51 dBA at the Refuge residence. The projected levels would be below the County's required construction limit of 75 dBA L_{eq} over an eight-hour period. Construction would be limited to 7:00 A.M. to 7:00 P.M. unless nighttime construction is permitted by the County Planning Director. Therefore, there would be no significant impact resulting from this construction noise.

Construction of the pipeline between production well OB3 and the power plant site will require the widening of the existing roadway between the west end of McKendry Road and Obsidian Butte. Installation of the pipeline in this area would require installing 20 pipe supports along the 600-foot distance. In addition typical construction equipment, pile driving will be required. Sound levels will typical construction equipment range from 70 dBA to 90 dBA at 50 feet from the source (U.S. EPA, 1972). Sound levels from pile driving may be as high as 105 dBA at 50 feet. Based on this range of values, the sound level would be approximately 32 dBA to 52 dBA for typical construction equipment and 67 dBA for pile driving at the Refuge residence. These projected levels would be below the County's required construction limit of 75 dBA L_{eq} over an eight-hour period. Construction would be limited to 7:00 A.M. to 7:00 P.M. unless nighttime construction is permitted by the County Planning Director. Therefore, there would be no significant impact resulting from this construction noise.

5.11.2.7 Water Supply Pipeline

Noise associated with the water supply pipeline would be limited to construction. Project construction would result in a short-term, temporary increase in the ambient noise level immediately near the construction activity. Construction would be limited to daytime hours. Periodic sound levels would be expected to be as high as 85 dBA at 50 feet from the source. The closest receptor to the water supply pipeline is the residence at the Refuge headquarters approximately 4,000 feet to the north. The sound level would be approximately 51 dBA at the Refuge residence. The projected levels would be below the County's required construction limit of 75 dBA L_{eq}. Construction would be limited to 7:00 A.M. to 7:00 P.M. unless nighttime construction is permitted by the County Planning Director. Therefore, there would be no significant impact resulting from construction noise near the pipelines.

5.11.3 Cumulative Impacts

Projects that will potentially contribute to cumulative noise impacts with the SSU6 are those in the same general geographic area of influence. The following projects are included in the cumulative impacts analysis (Section 5.17):

- SR 78/111 Expressway (Brawley Bypass, Project ID1).
- Solar Evaporation Pond Pilot Project (Project ID2).
- IID Water Conservation and Transfer Project/Habitat Conservation Plan (ID3)

It is anticipated that the proposed project, in conjunction with the above cumulative projects, would not result in cumulative noise impacts, because of the following factors or combination of factors: significant distance between the SSU6 project site and the other projects, scheduling timeline for construction and operation, and distance to sensitive receptors.

5.11.4 Mitigation Measures

No significant noise impacts were identified; therefore, no mitigation is required.

5.11.5 Applicable Laws, Ordinances, Regulations, and Standards

Based on the information provided in this AFC, the proposed SSU6 facility would comply with applicable noise LORS discussed below. Table 5.11-6 summarizes the applicable LORS, and Table 5.11-7 lists the agency contacts.

5.11.5.1 Federal Authorities and Administering Agencies

Federal Transit Administration (FTA) Circular C5620.1 (Federal Highway Administration, 1979). This standard provides guidance for the evaluation of urban mass transportation projects related to the significance of environmental impacts. The CEC bases its criteria on this guideline to evaluate the significance of noise impacts through the comparison of existing ambient noise levels with the noise levels projected to result from a project. Generally, an increase in noise of 3 dBA L_{eq} or less caused by a project represents no significant change. An increase of 10 dBA L_{eq} or more is considered a significant impact. If the increase in noise ranges between 3 and 10 dBA, its significance will depend on the existing ambient noise in proximity to noise-sensitive receptors. Generally, the CEC considers significant an increase in noise of 5 dBA L_{90} resulting from project operation at noise-sensitive receptors.

The project would not generate an increase in noise of 5 dBA L_{90} at noise-sensitive receptors; therefore, the project would comply with the Federal Highway Administration/Caltrans.

5.11.5.2 State Authorities and Administering Agencies

Cal-OSHA, Title 8, Group 15, Article 105, Sections 5095 to 5100. This standard regulates occupational exposure to noise and stipulates that protection against the effects of noise exposure shall be provided when sound levels exceed 90 dBA over an eight-hour exposure period. Protection shall consist of feasible administrative or engineering controls. If such controls fail to reduce sound levels to within acceptable levels, personal protective equipment shall be provided and used to reduce exposure to the employee. Additionally, the employers must institute a Hearing Conservation Program whenever employee noise exposure equals or exceeds the Action Level of an eight-hour TWA sound level of 85 dBA. The Hearing Conservation Program requirements consist of periodic area and personal noise monitoring, performance and evaluation of audiograms, provision of hearing protection, annual employee training, and recordkeeping.

Occupational noise exposure of employees within the plant cannot be evaluated until the project has been constructed and employee jobs and routines determined. At that time, a noise evaluation will be conducted to ensure that employees are adequately protected in accordance with OSHA and Cal/OSHA.

5.11.5.3 Local Authorities and Administering Agencies

Imperial County Code, Division 7 (Noise Abatement and Control), Section 90702.00. This code regulates noise from fixed sources. The applicable sound level is a function of the land use zone and the time of day and is applied at the boundary of the property on which the noise is produced. The project site and well pads are on land zoned A-3G (agricultural and geothermal uses) or S-1G (open space and geothermal uses). According to the code, the average hourly sound level cannot exceed 70 dBA at any time of day or night in agricultural or industrial zones.

Project-related noise would be below the required 70 dBA at the property line; therefore, the project would fully comply with the Imperial County Code.

Imperial County General Plan: Noise Element. The Noise Element of the General Plan regulates noise from transportation noise sources, such as vehicular traffic. The County defines a noise impact zone as an area that may be exposed to noise greater than 60 dBA CNEL or 75 dBA L_{eq} (1 hour). Projects that generate offsite vehicular traffic that may result in a significant noise impact are required to prepare a noise analysis to identify noise-reduction measures.

Project-generated traffic noise would not create an impact of greater than 60 dBA CNEL or 75 dBA L_{eq}; therefore, the project would fully comply with the Noise Element of the General Plan specifically related to vehicular traffic.

Imperial County General Plan: Noise Element. The Noise Element also regulates noise from fixed sources. The noise requirements are the same as the Imperial County Code discussed above. The Noise Element recognizes that noise level increases generally result in an adverse impact to the noise environment. If future noise levels after the project is completed will be within the normally acceptable range of the land use compatibility guidelines, but will result in an increase of 5 dBA CNEL or greater, the project will have a potentially significant noise impact, and mitigation measures must therefore be considered. If future noise levels after the project is completed will exceed the normally acceptable range of the land use compatibility guidelines, but will result in an increase of 3 dBA CNEL or greater, the project will have a potentially significant noise impact, and mitigation measures must therefore be considered.

Project-related sound levels would not result in a 5 dBA increase at the nearest residence and the sound level at the plant property line would be below 70 dBA, the project would comply with the Noise Element of the General Plan specifically related to fixed sources.

Imperial County General Plan: Noise Element. Construction noise from a single piece of equipment or combination of equipment cannot exceed 75 dBA L_{eq} when averaged over an eight-hour period and measured at the nearest sensitive receptor. Construction equipment operation is limited to 7:00 A.M. to 7:00 P.M. from Monday through Friday and 9:00 A.M. to 5:00 P.M. on Saturday. No commercial construction is permitted on Sundays or holidays. Construction may be permitted between 7:00 P.M. and 7:00 A.M. on Sundays and holidays pursuant to a variance (Title 9, Section 90202.08).

Projected construction-related noise at the nearest receptor would be approximately 41 dBA to 71 dBA, which is below the required limit of 75 dBA L_{eq} averaged over an eight-hour period. Therefore, the project would comply with the Noise Element of the General Plan specifically related to construction.

The Noise Element refers to the Geothermal and Transmission Element of the General Plan for a more detailed discussion of geothermal plants.

Imperial County General Plan: Geothermal and Transmission Element. This element of the General Plan has established criteria for the control of noise from geothermal facilities. The maximum permitted continuous sound level is 60 dBA CNEL measured at the nearest human receptor outside the parcel boundary.

The following standards are applicable to the control of noise from drilling:

1. The drilling operator must limit drilling noise to 60 dBA CNEL. The noise level may be exceeded by 10 percent if the noise is intermittent and during the daylight hours. The noise level is measured at the nearest human receptor site outside the parcel boundary.
2. Diesel equipment used for drilling within 300 feet of any residence must have hospital–type mufflers. Well venting and testing at these well sites must include the use of an effective muffling device or "silencer."
3. All work in preparation of the site for drilling must be done between 7:00 A.M. and 7:00 P.M. for any well within 300 feet of any residence.
4. Drill pipes must be racked and/or made up between 7:00 A.M. and 7:00 P.M. for any well within 300 feet of any residence.
5. Impulse noises, such as sudden stream venting, must be controlled by discharge through a muffler or other sound-attenuating system.
6. Drilling may be conducted on a 24-hour basis provided the above standards are met.

The sound level from well pad development would not exceed 60 dBA CNEL at the nearest human receptor; therefore, the project would comply with the Geothermal and Transmission Element of the General Plan.

5.11.6 References

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2001. *Geothermal and Transmission Element of the General Plan.*

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Table 5.11-1
SOUND LEVELS OF TYPICAL NOISE SOURCES AND NOISE ENVIRONMENTS
(A-Weighted Sound Levels)

Example Noise Source (at a Given Distance)	Scale of A-Weighted Sound Level in Decibels	Example Noise Environment	Human Judgment of Noise Loudness (Relative to a Reference Loudness of 70 Decibels)
Military Jet Takeoff with			
After-burner (50 ft)	140	Carrier Flight Deck	
Civil Defense Siren (100 ft)	130		
Commercial Jet Takeoff (200 ft)	120		Threshold of Pain
			*32 times as loud
Pile Driver (50 ft)	110	Rock Music Concert	*16 times as loud
Ambulance Siren (100 ft)	100		Very Loud
Newspaper Press (5 ft)			*8 times as loud
Power Lawn Mower (3 ft)			
Motorcycle (25 ft)	90	Boiler Room	*4 times as loud
Propeller Plane Flyover (1,000 ft)		Printing Press Plant	
Diesel Truck, 40 mph (50 ft)			
Garbage Disposal (3 ft)	80	High Urban Ambient Sound	*2 times as loud
Passenger Car, 65 mph (25 ft)			Moderately Loud
Living Room Stereo (15 ft)			*70 decibels
Vacuum Cleaner (3 ft)	70		(Reference Loudness)
Electronic Typewriter (10 ft)			
Normal Conversation (5 ft)	60	Data Processing Center	*1/2 as loud
Air Conditioning Unit (100 ft)		Department Store	
Light Traffic (100 ft)	50	Private Business Office	*1/4 as loud
Bird Calls (distant)	40	Lower Limit of Urban	Quiet
		Ambient Sound	*1/8 as loud
Soft Whisper (5 ft)	30	Quiet Bedroom	
	20	Recording Studio	Just Audible
	10		Threshold of Hearing

SOURCE: Compiled by URS Corporation

Table 5.11-2
25-HOUR AVERAGE AMBIENT SOUND LEVELS
COLLECTED AT NEAREST SENSITIVE RECEPTOR (ML10)

Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}
09:30–10:30	45.1	34.7	67.9	48.1	41.4	37.63
10:30–11:30	51.1	32.5	69.7	54.4	41.1	36.0
11:30–12:30	47.6	33.8	62.7	51.2	42.7	37.6
12:30–13:30	52.7	34.3	68.6	55.9	46.5	38.4
13:30–14:30	51.8	40.7	67.3	55.0	50.4	44.2
14:30–15:30	55.4	45.9	73.4	57.7	53.3	49.7
15:30–16:30	56.7	47.7	68.2	59.0	55.9	52.1
16:30–17:30	49.1	40.2	59.5	52.3	47.3	43.2
17:30–18:30	49.8	37.3	66.0	53.2	46.1	41.7
18:30–19:30	42.7	36.8	54.1	45.8	40.7	38.3
19:30–20:30	44.0	36.7	62.7	45.0	40.1	37.7
20:30–21:30	47.9	37.2	56.6	51.1	46.6	40.6
21:30–22:30	45.9	39.2	59.1	49.0	43.9	40.5
22:30–23:30	41.1	37.5	47.9	42.8	41.1	38.5
23:30–24:30	41.9	38.4	52.3	43.0	41.6	40.3
24:30–01:30	41.5	37.0	48.3	43.6	40.9	39.2
01:30–02:30	44.4	37.7	51.3	46.9	43.8	39.8
02:30–03:30	40.5	37.9	50.7	42.3	39.8	38.4
03:30–04:30	41.6	34.8	61.2	43.0	39.4	36.6
04:30–05:30	39.0	34.4	53.5	48.1	36.9	35.5
05:30–06:30	44.8	34.1	67.5	48.0	37.1	34.9
06:30–07:30	44.6	34.1	64.4	47.6	42.4	38.6
07:30–08:30	46.2	37.9	61.0	48.5	43.7	40.8
08:30–09:30	49.1	38.7	69.7	51.6	46.0	42.8
09:30–10:30	50.6	40.7	65.2	53.1	47.9	44.6
10:30–11:30	46.0	38.4	59.6	50.4	43.7	41.1

NOTES:
Sound levels were measured on January 10 and 11, 2002. Temperature ranged from 40 to 75º F with wind speed varying from 2 to 10 miles per hour.
All sound levels expressed in dBA.
The CNEL is 52.0 dBA.

Table 5.11-3
ONSITE SOUND LEVEL MEASUREMENTS

Measurement Identification	Description	Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}
ML1	Plant Site	07:00–08:00	59.6	56.9	64.8	61.2	59.2	58.1
		22:00–23:00	48.1	38.0	65.8	52.8	45.0	43.8
ML2	Well pad (OB1)	09:20–09:30	57.2	46.4	68.5	60.3	55.1	51.1
ML3	Well pad (OB2)	09:37–09:47	48.6	42.1	58.5	50.7	47.2	44.7
ML4	Well pad (OB3)	09:59–10:09	45.0	38.2	57.9	47.9	43.2	40.7
ML5	Well pad (OB4)	10:17–10:27	68.4	66.9	70.2	68.9	68.4	67.7
ML6	Well pad (OB5)	10:35–10:45	71.9	70.6	72.8	72.2	71.9	71.8
ML7	Well pad (OBI3)	10:52–11:02	63.0	40.9	80.1	64.6	49.7	43.7
ML8	Well pad (OBI2)	11:11–11:21	52.9	39.6	62.0	56.3	51.8	44.9
ML9	Well pad (OBI1)	11:26–11:36	42.3	37.2	53.0	44.9	40.8	38.7

NOTES:
Measurements taken on June 7, 2001. Temperature 50 to 110º F. Wind speed 2 miles per hour.
All sound levels dBA.
Primary noise sources were traffic on nearby roads, farm equipment on agricultural fields, and bird vocalizations.

Table 5.11-4
POWER PLANT SOURCE SOUND LEVELS

	1/3 Octave Band (Hz)										dBA
	31.5	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Overall**	
	Marley Cooling Tower (Model W499-12.0-9) Sound Power Level (in decibels re 1 pico Watt)										
Air Outlet	117.9	117.9	117.9	114.0	111.1	108.2	100.6	96.5	92.4	113.0	
Air Inlet				110.0	116.0	112.1	110.5	106.1	107.8	107.5	
	Auxiliary Cooling Water Pump (Floway Model 29MKN)										85 dBA at 3 feet*
	Cooling Water Circulation Pump (Patterson Model A 1)										82 dBA at 3 feet*
	Turbine (Fuji Electric) 2 casing, 4 exhaust flow, m reaction, condensing, triple press (HP/SP/LP) inlet, HP inlet steam, LP inlet steam; direct coupling; bottom exhaust; non-skid mount, outdoor Generator – TEWAC type, 205.6 MVA, 0.9 (lagging) power factor Sound Power Level (in decibels re 1 pico Watt) (Sound levels are expressed in dBA)										
Turbine		72.0	82.0	81.0	85.0	84.0	80.0	74.0	68.0	90.0	
Generator		69.0	82.0	78.0	82.0	86.0	82.0	76.0	65.0	90.0	
	Brine Injection Pumps										93 dBA at 1 meter*
	Diesel Generator (Caterpillar – 3516 2000 KW) Housed in modular enclosure with an acoustical guarantee of 70 dBA at 50 feet										70 dBA at 50 feet*
	Diesel Generator (Caterpillar – 3456 300 KW) Housed in modular enclosure with an acoustical guarantee of 70 dBA at 50 feet										70 dBA at 50 feet*
	Separator, Crystallizer and Miscellaneous Pumps										85 dBA at 3 feet*

* Sound Pressure Level

Table 5.11-5
WELL PAD DEVELOPMENT SOUND LEVELS

Activity	Sound Pressure Level at 100 feet*	Location of the 60 dBA L_{eq} Noise Contour
Drill Site Preparation	79 dBA	890 feet
Well Drilling	77 dBA	700 feet
Well Cleanout	75 dBA	560 feet
Flow Testing	79 dBA	890 feet

* Source: Final Salton Sea Anomaly Master Environmental Impact Report, December 1981.

Table 5.11-6
SUMMARY OF LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Jurisdiction	LORS	Requirements	Conformance Section	Administering Agency	Agency Contact
5.11 Noise					
Federal					
	FTA Circular C5620.1.	Limits noise increase to less than 5 dBA L_{90} at noise sensitive receptors.	Section 5.11.5.1	FTA	1
State					
	California Department of Industrial Relations, Division of Occupational Safety and Health (Cal-OSHA) (8 CCR, General Industrial Safety Orders, Article 105, Control of Noise Exposure, §5095)	Protects employees from significant noise exposure during an eight-hour workday. If areas of the plant exceed 85 dBA, the employer must implement all aspects of the hearing conservation program.	Section 5.11.5.2	CalOSHA	2
Local					
	Imperial County Code, Division 7 (Noise Abatement and Control), Section 90702.00	The L_{eq} cannot exceed 70 dBA at any time in agricultural or industrial zones at the boundary of the property on which the noise is produced.	Section 5.11.5.3	Imperial County	3
	Imperial County Noise Element of the General Plan	**Fixed:** Sound levels resulting from fixed noise sources are acceptable up to 60 dBA CNEL. An increase of 5 dBA CNEL is considered potentially significant. **Construction:** Construction noise cannot exceed 75 dBA L_{eq} when averaged over an eight-hour period. Construction is limited to the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, and 9:00 a.m. to 5:00 p.m. on Saturdays.	Section 5.11.5.3	Imperial County	3

Table 5.11-6 (continued)
SUMMARY OF LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Jurisdiction	LORS	Requirements	Conformance Section	Administering Agency	Agency Contact
Local (continued)					
		Vehicular Traffic: A noise impact zone is an area that may be exposed to noise greater than 60 dBA CNEL, or 75 dBA L_{eq} (1hr).	Section 5.11.5.3	Imperial County	3
	Imperial County Geothermal and Transmission Element of the General Plan	The maximum permitted sound level is 60 dBA CNEL at the nearest human receptor (outside the project boundary). Standards are also set to control noise from drilling: 1. Limit noise to 60 dBA CNEL at nearest human receptor. 2. Equipment must use effective muffling devices within 300 feet of a residence. 3. All work in preparation for drilling and drill pipes should be racked between the hours of 7:00 a.m. and 7:00 p.m. for wells within 300 feet of any residence.	Section 5.11.5.3	Imperial County	3

Table 5.11-7
AGENCY CONTACT LIST FOR
LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

FEDERAL	
1	Federal Transit Administration Region 9 201 Mission Road, Room 2210 San Francisco, CA 94105-1835 (415) 744-1333 Regional Administrator Leslie Rogers
STATE	
2	California Occupational Safety and Health Administration 7575 Metropolitan Drive, Suite 207 San Diego, CA 92108 (619) 767-2280 Area Manager Wende Carlson
LOCAL	
3	Imperial County Building/Planning Department 939 Main Street El Centro, California 92243-2875 760) 482-4313 Geothermal Planner Richard Cabanilla