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5.7 Noise

This section presents an assessment of potential noise effects related to the Stanton Energy Reliability Center (SERC). Section 5.7.1 discusses the fundamentals of acoustics. Section 5.7.2 describes the affected environment, including baseline noise level survey methodology and results. Section 5.7.3 presents an environmental analysis of the construction and operation of the power plant and associated facilities. Section 5.7.4 discusses cumulative effects. Section 5.7.5 discusses mitigation measures. Section 5.7.6 presents applicable laws, ordinances, regulations, and standards (LORS). Section 5.7.7 presents agency contacts, and Section 5.7.8 presents permit requirements and schedules. Section 5.7.9 contains the references used to prepare this section.

5.7.1 Fundamentals of Acoustics

Acoustics is the study of sound, and noise is defined as unwanted sound. Airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure creating a sound wave. Acoustical terms used in this section are summarized in Table 5.7-1.

Table 5.7-1. Definitions of Acoustical Terms

Term	Definition
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise or sound at a given location. The ambient level is typically defined by the L_{eq} level.
Background noise level	The underlying ever-present lower level noise that remains in the absence of intrusive or intermittent sounds. Distant sources, such as traffic, typically make up the background. The background level is generally defined by the L_{90} percentile noise level.
Intrusive	Noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, tonal content, and the prevailing ambient noise level, as well as the sensitivity of the receiver. The intrusive level is generally defined by the L_{10} percentile noise level.
Sound pressure level decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
A-Weighted sound pressure level (dBA)	The sound level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear, and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Equivalent noise level (L_{eq})	The average A-weighted noise level, on an equal energy basis, during the measurement period.
Percentile noise level (L_n)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (e.g., L_{90}).
Day-night noise level (L_{dn} or DNL)	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels from 10:00 p.m. to 7:00 a.m.

Notes:

L_{10} = represents the noise level exceeded for 10 percent of the measurement period
L_{90} = measurement that represents the noise level that is exceeded during 90 percent of the measurement period
L_{eq} = equivalent sound pressure level

The most common metric is the overall A-weighted sound level measurement that has been adopted by regulatory bodies worldwide. The A-weighting network measures sound in a similar fashion to the way in which a person perceives or hears sound. In this way, it provides a good measure for evaluating acceptable and unacceptable sound levels.

A-weighted sound levels are typically measured or presented as equivalent sound pressure level (L_{eq}), which is defined as the average noise level, on an equal energy basis for a stated period of time, and is commonly used to measure steady-state sound or noise that is usually dominant. Statistical methods are used to capture the dynamics of a changing acoustical environment. Statistical measurements are typically denoted by $L_{xx,}$ where xx represents the percentile of time the sound level is exceeded. The L_{90} is a measurement that represents the noise level that is exceeded during 90 percent of the measurement period. Similarly, the L_{10} represents the noise level exceeded for 10 percent of the measurement period.

Some metrics used in determining the impact of environmental noise consider the differences in response that people have to daytime and nighttime noise levels. During the nighttime, exterior background noises are generally lower than the daytime levels. However, most household noise also decreases at night and exterior noise becomes more noticeable. Furthermore, most people sleep at night and are sensitive to intrusive noises. To account for human sensitivity to nighttime noise levels, the Day-Night Sound Level (L_{dn} or DNL) was developed. L_{dn} is a noise index that accounts for the greater annoyance of noise during the nighttime hours.

L_{dn} values are calculated by averaging hourly L_{eq} sound levels for a 24-hour period, and apply a weighting factor to nighttime L_{eq} values. The weighting factor, which reflects the increased sensitivity to noise during nighttime hours, is added to each hourly L_{eq} sound level before the 24-hour L_{dn} is calculated. For the purposes of assessing noise, the 24-hour day is divided into two time periods with the following weightings:

- Daytime: 7 a.m. to 10 p.m. (15 hours) Weighting factor of 0 dB
- Nighttime: 10 p.m. to 7 a.m. (9 hours) Weighting factor of 10 dB

The two time periods are then averaged to compute the overall L_{dn} value. For a continuous noise source, the L_{dn} value is easily computed by adding 6.4 dB to the overall 24-hour noise level (L_{eq}). For example, if the expected continuous noise level from the power plant were 60.0 dBA, then the resulting L_{dn} from the plant would be 66.4 dBA.

The effects of noise on people can be listed in three general categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as startling and hearing loss

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial plants may experience noise effects in the last category. No completely satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily attributable to the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way of determining a person’s subjective reaction to a new noise is by comparing it to the existing or “ambient” environment to which that person has adapted. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

Table 5.7-2 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

Table 5.7-2. Typical Sound Levels Measured in the Environment and Industry

Noise Source at a Given Distance	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Impression
Shotgun (at shooter's ear)	140	Carrier flight deck	Painfully loud
Civil defense siren (100 feet)	130		
Jet takeoff (200 feet)	120		Threshold of pain
Loud rock music	110	Rock music concert	
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)	90	Boiler room	
Pneumatic drill (50 feet)	80	Noisy restaurant	
Busy traffic; hair dryer	70		Moderately loud
Normal conversation (5 feet)	60	Data processing center	
Light traffic (100 feet); rainfall	50	Private business office	
Bird calls (distant)	40	Average living room, library	Quiet
Soft whisper (5 feet); rustling leaves	30	Quiet bedroom	
	20	Recording studio	
Normal breathing	10		Threshold of hearing

Source: Beranek, 1998

5.7.2 Affected Environment

5.7.2.1 Local Land Use and Noise Sources

The SERC project site is located entirely within the eastern portion of the City of Stanton; however, natural gas will be delivered to SERC via one of two offsite pipeline linear route alternatives that extend into the western portion of Anaheim, southeastern Buena Park, Garden Grove, and a pocket of unincorporated Orange County. State Route (SR) 22 (Garden Grove Freeway), SR 39 (Beach Boulevard), Interstate Highway 5 (Santa Ana Freeway), and SR 91 (Riverside Freeway) are the main transportation corridors in the study area. Land uses surrounding the site include the City of Stanton's industrial area to the north and south, the City of Stanton's municipal maintenance facility to the west, public/quasi-public utility areas to the east consisting of the Southern California Edison Barre Peaker power plant, Barre Substation, and electrical transmission lines, and single- and multi-family residential uses to the southeast and northwest.

The SERC site is immediately north of an existing operating rail line. A modular home community is located approximately 100 feet southeast of Parcel 1, and a single-family home community is located approximately 65 feet north-northwest of Parcel 2. There is a manager's unit at the storage facility located 35 feet south of Parcel 1, 60 feet south of the noise and aesthetic enclosure surrounding the eastern LM6000 PC, and it is separated from the site by the existing operating rail line.

5.7.2.2 Ambient Noise Survey

Originally in August 2015 and again in August 2016, SERC completed a baseline noise survey at two locations (LT1 and LT2) adjacent to two neighboring residential receptors (SR1 and SR2). The second noise survey was conducted because the first noise survey included only 23 hours of data and not the full 25 hours required for California Energy Commission (CEC) data adequacy. Because SERC did not have homeowner permission to measure noise within the respective private properties, the LT1 and LT2 were selected on public right-of-way. The residential receptors (SR1 and SR2) are adjacent to measurement locations LT1 and LT2 with the main difference being the presence of a 4-foot perimeter wall between LT1 and SR1. Descriptions of noise monitoring locations LT1 and LT2 and the residential receptors SR1 and SR2 are shown in Table 5.7-3. An aerial view of the site showing the two residential receptors, baseline noise survey measurement locations, and other area features is shown on Figure 5.7-1.

Table 5.7-3. Summary of Noise Survey Locations

Location Number	Location Description	Measurement Duration	Primary Noise Sources
LT1	Southeastern corner of Dale Avenue and rail line; modular home community	Long term	Roadway traffic from Dale Avenue; rail line use
LT2	Northwestern corner of Fern Avenue and Pacific Street	Long term	Roadway traffic from Pacific Street and Fern Avenues; other industrial users in the surrounding area; rail line use
SR1	10800 Dale Avenue, Space 101		Roadway traffic from Dale Avenue; rail line use
SR2	10701 Fern Avenue		Roadway traffic from Pacific Street and Fern Avenues; other industrial users in the surrounding area; rail line use

Source: Esri World Imagery

LEGEND

Project Site

Generator Tie-Line

Proposed Natural Gas Pipeline Route Alternatives

Existing Residential Use

Sound Monitoring Location

N

0 220 440 Feet

FIGURE 5.7-1
Sound Monitoring Locations
Stanton Energy Reliability Center AFC
Stanton, California

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Tables 5.7-4, 5.7-5, 5.7-6, and 5.7-7 show the measured hourly noise levels outside the two residential locations from the August 4-5, 2015, and August 23-24, 2016, surveys. In each table, the quietest consecutive 4 hours of L_{90} measurements are indicated in bold text.

Table 5.7-4. Summary of Measurements at LT1 – August 2015 (dBA)

Date	Time	L_{eq}	L_{10}	L_{50}	L_{90}
August 4, 2015	12:00	N/A	N/A	N/A	N/A
	13:00	N/A	N/A	N/A	N/A
	14:00	67.4	71.2	60.8	50.5
	15:00	67.5	71.4	63.2	51.3
	16:00	68.7	72.6	64.3	52.3
	17:00	68.8	72.9	64.6	52.7
	18:00	67.9	72.3	63.5	54.0
	19:00	67.3	71.3	63.0	52.7
	20:00	65.5	69.8	59.6	52.6
	21:00	65.1	69.8	59.1	52.4
	22:00	63.4	67.6	53.3	47.5
	23:00	61.1	64.2	49.6	47.1
August 5, 2015	0:00	59.3	62.0	48.7	**45.3**
	1:00	55.9	55.0	46.3	**44.2**
	2:00	56.1	54.4	46.8	**43.5**
	3:00	54.9	53.6	48.0	**43.8**
	4:00	58.4	61.1	48.9	46.9
	5:00	63.1	66.8	54.1	49.1
	6:00	65.6	69.8	60.6	50.8
	7:00	66.7	70.7	62.9	52.9
	8:00	65.5	69.6	59.6	49.6
	9:00	65.4	69.9	58.9	49.1
	10:00	67.5	70.4	59.6	49.6
	11:00	66.1	69.9	58.6	49.8
	12:00	N/A	N/A	N/A	N/A
Average[a]		65.6	69.5	60.0	50.4
Nighttime (10:00 p.m.–7:00 a.m.)		61.2			47.1
Daytime[a] (7:00 a.m.–10:00 p.m.)		67.0			
L_{dn}[a]		69.1			
Nighttime (lowest consecutive 4 hours) L_{90} [b]					44.2

[a] Background data used for the 12:00 and 13:00 hours are the average of the 11:00 and 14:00 hours.
[b] Background Nighttime (lowest consecutive 4 hours) L_{90} is an arithmetic average. All other averages are logarithmic averages.

Table 5.7-5. Summary of Measurements at LT1 – August 2016 (dBA)

Date	Time	L_{eq}	L_{10}	L_{50}	L_{90}
August 23, 2016	12:00	68.6	72.6	64.5	57.2
	13:00	69.2	72.4	63.1	51.0
	14:00	69.4	73.2	65.3	53.2
	15:00	69.9	73.5	66.0	53.9
	16:00	70.9	74.6	67.7	55.5
	17:00	70.6	74.9	67.5	55.0
	18:00	70.7	74.3	66.0	54.1
	19:00	68.3	72.9	63.0	50.8
	20:00	67.0	71.4	62.3	51.7
	21:00	68.1	71.0	60.2	48.9
	22:00	64.6	69.2	55.9	46.2
	23:00	63.1	67.7	50.8	44.8
August 24, 2016	0:00	60.5	63.2	46.2	**43.3**
	1:00	60.8	60.2	45.2	**40.0**
	2:00	56.6	56.9	40.8	**39.3**
	3:00	59.3	54.1	47.1	**40.5**
	4:00	62.2	65.6	51.2	48.0
	5:00	64.8	68.8	56.6	50.1
	6:00	68.3	72.6	64.1	54.3
	7:00	69.5	73.7	66.2	54.5
	8:00	69.2	72.9	64.6	53.9
	9:00	68.1	72.0	63.7	53.3
	10:00	68.8	72.5	66.2	58.2
	11:00	68.3	72.6	63.8	51.0
	12:00	72.1	72.8	62.9	52.1
Average[a]		68.0	71.7	63.3	52.5
Nighttime (10:00 p.m.–7:00 a.m.)		63.5			47.9
Daytime[a] (7:00 a.m.–10:00 p.m.)		69.4			
L_{dn}[a]		71.4			
Nighttime (lowest consecutive 4 hours) L_{90}[b]					40.8

[a] Background data used for the 12:00 hour is the average of the two 12:00 hour values.
[b] Background Nighttime (lowest consecutive 4 hours) L_{90} is an arithmetic average. All other averages are logarithmic averages.

Table 5.7-6. Summary of Measurements at Table LT2 – August 2015 (dBA)

Date	Time	L_{eq}	L_{10}	L_{50}	L_{90}
August 4, 2015	12:00	N/A	N/A	N/A	N/A
	13:00	N/A	N/A	N/A	N/A
	14:00	58.8	58.8	54.8	53.6
	15:00	57.9	57.8	53.9	52.5
	16:00	59.6	57.9	49.2	45.4
	17:00	59.5	58.2	48.3	44.4
	18:00	51.4	52.4	46.4	44.0
	19:00	57.9	55.4	45.5	43.2
	20:00	52.7	50.1	44.9	42.6
	21:00	55.8	55.2	45.5	42.7
	22:00	46.7	46.9	41.8	39.7
	23:00	45.4	44.2	40.3	37.9
August 5, 2015	0:00	48.6	46.4	38.2	**36.2**
	1:00	49.3	46.0	39.5	**37.4**
	2:00	42.4	40.8	36.8	**35.8**
	3:00	46.9	39.2	37.1	**35.9**
	4:00	41.5	42.2	39.9	37.1
	5:00	52.3	50.6	45.4	41.9
	6:00	58.3	58.4	52.2	48.0
	7:00	56.5	58.8	51.6	47.7
	8:00	60.9	61.3	57.8	54.7
	9:00	57.1	56.4	53.4	52.4
	10:00	55.0	55.8	52.9	51.8
	11:00	62.0	61.9	54.7	52.6
	12:00	N/A	N/A	N/A	N/A
Average[a]		57.0	56.8	51.2	49.1
Nighttime (10:00 p.m.–7:00 a.m.)		51.1			41.1
Daytime[a] (7:00 a.m.–10:00 p.m.)		58.6			
L_{dn}[a]		59.7			
Nighttime (lowest consecutive 4 hours) L_{90} [b]					36.3

[a] Background data used for the 12:00 and 13:00 hours are the average of the 11:00 and 14:00 hours.
[b] Background Nighttime (lowest consecutive 4 hours) L_{90} is an arithmetic average. All other averages are logarithmic averages.

Table 5.7-7. Summary of Measurements at LT2 – August 2016 (dBA)

Date	Time	L_{eq}	L_{10}	L_{50}	L_{90}
August 23, 2016	12:00	68.6	72.6	64.5	57.2
	13:00	69.2	72.4	63.1	51.0
	14:00	69.4	73.2	65.3	53.2
	15:00	69.9	73.5	66.0	53.9
	16:00	70.9	74.6	67.7	55.5
	17:00	70.6	74.9	67.5	55.0
	18:00	70.7	74.3	66.0	54.1
	19:00	68.3	72.9	63.0	50.8
	20:00	67.0	71.4	62.3	51.7
	21:00	68.1	71.0	60.2	48.9
	22:00	64.6	69.2	55.9	46.2
	23:00	63.1	67.7	50.8	44.8
August 24, 2016	0:00	60.5	63.2	46.2	**43.3**
	1:00	60.8	60.2	45.2	**40.0**
	2:00	56.6	56.9	40.8	**39.3**
	3:00	59.3	54.1	47.1	**40.5**
	4:00	62.2	65.6	51.2	48.0
	5:00	64.8	68.8	56.6	50.1
	6:00	68.3	72.6	64.1	54.3
	7:00	69.5	73.7	66.2	54.5
	8:00	69.2	72.9	64.6	53.9
	9:00	68.1	72.0	63.7	53.3
	10:00	68.8	72.5	66.2	58.2
	11:00	68.3	72.6	63.8	51.0
	12:00	72.1	72.8	62.9	52.1
Average[a]		58.8	56.2	51.2	49.0
Nighttime (10:00 p.m.–7:00 a.m.)		53.5			44.8
Daytime[a] (7:00 a.m.–10:00 p.m.)		60.3			
L_{dn}[a]		61.8			
Nighttime (lowest consecutive 4 hours) L_{90} [b]					37.5

[a] Background data used for the 12:00 hour is the average of the two 12:00 hour values.
[b] Background Nighttime (lowest consecutive 4 hours) L_{90} is an arithmetic average. All other averages are logarithmic averages.

5.7.3 Environmental Analysis

Noise will be produced during the construction and operation of the project. Potential noise impacts from construction and operation activities are assessed in this subsection.

5.7.3.1 Significance Criteria

Following the California Environmental Quality Act guidelines (Title 14, California Code of Regulations [CCR], Appendix G, Section XI), the project would cause a significant impact if it would result in the following:

- Exposure of people to noise levels in excess of standards established in the local General Plan or noise ordinance
- Exposure of people to excessive groundborne noise levels or vibration
- Substantial permanent increase in ambient noise levels in the project vicinity
- Substantial temporary or periodic increase in ambient noise levels in the project vicinity

Generally, the design basis for noise control is the minimum, or most stringent, noise level required by any of the applicable LORS. Therefore, noise from the project is evaluated against the City of Stanton's requirements. The city has established quantitative guidelines for determining appropriate noise levels for various land uses in the Noise Element of its General Plan.

The CEC staff has previously stated that an increase in background noise levels up to 5 dBA in a residential setting is insignificant; an increase of more than 10 dBA is generally considered significant; and an increase between 5 and 10 dBA may be either significant or insignificant, depending on the particular circumstances of the project.

The CEC staff also has concluded that construction noise is typically insignificant if the construction activity is temporary, if noisy construction activities are limited to daytime hours, and if all feasible noise abatement measures are implemented for noise-producing equipment.

5.7.3.2 Construction Impacts

5.7.3.2.1 Plant Construction Noise

Construction of SERC is expected to be typical of other power plants in terms of schedule, equipment used, and other types of activities. The noise level will vary during the construction period depending on the construction phase. Construction of power plants can generally be divided into the following five phases that use different types of construction equipment: demolition, site preparation, and excavation; concrete pouring; steel erection; mechanical; and cleanup (Miller et al., 1978).

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control and the Empire State Electric Energy Research Company have extensively studied noise from individual pieces of construction equipment, as well as from construction sites of power plants and other types of facilities (EPA, 1971; Barnes et al., 1976). Because specific information on types, quantities, and operating schedules of construction equipment is not available at this point in project development, information from these documents for similarly sized industrial projects will be used. Use of these data, which are more than 30 years old, is conservative because the evolution of construction equipment has been toward quieter designs to protect operators from exposure to high noise levels.

The loudest equipment types generally operating at a site during each phase of construction are presented in Table 5.7-8. The composite average or equivalent site noise level, representing noise from all equipment, is also presented for each phase.

Table 5.7-8. Construction Equipment and Composite Site Noise Levels

Construction Phase	Loudest Construction Equipment	Equipment Noise Level (dBA) at 50 feet	Composite Site Noise Level (dBA) at 50 feet
Demolition, Site Clearing, and Excavation	Dump Truck Backhoe	91 85	89
Concrete Pouring	Truck Concrete Mixer	91 85	78
Steel Erection	Derrick Crane Jack Hammer	88 88	87
Mechanical	Derrick Crane Pneumatic Tools	88 86	87
Cleanup	Rock Drill Truck	98 91	89

Source: EPA, 1971; Barnes et al., 1976.

Average or equivalent construction noise levels projected at various distances from the site are presented in Table 5.7-9. These results are conservative because the only attenuating mechanism considered was divergence of the sound waves in open air. The noisiest construction activities will be confined to the daytime hours. Table 5.7-10 presents noise levels from common construction equipment at various distances.

Table 5.7-9. Average Construction Noise Levels at Various Distances

	Sound Pressure Level (dBA)		
Construction Phase	375 feet	1,500 feet	3,000 feet
Demolition, Site Clearing, and Excavation	71	59	53
Concrete Pouring	60	48	42
Steel Erection	69	57	51
Mechanical	69	57	51
Cleanup	71	59	53

Table 5.7-10. Noise Levels from Common Construction Equipment at Various Distances

Construction Equipment	Typical Sound Pressure Level at 50 feet (dBA)	Typical Sound Pressure Level at 375 feet (dBA)	Typical Sound Pressure Level at 1,500 feet (dBA)
Pile Drivers (20,000 to 32,000 ft-lbs/blow)	104	86	74
Dozer (250 to 700 hp)	88	70	58
Front End Loader (6 to 15 cu yd)	88	70	58
Trucks (200 to 400 hp)	86	68	56
Grader (13- to 16-foot blade)	85	67	55
Shovels (2 to 5 cu yd)	84	66	54
Portable Generators (50 to 200 kW)	84	66	54
Derrick Crane (11 to 20 tons)	83	65	53

Table 5.7-10. Noise Levels from Common Construction Equipment at Various Distances

Construction Equipment	Typical Sound Pressure Level at 50 feet (dBA)	Typical Sound Pressure Level at 375 feet (dBA)	Typical Sound Pressure Level at 1,500 feet (dBA)
Mobile Crane (11 to 20 tons)	83	65	53
Concrete Pumps (30 to 150 cu yd)	81	63	51
Tractor (0.75 to 2 cu yd)	80	62	50
Unquieted Paving Breaker	80	62	50
Quieted Paving Breaker	73	55	43

Notes:

cu yd = cubic yard
ft-lbs/blow = foot pounds per blow
hp = horsepower
kW = kilowatt

Noise generated during the testing and commissioning phase of the project is not expected to be substantially different from that produced during normal full-load operation. Starts and abrupt stops are more frequent during this period, but they are usually short-lived.

Compressed air and/or nitrogen blows may be used to flush debris from various piping systems. Such blows will be infrequent, short in duration (several minutes or less), and performed during daytime hours.

5.7.3.2.2 Construction Vibration

Construction vibrations can be divided into three classes based on the wave form and its source (see Table 5.7-11). Vibrations will be limited to normal construction hours (during the daytime) and will be of short duration; therefore, no mitigation is required.

Table 5.7-11. Construction Vibrations

Wave Form	Example Source
Impact	Impact pile driver or blasting
Steady-state	Vibratory pile driver
Pseudo steady-state	Double acting pile hammer

5.7.3.2.3 Worker Exposure to Noise

Worker exposure levels during construction of SERC will vary depending on the phase of the project and the proximity of the workers to the noise-generating activities. The project will develop a Hearing Protection Plan, which complies with California Division of Occupational Safety and Health (Cal/OSHA) requirements. This Hearing Protection Plan will be incorporated into the project construction Health and Safety Plan. The plan will require appropriate hearing protection for workers and visitors throughout the duration of the construction period.

5.7.3.3 Operational Impacts

5.7.3.3.1 Worker Exposure

Nearly all components will be specified not to exceed near-field maximum noise levels of 90 dBA at 3 feet (or 85 dBA at 3 feet where available as a vendor standard). SERC will be an unmanned facility; therefore, worker exposures will be limited to when personnel are visiting or maintaining the facility. In addition, because there are no permanent or semi-permanent workstations located near any piece of noisy plant equipment, no visiting worker's time-weighted average exposure to noise should routinely approach the level allowable under Occupational Safety and Health Act of 1970 guidelines. Nevertheless, signs requiring the use of hearing protection devices will be posted in all areas where noise levels commonly exceed 85 dBA, such as inside acoustical enclosures, and the project will comply with applicable Cal/OSHA requirements. Outdoor levels throughout the plant will typically range from 90 dBA near certain equipment to roughly 65 dBA in areas more distant from any major noise source. Therefore, noise impacts to visiting workers during operation will be less than significant.

5.7.3.3.2 Transmission Line and Switchyard Noise Levels

One of the electrical effects of high-voltage transmission lines is corona. Corona is the ionization of the air that occurs at the surface of the energized conductor and suspension hardware attributable to very high electric field strength at the surface of the metal during certain conditions. Corona may result in radio and television reception interference, audible noise, light, and production of ozone. Corona is generally a principle concern with transmission lines of 345 kilovolts and greater and with lines that are at higher elevations. Corona noise is also generally associated with foul weather conditions. As stated in Section 3, Electric Transmission, the audible noise associated with the transmission lines in the area will be of the same magnitude upstream and downstream of SERC. Because SERC will be connected at the 66-kilovolt level, it is expected that no corona-related design issues will be encountered, and any related impacts will be less than significant.

5.7.3.3.3 Plant Operational Noise Modeling

A noise model of the proposed SERC was developed by Innova, Inc. The acoustical modeling for this project was conducted using the Cadna/A computer software program from DataKustik GmbH, which follows the International Standards Organization (ISO) 9613-2 standard for outdoor noise propagation calculations.

Modeling Elements. Each noise radiating element was modeled based on its noise emission pattern. Concentrated sources such as fans were modeled as point sources, which radiate sound spherically. Surfaces and openings were modeled as area sources, which radiate sound in a hemispherical pattern. Point and area sources were expressed in sound power level (L_w).

Buildings and other obstacles were modeled as solid barrier elements. The reflective characteristic of the structure is quantified by its absorption coefficient, which is specified based on the construction material used.

Modeling Accuracy. The following three factors affect accuracy when modeling:

- **Between Cadna/A and ISO 9613.** Cadna/A predictions are accurate to within 1 dB of the propagation standard.
- **Between ISO 9613 and actual measurements.** Meteorological effects can produce significant variations between measured results. Calculations based on the ISO 9613-2 standard are typically accurate to within 3 dB of actual measurements under the conditions described here, and in most cases yields conservative results. Model uncertainty for individual Octave Bands and low-frequency sound levels is higher.
- **Source level uncertainty.** The source sound power level uncertainty, whether derived from measurements or stated by the equipment manufacturer, will be incorporated into modeling uncertainty.

Model Assumptions and Meteorological Conditions. The following assumptions were made in the noise propagation model:

- Both LM6000 PC units operating simultaneously at full load, steady-state
- Compartment ventilation fans operating on a 2 × 100 percent redundancy (i.e., one fan is in operation, and one fan is on standby)

The meteorological conditions used in the model were downwind conditions that favor the transmission of sound from the sources to the receptors. The inputs for the model are presented in Table 5.7-12.

Table 5.7-12. Summary of Sound Power Levels Used to Model SERC Plant Operations

Item	Modeling Input and Description
Terrain of Study Area	Flat
Temperature	68 degrees Fahrenheit
Relative Humidity	70%
Wind	2 to 11 miles per hour, from facility to receptor*
Ground Attenuation	G = 0.3 onsite, G = 0.5 otherwise
Number of Sound Reflections	2
Receptor Height	5 feet above ground

*Propagation calculations under the ISO 9613 standard incorporate the effects of downwind propagation (from facility to receptor) with wind speeds of 2 to 11 miles per hour) measured at a height of 10 to 36 feet above the ground.

Noise Attenuation Measures. To assist SERC in determining the type and extent of noise mitigation that would be required to minimize operational noise impacts at the sensitive receptors to less than significant levels, a base case of the facility design with standard equipment and 50-foot-tall exhaust stacks was evaluated. The resulting modeled unattenuated noise increase was 19.4 dB and 14.7 dB over the nighttime lowest consecutive 4-hour average ambient L_{90} at SR1 and SR2, respectively.

To significantly reduce the noise levels at the neighboring receptors, the following noise attenuation measures were incorporated into the SERC design:

- **LM6000 PC Roofless Enclosures.** SERC has committed to constructing open roofless enclosures around each LM6000 PC package to satisfy aesthetic requirements and attenuate noise from the LM6000 PC package and associated auxiliary skids. The roofless enclosures will be 35 feet in height with a minimum of 24-gauge metal cladding with interior acoustic absorption treatment. These roofless enclosures will encapsulate the majority of the equipment associated with the turbine packages and will serve as an effective noise barrier.
- **LM6000 PC Exhaust Stack Design.** The LM6000 PC exhaust stacks for the two units were determined to be the dominant noise sources at both sensitive receptor locations. For the base case analysis, the LM6000 PC units were modeled with a basic level of silencing to meet a target of 85 dBA at 3 feet from the stack exit at 50 feet above ground level. This is equivalent to roughly 50 dBA at 400 feet above ground level. To effectively reduce the noise level, additional stack silencing was required, which entailed increasing the overall stack height to 70 feet in addition to increasing the square stack external cross section to 15 × 15 feet. With this additional attenuation, the stacks will have a sound pressure level of 70 dBA at 3 feet from the stack exit at 70 feet above ground level.
- **LM600 Exhaust Diffuser Enclosure.** As a standard offering, General Electric provides acoustic barriers on either side of the exhaust diffusers. While this provides effective noise reduction in the near-field, noise emanating from the diffusers will refract above the barriers and into the far-field. Instead, a close-fitting enclosure will be installed for each exhaust diffuser in lieu of the barriers.
- **Oversized Generator Step-up Transformer.** The generator step-up transformer has been oversized such that SERC will be able to operate at full load without operation of the cooling fans, which is otherwise typically a significant noise contributor.

- **Gas Compressor Noise Enclosure.** The gas compressor skid will include a noise enclosure enveloping the rotary compressor.
- **Optimized Battery System Layout.** The layout of the battery system was optimized to reduce the noise at SR2 by using the battery enclosures to act as an acoustic barrier between the inverters and SR2.

Noise Modeling Results. With the above mitigation measures incorporated at location SR1, the anticipated project noise level is 49.0 dBA. Existing average (L_{eq}) levels at this location ranged between 65.6 and 68.0 dBA. The nighttime lowest consecutive 4-hour average L_{90} was 44.2 and 40.8 dBA in August 2015 and August 2016, respectively. The arithmetic average of the nighttime lowest consecutive 4-hour L_{90} for the two surveys is 42.5 dBA. When the project noise level of 49.0 dBA is added to this average, the resulting level is 49.9 dBA. This represents a 7.4 dBA increase.

With the above mitigation measures incorporated at location SR2, the anticipated project noise level is 43.0 dBA. Existing average (L_{eq}) levels at this location ranged between 57.0 and 58.8 dBA. The nighttime lowest consecutive 4-hour average L_{90} was 36.3 and 37.5 dBA in August 2015 and August 2016, respectively. The arithmetic average of the nighttime lowest consecutive 4-hour L_{90} for the two surveys is 36.9 dBA. When the project noise level of 43.0 dBA is added to this average, the resulting level is 44.0 dBA. This represents a 7.1 dBA increase.

Because of the anticipated infrequent operation of the facility during the quietest hours of the nighttime, the SERC will not cause significant impacts to the closest sensitive receptors.

With respect to the manager’s quarters located at the adjacent warehouse, because of the industrial nature of the area, the zoning of the storage facility property as industrial, and the modern construction of the manager’s quarters, the infrequent operation of SERC will not result in significant noise impacts inside those quarters.

5.7.3.3.4 Tonal Noise

At the nearby residential locations, no significant tones are anticipated. However, audible tones are not impossible because certain sources within the plant (such as the combustion turbine inlets, transformers, and pump motors) have been known to sometimes produce significant tones. SERC will anticipate the potential for audible tones in the final design and specification of the plant’s equipment and will take necessary steps to prevent sources from emitting tones that might be disturbing at the nearest receptors.

5.7.3.3.5 Ground and Airborne Vibration

Similar simple-cycle facilities have not resulted in ground- or airborne vibration impacts. The project is primarily driven by gas turbines exhausting into a stack and a stack silencer. These very large ducts reduce low-frequency noise, which is the main source of airborne-induced vibration of structures. It is SERC’s intention to anticipate the potential for low-frequency noise in the design and specification of the project equipment and to take necessary steps to prevent ground- or airborne vibration impacts.

The equipment that would be used in the project is well balanced and is designed to produce very low vibration levels throughout the life of the project. An imbalance could contribute to ground vibration levels in the vicinity of the equipment. However, vibration-monitoring systems installed in the equipment are designed to ensure that the equipment remains balanced. Should an imbalance occur, the event would be detected and the equipment would automatically shut down. Given these protective measures, impacts related to ground- and airborne vibrations will be less than significant.

5.7.4 Cumulative Effects

A cumulative impact refers to a proposed project’s incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code § 21083; Title 14, CCR, §§15064[h], 15065[c], 15130, and 15355).

SERC will involve the construction and operation of a new electrical energy reliability facility on a parcel within the City of Stanton's Industrial General zoning, which will be consistent with other existing uses within the city's designated Industrial land use area. Based on the list of cumulative projects provided in Appendix 5.6A, there are no other pending projects whose operation is expected to result in additional noise in the immediate area. For these reasons, SERC will not cause a significant cumulative noise impact.

5.7.5 Mitigation Measures

In addition to the attenuation measures incorporated into the design and discussed above, SERC proposes to implement the following measures to minimize any potential noise impacts.

5.7.5.1 Noise Hot Line

The Applicant will establish a telephone number for use by the public to report any significant undesirable noise conditions associated with the construction and operation of the project. If the telephone is not staffed 24 hours per day, the project owner will include an automatic answering feature with date and time stamp recording to answer calls when the phone is unattended. This telephone number will be posted at the project site during construction in a manner visible to passersby. This telephone number will be maintained until the project has been operational for at least 1 year.

5.7.5.2 Noise Complaint Resolution

Throughout project construction and operation, the project owner will document, investigate, evaluate, and attempt to resolve all legitimate project-related noise complaints.

The Applicant or authorized agent will do the following:

- Use the Noise Complaint Resolution Form typically suggested by CEC or a 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.
- If the noise complaint is legitimate, take all feasible measures to reduce the noise at its source.

5.7.5.3 Construction Hours

In accordance with the City of Stanton Noise Ordinance 9.28.070, noisy construction work will not take place between the hours of 8 p.m. and 7 a.m. on weekdays and Saturdays, or at any time on Sundays or a federal holiday.

Haul trucks and other engine-powered equipment will be equipped with adequate mufflers. Haul trucks will be operated in accordance with posted speed limits. Truck engine exhaust brake use will be limited to emergencies.

As discussed in Section 5.6, Land Use, the natural gas pipeline alternatives would traverse the jurisdictions of the Cities of Stanton, Buena Park, Garden Grove, and Anaheim, as well as the unincorporated County of Orange. Construction of the natural gas pipeline would therefore be subject to construction jurisdiction specific work-hour restrictions for pipeline construction activities that would be conducted within each city or the county.

For the City of Buena Park, pipeline construction would be limited to Mondays through Saturdays between the hours of 7 a.m. and 8 p.m., unless written provision is provided by the city engineer.

For pipeline construction activities conducted within the City of Garden Grove, the activities would be limited to any day of the week between the hours of 7 a.m. and 10 p.m. if the activity took place within, or within a 500-foot radius of, a residential area.

For the City of Anaheim and the County of Orange, noisy pipeline construction activities would be limited to any day of the week between the hours of 7 a.m. and 7 p.m.

5.7.6 Laws, Ordinances, Regulations, and Standards

Table 5.7-13 presents the LORS that apply to noise.

Table 5.7-13. Laws, Ordinances, Regulations, and Standards for Noise

LORS	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Federal			
EPA	Guidelines for state and local governments.	EPA	5.7.6.1.1
Occupational Safety and Health Act of 1970	Exposure of workers over 8-hour shift limited to 90 dBA.	Occupational Safety and Health Administration	5.7.6.1.2
State			
Cal/OSHA, Title 8 CCR Article 105 Sections 095 et seq.	Exposure of workers over 8-hour shift limited to 90 dBA.	Cal/OSHA	5.7.6.2.1
California Vehicle Code Sections 23130 and 23130.5	Regulates vehicle noise limits on California highways.	Caltrans, California Highway Patrol, and the County Sheriff's Office	5.7.6.2.2
Local			
California Government Code Section 65302	Requires local government to prepare plans that contain noise provisions.	California Office of Planning and Research	5.7.6.3
City of Stanton General Plan	The General Plan provides quantitative compatibility goals and policy.	City of Stanton	5.7.6.3
City of Stanton Municipal Code	The Municipal Code includes quantitative limits on allowable noise for various receptor land uses.	City of Stanton	5.7.6.3

5.7.6.1 Federal LORS

5.7.6.1.1 EPA

Guidelines are available from the EPA (1974) to assist state and local government entities in development of state and local LORS for noise. Because there are local LORS that apply to this project, these guidelines are not applicable.

5.7.6.1.2 Occupational Safety and Health Administration

Onsite noise levels are regulated through the Occupational Safety and Health Administration (OSHA). The noise exposure level of workers is regulated at 90 dBA over an 8-hour work shift, to protect hearing (29 Code of Federal Regulations 1910.95). Onsite noise levels will generally be in the 70- to 85-dBA range. Areas above 85 dBA will be posted as high noise level areas, and hearing protection will be required. The power plant will implement a hearing conservation program for applicable employees and will maintain exposure levels below 90 dBA.

5.7.6.2 State LORS

5.7.6.2.1 Cal/OSHA

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, CCR, General Industrial Safety Orders, Article 105, Control of Noise Exposure, Sections 5095 et seq.

5.7.6.2.2 California Vehicle Code

Noise limits for highway vehicles are regulated under the California Vehicle Code, Sections 23130 and 23130.5. The limits are enforceable on highways by the California Highway Patrol and the county sheriffs' offices.

5.7.6.3 Local LORS

The California State Planning Law (California Government Code Section 65302) requires that all cities, counties, and entities (such as multi-city port authorities) prepare and adopt a General Plan to guide community development. The Noise Element of the City of Stanton's General Plan establishes noise level performance standards from nontransportation noise sources of 55 dBA L_{eq} during daytime (7 a.m. to 10 p.m.) and 50 dBA L_{eq} during the nighttime (10 p.m. to 7 a.m.). The Noise Element has adopted general policies that are less stringent than the Noise Ordinance.

The City of Stanton Noise Ordinance is found in its Municipal Code at 9.28 and sets the same numerical limits outlined above in the Noise Element of the General Plan. The modeling of the operational noise of SERC with the mitigation measures described in Section 5.7.3.3.3 result in project noise of 49 dB and 43 dB at SR1 and SR2, respectively, and therefore will meet the Noise Ordinance limit of 50 dBA L_{eq}.

5.7.7 Agencies and Agency Contacts

No agencies were contacted directly to specifically discuss project noise.

5.7.8 Permits and Permit Schedule

No permits are required; therefore, there is no permit schedule.

5.7.9 References

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