

5.7 Noise

5.7.1 Introduction

This section discusses the potential effects of the Carlsbad Energy Center Project (CECP) related to noise. This section first describes the applicable laws, ordinances, regulations, and standards (LORS) relevant to noise and the environmental setting of the project. It provides an analysis of the noise impacts that may occur as a result of construction and operation of CECP. Protection and mitigation measures that would avoid or minimize, or potential significant impacts are also presented, along with proposed conditions of certification. At the end of the section is a list of agency contacts and permits that would be required.

5.7.2 Laws, Ordinances, Regulations, and Standards

The following federal, state and local LORS apply to noise generated by CECP. They are summarized in Table 5.7-1.

5.7.2.1 Federal LORS

5.7.2.1.1 U.S. Environmental Protection Agency

Guidelines are available from the U.S. Environmental Protection Agency (USEPA, 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, the USEPA guidelines are not applicable.

5.7.2.1.2 Occupational Safety and Health Act

Onsite noise levels are regulated, in terms of exposure to workers, through the Occupational Safety and Health Act of 1970 (OSHA). The noise exposure level of workers is regulated at 90 decibels, A-weighted (dBA), over an 8-hour work shift to protect hearing (29 CFR 1910.95).

5.7.2.2 State LORS

5.7.2.2.1 California Occupational Safety and Health Administration

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

5.7.2.2.2 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 the highways by the California Highway Patrol and the County Sheriff's Office.

5.7.2.3 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 change. Because the project is located within the City of Carlsbad, only the City has jurisdiction over the project.

TABLE 5.7-1
Laws, Ordinances, Regulations, and Standards Applicable to Noise

LORS	Requirements/ Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
USEPA	Guidelines for state and local governments.	USEPA	5.7.2.1.1.
OSHA	Exposure of workers over 8-hour shift limited to 90 dBA.	OSHA	5.7.2.1.2, 5.7.5.2.1, and 5.7.5.3.1. Also see Section 5.16, Worker Safety
State			
Cal-OSHA 8 CCR Article 105 sections 095 et seq.	Exposure of workers over 8-hour shift limited to 90 dBA.	Cal-OSHA	5.7.2.2.1, 5.7.5.2.1, and 5.7.5.3.1. Also see Section 5.16, Worker Safety
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	Delivery trucks and other vehicles will meet Code requirements.
Local			
California Government Code Section 65302	Requires local government to prepare plans that contain noise provisions.	City of Carlsbad	5.7.2.3
City of Carlsbad General Plan - Noise Element	Discourages new noise sensitive land uses in areas above CNEL of 60 dBA.	City of Carlsbad	5.7.2.3 and 5.7.5
City of Carlsbad Municipal Code	Chapter 8.48 establishes limitations on the hours of construction within 1000 feet of residential dwellings.	City of Carlsbad	5.7.2.3 and 5.7.5

5.7.2.3.1 City of Carlsbad

The City of Carlsbad General Plan Noise Element (1995) establishes policies primarily to discourage new residential development in areas where noise levels exceed a Community Noise Equivalent Level (CNEL) of 60 dBA (or 65 dBA if located near the McClellan-Palomar Airport). A CNEL of 60 dBA is approximately equivalent to a continuous noise level of 53 dBA or time varying noise level of 60 dBA between 7 AM and 7 PM, 55 dBA between 7 PM and 10 PM and 50 dBA between 10 PM and 7 AM.

The City of Carlsbad Noise Guidelines Manual presents the land use compatibility guidelines presented in Figure 5.7-1.

Chapter 8.48 of the City of Carlsbad Municipal Code states that it is a violation to create excessive construction noise "after sunset any day or before 7 AM Monday through Friday and before 8 AM on Saturday; all day on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and Christmas Day."

Exceptions are provided for emergency repairs and “in nonresidential zones, provided there are no inhabited dwellings within one thousand feet of the building or structure being erected, demolished, altered or repaired or the exterior boundaries of the site being graded or excavated.”

The City of Carlsbad Noise Guidance Manual (1995) states that when potential construction noise impacts have been identified, conditions may be applied to minimize such impacts. Examples of such conditions require the use of properly operated and maintained mufflers if operated within 1,000 feet of a dwelling or noise sensitive use.

5.7.3 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 5.7-2.

TABLE 5.7-2
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, 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.
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 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})

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 how a person perceives or hears sound, thus achieving very good correlation in terms of how to evaluate 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.

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

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

In most cases, environmental noise may produce 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 due 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 5.7-3 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

TABLE 5.7-3
Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Carrier Deck Jet Operation	140	
	130	Pain threshold
Jet takeoff (200 feet)	120	
Auto Horn (3 feet)	110	Maximum Vocal Effort
Jet takeoff (2,000 feet)	100	
Shout (0.5 feet)		
N.Y. Subway Station	90	Very Annoying
Heavy Truck (50 feet)		Hearing Damage (8-hr, continuous exposure)
Pneumatic drill (50 feet)	80	Annoying
Freight Train (50 feet)		
Freeway Traffic (50 feet)	70	Intrusive Telephone Use Difficult
Air Conditioning Unit (20 feet)	60	
Light auto traffic (50 feet)	50	Quiet

TABLE 5.7-3
Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Living Room Bedroom	40	
Library Soft whisper (5 feet)	30	Very Quiet
Broadcasting Studio	20	Recording studio
	10	Just Audible

Adapted from Table E, "Assessing and Mitigating Noise Impacts", NY DEC, February 2001.

5.7.4 Affected Environment

The CECP site is located in an area designated as Public Utility ("U" or "PU") in the City of Carlsbad's General Plan and Zoning Ordinance. This designation allows electrical generation and transmission facilities. The existing Encina Power Station and CECP are consistent with and are allowable uses in the Public Utility land use designation. Figure 5.7-2 shows the location of the generating facility.

The total acreage of the existing Encina Power Station is 95 acres. The CECP site is approximately 23 acres. The project site is bounded to the north by the Agua Hedionda Lagoon, to the east by Interstate 5 (I-5) and agricultural lands, to the north and south by residential neighborhoods, and to the west by the existing Encina Power Station, Carlsbad Boulevard, and the Pacific Ocean. The closest residential area to CECP is located north of the Agua Hedionda Lagoon, approximately 1,750 feet from the CECP site.

I-5 is the dominant noise source at the closest receptors. Average daily traffic on I-5 is 261,000 vehicles (near State Route 56) and is projected to increase to 430,000 daily vehicles by the year 2030. More than 10,000 daily truck trips are made on I-5. Local traffic, the COASTER commuter rail service (which is being expanded), Amtrak rail services, and heavy rail traffic are also prominent existing noise sources.

5.7.4.1 Ambient Noise Survey

As part of the noise analysis of CECP, an ambient noise survey was conducted at seven locations in the project area (Figure 5.7-3). Location M5 was monitored continuously for 25 hours while attended short-term measurements were collected at the remaining locations.

Larson Davis 820 and 824 ANSI Type 1 (precision), statistical sound level meters were used to conduct the measurements. The sound level meters were field calibrated before and after the measurement with a Larson Davis CAL200 and were factory calibrated within the previous 12 months.

Clear skies and a light breeze (generally less than 10 miles per hour at the microphone) generally persisted throughout most of the measurement period. There was no precipitation and the temperature varied from 66 degrees Fahrenheit (°F) to 75°F. The humidity varied from 66 percent to 88 percent.

Table 5.7-4 presents the hourly weather data reported at the nearby McClellan-Palomar Airport. Tables 5.7-5 through 5.7-12 present the noise monitoring results at locations M1 through M7. The continuous unattended sound level meter at Location M5 was programmed to log average and statistical levels in hourly intervals. The short-term attended measurements were collected in 10 minute intervals unless otherwise noted. At some locations where the measurement period extended beyond 10 minutes, the overall levels for the entire attended measurement duration are also presented.

TABLE 5.7-4
Summary of Weather Conditions at McClellan-Palomar Airport

Date	Time	Temperature (°F)	Relative Humidity (%)	Wind Direction	Wind Speed (mph)	Conditions
24-Jul-07	4:53 PM	71.1	70	SSW	5.8	Clear
24-Jul-07	5:53 PM	70	73	SW	8.1	Partly Cloudy
24-Jul-07	6:53 PM	69.1	75	West	5.8	Partly Cloudy
24-Jul-07	7:53 PM	69.1	75	WSW	5.8	Clear
24-Jul-07	8:53 PM	68	78	Calm	Calm	Clear
24-Jul-07	9:53 PM	66.9	81	Calm	Calm	Clear
24-Jul-07	10:53 PM	66.9	81	SSW	4.6	Clear
24-Jul-07	11:53 PM	66.9	81	Calm	Calm	Clear
25-Jul-07	12:53 AM	66.9	81	SSE	3.5	Clear
25-Jul-07	1:53 AM	66	84	Calm	Calm	Clear
25-Jul-07	2:53 AM	66	84	Calm	Calm	Clear
25-Jul-07	3:53 AM	66	84	Calm	Calm	Clear
25-Jul-07	4:53 AM	66	84	Calm	Calm	Clear
25-Jul-07	5:53 AM	66	84	Calm	Calm	Clear
25-Jul-07	6:51 AM	66.2	88	Calm	Calm	Partly Cloudy
25-Jul-07	6:53 AM	66.9	84	Calm	Calm	Partly Cloudy
25-Jul-07	7:53 AM	69.1	78	Calm	Calm	Clear
25-Jul-07	8:53 AM	71.1	73	Calm	Calm	Clear
25-Jul-07	9:53 AM	72	73	WSW	6.9	Clear
25-Jul-07	10:53 AM	73	68	WSW	8.1	Clear
25-Jul-07	11:53 AM	73.9	68	WSW	8.1	Haze
25-Jul-07	12:53 PM	75	66	SW	8.1	Clear
25-Jul-07	1:53 PM	75	66	WSW	9.2	Clear
25-Jul-07	2:53 PM	75	66	West	9.2	Clear
25-Jul-07	3:53 PM	73.9	68	SW	8.1	Clear
25-Jul-07	4:53 PM	73	71	WSW	6.9	Clear

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25-Jul-07	5:53 PM	72	73	WSW	6.9	Clear
25-Jul-07	6:53 PM	71.1	75	WSW	5.8	Clear
25-Jul-07	7:53 PM	70	78	WSW	4.6	Clear
25-Jul-07	8:53 PM	70	78	Calm	Calm	Clear

As shown on Figure 5.7-3, location M1 was west of the West Hotel and Restaurant, near the entrance to the existing SDG&E yard. Observed nighttime noise sources consisted primarily of traffic on I-5, though some corona noise from the transmission lines/SDG&E yard was audible, as were crickets. Intermittent train traffic would also be a nighttime noise source but was not present during the short term monitoring period. Daytime noise levels were also primarily the result of I-5 and several commuter (COASTER) trains (as reflected by the high L_{eq} , L_1 and L_{10} readings).

TABLE 5.7-5
Summary of Noise Monitoring at Location M1 (dBA)

Date/Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
July 24, 2007 1:42 AM	52	58	54	51	49
July 24, 2007 1:52 AM	51	58	54	49	46
<i>Overall</i> (1:40 AM -2:05 AM)	52	59	54	51	47
July 24, 2007 5:10 PM	65	78	58	55	53
July 24, 2007 5:20 PM	55	60	57	54	53
July 24, 2007 5:30 PM	75	81	58	54	52
July 24, 2007 5:40 PM (2 min)	86	104	77	54	52
<i>Overall</i> (5:10 PM – 5:42 PM)	76	81	58	54	53

Location M2 was in front of the residence located at 5120 El Arbol Drive. Nighttime observations consisted of a freight train sounding its horn as it approached Cannon Road (76 dBA). When the train was not present noise levels dropped to just less than 40 dBA and consisted primarily of traffic from I-5. Daytime levels consisted of a commuter train, helicopter and jetliner overflights in addition to distant and local traffic.

TABLE 5.7-6
Summary of Noise Monitoring at Location M2 (dBA)

Date/Time	L _{eq}	L ₁	L ₁₀	L ₅₀	L ₉₀
July 24, 2007 2:14 AM	62	76	41	38	36
July 24, 2007 2:24 AM	38	43	40	37	36
<i>Overall</i> (2:14 AM to 2:36 AM)	58	61	40	38	36
July 24, 2007 4:59 PM	58	70	59	51	46

Location M3 was in front of the residence located at 5022 Tiera Del Oro Drive. Nighttime levels consisted primarily of surf noise and intermittent traffic on Carlsbad Boulevard or Cannon Road. Daytime levels include several helicopter overflights and local traffic.

TABLE 5.7-7
Summary of Noise Monitoring at Location M3 (dBA)

Date/Time	L _{eq}	L ₁	L ₁₀	L ₅₀	L ₉₀
July 24, 2007 2:42 AM	47	51	48	46	45
<i>Overall</i> (2:42 AM to 2:44 AM)	47	50	48	46	45
July 24, 2007 4:47 PM (5 minutes)	57	70	56	51	49

Location M4 was located on the bluff above the ocean just north of Tiera del Oro. The levels consisted primarily of surf noise, but there were several helicopter overflights and a small plane in addition to traffic on Carlsbad Boulevard.

TABLE 5.7-8
Summary of Noise Monitoring at Location M4 (dBA)

Date/Time	L _{eq}	L ₁	L ₁₀	L ₅₀	L ₉₀
July 24, 2007 4:30 PM	62	69	63	61	59
<i>Overall</i> (4:30 PM to 4:41 PM)	62	72	64	61	59

Location M5 was selected for the continuous monitor as it could be secured within a locked and fenced area. It was located on the bluff above the Hubs-SeaWorld facility, on the residential property line. The observed sources of noise included roadway traffic on Carlsbad Boulevard and I-5 in addition to rail traffic (80 dBA during pass-by's) and surf noise.

TABLE 5.7-9
Summary of Noise Monitoring at Location M5 (dBA)

Date/Time	L _{eq}	L ₁	L ₁₀	L ₅₀	L ₉₀
July 23, 2007 5:00 PM	60	67	56	54	53
July 23, 2007 6:00 PM	59	65	56	54	52
July 23, 2007 7:00 PM	60	63	56	53	52
July 23, 2007 8:00 PM	59	66	55	53	52
July 23, 2007 9:00 PM	57	63	54	52	50
July 23, 2007 10:00 PM	52	58	53	52	50
July 23, 2007 11:00 PM	60	67	55	52	50
July 24, 2007 12:00 AM	54	67	53	51	49
July 24, 2007 1:00 AM	51	55	51	50	48
July 24, 2007 2:00 AM	63	56	51	49	47
July 24, 2007 3:00 AM	48	52	50	48	46
July 24, 2007 4:00 AM	53	67	51	48	46
July 24, 2007 5:00 AM	54	58	56	52	50
July 24, 2007 6:00 AM	58	67	58	56	55
July 24, 2007 7:00 AM	60	71	58	56	54
July 24, 2007 8:00 AM	56	69	55	52	50
July 24, 2007 9:00 AM	54	64	55	52	50
July 24, 2007 10:00 AM	55	62	55	53	51
July 24, 2007 11:00 AM	54	63	55	53	51
July 24, 2007 12:00 PM	56	65	55	52	50
July 24, 2007 1:00 PM	54	63	54	52	50
July 24, 2007 2:00 PM	56	69	57	52	51
July 24, 2007 3:00 PM	56	63	58	53	51
July 24, 2007 4:00 PM	59	65	56	53	51
July 24, 2007 5:00 PM	60	69	56	53	51
July 24, 2007 6:00 PM	55	63	54	52	50
July 24, 2007 7:00 PM	55	66	56	51	49

The following location was just west of the continuous monitor, located in the driveway leading down to the Hubs-SeaWorld facility. There was some local traffic on Garfield Street in addition to Carlsbad Boulevard and more distant I-5 and surf noise.

TABLE 5.7-10
Summary of Noise Monitoring at West of Location M5 (dBA)

Date/Time	L _{eq}	L ₁	L ₁₀	L ₅₀	L ₉₀
July 24, 2007 3:26 AM	57	66	61	51	47
Overall (3:26 AM to 3:44)	60	67	64	58	48

Location M6 was in the cul-de-sac of Olive Avenue, adjacent to the railroad tracks. There is a noise wall and apartment buildings that shield this location from traffic on I-5. These features would also provide shielding from CECP related noise. While a train did not pass during the monitoring periods, it is subject to periodic train traffic that is expected to be similar in level (80 dBA) to that measured at other locations near the tracks (M1 and M2).

TABLE 5.7-11
Summary of Noise Monitoring at Location M6 (dBA)

Date/Time	L _{eq}	L ₁	L ₁₀	L ₅₀	L ₉₀
July 24, 2007 3:06 AM	39	44	42	38	35
Overall (3:06 AM – 3:18 AM)	39	45	42	38	35
July 24, 2007 3:51 PM	57	67	49	44	42
July 24, 2007 4:01 PM	46	58	46	43	42
Overall (3:51 PM to 4:11 PM)	54	60	47	44	42

Location M7 was on the bluff at the end of Harbor Drive, overlooking the lagoon and I-5. It is the closest residential location to CECP. As one would expect, this noise in this area is dominated by traffic on I-5 throughout the day and night. It was also observed to be louder than the continuous monitoring location M5 given its proximity to I-5, although measurements were not collected during all observations.

TABLE 5.7-12
Summary of Noise Monitoring at Location M7 (dBA)

Date/Time	L _{eq}	L ₁	L ₁₀	L ₅₀	L ₉₀
July 24, 2007 1:10 AM	56	60	58	55	51
July 24, 2007 1:20 AM	57	62	59	56	52
Overall (1:10 AM -1:40 AM)	56	61	59	56	52

5.7.5 Environmental Analysis

The construction and operation of CECP will produce noise, but any increase in noise levels at the closest sensitive receptors will be minimal. Potential noise impacts from construction and operation activities are assessed in this section.

5.7.5.1 Significance Criteria

The City of Carlsbad has established quantitative guidelines for determining appropriate noise levels for various land use categories, primarily a CNEL of 60 dBA for new residential uses. These standards are summarized in Figure 5.7-1. Noise impacts may be considered significant by the City if operational activities conflict with these guidelines.

In addition to the City criteria, California Energy Commission (CEC) staff concluded that a potential for a significance noise impact under the California Environmental Quality Act (CEQA) exists where the noise of a project exceeds the background noise by 5 dBA or more (CEC Data Adequacy Checklist, 2007). It is important to note that the potential for an impact does not mean that there is an impact. Rather, it means that a project's noise levels need further evaluation. The CEC staff has also concluded that construction noise is typically insignificant if: (1) the construction activity is temporary; (2) use of heavy equipment and noisy activities are limited to daytime hours; and (3) all feasible noise abatement measures are implemented for noise-producing equipment.

5.7.5.2 Construction Impacts

This section addresses the various components of construction noise and vibration associated with the CECP.

5.7.5.2.1 Worker Exposure to Noise

Worker exposure levels during construction of the CECP will vary depending on the phase of construction and the proximity of the workers to the noise-generating activities. Hearing protection will be available for workers and visitors to use as needed throughout the duration of the construction period. A Hearing Protection Plan, which complies with Cal-OSHA requirements, will be incorporated into the CECP Health and Safety Plan.

5.7.5.2.2 Plant Construction Noise

Construction of CECP is expected to be similar to other power plants in terms of schedule, equipment used, and other types of activities. The noise level will vary during the construction period, depending upon the construction phase. Construction of power plants can generally be divided into five phases that use different types of construction equipment. The five phases are: (1) site preparation, and excavation; (2) concrete pouring; (3) steel erection; (4) mechanical; and (5) clean-up (Miller et al., 1978). Construction noise levels will be similar for either the Single Phase Construction Schedule or the Phased Construction Schedule (see Section 2.2.15 for a discussion of the optional CECP construction schedule). Therefore, there is no need for a separate analysis of construction noise levels.

Both the USEPA 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 (USEPA, 1971; Barnes et al., 1976). Since 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 this data, which is between 21 and 26 years old, is conservative since 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 5.7-13. The composite average or equivalent site noise level, representing noise from all equipment, is also presented in the table for each phase.

TABLE 5.7-13
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
Site Clearing, and Excavation	Dump Truck	91	89
	Backhoe	85	
Concrete Pouring	Truck	91	78
	Concrete Mixer	85	
Steel Erection	Derrick Crane	88	87
	Jack Hammer	88	
Mechanical	Derrick Crane	88	87
	Pneumatic Tools	86	
Cleanup	Rock Drill	98	89
	Truck	91	

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

Average or equivalent construction noise levels projected at various distances from the site are presented in Table 5.7-14. These results are conservative since the only attenuating mechanism considered was divergence of the sound waves in open air. Shielding effects of intervening structures are not included in the calculations. The construction noise may be audible at the nearest dwelling units, but is not anticipated to dramatically exceed current exposure levels. In accordance with the Carlsbad Municipal Code section 8.48.010 construction activities are permitted to occur 24 hours a day, 7 days a week provided they do not create disturbing, excessive or offensive noise. There is the potential for double shifts that would expand the hours of construction; however, noisy construction work (that causes offsite annoyance as evidenced by the filing of a legitimate noise complaint) will be confined to between 7:00 AM and 7:00 PM unless an exception to these hours is granted by the CBO.

TABLE 5.7-14
Average Construction Noise Levels at Various Distances

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

permanent or semi-permanent workstations located near any piece of noisy plant equipment, no worker's time-weighted average exposure to noise should approach the level allowable under OSHA guidelines. Nevertheless, signs requiring the use of hearing protection devices will be posted in all areas where noise levels may commonly exceed 85 dBA, such as inside acoustical enclosures, and hearing protection will be required. 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.

5.7.5.3.2 Plant Operation Noise Levels

A noise model of the CECP operations has been developed using source input levels derived from manufacturers' data and field surveys of similar equipment. The noise emissions from the CECP have been calculated at the residential receptors of potential concern. The noise levels presented represent the anticipated steady-state level from the plant with essentially all equipment operating.

Standard acoustical engineering methods were used in the noise analysis. The computer software noise model, CADNA/A by DataKustik GmbH of Munich, Germany is very sophisticated and is capable of fully modeling very complex industrial plants. The sound propagation factors used in the model have been adopted from ISO 9613-2 *Acoustics - Sound Attenuation During Propagation Outdoors* and VDI 2714 *Outdoor Sound Propagation*. The model divides the proposed facility into a list of individual point and area noise sources representing each piece of equipment that produces a significant amount of noise. The sound power levels representing the standard performance of each of these components are assigned based either on field measurements of similar equipment made at other existing plants, data supplied by manufacturers, or information found in the technical literature. Using these standard power levels as a basis, the model calculates the sound pressure level that would occur at each receptor from each source after losses from distance, air absorption, blockages, etc. are considered. The sum of all these individual levels is the total plant level at the modeling point.

The A-weighted sound power levels for the major noise sources for the CECP used in the model are summarized in Table 5.7-16.

TABLE 5.7-16
Summary of Sound Power Levels Used to Model CECP Plant Operations

Plant Component	Sound Power Level, dBA
Stacks	105
Combustion Turbine Generators	101
Steam Turbine Generators	112
Fuel Gas Compressor Enclosure	98
Steam Turbine Fin Fan Cooler	112
GSU Transformers	107
HRSG Duct Walls	108

Operational noise from CECP, with noise control incorporated in the design, is anticipated to not exceed 51 dBA at the closest residential receptor M7, as well as at receptor M5. This is similar to the measured L_{90} of 52 dBA at receptor M7 and the daytime L_{90} 's at receptor M5. At receptor M1 (the West Hotel, south of CECP) the anticipated project noise level is 52 dBA. At receptor M2, the closest residential area to the south of the CECP site, the project noise level is anticipated to be 47 dBA (the same as the measured daytime L_{90}) and less than 40 dBA at receptors M3 and M4.

Nighttime operation of CECP, while it may occur, will be relatively rare. It is expected that the plant will be operated primarily as an intermediate duty unit, on daily cycles, especially during summer months. The exact operational profile of the plant, however, cannot be defined in detail since operation of the facility depends on the variable demand in the service area. The most common times of operation will be afternoons during hot weather episodes when the background levels are highest.

Several design elements may be necessary to achieve these levels. The specific types of noise control will be determined during the detailed project design phase. Design elements included to control noise emissions include stack silencers, equipment enclosures and berms.

5.7.5.3.3 Tonal Noise

At the monitoring locations modeled for the CECP, no significant tones are anticipated. That is not to say that audible tones are impossible – certain sources within the plant such as the combustion turbine inlets, transformers, pump motors, cooling tower fan gearboxes, etc. have been known to sometimes produce significant tones. It is the Applicant's intention to anticipate the potential for audible tones in the design and specification of the plant's equipment and take necessary steps to prevent sources from emitting tones that might be disturbing at the nearest receptors.

5.7.5.3.4 Ground and Airborne Vibration

Similar combined-cycle facilities have not resulted in ground or airborne vibration impacts. CECP is primarily driven by gas turbines exhausting into large HRSG duct and a stack silencer. These very large ducts reduce low frequency noise, which is the main source of airborne-induced vibration of structures.

The equipment that will be used for CECP 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.

5.7.5.3.5 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 due 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 kV and higher. Noise is also generally associated with inclement weather

conditions. CECP interconnections will be via 138 kV and 230 kV lines to the existing SDG&E switchyards at the Encina Power Station and audible noise levels are expected to be similar to those of the existing 138-kV and 230-kV transmission lines. The addition of CECP, including the interconnection of transmission lines to the existing SDG&E switchyards at the Encina Power Station, is expected to have negligible impact on the existing noise levels at the edges of the Encina Power Station property lines (See Section 3.0, Transmission System Engineering).

5.7.5.3.6 Cumulative Effects

Poseidon Resources LLC has submitted an amendment to the pending Encina Power Station Precise Development Plan application to the City of Carlsbad to obtain land use approvals to construct and operate an approximately 50 million gallons per day (mgd) Carlsbad Seawater Desalination Plant and other appurtenant and ancillary water and support facilities, including the offsite water delivery infrastructure to produce potable water. The desalination plant would be located on land that would be leased from Cabrillo Power I LLC at the existing Encina Power Station, along the southern edge of the Agua Hedionda Lagoon. The Final Environmental Impact Report for the desalination plant was certified by the City of Carlsbad on June 13, 2006. The project is slated to be operational as early as 2010. According to the desalination plants noise assessment, the anticipated noise level is 35 dBA CNEL (28 dBA continuous) at 450 feet. Given the low levels anticipated from the desalination plant, no Cumulative Effects are anticipated.

In addition to the desalination plant, there are several other projects which are currently under development in the vicinity of CECP (see Section 5.6, Land Use). Most of these projects have not advanced to the point where enough is known about them in terms of specific construction requirements or construction schedule. Major construction projects typically utilize equipment similar in noise levels discussed in Section 5.7.5.2.2. Cumulatively, the greatest increase in noise resulting from the simultaneous construction activities at CECP is 3 dBA. This is generally considered the threshold of perceptible change in noise level and therefore construction activities are not anticipated to result in cumulative noise impacts.

5.7.6 Mitigation Measures

The following mitigation measures are included as part of the CECP.

5.7.6.1 Noise Mitigation Measure #1

The Applicant shall 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 Applicant shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the project site during construction in a manner visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

5.7.6.2 Noise Mitigation Measure #2

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

The Applicant or authorized agent shall:

- 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

5.7.6.3 Noise Mitigation Measure #3

Noisy construction work (that causes offsite annoyance as evidenced by the filing of a legitimate noise complaint) shall be restricted to the 7:00 AM to 7:00 PM time period. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.

5.7.7 Proposed Conditions of Certification

While construction and operational noise levels from the CECP are expected to be less than significant, the following conditions of certification are proposed by the Applicant to ensure impacts remain less than significant.

NOISE-1: At least 15 days prior to site mobilization, the Applicant shall notify all residents within one-half mile of the site by mail and/or other effective means, of the commencement of project construction. At the same time, the Applicant shall establish and disseminate a 24-hour “hotline” telephone number for use by the public to report any undesirable noise conditions associated with the construction of the project. This telephone number shall also be posted at the project site during construction in a manner visible to passersby, if feasible. This telephone number shall be maintained until the project has been operational for at least one year. The telephone shall be located in an area that is likely to be staffed, and, if the telephone is not staffed 24 hours per day, the Applicant shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended.

Verification: The Applicant shall transmit to the CPM in the first Monthly Construction Report following site mobilization, a statement, signed by the project manager, attesting that the above notification has been performed, and describing the method of that notification. This statement shall also attest that the telephone number has been established and posted at the site.

NOISE-2: Throughout construction and operation the Applicant shall document, investigate, evaluate, and attempt to resolve all project related noise complaints. The Applicant shall:

- Use the Noise Complaint Resolution Form (see below for example), or functionally equivalent procedure acceptable to the CPM, 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 determine the source of noise related to the complaint;
- If the noise is project related, take all feasible measures to reduce the noise at its source; and
- Submit a report documenting the complaint and the actions taken. The report shall include: a complaint summary, including final results of noise reduction efforts; and if obtainable, a signed statement by the complainant stating that the noise problem is resolved to complainant's satisfaction.

Verification: Within thirty (30) days of receiving a noise complaint, the Applicant shall file a copy of the Noise Complaint Resolution Form, or similar instrument approved by the CPM, with the City and with the CPM documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a thirty (30) day period, the Applicant shall submit an updated Noise Complaint Resolution Form when the mitigation is finally implemented.

NOISE-3: Prior to site mobilization, the Applicant shall submit to the CPM for review and approval a noise control program. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA and Cal-OSHA standards.

Verification: At least 30 days prior to site mobilization, the Applicant shall submit to the CPM the above referenced program for review and approval. The Applicant shall make the program available to OSHA upon request.

NOISE-4: If a traditional, high-pressure steam blow process is employed, the Applicant shall equip steam blow piping with a temporary silencer that quiets the noise of steam blows to no greater than 100 dBA L50 measured at a distance of 100 feet. The Applicant shall conduct steam blows only during the hours of 7:00 AM to 7:00 PM weekdays, and 8:00 AM to 6:00 PM weekends and holidays. If a modern, low-pressure continuous steam blow process is employed, the Applicant shall submit a description of this process, with expected noise levels and projected hours of execution, to the CPM.

Verification: At least 30 days prior to the first high-pressure steam blow, the Applicant shall submit to the CPM drawings or other information describing the temporary steam blow silencer, and a description of the steam blow schedule. At least fifteen (15) days prior to the first low-pressure continuous steam blow, the Applicant shall submit to the CPM drawings or other information describing the process, including the noise levels expected and the expected time schedule for execution of the process.

NOISE-5: The Applicant shall conduct a public notification program to alert residents within one mile of the site prior to the start of steam or gas blow activities. The notification shall include a description of the purpose and nature of the steam or gas blow(s), the proposed schedule, the expected sound levels, and the explanation that it is a one-time operation and not a part of normal plant operations.

Verification: At least fifteen (15) days prior to the first steam blow(s), the Applicant shall notify all residents within one mile of the of the planned steam blow activity, and shall

make the notification available to other area residents in an appropriate manner. The notification may be in the form of letters to the area residences, telephone calls, fliers, or other effective means. Within five (5) days of notifying these entities, the Applicant shall send a letter to the CPM confirming that the residents have been notified of the planned steam blow activities, including a description of the method(s) of that notification.

NOISE-6: In accordance with the Carlsbad Municipal Code section 8.48.010 construction activities are permitted to occur 24 hours a day, 7 days a week provided they do not create disturbing, excessive or offensive noise. There is the potential for double shifts that would expand the hours of construction; however, noisy construction work (that causes offsite annoyance as evidenced by the filing of a legitimate noise complaint) will be confined to between 7:00 AM and 7:00 PM unless an exception to these hours is granted by the Chief Building Official. Truck engine exhaust brake use shall be limited to emergencies.

Verification: The Applicant shall transmit to the CPM in the first Monthly Construction Report a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

NOISE-7: Within 30 days of the project first achieving a sustained output of 80 percent or greater of rated capacity, the Applicant shall conduct an occupational noise survey to identify the noise hazardous areas in the facility. The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations, sections 5095-5099 (Article 105) and Title 29, Code of Federal Regulations, section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure. The Applicant shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable California and federal regulations.

Verification: Within 30 days after completing the survey, the Applicant shall submit the noise survey report, including proposed mitigation measures, to the CPM for review and approval. The Applicant shall make the report available to OSHA and Cal-OSHA upon request.

NOISE-8: Within 30 days of the project first achieving a sustained output of 80 percent or greater of rated capacity, the Applicant shall conduct a 25-hour community noise survey at M2, M5 and M7. Surveys shall be conducted at 80% or greater load conditions. The surveys shall also include the octave band pressure levels to ensure that no new pure-tone noise components have been introduced.

No single piece of equipment shall be allowed to stand out as a dominant source of noise that draws legitimate complaints. Steam relief valves shall be adequately muffled to preclude noise that draws legitimate complaints.

Protocol: The measurement of power plant noise for purposes of demonstrating compliance with this Condition may alternatively be made at an acceptable location closer to the plant (e.g. 400 feet from the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the nearest sensitive receptor. However, notwithstanding the use of this alternative method for determining the noise level, the character of plant noise shall be evaluated at the nearest sensitive receptor to determine the presence of pure tones or other dominant sources of plant noise.

Verification: Within thirty (30) days after completing a survey, the Applicant shall submit a summary report of the survey to the City and the CPM. Included in the report will be a description of any additional mitigation measures necessary to achieve compliance with the project noise limits (47 dBA at M2, 51 dBA at M5 and M7), and a schedule, subject to CPM approval, for implementing these measures. Within thirty (30) days of completion of installation of these measures, the Applicant shall submit to the CPM a summary report of a new noise survey, performed as described above and showing compliance with this condition.

5.7.8 Involved Agencies and Agency Contacts

Agency contacts for noise issues are presented in Table 5.7-17.

TABLE 5.7-17
Agency Contacts for Noise

Issue	Agency	Contact
Noise Levels and Community Disturbance	City of Carlsbad	Scott Donnell, Planner Planning Department 1635 Faraday Avenue Carlsbad, CA 92008-7314 (760) 602-4600

5.7.9 Permits Required and Permit Schedule

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

5.7.10 References

Barnes, J.D., L.N. Miller, and E.W. Wood. 1976. *Prediction of noise from power plant construction*. Bolt Beranek and Newman, Inc. Cambridge, MA. Prepared for the Empire State Electric Energy Research Corporation, Schenectady, NY.

Beranek, L. L. 1998. *Noise and Vibration Control*. Institute of Noise Control Engineering. McGraw Hill.

City of Carlsbad. 1994. General Plan, Land Use Element.

City of Carlsbad. 1995. City of Carlsbad Noise Guideline Manual. September 1995.

International Organization for Standardization. 1996. *Acoustics – Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation*. ISO 9613-2, Geneva, Switzerland.

Miller, Laymon N., et al. 1984. *Electric Power Plant Environmental Noise Guide*, 2nd Edition, Edison Electric Institute, New York.

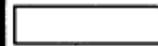
Miller, L. N., E. W. Wood, R. M. Hoover, A. R. Thompson, and S. L. Thompson, and S. L. Paterson. 1978. *Electric Power Plant Environmental Noise Guide*, Vol. 1. Bolt, Beranek & Newman, Inc. Cambridge, MA. Prepared for the Edison Electric Institute, New York, NY.

U.S. Environmental Protection Agency (USEPA). 1971. *Noise from Construction Equipment and Operations, US Building Equipment, and Home Appliances*. Prepared by Bolt, Beranek & Newman, Inc. for USEPA Office of Noise Abatement and Control, Washington, DC.

U.S. Environmental Protection Agency (USEPA). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, EPA-550/9-74-004, EPA. U.S. Environmental Protection Agency (March 1974).

Land Use Category.	Community Noise Exposure CNEL, dB					
	55	60	65	70	75	80
Residential - (all) Single Family, Duplex, Mobilehome, Multi-Family, etc.						
Transient Lodging - Motel, Hotel						
School, Library, Church, Hospital, Nursing Home						
Auditorium, Concert Hall, Amphitheater						
Sports Arena, Outdoor Spectator Sports						
Playground, Neighborhood Park						
Golf Course, Riding Stable, Water Recreation, Cemetery						
Office Building, Business Commercial Planned Industrial and Professional						
General Industrial, Manufacturing, Utilities, Agriculture						

INTERPRETATION:



Normally Acceptable
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.



Conditionally Acceptable
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.



Normally Unacceptable
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

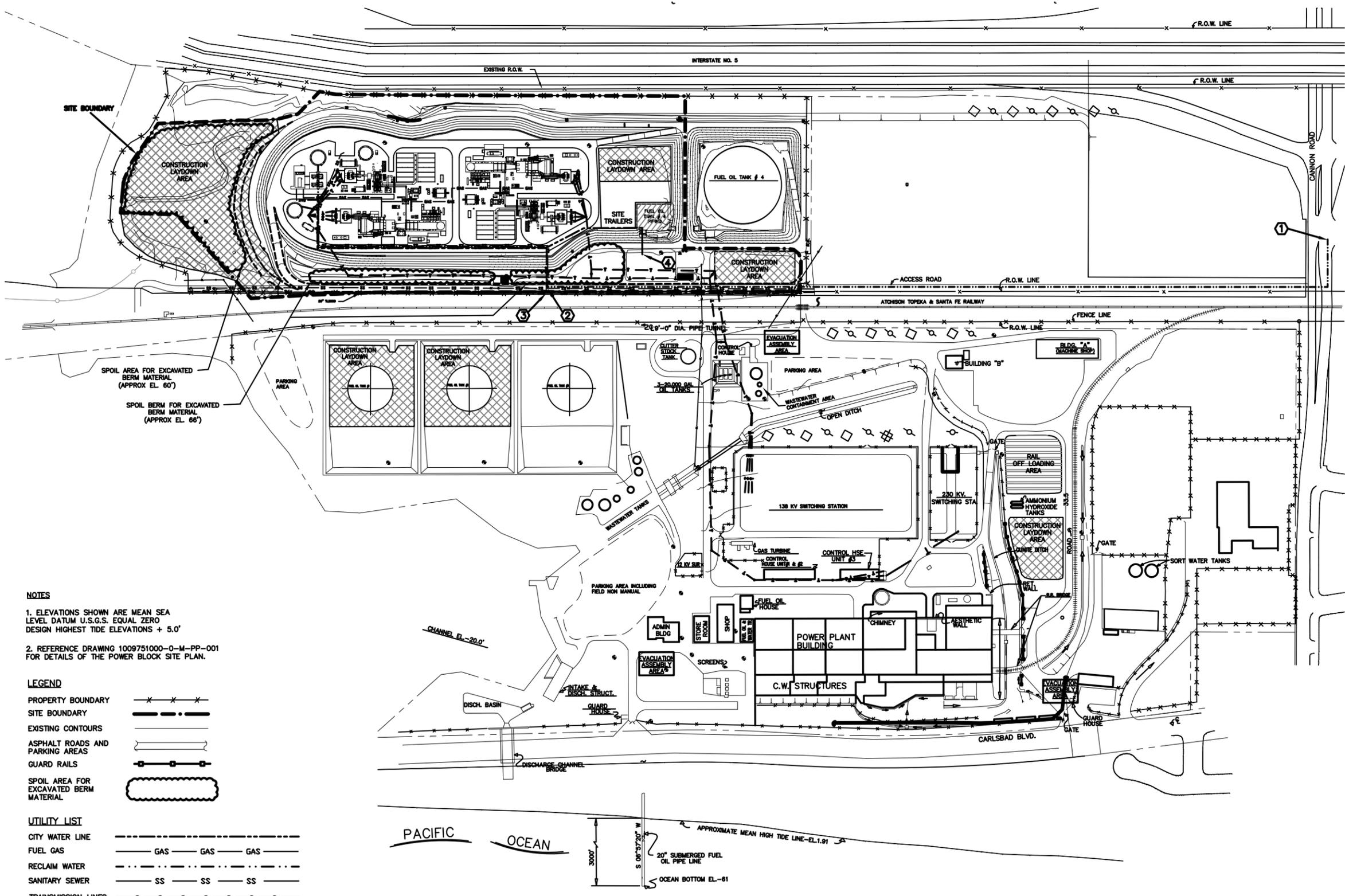


Land Use Discouraged
New construction or development should generally not be undertaken.

NOTE: McClellan Palomar Airport Noise is regulated by the Airport Comprehensive Land Use Plan (CLUP). See the CLUP for airport noise compatibility guidelines.

**FIGURE 5.7-1
CITY OF CARLSBAD NOISE
GUIDANCE MANUAL LAND
USE COMPATIBILITY
MATRIX**

CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CALIFORNIA



NOTES

- ELEVATIONS SHOWN ARE MEAN SEA LEVEL DATUM U.S.G.S. EQUAL ZERO DESIGN HIGHEST TIDE ELEVATIONS + 5.0'
- REFERENCE DRAWING 1009751000-0-M-PP-001 FOR DETAILS OF THE POWER BLOCK SITE PLAN.

LEGEND

- PROPERTY BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOURS
- ASPHALT ROADS AND PARKING AREAS
- GUARD RAILS
- SPOIL AREA FOR EXCAVATED BERM MATERIAL

UTILITY LIST

- CITY WATER LINE
- FUEL GAS
- RECLAIM WATER
- SANITARY SEWER
- TRANSMISSION LINES

TIE POINTS

- ① RECLAIM WATER
- ② SANITARY SEWER
- ③ FUEL GAS
- ④ CITY WATER

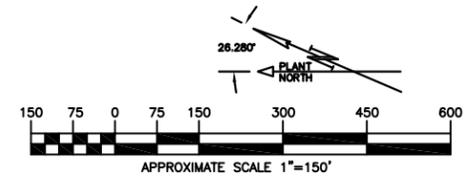


FIGURE 5.7-2
CECP PLOT PLAN
 CARLSBAD ENERGY CENTER PROJECT
 CARLSBAD, CALIFORNIA

Source: Shaw Stone & Webster, Inc.



LEGEND

○ NOISE MONITORING LOCATIONS

▭ PROJECT SITE BOUNDARY

0 350 700
FEET

SCALE IS APPROXIMATE
1:8,400



**FIGURE 5.7-3
NOISE MONITORING
LOCATIONS**

CARLSBAD ENERGY CENTER PROJECT
CARLSBAD, CALIFORNIA