5.7 Noise

This section presents an assessment of potential noise effects related to the CPV Vaca Station (CPVVS). 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.

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

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, 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.

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, 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 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 5.7-2 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 ft)	130		
Jet takeoff (200 ft)	120		Threshold of pain
Loud rock music	110	Rock music concert	
Pile driver (50 ft)	100		Very loud
Ambulance siren (100 ft)	90	Boiler room	
Pneumatic drill (50 ft)	80	Noisy restaurant	
Busy traffic; hair dryer	70		Moderately loud
Normal conversation (5 ft)	60	Data processing center	
Light traffic (100 ft); rainfall	50	Private business office	
Bird calls (distant)	40	Average living room, library	Quiet
Soft whisper (5 ft); 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 proposed 24-acre project site is on City-owned land to the east of Vacaville, in rural Solano County, California. The project site is located on the northwest corner of Fry and Lewis roads. A 24-acre parcel located to the north of and adjacent to, the project site is planned to be the project construction laydown area. Additionally, the new 6-acre substation site, the proposed electrical transmission line route, and the proposed natural gas pipeline route would be located on agricultural land.

Existing uses adjacent to the proposed project sites include agricultural and undeveloped open space uses. The City's Easterly Wastewater Treatment Plant (EWTP) is approximately 250 feet northwest of the proposed power plant site. The closest residential land use is on Lewis Road, approximately 800 feet to the southeast of the project site. Other residences are located approximately 1,900 feet to the north and 1,600 feet to the east.

5.7.2.2 Ambient Noise Survey

CPVVS conducted continuous ambient noise monitoring to determine the level of noise in the project area. The monitoring was conducted onsite at the location shown in Figure 5.7-1.

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

The hourly results are summarized in Table 5.7-3. The L_{dn} at this location was calculated to be 68 dBA. The quietest 4-hour nighttime average L_{90} was 40 dBA. The primary noise source at the monitoring location was traffic on Fry Road.

Weather conditions throughout the survey were clear and sunny with low humidity. Temperatures ranged between 64°F and 100°F and relative humidity ranged from 11 to 41 percent. Nighttime winds were calm and daytime winds varied between approximately 0 and 10 mph.

TABLE 5.7-3
Summary of Ambient Monitoring Results – Project Site (in dBA)

Date/Time	L_{eq}	L_{10}	L_{50}	L_{90}
June 19, 2008 4:00 PM	66	70	56	38
June 19, 2008 5:00 PM	66	70	54	39
June 19, 2008 6:00 PM	65	69	53	42
June 19, 2008 7:00 PM	66	68	51	41
June 19, 2008 8:00 PM	63	67	50	46
June 19, 2008 9:00 PM	61	65	48	44
June 19, 2008 10:00 PM	60	62	47	45
June 19, 2008 11:00 PM	57	59	45	42
June 20, 2008 12:00 AM	57	54	43	41
June 20, 2008 1:00 AM	56	48	42	39
June 20, 2008 2:00 AM	54	51	43	41
June 20, 2008 3:00 AM	54	50	43	41
June 20, 2008 4:00 AM	57	55	42	40
June 20, 2008 5:00 AM	63	67	49	41
June 20, 2008 6:00 AM	66	70	59	50
June 20, 2008 7:00 AM	67	71	59	49
June 20, 2008 8:00 AM	66	70	54	45
June 20, 2008 9:00 AM	71	70	48	39
June 20, 2008 10:00 AM	66	69	48	40
June 20, 2008 11:00 AM	65	69	44	36
June 20, 2008 12:00 PM	66	70	46	36
June 20, 2008 1:00 PM	68	70	47	35

TABLE 5.7-3
Summary of Ambient Monitoring Results – Project Site (in dBA)

Date/Time	L_{eq}	L_{10}	L_{50}	L_{90}
June 20, 2008 2:00 PM	66	70	48	34
June 20, 2008 3:00 PM	66	70	55	35
June 20, 2008 4:00 PM	66	70	51	34
L_{dn}	**68**			
Overall Average	**63**	**65**	**49**	**41**
Nighttime Average (10:00 p.m. to 7:00 a.m.)	**58**	**57**	**46**	**42**

5.7.3 Environmental Analysis

The CPVVS will produce noticeable noise, but facility design efforts are anticipated to bring the noise levels into compliance with the City's policy as established in the Noise Element of its General Plan, as well as the noise limits in Section 14.09.127.120 of the Vacaville Municipal Code. Noise also will be produced at the site during the construction 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 (CEQA) guidelines (California Code of Regulations [CCR], Title 14, 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 ground-borne 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's requirements. The City has established quantitative standards for determining appropriate noise levels for various land uses in its Municipal Code and has established guidelines in the Noise Element of its General Plan.

The California Energy Commission (CEC) has previously determined 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 considered significant, and an increase between 5 and 10 dBA may be either significant or insignificant, depending on the particular circumstances of a case.

The CEC also has concluded that construction noise is typically insignificant if the construction activity is temporary, use of heavy equipment and noisy activities is limited to

daytime hours, and 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 the CPVVS 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 five phases that use different types of construction equipment. The five phases are demolition, site preparation, and excavation; concrete pouring; steel erection; mechanical; and clean-up (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.

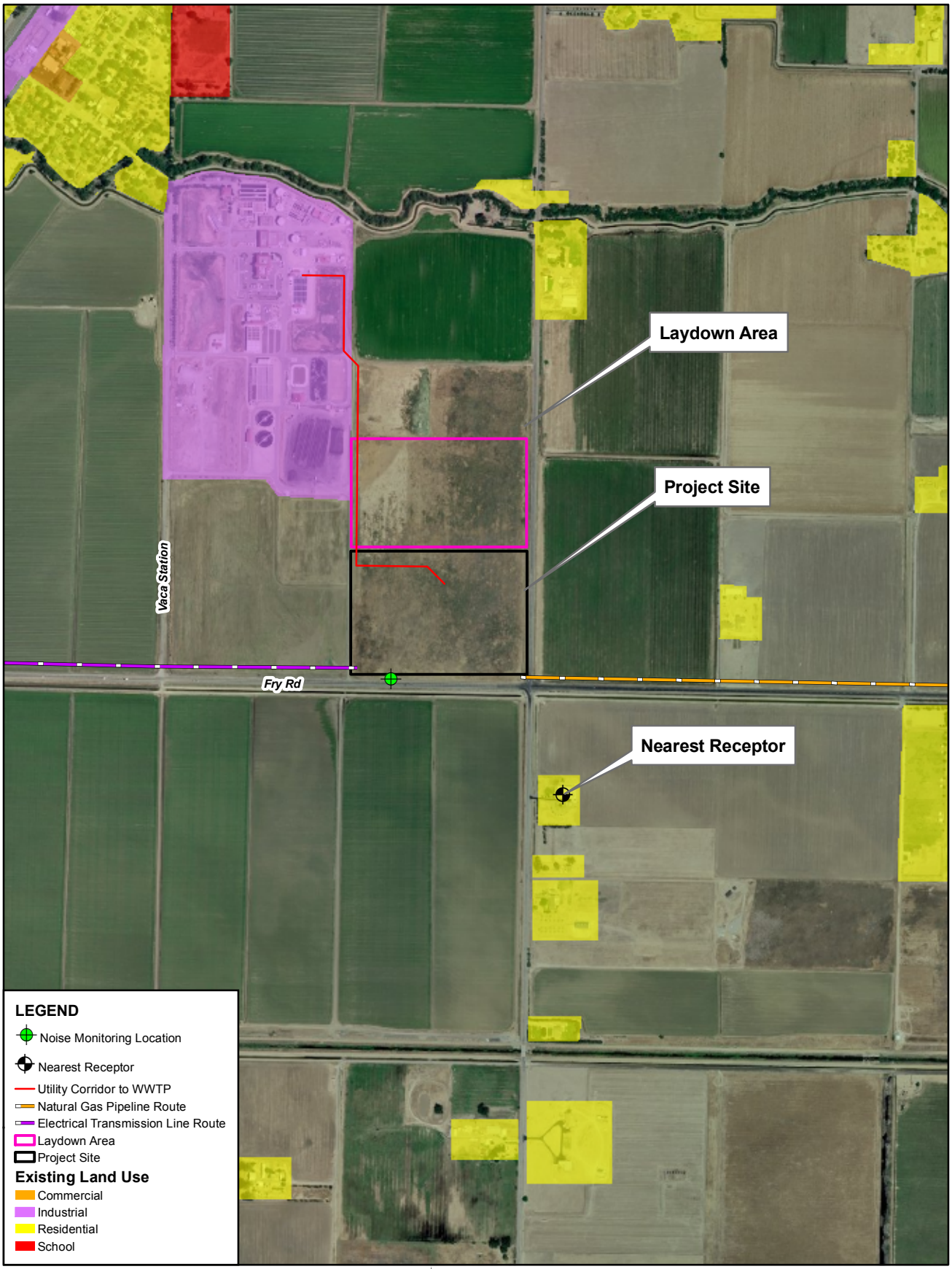
The loudest equipment types generally operating at a site during each phase of construction are presented in Table 5.7-4. The composite average or equivalent site noise level, representing noise from all equipment, also is presented for each phase.

TABLE 5.7-4
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	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: EPA, 1971; Barnes et al., 1976.

Average or equivalent construction noise levels projected at various distances from the site are presented in Table 5.7-5. 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 5.7-6 presents noise levels from common construction equipment at various distances.



This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

FIGURE 5.7-1
NOISE MONITORING LOCATION
CPV VACA STATION
VACAVILLE, CA

CH2MHILL

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TABLE 5.7-5
Average Construction Noise Levels at Various Distances

Construction Phase	Sound Pressure Level (dBA)		
	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
Clean-Up	71	59	53

TABLE 5.7-6
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 (20,000-32,000 ft-lbs./blow)	104	86	74
Dozer (250-700 hp)	88	70	58
Front End Loader (6-15 cu. yds.)	88	70	58
Trucks (200-400 hp)	86	68	56
Grader (13 to 16 ft. blade)	85	67	55
Shovels (2-5 cu. yds.)	84	66	54
Portable Generators (50-200 kW)	84	66	54
Derrick Crane (11-20 tons)	83	65	53
Mobile Crane (11-20 tons)	83	65	53
Concrete Pumps (30-150 cu. yds.)	81	63	51
Tractor (3/4 to 2 cu. yds.)	80	62	50
Unquieted Paving Breaker	80	62	50
Quieted Paving Breaker	73	55	43

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.

The steam blow, with a noise level of 110 dBA at 1,000 feet, is an activity, rather than a piece of equipment. This activity is designed to clean scale and other debris from the boiler tubes and steam lines before admitting any steam turbines where the foreign material would damage the blades. A temporary bypass line to the atmosphere is welded into the main steam line upstream of the steam turbines to divert the steam. Several short blows of about two minutes in duration each will be performed per day and the entire process generally

takes several weeks. Steam blow silencers can reduce noise levels by about 30 dBA to acceptable levels, providing that steam blowing activities take place during the 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 5.7-7). It will be limited to normal construction hours (during the daytime) and will be of short duration; therefore, no mitigation is required.

TABLE 5.7-7
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 the CPVVS will vary depending on the phase of the project and the proximity of the workers to the noise-generating activities. Construction noise is potentially harmful to the health and hearing of construction workers. The project will develop a Hearing Protection Plan, which complies with California Occupational Safety and Health Administration (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). Because there are no permanent or semi-permanent workstations located near any piece of noisy plant equipment, no worker's time-weighted average exposure to noise should routinely approach the level allowable under Occupational Safety and Health Act of 1970 (OSHA) 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 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 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 kilovolt (kV) and higher. Noise is also generally associated with foul weather conditions. As stated in Section 3.0, Electric Transmission, the audible noise associated with the 230-kV lines in the area will be of the same magnitude upstream and downstream of the CPVVS. Because the CPVVS will be connected at 230-kV voltage 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 Levels

A noise model of the proposed CPVVS has been developed using source input levels derived from manufacturers' data and field surveys of similar equipment. The noise emissions from the project 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 used in the model are summarized in Table 5.7-8. Some of the specific equipment to be used at the plant has not yet been determined. Therefore, typical noise levels for equipment associated with similar combined-cycle facilities have been assumed. Design elements to control noise emissions will likely include stack silencers, acoustical equipment enclosures/buildings, noise-abated cooling tower, and localized and property line noise barriers. Noise control measures will be incorporated in the design to maintain project noise levels of less than 44 dBA at the closest residential receptor. Doing so will ensure the project complies with the 45 dBA nighttime limit for residential land use. A project level of 44 dBA will also lead to an ambient-plus-project noise level of 45 dBA, which is within 5 dBA of the existing average nighttime L_{90} of 40 dBA.

TABLE 5.7-8
Summary of Sound Power Levels Used to Model CPVVS Plant Operations

Plant Component	Sound Power Level, dBA
Stacks	110
Combustion Turbine Generators	101
Steam Turbine Generators	115
Cooling Tower	118
GSU Transformers	105
HRSG Duct Walls	108

Several design elements will be necessary to control noise emissions to meet project noise limits. The specific types of noise control will be determined during the detailed project design phase. Potential noise control measures include:

- Increasing combustion turbine air inlet and ventilation silencing
- Additional noise barriers at specific locations on the property line and near equipment (such as the HRSG transition duct, air flow control unit, SCR skid and expansion joint, gas compressor, etc.)
- Increasing stack silencing
- Shroud for the HRSG
- Increasing the thickness of the HRSG plate steel
- Low noise cooling tower fans and motors
- Steam turbine enclosure or building
- Silencers, barriers, lagging, and partial or full enclosures/buildings for plant equipment

5.7.3.3.4 Tonal Noise

At the nearby residential locations, 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, and cooling tower fan gearboxes have been known to sometimes produce significant tones. CPVVS will anticipate the potential for audible tones in the final 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.

5.7.3.3.5 Ground and Airborne Vibration

Similar combined-cycle facilities have not resulted in ground or airborne vibration impacts. The project is primarily driven by gas turbines exhausting into a 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. It is CPVVS's intention to anticipate the potential

for low-frequency noise in the design and specification of the project equipment and 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 (Pub. Resources Code § 21083; Cal. Code Regs., tit. 14, §§ 15064(h), 15065(c), 15130, and 15355).

Applications for a large number of residential developments and other project have been filed in Vacaville and Solano County within the last 18 months. None of the projects will be built near the CPVVS. Because of the distance between the CPVVS and any foreseeable new land uses, it is unlikely that noise from the CPVVS would combine with noise from these other new land uses. Cumulative noise impacts are therefore unlikely to occur.

5.7.5 Mitigation Measures

The CPVVS proposes to implement the following measures to ensure that any potential noise impacts of the CPVVS are mitigated below the level of significance.

5.7.5.1 Noise Hot Line

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 project owner 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 1 year.

5.7.5.2 Noise Complaint Resolution

Throughout the construction and operation of the project, the project owner 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 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

Noisy construction or demolition work (that which causes offsite annoyance as evidenced by the filing of a legitimate noise complaint) shall be restricted to 7 a.m. to dusk (30 minutes after sunset).

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

5.7.6 Laws, Ordinances, Regulations, and Standards

Table 5.7-9 presents the LORS that apply to noise.

TABLE 5.7-9
Laws, Ordinances, Regulations, and Standards for Noise

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
EPA	Guidelines for state and local governments.	USEPA	5.7.6.1.1
OSHA	Exposure of workers over 8-hour shift limited to 90 dBA.	OSHA	5.7.6.1.2
State			
Cal-OSHA, 8 CCR Article 105 Sections 095 et seq.	Exposure of workers over 8-hour shift limited to 90 dBA.	Cal-OSHA	5.7.6.2.1
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 Vacaville General Plan	The General Plan provides quantitative compatibility goals and policy.	City of Vacaville	5.7.6.3
City of Vacaville Municipal Code	The Municipal Code includes quantitative limits on allowable noise for various receptor land uses.	City of Vacaville	5.7.6.3
Solano County General Plan	The General Plan provides quantitative compatibility goals and policy.	Solano County	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 OSHA

Onsite noise levels are regulated through 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 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 of the 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 the highways by the California Highway Patrol and the County Sheriff 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 in the City of Vacaville's General Plan requires that the noise levels from non-transportation noise source not exceed a nighttime L_{eq} of 45 dBA and maximum level of 65 dBA.

The City's Municipal Code, Section 14.09.127.120, provides for the same exterior noise limits as the General Plan. For a project such as the CPVVS, the most restrictive limit is the nighttime L_{eq} of 45 dBA.

As described in Section 5.6, Land Use, the project site is in Vacaville but borders Solano County, and the closest residences are Solano County. The applicable noise regulations are those of the City, because the source of the noise will be located in Vacaville.

Although the Solano County noise ordinances would not apply to this project, a discussion is included here for comparison. Solano County does not have a noise ordinance, and so the applicable County guidelines are contained in the noise portion of the General Plan. The Solano County General Plan is being updated. The existing County General Plan (1980) is currently in effect; however, the draft 2008 General Plan noise requirements are also summarized here.

Solano County's 1980 Health and Safety element requires that new industrial noise sources limit their noise emissions to 50 dBA CNEL (equivalent to a 24-hour average [L_{eq}] of 43 dBA for a continuous source such as the CPVVS) at the boundary of a residential zones and 60 dBA CNEL (53 dBA for a source such as the CPVVS) at the boundary of a commercial, business or other noise-sensitive industrial or manufacturing zone (identified as research, communications, etc.).

The Land Use Compatibility Guidelines established in the Draft 2008 General Plan are summarized in Table 5.7-10. Table 5.7-11 presents the Solano County Draft 2008 Noise Level Performance Standards for Nontransportation Noise Sources. The most restrictive nighttime performance standard of 45 dBA is similar to the City's nighttime limit. For a steady state noise source, the L_{eq} and the 30-60 minute event duration (also referred to as the median or L_{50}) used by Solano County are equivalent.

TABLE 5.7-10
Solano County Draft 2008 Land Use Compatibility Guidelines (CNEL or L_{dn})

Land Use Category	Normally Acceptable[a]	Conditionally Acceptable[b]	Normally Unacceptable[c]	Clearly Uncceptable[d]
All residential, lodging, schools, libraries, places of worship, nursing homes	<60	60–65	65–75	75+
Auditoriums, concert halls, amphitheaters		<70	70+	
Sports arena, outdoor spectator sports		<75	70+	
Playgrounds, neighborhood parks	<67.5		67.5–75	75+
Golf courses, riding stables, water recreation, cemeteries	<70		70–80	80+
Retail, movie theaters, restaurants	<65	65-75	75-80	80+
Office building, business commercial and professional	<67.5	67.5-77.5	77.5+	
Industrial, manufacturing, utilities, agriculture	<75	70–80	75+	
Noise-sensitive manufacturing and communications	<55	55-70	70-80	80+

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

[b]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.

[c]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. Outdoor areas must be shielded.

[d]New construction or development should generally not be undertaken.

[e]These standards are not applicable for development within the airport compatibility review area. Development in the airport compatibility review areas are subject to standards in the applicable airport land use plan.

Source: Solano County 2008 Draft General Plan, Public Health & Safety Element, Table HS-2

TABLE 5.7-11
Solano County Draft 2008 Noise Level Performance Standards for Nontransportation Noise Sources

Cumulative Duration of a Noise Event (Minutes)[a]	Daytime[b,d]	Nighttime[c,d]
30–60	50	45
15–30	55	50
5–15	60	55
1–5	65	60
0–1	70	65

[a] Cumulative duration refers to time within any 1-hour period.

[b]Daytime = Hours between 7:00 a.m. and 10:00 p.m.

[c]Nighttime = Hours between 10:00 p.m. and 7:00 a.m.

[d]Each of the noise level standards specified may be reduced by 5 dBA for tonal noise (i.e., a signal that has a particular and unusual pitch) or for noises consisting primarily of speech of for recurring impulsive noises (i.e., sounds of short duration, usually less than 1 second, with an abrupt onset and rapid decay such as the discharge of firearms).

Source: Solano County 2008 Draft General Plan, Public Health & Safety Element, Table HS-5

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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