8.2 NOISE

8.2.1 INTRODUCTION

This section provides an evaluation of the potential noise impacts associated with the construction and operation of the proposed Kings River Conservation District Community Power Plant (KRCD CPP) a nominal 565 megawatt (MW) natural gas-fired plant. This section provides a discussion of the fundamentals of noise, common noise sources and a discussion of land uses in the area. The section includes a discussion of conformance with applicable noise related policies and applicable federal, state and local laws, ordinances, regulations and standards (LORS). An assessment of noise impacts associated with the KRCD CPP and proposed mitigation measures is also included.

8.2.2 FUNDAMENTALS OF ACOUSTICS

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective: one person's music is another's headache.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel (dB) scale was devised. The dB scale uses the hearing threshold (20 micropascals) as a point of reference, defined as 0 dB. Other sound pressures are then compared to the reference pressure, and the logarithm is taken to keep the numbers in a practical range. The dB scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in dB levels correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by the A-weighting network. There is a strong correlation between A-weighted sound levels (or dBA) and the way the human ear perceives noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted sound levels. Table 8.2-1 provides a description of various acoustical terminologies.

Table 8.2-1 Acoustical Terminology KRCD CPP	
Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of noise.
A-Weighting (or dBA)	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
dB	Fundamental unit of sound. A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A dB is one-tenth of a Bell.
Community Noise Equivalent Level (CNEL)	Defined as the 24-hour average noise level with noise occurring during evening hours (7 p.m. to 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or Hz.
Day/Night Average Sound Level (Ldn)	Similar to CNEL but with no evening weighting.
Equivalent Sound level (Leq)	The average dBA noise level, on an equal energy basis, during the measurement period.
Level Maximum (Lmax)	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.

Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent sound level (Leq), which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The Leq is the foundation of the composite noise descriptors such as the Day Night Average Sound Level (Ldn) and Community Noise Equivalent Level (CNEL), and shows very good correlation with community response to noise. Table 8.2-2 provides typical A-weighted sound levels of common noise sources found in communities and in industry.

Table 8.2-2
Typical A-Weighted Sound Levels of Common Noise Sources
KRCD CPP

Loudness Ratio Level		A Weighted Sound Level
128	130	Threshold of pain
64	120	Jet aircraft take-off at 100 feet
32	110	Riveting machine at operators position
16	100	Shot-gun at 200 feet
8	90	Bulldozer at 50 feet
4	80	Diesel locomotive at 300 feet
2	70	Commercial jet aircraft interior during flight
1	60	Normal conversation speech at 5-10 feet
1/2	50	Open office background level
1/4	40	Background level within a residence
1/8	30	soft whisper at 2 feet
1/16	20	Interior of recording studio

The Ldn is based upon the average noise level over a 24-hour day, with a +10 dB weighting applied to noise occurring during nighttime hours (i.e., 10 p.m. to 7 a.m.). The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because Ldn represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

8.2.3 AFFECTED ENVIRONMENT

8.2.3.1 Project Description

The KRCD CPP project site is located at 9664 South Bethel Avenue in Fresno County, California and near the southwest quadrant of South Bethel and East Dinuba Avenues. The proposed KRCD CPP is located within a rural area near the cities of Selma and Parlier.

Northeast of the proposed project site is the City of Parlier Waste Water Treatment Plant (WWTP). Figure 8.2-1 shows the project location.

Noise sensitive land uses in the vicinity of the KRCD CPP project site are primarily residential in nature. The nearest residential uses in the area of the project site are located approximately 1,800 feet to the north along the western property boundary, 100 feet due west, 600 feet to the south and 250 feet west from the southeast property corner and 600 feet east and 500 feet south from the southeast property corner.

KRCD has purchased the proposed project site, which is approximately 32 acres in size. The site is located in an area currently zoned for agriculture and currently being used predominately for agricultural purposes (vineyards). Existing structures on the project site include a vacant rural dwelling, detached garage and barn. Approximately 15 acres of a 40-acre parcel to the immediate south of the project site will be used for temporary staging and parking during construction. The project site and all associated linear facilities (as described below) are shown on Figure 1-3, in Chapter 1, Executive Summary.

Natural gas for the KRCD CPP will be provided by a new approximately 26-mile long 20-inch underground pipeline interconnection to the Southern California Gas Company (SCG) Line 7000 near the City of Visalia, California. The new gas pipeline will primarily follow existing roads and be located in public right-of-way (ROW). Five construction staging areas have also been identified for use during construction of the gas pipeline, each with an approximate size of 200 feet by 200 feet.

The KRCD CPP will deliver electric power to the Pacific Gas & Electric Company (PG&E) transmission grid through a new approximately five mile-long 230-kilovolt (kV) radial transmission line between the on-site 230-kV switchyard site and PG&E's McCall Substation. The transmission line will cross both private property and the public right of way.

The primary source of process makeup water for the KRCD CPP will be recycled water delivered by new underground pipeline interconnections to the Parlier WWTP and the Sanger WWTP effluent percolation and evaporation ponds located on Lincoln Avenue (i.e., Lincoln Ponds). The Parlier WWTP is located adjacent to the north of the plant site, and the interconnection will be located at the northern plant site boundary. The proposed interconnection to the Sanger Lincoln ponds is approximately five miles north and will be located primarily along existing roadways. Currently two options are being considered for the water pipeline interconnection to Lincoln Ponds (i.e., Water Supply Pipeline Option 1 and

Option 2). Up to four new shallow wells recovering percolated effluent will provide a back-up cooling water supply.

Potable water for domestic use will be supplied by a new groundwater well to be installed on the project site. There is no offsite linear associated with the potable water supply. Domestic wastewater will be discharged to the Parlier WWTP. The sewer interconnection is located on the northern boundary of the project site with no offsite linear.

8.2.3.2 Ambient Noise Survey

The existing ambient noise environment in the vicinity of the project site is defined primarily by traffic on the local roadway network, including East Manning Avenue, South Bethel Avenue, and East Dinuba Avenue. Other noise sources which contribute to the background noise levels include agricultural operations in the project vicinity.

To quantify existing background noise levels, continuous hourly noise measurements were conducted at residential areas near the project site for a period of 25 hours. The locations for the 25-hour noise measurements were coordinated with the CEC prior to conducting field measurements. The 25-hours noise measurements were conducted at the four locations on November 2-3, 2006.

These monitoring locations are further identified as:

- A: Residential area location northeast of the Parlier WWTP;
- B: Residences located on Manning Avenue;
- C: Residence located on East Dinuba Avenue; and
- D: Southwest corner of the project site.

The locations of the noise measurement locations are also shown on Figure 8.2-1. Table 8.2-3 shows a summary of the continuous hourly noise monitoring measurements. Appendix 8.2-1 graphically shows the continuous 25-hour ambient noise monitoring results.

Table 8.2-3
Summary of Continuous 25 Hour Ambient Noise Measurements
KRCD CPP

Site	Location	Average Measured Hourly Noise Levels, dBA										
		Ldn (dBA)	Daytime (7:00 am - 10:00 pm)					Nighttime (10:00 pm - 7 am)				
			Leq	Lmax	L10	L50	L90	Leq	Lmax	L10	L50	L90
A	Northeast of the Parlier WWTP	52.8	47.0	60.6	47.6	42.8	40.1	46.3	56.4	47.4	43.9	40.8
B	11949 E. Manning Ave.	60.9	56.6	68.0	58.2	53.8	48.3	54.0	67.5	56.9	49.8	39.8
C	12464 E Dinuba Ave	55.4	53.1	69.5	55.9	46.1	39.2	47.7	65.0	48.4	42.2	39.8
D	SW Corner of Project Site	56.3	52.6	71.9	55.1	44.2	38.6	49.4	69.4	48.1	42.0	39.2

Source – j.c. brennan & associates, Inc. – 2006
Acronyms: L10, L50 & L90 – Noise levels exceeded 10, 50 and 90 percent of the time

Based upon the noise measurement results contained within Table 8.2-3, the typical daytime hourly L90 (i.e., noise level exceeded 90 percent of the time) values at the 25-hour noise measurement sites were 38 dB to 48 dB. The typical nighttime hourly L90 values at the 25-hour noise measurement sites ranged between 39 dB and 40 dB.

In addition to the continuous noise monitoring, short-term noise level measurements were conducted during the daytime and nighttime periods at four locations in the vicinity of the project site. The purpose of the short-term noise measurements is to supplement the continuous noise measurement data and to document any existing tonal noise sources which may exist in the project vicinity. Because the KRCD CPP may introduce new tonal noise sources into the community, establishing the existing tonal content of the surrounding noise environment in terms of one-third octave band center frequencies is important. Short-term noise measurements were conducted at four locations on November 2, 2006.

These monitoring locations are further identified as:

- 1: Area north of the Parlier WWTP;
- 2: Area located west of the project site near a small number of residences;
- 3: Area located south of the project site near a small number of residences; and
- 4: Residential area located east of the Parlier WWTP.

The locations of the short-term noise level measurements are shown on Figure 8.2-1. It should be noted that the residence shown on the project site in the figure is an abandoned structure and will be demolished prior to construction. Table 8.2-4 shows a summary of the short-term noise

measurement results. Appendix 8.2-1 provides the frequency data for each of the short-term noise measurement sites during each of the daytime and nighttime noise measurement samples. No tones were observed at any of the short-term noise measurement sites.

Table 8.2-4
Summary of Short-Term Ambient Noise Monitoring Results
KRCD CPP

Site	Date	Time	Sound Level (dBA)			
			Leq	Lmax	L50	L90
1	November 02, 2006	12:17 am	47.8	67.2	43.4	39.6
		1:20 pm	60.0	75.3	43.5	37.5
2	November 02, 2006	12:49 am	38.5	43.7	38.2	36.7
		1:38 pm	40.1	45.9	39.9	38.4
3	November 02, 2006	1:07 am	41.8	61.5	37.8	36.5
		1:56 pm	59.3	69.7	53.8	41.9
4	November 02, 2006	1:20 am	45.4	60.6	40.7	39.2
		2:16 pm	42.6	54.6	40.5	38.5

Source – j.c. brennan & associates, Inc. – 2006
Acronyms: L50 & L90 – Noise levels exceeded 50 and 90 percent of the time

Atmospheric conditions during the 25-hour noise monitoring and short-term ambient noise monitoring were generally mild with temperatures ranging between 55-77 degrees Fahrenheit. Cloud cover ranged from cloudy to partially cloudy skies with approximately 50 percent relative humidity during the measurement period. No significant precipitation occurred during the 25-hour noise measurement period. Winds were calm during the noise measurement period.

Noise measurement equipment consisted of Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters, and a LDL Model 824 Real Time Analyzer (RTA) equipped with a LDL Model 2541 one half inch microphone. The measurement systems were calibrated using a LDL Model CAL200 acoustical calibrator before testing. The measurement equipment meets all of the pertinent requirements of the American National Standards Institute (ANSI) for Type 1 (precision) sound level meters and one-third octave filters.

A discussion of audible noise and corona noise associated with the KRCD CPP electric transmission line is included in Chapter 4, Electric Transmission.

8.2.4 ENVIRONMENTAL CONSEQUENCES

Generally, a project may have a significant effect on the environment if it will substantially increase the ambient noise levels for adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local planning criteria or ordinances, or substantially increase noise levels at noise-sensitive land uses.

8.2.4.1 Significance Criteria

CEQA guidelines state that implementation of the project would result in significant noise impacts if the project would result in either of the following:

a) Exposure of persons to or generation of noise levels in excess of standards established in the Fresno County General Plan. Specifically, exterior noise levels of 50 dB L50 (i.e., noise level exceeded 50 percent of the time) (daytime) or 45 dB L50 (nighttime);

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project; and

e) Exposing workers to excessive noise during construction and operation of the plant.

8.2.4.2 Construction Impacts

Construction Noise

During the construction phases of the KRCD CPP, noise from construction activities will dominate the noise environment in the immediate area. Activities involved in construction will generate noise levels, as indicated in Table 8.2-5, ranging from 70 to 90 dBA at a distance of 50 feet. Pile-driving activities will result in higher noise levels ranging from 96-107 dB. During construction, mobile equipment on the project site and on local roadways can be a major noise source. The mobile equipment is generally transporting heavy materials and construction equipment. These types of noise sources and levels are typical for projects of this nature. Construction activities will be temporary in nature, typically occurring during normal working hours. At nighttime, construction noise impacts could be significant, and could result in annoyance or sleep disruption for nearby residences.

Table 8.2-5 Construction Equipment Noise KRCD CPP	
Type of Equipment	**Maximum Level, dBA at 50 feet**
Scrapers	88
Bulldozers	87
Heavy Trucks	88
Backhoe	85
Pneumatic Tools	85
Pile Driver (Impact)	107
Pile Driver (Sonic)	96
Sources: Cunniff, 2007; Hoover and Keith, 1981.	

The nearest residential use is located approximately 100 feet west of the project site. At this residence, construction noise levels could vary from 64-84 dB, depending on the location of construction activities on the project site.

If normal construction activities are limited to the daytime hours (6:00 a.m. to 9:00 p.m. weekdays or 7:00 a.m. to 5:00 p.m. weekends.), it is expected that the noise impacts will not be significant. However, pile driving activities at the nearest residence could generate substantially higher noise levels ranging from 81-101 dB, depending on the location of construction activities on the project site. Due to potentially high levels of pile driving noise, mitigation measures will be required as presented below in Section 8.2.5.

Construction Vibration

Construction activities will generate construction induced vibration that could damage nearby buildings if they are exposed to excessive groundborne vibrations. Construction activities can generate ground-borne vibrations. These vibrations can pose a risk to nearby structures. Constant or transient vibrations can weaken structures and crack facades.

Construction vibrations can either be transient, random, or continuous. Transient construction vibrations occur from blasting, impact pile driving, and wrecking balls. Continuous vibrations result from vibratory pile drivers, large pumps, and compressors. Random vibrations can result from jack hammers, pavement breakers, and heavy construction equipment. The most significant source of ground-borne vibrations will be from pile-drivers during periods of construction on the project site.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Criteria developed by the California Department of Transportation (Caltrans) for evaluating vibration from transportation and construction noise sources shows the vibration levels which could result in damage to structures ranges from 0.2 to 5.0 inches per second (in/sec) peak particle velocity (PPV), as shown in Table 8.2-6.

Table 8.2-6 Effects of Various Vibration Levels on People and Buildings KRCD CPP			
PPV		**Human Reaction**	**Effect on Buildings**
in/sec	**millimeters /second**		
0 -.006	0.15	Imperceptible by people	Vibrations unlikely to cause damage of any type
.006 -.02	0.5	Range of threshold of perception	Vibrations unlikely to cause damage of any type
.08	2.0	Vibrations clearly perceptible	Recommended upper level of which ruins and ancient monuments should be subjected
0.1	2.54	Level at which continuous vibrations begin to annoy people	Virtually no risk of architectural damage to normal buildings
0.2	5.0	Vibrations annoying to people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings
1.0	25.4		Architectural Damage
2.0	50.4		Structural Damage to Residential Buildings
6.0	151.0		Structural Damage to Commercial Buildings
Source: Survey of Earth-borne Vibrations due to Highway Construction and Highway Traffic, Caltrans 1976.			

If pile driving were to occur on the project site, it is expected that the activity will most likely occur 400 feet or more from any existing residential structures. Based upon recent pile driving vibration monitoring conducted by j.c. brennan & associates, Inc., vibration levels at this distance are expected to be in the range of .04-.07 in/sec PPV, depending on soil conditions and the type of pile driver.

Therefore, groundborne vibrations are not predicted to exceed the threshold for architectural damage. This conclusion assumes that all pile driving activities will occur no closer than 400 feet from any existing residential structures and that all pile holes will be pre-drilled to the maximum practicable depth. In addition, pile driving will be further limited to weekdays between 8:00 a.m. and 6:00 p.m. KRCD will also provide notice by mail to all residents within 1000 feet of the project site at least one-week prior to any pile driving activity.

8.2.4.3 Operational Impacts

Plant Operation Noise Levels

As a means of predicting noise levels associated with KRCD CPP operations, j.c. brennan & associates, Inc. used the computer based Environmental Noise Model (ENM). The ENM is capable of projecting the locations of noise contours for multiple noise sources, while accounting

for natural topography, ground type, atmospheric conditions, noise source directionality, height of the noise sources, and frequency content of the noise sources.

Inputs to the ENM were obtained from United States Geological Survey (USGS) topographic maps of the area, and base maps provided by the project proponent. Other inputs to the ENM included temperature and the relative humidity. In addition, existing buildings in the vicinity of the project site were digitized into the model to account for shielding. Noise level and sound power data were based upon information provided by ATCO Noise Management Limited of specific equipment for the unsilenced Siemens W501F plant package.

The primary noise sources associated with the proposed project site include the following:

- Combustion Turbine Generator (2);
- Stack (2);
- Steam Turbine Generator (1)
- Heat Recovery Steam Generator (HRSG) Units (2);
- Cooling Tower (2);
- Boiler Water Feed Pumps (4); and
- Gas Metering Station (1).

Octave band sound power levels which were used for direct inputs to the ENM for each individual piece of equipment are contained within Table 8.2-7. Due to the fact that the HRSG stacks are the dominant noise source, this analysis assumes silencers within the stacks. The noise level data for the HRSG stacks are based upon file data for stack silencers. Noise data for the gas metering, regulating and compression equipment, denoted as Gas Metering Station in the table, assumes the use of a sound-attenuating enclosures around the equipment.

Table 8.2-7
Siemens W501F Package Sound Power Levels with Silenced HRSG Stacks
KRCD CPP

Number	*Component	Sound Power Level Octave Band Center Frequency (Hz, dB)									dBA
		31.5	63	125	250	500	1K	2K	4K	8K	
2	Combustion Turbine Generator Package	122	121	113	113	111	109	109	106	99	115
1	Steam Turbine Generator	106	115	110	104	103	103	106	104	97	111
2	HRSG Units	123	120	117	114	111	108	107	107	101	115
4	Boiler Water Pumps	101	104	102	106	112	112	110	98	94	116
2	Cooling Towers	114	116	116	115	111	107	103	95	88	113
1	Gas Metering Station	68	61	49	46	43	45	46	44	44	52
2	**HRSG Stacks with silencers	131	128	118	106	94	79	76	84	86	106

Source:
*ATCO, 2007
**HRSG Stacks with silencers Sound Technologies 2003

The ENM was used for determining overall noise levels at the nearest receiver locations, and are shown below in Table 8.2-8. The nearest receiver locations also coincide with some of the noise monitoring locations. The ENM inputs the coordinates of each receiver, and point source calculations of noise levels at each of the receiver locations were conducted.

Table 8.2-8
Estimated Power Plant Noise Levels at the Nearest Residential Property Lines
KRCD CPP

Location*	Distance from Center of Project Site (feet)	Sound Level	Attenuation Needed to Reach 45 dB
(R1) Residential to West	1,130	59.2 dBA	15 dBA
(R2) Residential to Southwest	1,470	54.7 dBA	10 dBA
(R3) Residential to Southeast	1,445	56.7 dBA	12 dBA
(R4) Residential to Northeast	2,135	44.2 dBA	---
(R5) Residential to Northwest	2,320	48.2 dBA	3 dBA

* See Figure 8.2-1

In general, it is expected that the overall plant noise levels will need to be reduced by a minimum of 15 dB, and should be designed to reduce overall noise levels by approximately 20 dB. The primary noise sources include the combustion turbines, HRSG units, boiler water feed pumps, HRSG stacks, and cooling towers. Noise mitigation that is being considered in the design of the KRCD CPP may include some or all of the following:

- Berms or walls;
- Sound attenuating enclosures around equipment;
- Improved silencers in stacks;
- Air inlets/outlets of the combustion turbines;

- Sound attenuating treatment of HRSG units and cooling tower stacks; and
- Variable frequency drives for the cooling tower fan motors.

The mitigation which will be incorporated into the design of the KRCD CPP will ensure that noise levels attributed to the project will not exceed 45 dB L50 at any residence.

Ground and Airborne Vibration

Ground and airborne vibration levels associated with KRCD CPP operations are not anticipated to affect the surrounding areas. The proposed KRCD CPP potential airborne vibration impacts will be due to the turbulent flow of air driven by the gas turbines. However, these systems are equipped vibration monitoring systems which determine significant imbalances of equipment. In the event of a significant imbalance in the equipment, corrective measures will be employed to reduce those effects.

Tonal Noise

The combustion turbine generators, transformers and combustion turbine inlet compressors produce tonal sounds. Because of the care taken in specifying KRCD CPP engineering design features, no prominent tonal noise emissions will be propagated to noise-sensitive receptors. For example, the generator enclosure and combustion turbine enclosure and inlet silencers will be designed to reduce the tonal emissions from these sources to levels below the general plant noise. In addition, the transformer tonal noise emission level will be below the broadband plant noise. Therefore, any equipment tonal emissions will not be distinctly audible at any offsite locations. During normal operations, the nature of noise from the proposed KRCD CPP will be essentially continuous and broadband (no tones).

Occupational Noise Exposure

A review of major equipment near-field (very close to the source) noise emission data and general knowledge of machinery associated with power generation indicate that noise levels within the KRCD CPP project site could reach 85 to 95 dBA within three feet of the equipment envelope. Because of these predicted site noise levels, the requirement for a hearing conservation program will be evaluated and employees working at the plant with exposure to noise sources will be identified. All areas within the project site where noise levels could be 85 dBA or greater will be delineated and posted "Noise Hazard Area – Hearing Protection Required."

Noise levels within the project site were modeled to be above 85 dBA within 50 feet of major noise-producing equipment. Employees working near the noise sources will participate in a facility-specific hearing conservation program if a program is necessary for compliance with Occupational Safety and Health Administration regulations. In addition, specific plant areas will

have noise surveys conducted after commissioning to determine where noise hazard warnings and personal hearing protection is necessary. With these project features in-place, no special mitigation measures will be required.

8.2.4.4 Cumulative Impacts

There will be no cumulative impacts on noise resulting from either construction, operation or maintenance activities associated with the proposed KRCD CPP.

8.2.5 MITIGATION MEASURES

The following discussion presents mitigation measures that are anticipated to be included in the project design:

- The KRCD CPP will be designed to limit noise generation of the power plant to 45 dB L90, or less, at the nearest residential property lines. The final design for the project will be verified by an acoustical engineer using an appropriate computer model to verify the predicted noise levels at the nearest noise-sensitive receptors.
- A telephone number will be established for use by the public to report any significant undesirable noise conditions associated with the construction and operation of the proposed KRCD CPP. If the telephone is not staffed 24 hours per day, it will include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. The telephone number will be posted at the project site during construction in a manner visible to passerby and will be maintained until the project has been operational for at least one year.
- Throughout the construction and operation of the KRCD CPP, KRCD will document, investigate, evaluate, and attempt to resolve all legitimate project-related noise complaints. Specifically,
    - The Noise Complaint Resolution Form typically suggested by CEC or a functionally equivalent procedure will be used to document and respond to each noise complaint;
    - An attempt to contact the person(s) making the noise complaint within 24 hours; and
    - An investigation will be conducted to attempt to determine the source of noise related to the complaint, and if the noise complaint is legitimate, all feasible measures to reduce the noise at its source will be taken.
- Noisy construction work at plant site (that causes offsite annoyance as evidenced by the filing of a legitimate noise complaint) shall be restricted to the hours of 6:00 a.m. to 9:00 p.m. Monday through Friday and 7:00 a.m. to 5:00 p.m. Saturday and Sunday. Haul

trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.

- An eight-foot tall noise barrier will be erected around the primary area of pile driving activities. The barrier will not contain any significant gaps at its base or face, except for site access and surveying openings. The barrier will be constructed of solid material such as one-half inch thick (or thicker) plywood or suspended acoustical curtains.
- Pile holes will be pre-drilled to the maximum practicable depth. This will reduce the number of blows required to seat the pile, and will concentrate the pile driving activity closer to the ground where noise can be attenuated more effectively by the construction/noise barrier.
- Pile driving occurring closer than 400 feet to any existing residential structures will require vibration monitoring to ensure that vibration levels do not cause architectural damage to nearby structures. Specifically, vibration monitoring will be conducted to ensure that vibration levels do not exceed a 0.2 in/sec PPV when for airborne or groundborne vibrations. In addition, pile driving will be further limited to weekdays between 8:00 a.m. and 6:00 p.m. KRCD will provide notice by mail to all residents within 1000 feet of the project site at least one-week prior to the activity.

8.2.6 APPLICABLE LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following sections summarize applicable LORS and compliance with respect to noise. The applicable LORS are also summarized in Table 8.2-9, which lists federal, state, and local LORS that apply to noise requirements. Additional information concerning LORS is also provided below.

Table 8.2-9 Noise LORS KRCD CPP		
Regulatory Authority/	**Applicability**	**Conformance Subsection**
Federal		
Occupational Health and Safety Act of 1970	Regulates exposure of workers to noise levels.	See Section 8.2.6.1
State		
California Occupational Safety and Health Administration (Cal-OSHA) regulations, California Code of Regulations (CCR), General Industrial Safety Orders, Article 105, Control of Noise Exposure, Sections 5095, et seq.	The California Department of Industrial Relations, A division of OSHA enforces Cal-OSHA regulations which regulate exposure of workers to noise levels.	See Section 8.2.6.2 and Section 8.10, Worker Health and Safety
California Vehicle Code regulates Sections 23130 and 23130.5	The California Highway Patrol and Highway Sheriff's Office enforces vehicle noise limits on highways.	See Section 8.2.6.2
Caltrans	Caltrans has developed criteria for evaluating vibration from transportation and construction noise sources.	See Section 8.2.6.2
Local		
Fresno County General Plan Noise Element and Noise Ordinance	Establish noise level criteria for acceptable noise exposure for varying land uses during the daytime and nighttime periods.	See Section 8.2.6.3
City of Sanger Construction Activity Noise Ordinance	Restricts noise from construction activities near residences during evening and early morning hours.	See Section 8.2.6.3

8.2.6.1 Federal

The federal government has no standards or regulations applicable to offsite noise levels from the proposed project.

Onsite noise levels are regulated, in a sense, through the Occupational Health and Safety Act of 1970. The noise exposure level of workers is regulated at 90 dBA, over an eight-hour shift to protect hearing (29 Code of Federal Regulations (CFR) 1910.95). The exposure of noise to an employee is usually measured with an audiodosimeter which gives a readout in terns of "DOSE". OSHA Regulation 29 CFR 1910.5 Appendix A provides a standard procedure to calculate permissible noise exposure based upon the overall noise level and exposure time. For instance,

if an employee is exposed to a constant exposure of 95 dBA, the total time of allowed exposure is four hours. Areas above 85 dBA will be posted as high noise level areas and hearing protection will be required. Therefore, KRCD will be required to implement a hearing conservation program for applicable employees, and ensure that employees do not receive a daily DOSE of 90 dBA.

8.2.6.2 State

The State of California noise level criteria which may apply to the project include those associated with occupational safety. The California Department of Industrial Relations, Division of OSHA enforces Cal-OSHA regulations, which are the same as the federal OSHA Regulations described above in Section 8.2.6.1. The criteria and regulations are contained within CCR, General Industrial Safety Orders, Article 105, Control of Noise Exposure, Sections 5095, et seq. However, this analysis is not intended to address compliance with OSHA requirements. This type of analysis can be conducted at a later date by an industrial hygienist or audiologist.

The California Vehicle Code regulates noise limits for highway vehicles under Sections 23130 and 23130.5. Vehicle noise limits are enforceable on the highways by the California Highway Patrol and Highway Sheriff's Office.

As previously described in Section 8.2.4.2, Caltrans has developed criteria for evaluating vibration from transportation and construction noise sources. Fresno County has no criteria for acceptable exposure to vibration

8.2.6.3 Local

Fresno County Noise Criteria

The Fresno County General Plan Noise Element and Noise Ordinance establish noise level criteria for acceptable noise exposure for varying land uses. The criteria include 24-hour average noise level criteria (Ldn) and hourly statistical noise level criteria during the daytime and nighttime periods.

In general, the 24-hour average, or Ldn noise level descriptor is used for evaluating transportation-related noise sources such as roadway traffic, aircraft operations, and to a lesser extent railroad operations. Hourly median (L50) and maximum noise level criteria are typically used for evaluating stationary on-site or non-transportation noise sources. For the purposes of this analysis, the Ldn criteria will only be applied to the evaluation of noise due to roadway traffic, and the hourly median (Level not to be exceeded 30 minutes in any hour time period) and maximum (Lmax) criteria shall be used for evaluating noise levels associated with operations of the KRCD CPP. Table 8.2-10 provides the noise level criteria contained within the Fresno County Noise Element and Noise Ordinance.

Table 8.2-10 Fresno County Noise Level Criteria KRCD CPP					
		Exterior L50[1] Noise Level Criterion		Interior Noise Maximum Noise Level Criterion	
Land Use	**Ldn**	**Daytime L50 (7 am to 10 pm)**	**Nighttime L50 (10 pm to 7 am)**	**Daytime Lmax (7 am to 10 pm)**	**Nighttime Lmax (10 pm to 7 am)**
Residential and Churches	60 dB	50 dB	45 dB	55 dB	45 dB
1. Exterior Noise Level not to be exceeded 30 minutes in any hour					

The project site and most of the linear facilities are located within Fresno County. The Fresno County Noise Ordinance exempts noise from construction activities occurring during the hours of 6:00 a.m. and 9:00 p.m. Monday through Friday and 7:00 a.m. to 5:00 p.m. Saturday and Sunday.

The gas pipeline interconnection and a portion of the natural gas pipeline will be constructed in Tulare County. Currently, Tulare County has no ordinance regulating noise from construction activities. A small portion of the reclaimed wastewater pipeline from Lincoln Ponds to the project site may fall within the cities of Parlier and Sanger. Parlier currently has no construction noise ordinance. Sanger has a local ordinance that prohibits construction activities within 500 feet from occupied residences between the hours of 10:00 p.m. and 6:00 a.m. the next morning or 8:00 a.m. if the next morning is on Sunday.

8.2.7 INVOLVED AGENCIES AND CONTACTS

Table 8.2-11 identifies agency contacts for the KRCD CPP.

Table 8.2-11 Noise Agency Contacts KRCD CPP		
Agency	**Contact Person, Title and email**	**Phone Number**
Fresno County Department of Public Works and Planning - Development Services Division 2220 Tulare Street, Suite A Fresno, California 93721	William M. Kettler Principal Staff Analyst wkettler@co.fresno.ca.us	(559) 262-4242
Tulare County Government Plaza 5961 South Mooney Boulevard Visalia, California 93277	Theresa Szymanis, Chief Planner Tszymanis@co.tulare.ca.us	(559) 733-6291
City of Sanger 1700 7th Street Sanger, CA 93657-6513	Ralph Kachadourian, Senior Planner, RKachadourian@ci.sanger.ca.us	(559) 876-6300 Extension 1540

Table 8.2-11 Noise Agency Contacts KRCD CPP		
Agency	**Contact Person, Title and email**	**Phone Number**
City of Parlier 1100 East Parlier Avenue Parlier, CA 93648	Bruce O'Neill City Planner b.oneal@comcast.net	(559) 256-4250

8.2.8 REQUIRED PERMITS AND PERMITTING SCHEDULES

No specific noise permits are required, therefore, no permit schedule is provided.

8.2.9 REFERENCES

ATCO Noise Management Limited. Sound Power Level Data for Specific Equipment for the Unsilenced Siemens W501F Plant Package. 2007.

Architectural Acoustics, M. David Egan, 1988.

Cunniff, Patrick R. Environmental Noise Pollution, 1977.

Fresno County Municipal Code, Chapter. 8.40 Noise Control.

Fresno County General Plan Noise Element, October 2000.

Hoover and Keith, Inc. Noise Control for Buildings, Manufacturing Plants, Equipment and Products. 1981.

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Noise Control for Buildings, Manufacturing Plants, Equipment and Products, Hoover and Keith, Inc. 1981.

Survey of Earth-borne Vibration Due to Highway Construction and Highway Traffic, Caltrans. 1976.