5.7 Noise

This section presents an assessment of potential noise effects related to the Mariposa Energy Project (MEP). 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 provides 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 feet)	130		
Jet takeoff (200 feet)	120		Threshold of pain
Loud rock music	110	Rock music concert	
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)	90	Boiler room	
Pneumatic drill (50 feet)	80	Noisy restaurant	
Busy traffic; hair dryer	70		Moderately loud
Normal conversation (5 feet)	60	Data processing center	
Light traffic (100 feet); rainfall	50	Private business office	
Bird calls (distant)	40	Average living room library	Quiet
Soft whisper (5 feet); rustling leaves	30	Quiet bedroom	
	20	Recording studio	
Normal breathing	10		Threshold of hearing

Source: Beranek, 1998.

5.7.2 Affected Environment

5.7.2.1 Local Land Use and Noise Sources

The proposed 10-acre project site is in unincorporated eastern Alameda County, California. The area is zoned for large parcel agriculture and the project site is within a designated Wind Resource Area. The proposed project site is directly south-southwest of the existing 6.5-megawatt (MW) Byron Power Cogen Plant. The larger site parcel, referred to as the Lee Property, contains remnants of prior wind turbine development that has been removed except for minor debris. Wind energy installations are still active in the general area, as the Altamont Pass Wind Farm is approximately 1 mile southwest of the project area.

Uses closer to the project site include grazing, power generation, water management facilities, and recreation areas. Grazing occurs on most of the land within a mile radius of the project site. The Pacific Gas and Electric Company (PG&E) Kelso Substation and Bethany Compressor Station are located directly north of the project site, along Kelso Road. Farther east on Kelso Road is the Western Area Power Administration (WAPA) Tracy Substation. The California Department of Water Resources Delta Pumping Plant is located

to the northwest of the project site, near the end of Kelso Road and midway along the California Aqueduct between Clifton Court Forebay and Bethany Reservoir. The Delta-Mendota Canal is east of the project site, and the Tracy Pumping Plant, managed by the U.S. Bureau of Reclamation, is northeast of the project site, along Kelso Road.

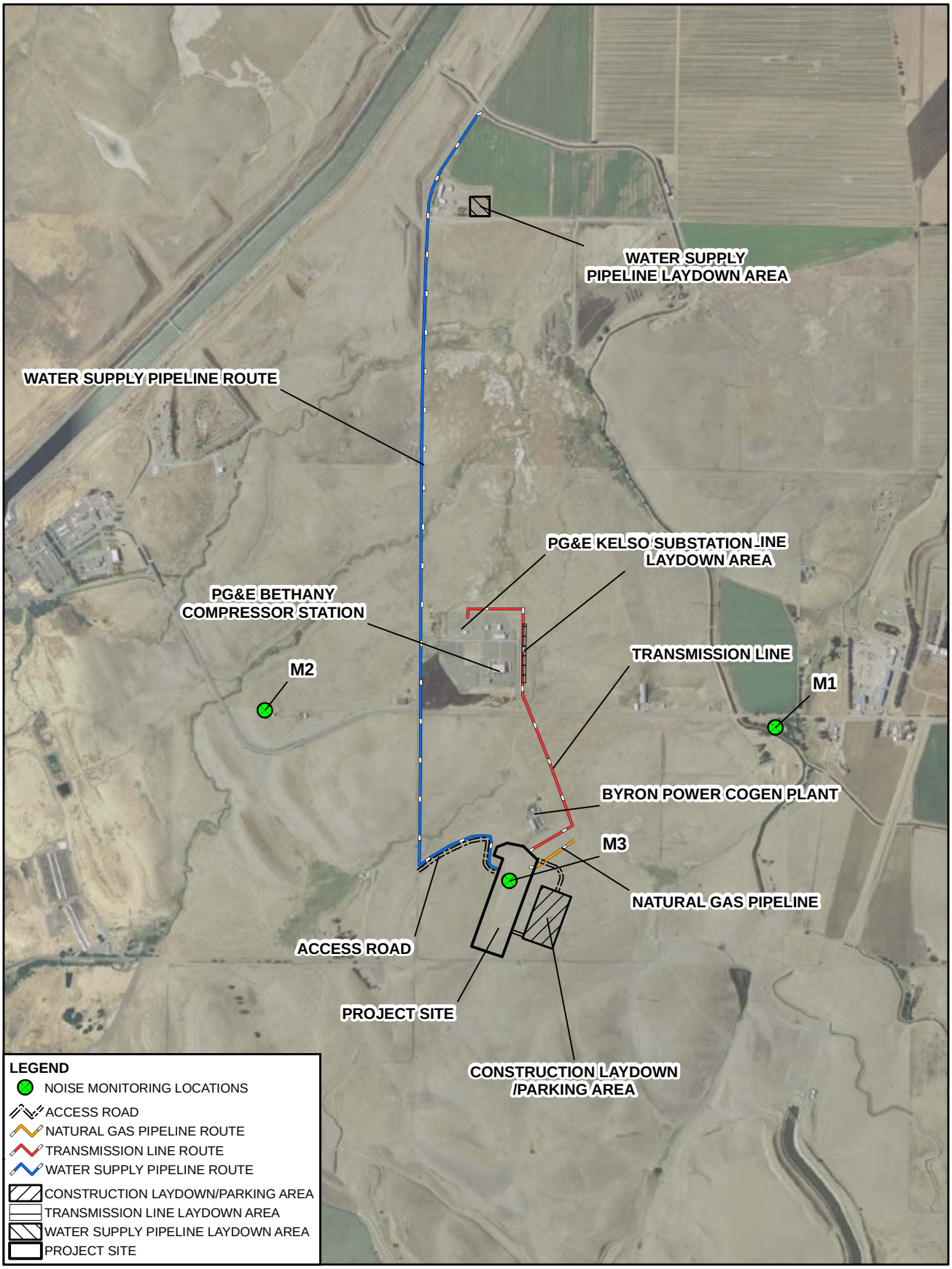
The closest sensitive receptors include a few isolated residences, the closest of which is approximately 3,300 feet to the northwest from the center of the combustion turbines. A second residence is approximately 3,600 feet to the northeast, and a third residence is approximately 3,700 feet to the west.

5.7.2.2 Ambient Noise Survey

CH2M HILL conducted continuous ambient noise monitoring to determine the level of noise in the project area. There were three monitoring locations (Figure 5.7-1). These locations included M1 – along the canal northeast of the project, representative of the residence 3,600 feet northeast of the project; M2 – in the pasture of the residence 3,300 feet to the northwest; and M3 – at the MEP site.

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

Clear skies persisted throughout the monitoring period. It was windy at times, particularly during the nighttime hours when rustling trees were the dominate source of noise at M1, though the hum of the distant wind turbines was also audible at all monitoring locations during the windy nighttime period. There was no precipitation and the temperature varied from approximately 50 degrees Fahrenheit (°F) to 70°F. The humidity varied from 30 percent to 70 percent. Tables 5.7-3 through 5.7-5 present the monitoring results. At M1, the hourly L_{eq} varied from 45 to 64 dBA, while the L_{90} varied between 32 and 60 dBA. At M2 the hourly L_{eq} varied from 41 to 58 dBA while the L_{90} varied between 27 and 50 dBA. Measured L_{eq} at the project site varied from 46 to 57 dBA, while the L_{90} ranged between 34 and 48 dBA. As noted above, the project lies within a designated Wind Resource Area and the variability in noise levels is not unexpected. The quietest 4-hour average L_{90} for M1, M2 and M3 was 38, 35, and 34 dBA, respectively.



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

N

0 750 1,500

Feet

FIGURE 5.7-1
NOISE MONITORING LOCATIONS
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

SAC\\ZION\SACGIS\PROJ\DIAMOND_376670\MAPFILES\AFC_MAPS\NOISE_RESIDENTIAL.MXD MHASKELL 5/12/2009 09:17:45

TABLE 5.7-3
Summary of Hourly Measurements at M1

Date/Time	L_{eq}	L_{10}	L_{50}	L_{90}
March 25, 2009 3:00 PM	45	47	41	36
March 25, 2009 4:00 PM	48	53	40	32
March 25, 2009 5:00 PM	47	50	46	41
March 25, 2009 6:00 PM	53	50	47	44
March 25, 2009 7:00 PM	57	62	50	45
March 25, 2009 8:00 PM	63	65	62	60
March 25, 2009 9:00 PM	63	64	63	60
March 25, 2009 10:00 PM	64	66	64	60
March 25, 2009 11:00 PM	63	65	63	60
March 26, 2009 12:00 AM	60	63	59	55
March 26, 2009 1:00 AM	58	61	55	52
March 26, 2009 2:00 AM	56	59	54	52
March 26, 2009 3:00 AM	51	54	51	48
March 26, 2009 4:00 AM	48	50	48	45
March 26, 2009 5:00 AM	48	50	48	45
March 26, 2009 6:00 AM	50	52	49	46
March 26, 2009 7:00 AM	52	54	50	47
March 26, 2009 8:00 AM	51	53	49	46
March 26, 2009 9:00 AM	56	54	50	47
March 26, 2009 10:00 AM	47	50	45	41
March 26, 2009 11:00 AM	49	49	43	39
March 26, 2009 12:00 PM	51	52	46	42
March 26, 2009 1:00 PM	50	52	47	44
March 26, 2009 2:00 PM	50	53	49	45
March 26, 2009 3:00 PM	51	54	50	46
March 26, 2009 4:00 PM	52	53	49	43
L_{dn}	**65**			

TABLE 5.7-4
Summary of Hourly Measurements at M2

Date/Time	L_{eq}	L_{10}	L_{50}	L_{90}
March 25, 2009 4:00 PM	42	46	36	27
March 25, 2009 5:00 PM	41	44	38	34
March 25, 2009 6:00 PM	47	47	43	40
March 25, 2009 7:00 PM	48	51	47	43
March 25, 2009 8:00 PM	55	58	52	48
March 25, 2009 9:00 PM	57	61	55	50
March 25, 2009 10:00 PM	57	61	54	49
March 25, 2009 11:00 PM	58	62	55	48
March 26, 2009 12:00 AM	57	61	54	48
March 26, 2009 1:00 AM	52	55	50	46
March 26, 2009 2:00 AM	48	51	47	44
March 26, 2009 3:00 AM	48	51	47	44
March 26, 2009 4:00 AM	47	50	45	42
March 26, 2009 5:00 AM	48	51	46	42
March 26, 2009 6:00 AM	49	51	48	45
March 26, 2009 7:00 AM	48	50	46	43
March 26, 2009 8:00 AM	50	49	45	42
March 26, 2009 9:00 AM	44	47	43	40
March 26, 2009 10:00 AM	47	48	40	36
March 26, 2009 11:00 AM	41	42	37	34
March 26, 2009 12:00 PM	50	48	38	35
March 26, 2009 1:00 PM	44	47	40	36
March 26, 2009 2:00 PM	48	50	42	37
March 26, 2009 3:00 PM	49	50	43	38
March 26, 2009 4:00 PM	45	47	41	37
L_{dn}	**60**			

TABLE 5.7-5
Summary of Hourly Measurements at M3

Date/Time	L_{eq}	L_{10}	L_{50}	L_{90}
March 25, 2009 5:00 PM	50	46	38	34
March 25, 2009 6:00 PM	46	47	43	40
March 25, 2009 7:00 PM	50	50	44	41
March 25, 2009 8:00 PM	55	58	52	47
March 25, 2009 9:00 PM	57	61	54	49
March 25, 2009 10:00 PM	54	58	52	47
March 25, 2009 11:00 PM	57	60	53	48
March 26, 2009 12:00 AM	57	61	54	48
March 26, 2009 1:00 AM	53	57	51	46
March 26, 2009 2:00 AM	51	55	49	45
March 26, 2009 3:00 AM	48	51	46	43
March 26, 2009 4:00 AM	45	48	43	41
March 26, 2009 5:00 AM	45	48	44	41
March 26, 2009 6:00 AM	46	49	45	42
March 26, 2009 7:00 AM	52	48	44	41
March 26, 2009 8:00 AM	52	51	46	43
March 26, 2009 9:00 AM	52	51	46	42
March 26, 2009 10:00 AM	55	51	41	37
March 26, 2009 11:00 AM	52	49	39	34
March 26, 2009 12:00 PM	48	48	41	36
March 26, 2009 1:00 PM	48	51	45	39
March 26, 2009 2:00 PM	48	51	45	40
March 26, 2009 3:00 PM	48	51	45	39
March 26, 2009 4:00 PM	46	50	43	37
March 26, 2009 5:00 PM	44	47	41	36
L_{dn}	**59**			

5.7.3 Environmental Analysis

The proposed MEP will produce noticeable noise but the noise levels will be in compliance with the Alameda County requirements. Noise will also be produced at the site during the construction phase 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 this project is evaluated against the Alameda County requirements, which are summarized in Section 5.7.6.3. Alameda County has established quantitative standards for determining appropriate noise levels for various land uses in its Municipal Code and General Plan. The Municipal Code land use requirements are the most restrictive requirements which establish a 45 dBA nighttime and 50 dBA daytime limit for residential receptors. The MEP project vicinity is primarily composed of cattle grazing and utility uses; however, this analysis applies the more restrictive residential limit, which also includes schools, hospitals, churches, libraries.

The California Energy Commission (CEC) has concluded that construction noise is typically insignificant if: (1) the construction activity is temporary, (2) use of heavy equipment and noisy activities is limited to daytime hours, and (3) 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

MEP construction 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 (1) demolition, site preparation, and excavation; (2) concrete pouring; (3) steel erection; (4) mechanical; and (5) clean-up (Miller et al., 1978).

Both 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). 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 these data, which are between 33 and 38 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 5.7-6. The composite average or equivalent site noise level, representing noise from all equipment, is also presented in the table for each phase.

TABLE 5.7-6
Construction Equipment and Composite Site Noise Levels

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

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

Average or equivalent construction noise levels projected at various distances from the site are presented in Table 5.7-7. 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 and the noisiest construction activities will be confined to the daytime hours. Table 5.7-8 presents noise levels from common construction equipment at various distances.

TABLE 5.7-7
Average Construction Noise Levels at Various Distances

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

TABLE 5.7-8
Noise Levels from Common Construction Equipment at Various Distances

Construction Equipment	Typical Sound Pressure Level at 50 feet (dBA)	Typical Sound Pressure Level at 1,500 feet (dBA)	Typical Sound Pressure Level at 3,000 feet (dBA)
Pile Drivers (20,000-32,000 ft-lbs/blow)	104	74	68
Dozer (250-700 hp)	88	58	52
Front End Loader (6-15 cu. yds.)	88	58	52
Trucks (200-400 hp)	86	56	50
Grader (13- to 16-foot blade)	85	55	49
Shovels (2-5 cu. yds.)	84	54	48
Portable Generators (50-200 kW)	84	54	48
Derrick Crane (11-20 tons)	83	53	47
Mobile Crane (11-20 tons)	83	53	47
Concrete Pumps (30-150 cu. yds.)	81	51	45
Tractor (3/4 to 2 cu. yds.)	80	50	44
Unquieted Paving Breaker	80	50	44
Quieted Paving Breaker	73	43	37

cu. yds. = cubic yards
ft-lbs/blow = feet pounds per blow
hp = horsepower
kW= kilowatt

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

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 5.7-9). Based on the recommendations of the preliminary geotechnical investigation, pile foundations will not be required for MEP. Therefore, pile driving is not currently anticipated. If it were to occur, it would be limited to normal construction hours (during the daytime) and would be of short duration; therefore, no mitigation would be required.

TABLE 5.7-9
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 MEP 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. This potentially significant impact will be reduced to a level below significance by preparation and execution of 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 hearing protection for workers and visitors throughout 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). Since 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 approach the level allowable under Occupational Safety and Health Act of 1970 guidelines. Nevertheless, signs requiring the use of hearing protection devices will be posted in all areas where noise levels commonly exceed 85 dBA, such as inside acoustical enclosures. 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.

5.7.3.3.2 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 principal concern with transmission lines of 345 kilovolt (kV) and higher. MEP will interconnect to the 230-kV PG&E Kelso Substation via a new, approximately 0.7-mile, 230-kV transmission line that will run north on the property, then across Kelso Road to the Kelso Substation. Noise is also generally associated with foul weather conditions. Since MEP will be connected at 230-kV voltage level, it is expected that no corona-related design issues will be encountered.

5.7.3.3.3 Plant Operational Noise Levels

A noise model of the proposed MEP facility has been developed using source input levels derived from manufacturers' data and field surveys of similar equipment. The noise emissions from the plant 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 sophisticated computer software noise model, CADNA/A by DataKustik GmbH of Munich, Germany, 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* (ISO 1996) and VDI 2714 *Outdoor Sound Propagation* (VDI 1998). 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 5.7-10. The specific equipment to be used at the plant has not yet been determined. Therefore, typical noise levels for equipment associated with LM6000 peaker plants have been assumed. Noise from the project, with noise control incorporated in the design, is predicted to not exceed 43 dBA at the closest residential receptors, M1 and M2. This limit will comply with Alameda County's more restrictive 45 dBA nighttime limit for residential land use. It is important to note that when only two of the four combustion turbines are operating, project noise levels would be 3 dBA quieter (40 dBA at M1 and M2); if only one of the combustion turbines is operating, the anticipated level is 6 dBA quieter (37 dBA at M1 and M2).

As a peaking power plant, it is anticipated that MEP would operate during times of very high electrical load, when baseload plants are not operating, or during emergency conditions. The most common times of operation will likely be afternoons during hot weather episodes. Nighttime operation of MEP, while it may occur, is anticipated to be relatively rare and full load nighttime operation is expected to be even less frequent. Consistent with most peakers, MEP could be expected to operate about 5 to 10 percent of the available hours. A CEC staff analysis showed that 19 simple-cycle peaking plants in California with a gross generating capacity of 50 MW or more operated an average of 6.2 percent of the time in 2004 (the range of 0.3 to 31.9 percent is summarized in Table 2.3-1), or approximately 543 hours per year. Only four of these 19 plants operated more than 10 percent of the time (CEC, 2006).

TABLE 5.7-10
Sound Power Levels Used to Model MEP Plant Operations

Plant Component	Sound Power Level, dBA
Stacks	98
LM6000 Combustion Turbine Generators	109
Fuel Gas Compressors	112
Generator Step-up Transformers	87
Selective Catalytic Reduction (SCR) Duct Walls	100

Several design elements may 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 or near equipment (such as the SCR inlet and expansion joint)
- Increasing SCR stack silencing
- Shroud for the SCR
- Increasing the thickness of the SCR plate steel
- Low noise fans and motors for the fin fan cooler
- Silencers, barriers, lagging, and partial or full enclosures for auxiliary equipment

The resulting project's full load noise level of 43 dBA will clearly comply with Alameda County's noise requirements. As described in Section 5.7.6.3, the Alameda County Code establishes a daytime (7 a.m. to 10 p.m.) limit of 50 dBA and a nighttime (10 p.m. to 7 a.m.) limit of 45 dBA. Both limits are in terms of hourly L_{50}, the sound level exceeded for 30 minutes in any hour. Higher limits are established for shorter durations. The full load project noise level of 43 dBA complies with the more restrictive nighttime limit of 45 dBA and is well below the daytime limit of 50 dBA. As discussed earlier, lower project levels are expected when fewer than four combustion turbines are operating.

5.7.3.3.4 Tonal Noise

At the monitoring locations modeled here, 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, and pump motors, have been known to sometimes produce significant tones. It is Mariposa Energy, LLC'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.

5.7.3.3.5 Ground and Airborne Vibration

Similar LM6000-based facilities have not resulted in ground or airborne vibration impacts. The proposed project is primarily driven by gas turbines exhausting into a SCR duct and a stack silencer. These large ducts reduce low frequency noise, which is the main source of airborne-induced vibration of structures.

The equipment that would be used in the proposed 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.

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; California Code of Regulations, tit. 14, §§ 15064(h), 15065(c), 15130, and 15355).

Applications for six proposed projects have been filed in the area surrounding the project, including Alameda and San Joaquin counties. These projects include power generation facilities, a residential development, a motorway rezoning, and a composting facility. The closest project, Green Volts Solar Field, is a 2-MW utility-scale solar farm), which is approximately 1 mile away from the project site. The Green Volts Solar Field will utilize concentrating photovoltaic technology, which is not a significant source of noise.

The East Altamont Energy Center (EAEC), a 1,100-MW power plant project proposed for near the northeast intersection of Mountain House Road and Kelso Road, is located approximately 1.5 miles northeast of the MEP site. The EAEC Application for Certification was approved by the CEC in 2003 and was granted a 3-year extension for commencement of construction in August 2008 (CEC, 2008). Actual construction plans for this facility are unknown. The EAEC condition of certification requires the project to comply with a 43 dBA L50 limit at 3,200 feet (EAEC's Site 2). EAEC is approximately 4,900 feet from MEP's closest receptor, M1, and geometric spreading from 3,200 to 4,900 feet is anticipated to result in a 4 dBA reduction. This results in an EAEC contribution of 39 dBA at M1. When full-load operation of MEP (43 dBA at M1) is combined with the EAEC level of 39 dBA at M1, the resulting level is 44 dBA. This increase of 1 dBA is generally not considered noticeable. As stated previously, full-load operation of MEP during the nighttime hours is expected to be rare. Additionally, CEC Staff correctly note that project noise modeling tends to be conservative as compliance monitoring "shows it to be markedly quieter than was projected" and that in the past 16 years only two projects have exceeded modeled results. In those two cases, staff notes that the exceedances were due to "unexpected factors and not the result of lack of conservativeness in modeling" (CEC, 2008). Given the potential for a cumulative noise effect is estimated to be at most 1 dBA and the expected levels are anticipated to be markedly quieter, MEP will result in a less than significant cumulative impact.

5.7.5 Mitigation Measures

Mariposa Energy proposes to implement the following measures to ensure that any potential noise impacts of the facility are mitigated below the level of significance.

5.7.5.1 Noise Hot Line

Mariposa Energy 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, Mariposa Energy 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, Mariposa Energy shall document, investigate, evaluate, and attempt to resolve all legitimate project-related noise complaints.

Mariposa Energy or its 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 between the hours of 7 a.m. and 7 p.m., Monday through Friday, and 8 a.m. and 5 p.m. on Saturdays.

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 5.7-11 presents the LORS that apply to noise.

TABLE 5.7-11
Applicable Laws, Ordinances, Regulations, and Standards for Noise

LORS	Purpose
Federal Offsite	
EPA	Guidelines for state and local governments.
Federal Onsite	
Occupational Health and Safety Administration (OSHA)	Exposure of workers over 8-hour shift limited to 90 dBA.
State Onsite	
Cal-OSHA, 8 CCR Article 105 Sections 095 et seq.	Exposure of workers over 8-hour shift limited to 90 dBA.
State Offsite	
California Vehicle Code Sections 23130 and 23130.5	Regulates vehicle noise limits on California highways.
Local	
California Government Code Section 65302	Requires local government to prepare plans that contain noise provisions.
Alameda County General Plan	The General Plan provides quantitative compatibility goals and policy.
Alameda County Municipal Code	The Municipal Code includes quantitative limits on allowable noise for various receptor land uses.

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 by the Occupational Health and Safety Administration (OSHA). The noise exposure level of workers is regulated at 90 dBA, over an 8-hour work shift to protect hearing (29 Code of Federal Regulations 1910.95). Onsite noise levels will generally be in the 70- to 85-dBA range. Areas above 85 dBA will be posted as high noise level areas and hearing protection will be required. The power plant will implement a hearing conservation program for applicable employees and 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 Alameda County General Plan consists of three General Plans, one for each geographical area. Policies governing physical development within the area that includes the project site are in the East County Area Plan portion of the Alameda County General Plan. The East County General Plan Environmental Safety Element (Alameda County, 2002) requires noise studies as part of development review for projects located in areas exposed to high noise levels and in areas adjacent to existing residential or other sensitive land uses. Policy 289 states the County will limit or require appropriate mitigation for new noise sensitive developments in areas projected to exceed 60 dBA L_{dn}.

The Alameda County Code Title 6, Chapter 6.60, Noise establishes noise standards for residential and commercial areas as shown in Table 5.7-12. The allowed levels are reduced by 5 dBA for simple tone noise, noises consisting primarily of speech or music or for recurring impulsive noises. Construction activities between the hours of 7 a.m. and 7 p.m., Monday through Friday, and 8 a.m. and 5 p.m. on weekends are exempt from these standards.

TABLE 5.7-12
Alameda County Noise Standards (dBA)

Cumulative Number of Minutes in Any 1-hour Period	Residential and Noise Sensitive Uses		Commercial Uses	
	Daytime 7 a.m.-10 p.m.	Nighttime 10 p.m.-7 a.m.	Daytime 7 a.m.-10 p.m.	Nighttime 10 p.m.-7 a.m.
30	50	45	65	60
15	55	50	70	65
5	60	55	75	70
1	65	60	80	75
0	70	65	85	80

5.7.7 Agencies and Agency Contacts

No agencies were contacted directly to specifically discuss project noise.

5.7.8 Permits Required and Permit Schedule

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

5.7.9 References

Alameda County. 2002. East County General Plan, Environmental Health and Safety Element.

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California Energy Commission (CEC). 2008. Final Staff Assessment, CPV Sentinel Energy Project, Application for Certification (07-AFC-3). October 10.

California Energy Commission (CEC), 2006. Errata to the Presiding Member's Proposed Decision, Application for Certification for the Pastoria Energy Facility 160 MW Expansion (05-AFC-1). November 16.

California Energy Commission (CEC). 2003. Final Commission Decision, East Altamont Energy Center, Application for Certification (01-AFC-4). August 20.

California Energy Commission (CEC). 2008. Order Approving Extension of the Deadline for Commencement of Construction. August 13.

International Organization for Standardization. 1996. Acoustics—Attenuation of sound during propagation outdoors, Part 2: General method of calculation ISO 9613-2, Geneva, Switzerland.

Miller, L.N., E.W. Wood, R.M. Hoover, A.R. Thompson, 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.

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U.S. Environmental Protection Agency (EPA). 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).

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