12.0 NOISE

12.1 INTRODUCTION

This chapter describes the existing noise environment of the project area, addresses the potential noise impacts associated with project construction and operation, and proposed mitigation measures to eliminate or reduce potential impacts. Potential noise impacts associated with project construction and operation include noise from construction equipment, corona discharge associated with high-voltage transmission lines, and operation of additional circuit breakers at substations. Though all noise impacts will be less than significant, standard noise-abatement mitigation measures will be implemented during project construction to further reduce project-related noise. A glossary of acoustical terms is provided at the end of this chapter.

By definition, "noise" is human-caused sound that is considered unpleasant and unwanted. Whether a sound is considered unpleasant depends on the individual who hears the sound and the setting and circumstance under which the sound is heard. While performing certain tasks, people expect and, as such, accept certain sounds that are considered unpleasant under other circumstances. For example, if a person works in an office, sounds from printers, copiers, telephones, and keyboards are generally acceptable and not considered unduly unpleasant or unwanted. By comparison, when resting or relaxing, these same sounds may be intolerable. Because individuals' tolerance for noise varies by setting, some land uses are more sensitive to changes in the ambient noise environment. Noise-sensitive receptors include those facilities and activities for which excessive noise may cause annoyance, increased stress, loss of business, or other adverse effects. Sensitive receptors in the vicinity of the project include residential areas, hospitals, schools, performance spaces, businesses, and religious congregations. Sensitive receptors in the project area are discussed in Section 12.2.3.

Since the human ear is not equally sensitive to sound at all frequencies, a specific frequency-dependent rating scale was devised to relate noise to human sensitivity. Noise levels are usually measured in A-weighted decibels (dBA), which performs this compensation by discriminating against frequencies in a manner that approximates the human ear, and noise descriptors such as the energy equivalent noise level (L_{eq}) and the day-night average noise level (L_{dn}) are commonly used to account for noise fluctuations over time. Generally, a 3-dBA increase in ambient noise levels is considered the minimum threshold at which most people can detect a change in the noise environment; an increase of 10 dBA is perceived as a doubling of the ambient noise level. As a point of reference, a conversation between two people would typically measure about 60 dBA, and noise above 80dBA can cause hearing loss if prolonged.

12.1.1 Methodology

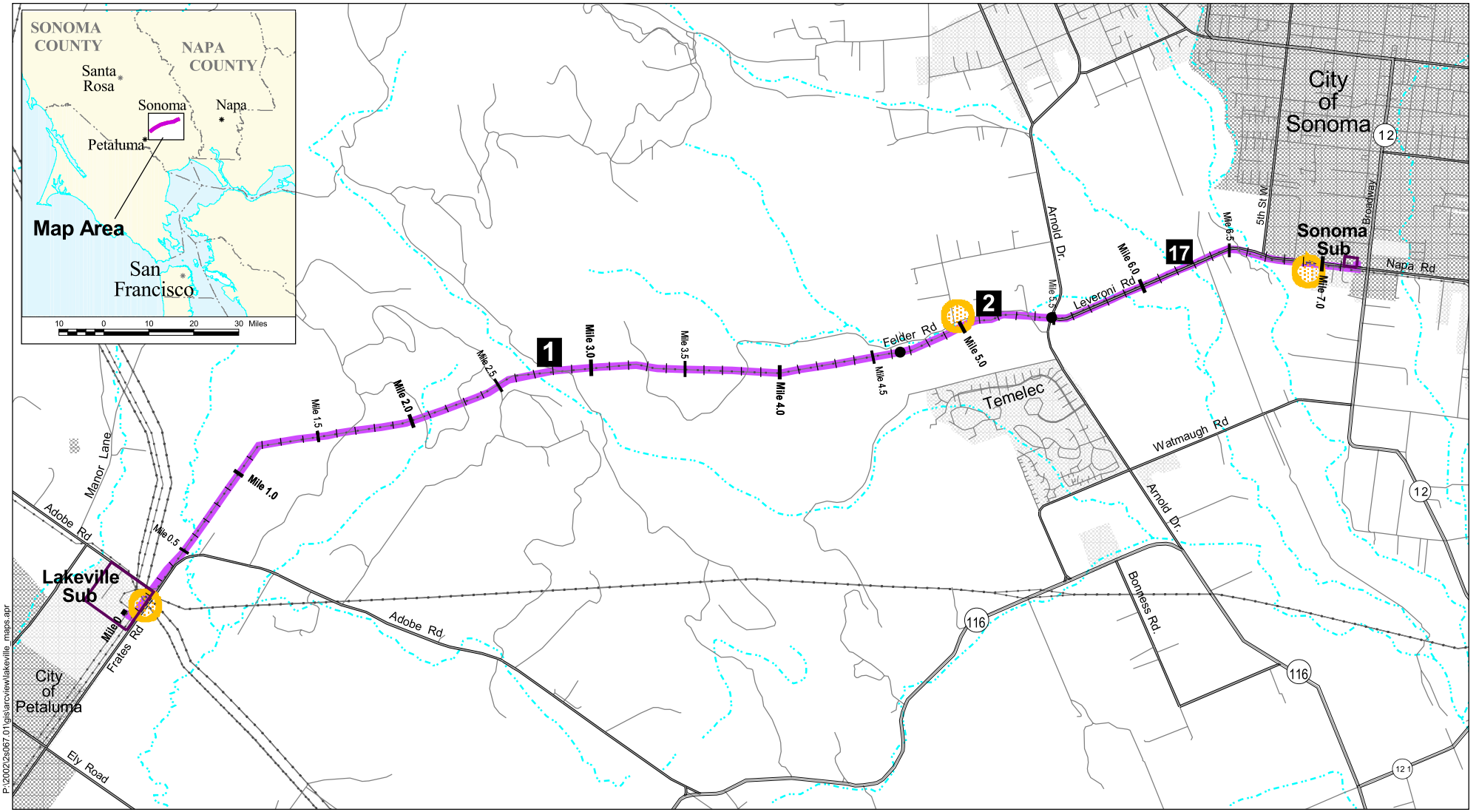
Evaluation of potential noise impacts from project construction and operation included reviewing relevant city and county noise standards and policies, characterizing the existing noise environment throughout the project area, and projecting noise from construction and operation of project facilities. Noise monitoring was conducted at three locations throughout the project area to accurately represent the area's ambient noise environment. Following the characterization of the existing noise environment, computer modeling was used to determine the project's potential to result in construction-related or operational impacts on the project area's noise environment. The significance of potential impacts was assessed based on applicable noise regulations, projected changes in the ambient noise environment, and CEQA significance criteria.

Noise measurements were taken by PG&E at three locations in the project area during both weekend and weekday periods in September and October of 2003 (see Figure 12-1). All measurements were taken for multiple 24-hour periods, and hourly average noise data were calculated for each measurement location. Long-term noise data were obtained using calibrated microphones and integrating sound level meters/statistical data loggers (Larson Davis, Models 820 and 700). Short-term noise measurements were obtained using a calibrated microphone and sound-level meter (Bruel and Kjaer, Type 2236), in conjunction with a digital audio tape recorder (Sony, Model TCD-D6 Digital Audio Recorder), and were analyzed using the Bruel and Kjaer Type 2144 Real-Time Frequency Analyzer.

Following the characterization of the project area noise environment, published construction-related noise data was used to determine construction-related impacts and computer modeling was used to determine operations-related impacts. Construction impacts were assessed by comparing the published noise levels of construction equipment and activities to be used during project construction to the ambient noise environment and significance criteria.

12.1.2 Applicable Laws and Regulations

Federal, state, and local jurisdictions have the authority to regulate the ambient noise environment to provide for public health and well-being. Though there are federal and state policies in place which limit vehicle noise, establish the maximum "normally acceptable" noise levels in residential areas, and establish the maximum interior noise levels in residential units, there are no federal or state policies or regulations that are relevant to noise associated with the proposed project's construction or operation. However, the City of Sonoma and County of Sonoma have developed general plan policies, goals, and guidelines regarding the ambient noise environment, which are applicable to the project area, as discussed below.



P:\2002\2s067.01\gis\arcview\lakeville_maps.apr

Source: PG&E 2004 / EDAW, Inc. 2004

1 0 1 Miles

Scale 1 : 47,520
1" = 0.75 mile

LEGEND

- Noise Monitoring Locations
- 1 Proposed Transmission Line with Route Segment #
- Existing Substation
- Existing Transmission Line

FIGURE 12-1

Lakeville-Sonoma 115kV Transmission Line Project

Noise Monitoring Locations

EDAW

Pacific Gas and Electric Company

8/31/04

12.1.2.1 Sonoma County

The Noise Element of the Sonoma County General Plan states the following policies, goals, and objectives:

- NE-1, "Protect people from the harmful effects of exposure to excessive noise and to achieve an environment in which people and land uses may function without impairment from noise." The intent of the ordinance is to protect persons from existing or future excessive levels of noise that interfere with sleep, communication, relaxation, health or legally permitted use of property. Noise sensitive areas include residences, schools, hospitals, other medical care facilities and other uses deemed noise sensitive by the local jurisdiction.
- This goal is achievable by designating areas of Sonoma County to limits of 60 dB L_{dn} (60 dB CNEL) or
- Adhering to a dose-based performance standard that limits the cumulative duration of a noise event in any one-hour period to a designated noise levels dependent on the duration of that noise.

The most current version of the General Plan does not specifically address intermittent or short-term construction noises.

12.1.2.2 City of Sonoma

The General Plan of the City of Sonoma states as Goals and Policies "…to maintain the city's quiet noise environment." To achieve noise compatibility between new and existing developments and ensure the continuation of the prevailing quiet county atmosphere the Policy stated in Goal NE-1 includes the maximum L_{dn} levels for these specified land uses:

- 60 L_{dn} – Exterior environments around all residential developments
- 65 L_{dn} – Exterior environments around commercial and public buildings
- 70 L_{dn} – Exterior environments around industrial buildings.

The Noise Element of the General Plan also states "The city may impose more restrictive noise standards in neighborhood that may be sensitive to noise levels below the accepted State standards."

The City Sonoma's Municipal Code 9.56.011 states that "no person shall cause, or permit to be caused, any noise or sound which, by reason of its raucous or nerve wracking nature or intensity, disturbs the peace or comfort or is injurious to the health of any person or persons." No construction-generated noise is allowed between 7:00 p.m. and 8:00 a.m. local time during

weekdays and weekends. PG&E may need to work outside this window at times due to equipment clearance limitations.

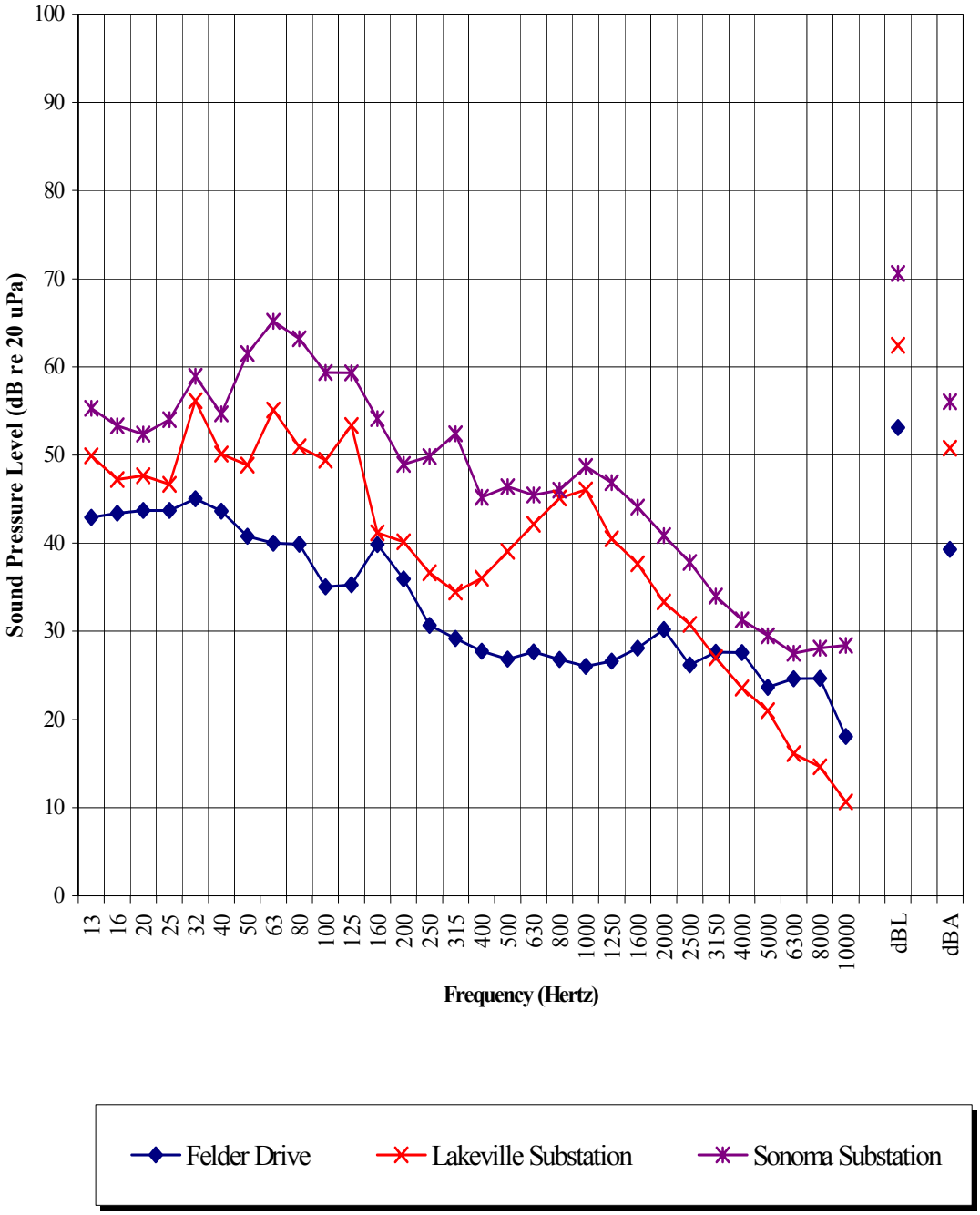
12.2 EXISTING CONDITIONS

The project area encompasses an approximately 7.23-mile corridor of residential, agricultural, commercial and open space areas. The primary contributors to the project area's noise environment include vehicle traffic on highways and city streets; airplane over flight; sounds emanating from residential neighborhoods, including voices, noises from household appliances, and radio and television broadcasts; and naturally occurring sounds such as wind and wind-generated rustling. Additional noise sources may include electrical and industrial devices and other man-made localized sources in the project area. Generally, intermittent short-term noises do not significantly contribute to longer-term noise averages.

Noise monitoring was conducted at several locations throughout the project area to characterize the average noise environment for the transmission line route and substation sites. Noise measurements were taken as detailed in Section 12.1.1 at three locations, and measurement locations were selected to best represent the typical noise environment throughout the project area. In some cases, monitoring locations were also selected for ease and safety of access and the availability of PG&E-owned facilities and properties on which to mount long-term sound measuring devices, such as transmission poles and property line fences.

The previous Figure 12-1 shows the locations in the project area at which noise measurements were taken, and Table 12-1 shows the results of noise measurements conducted in the project area. Table 12-1 summarizes noise monitoring results in terms of the average equivalent noise level (L_{eq}), minimum L_{eq}, and maximum L_{eq}; day-night noise equivalent (L_{dn}); and the statistical descriptors L_{50} and L_{90}, which indicate the noise level the ambient noise. That is exceeded 50 percent and 90 percent of the time, respectively. Values given in Table 12-1 are representative of noise levels along the length of the route. Also shown are additional noise data collected at the Lakeville and Sonoma substations. Substation noise data are characteristic of the existing ambient noise environment at these locations. In addition, Figure 12-2 contains the spectral analyses of the sound recordings at various locations along the transmission route and substation sites and represent the ambient noise tonal characteristics found at each land use area.

Figure 12-2: Transmission Route, Short Term-One Third-Octave Frequency Analyses



12.2.1 Sensitive Receptors

In addition to conducting noise measurements to characterize the project area's noise environment, sensitive receptors throughout the project vicinity were located. Sensitive receptors include residential areas, hospitals, schools, performance spaces, businesses (including winery tasting

facilities), and religious congregations. Figure 11-1 in Chapter 11 and Figures 2-4 (a) through (d) in Chapter 2 show sensitive receptor land uses and residential and commercial developments in the project area. Over the length of the transmission route, some sensitive receptors lie as close as 15 yards from the transmission line corridor. The majority of the route, however, traverses agricultural and open-space areas, where the project will have no impact on sensitive receptors. Though few sensitive receptors lie close to the project's transmission line route or substation locations, project construction will include materials transport and other activities in direct proximity to many additional sensitive receptors.

12.2.2 Transmission Line Route

Noise measurements were taken at three locations along the transmission line route, as shown in Figure 12-1, during both weekend and weekday periods in September and October 2003. Monitoring results are summarized in Table 12-1. The baseline noise environment generally complies with the noise ordinances discussed in Section 12.1.2.

Table 12-1
Noise Measurement Results (A-Weighted Decibels [dBA])

Area Represented (Segments and Substations)	Monitoring Location	Average (L_{eq})	Minimum (L_{eq})	Maximum (L_{eq})	Average (L_{50})	Average (L_{90})	Average (L_{dn})
Segment 1 Lakeville Substation	Lakeville Substation	68.2	44.5	84.3	72.0	65.7	71.3
Segment 2	Felder Road	51.0	46.1	73.9	51.9	46.9	58.3
Segment 17 Sonoma Substation	Sonoma Substation	64.5	43.8	86.1	68.2	50.7	67.7

12.2.3 Substation Sites

Noise measurements were taken at Sonoma and Lakeville substations. Monitoring results are also shown in Table 12-1.

The Sonoma Substation is located within the City of Sonoma in a commercial/residential land use area. Measurements were taken at the south fence line on Leveroni Road. At this location, the nearest the sensitive receptors would be people in the adjacent apartment building, hotel and a business office located approximately 100 yards distance.

The Lakeville Substation site is located off Frates Road in an agricultural and open space area. Measurements were taken at the substation entrance on Adobe Road. The nearest sensitive receptor is located more than 800 yards from the substation location.

12.3 POTENTIAL IMPACTS

This section presents an analysis of the potential noise impacts associated with project construction and operation. Equipment noise during project construction is the primary concern in evaluating short-term noise impacts. During operation, noise from corona discharge along high-voltage transmission lines during wet conditions and from operation of additional circuit breakers at substations will add slightly to the ambient noise environment. Significance criteria and construction- and operation-related noise impacts are discussed below.

12.3.1 Significance Criteria

Standards of significance were derived from Appendix G of the CEQA Guidelines and local noise ordinances. Accordingly, impacts to the ambient noise environment were considered significant if they would:

- Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Expose persons to or generate excessive ground-borne vibration or ground-borne noise levels;
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan, within two miles of a public or public use airport, or within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

In addition, impacts were considered significant if:

- Project construction activities will generate repetitive or long-term noise lasting more than three hours at noise levels above 65 dBA-L_{eq} in residential areas, or above 70 dBA-L_{eq} in commercial areas, at a distance of 200 feet from or at the nearest sensitive receptor;
- Project construction activities will result in a noticeable (3dBA or greater) increase in ambient noise levels;
- Project operation will generate noise levels above 60 dBA-L_{dn} (or CNEL) within cities and towns along the project route within the project area;

- Project operation will result in an ambient noise level increase of 3 dBA or more at a sensitive receptor.

12.3.2 Construction Impacts

Construction of transmission lines and upgrading of substations will require a variety of equipment, as detailed in Table 12-2. Equipment will not be operated at night except as necessary, such as operation of generators as emergency power back-up contingencies for essential safety purposes. Typical noise levels for construction equipment at 15 yards from the source are listed in Table 12-2.

Table 12-2
Typical Noise Levels Generated by Construction Equipment

Equipment	Range of Noise Level (dBA) at 15 yards
Earthmoving	
Front loaders/Excavators	72-84
Backhoes	72-93
Tractors, dozers	76-96
Scrapers/ graders	80-93
Pavers	86-88
Trucks	82-94
Helicopter	110-113
Materials Handling	
Concrete mixers/Millers	75-88
Concrete pumps/Spreaders	81-83
Cranes (movable)	75-86
Cranes (derrick)	86-88
Stationary	
Pumps	69-71
Generators	71-82
Compressors	74-86
Drill rigs	70-85

Source: WIA 1986.

12.3.2.1 Transmission Line Construction

Construction of the transmission line will primarily involve intermittent use of a track augur, crew cab pickup truck, and helicopter, and may be either temporary or repetitive. The majority of the transmission line construction activities will take place in open space and agricultural areas and vineyards, though some construction activities will be in and adjacent to residential areas. Construction activities near residential areas will generally be limited to daytime hours (between 8:00 a.m. and 7:00 p.m.) with some exceptions as required for safety considerations or certain

construction procedures that cannot be interrupted. In addition, construction-related noise will be minimized by**:**

- Complying with manufacturers' muffler requirements.
- Shutting down engines when not in use, where applicable.
- Minimizing equipment use.

Impact 12.1 Construction Noise.

As shown in Table 12-2, intermittent and continuous use of construction equipment will generate noise levels in excess of 65 dBA-L_{eq} in or adjacent to residential areas, thereby presenting a potentially significant impact. Using the inverse square law, which equates to a 6 dB decrease in sound levels for each doubling of distance (Beranek 1988) and referring to Table 12-2, the maximum intermittent construction noise levels range from 80 to 88 dBA at 45 yards for supporting structure assembly operations and 84 to 80 dBA during tamping operations. Helicopter noise levels are expected to range from 92 to 95 dBA at 150 feet from the helicopter (WIA 1986). In addition to intermittent noise levels, continuous noise levels from construction activities will range from 70 to 77 dBA. At 30 and 60 yards from the construction site, the continuous noise levels will be approximately 64 to 71 dBA and 58 to 65 dBA, respectively (Beranek 1988).

While construction of the transmission line will constitute a temporary and potentially significant impact to nearby residents, with implementation of Mitigation Measure 12-1, noise levels will be reduced to less than significant. Modification of the Lakeville and Sonoma substations will constitute a temporary and potentially significant impact to nearby residents. However, with implementation of Mitigation Measure 12-1, noise levels will be reduced to less than significant.

Mitigation Measure 12-1. The following noise suppression techniques will be employed during project construction to minimize the impact of temporary construction-related noise on nearby sensitive receptors:

- Compressors and other small stationary equipment will be shielded with portable barriers.
- "Quiet" equipment (i.e., equipment that incorporates noise control elements into the design, including some models of jackhammers and compressors) will be used during construction.
- Equipment exhaust stacks/vents will be directed away from buildings.
- Truck traffic will be routed away from noise-sensitive areas where feasible.

- Temporary sound barriers or sound curtains will be employed if the other noise reduction methods are not effective or possible, or if sensitive receptors will be exposed to construction noise for more than 1 day, such as for emergency purposes i.e., operations of water pumps and generators for power back-up.

12.3.3 Operational Impacts

Project operation will include the operation and maintenance of project facilities, including transmission lines and substations. Operation of project facilities will include maintaining voltage across transmission lines and substations, which generate noise associated with corona discharge. In addition, maintenance activities will include the occasional use of light-duty trucks and ATVs to transport maintenance workers to and from the project and the occasional use of landscaping equipment, such as mechanical trimmers, mowers, and chainsaws, for vegetation management along the transmission line route.

12.3.3.1 Transmission Line Operation

Operation of transmission lines will generate random crackling or hissing sounds associated with corona discharge, which occurs under high voltages as detailed in Chapter 16. Particles such as dust or water droplets that may come in contact with a conductor tend to increase corona discharge and associated noises, making the potential for noise from corona discharge greatest during wet weather. The sound generated by a 115 kV transmission line during adverse weather conditions such as fog or rain is typically between 30 and 40 dBA at 30 yards from the outer conductor.

Impact 12.2 Corona Noise.

Operation of transmission lines could generate noise levels from corona activity as high as 46 dBA at the closest sensitive receptors (in this case 15 yards distance) under adverse weather conditions (WIA 1998). As operation of the project's transmission lines will not result in the generation of noise levels above 60 dBA L_{dn} or an increase in existing ambient noise levels of 3 dBA or more at a sensitive receptor, this constitutes a less than significant impact, and no mitigation is required.

12.3.3.2 Substation Operation

Operation of the Lakeville and Sonoma substations will not result in any appreciable increase to the existing average ambient noise levels at either site. The operation of additional circuit breakers at each site result in only momentary noise as there are activated and result in no statistical increase to ambient noise levels and is, therefore, not a significant impact.

12.4 REFERENCES

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12.5 GLOSSARY

A-weighted Sound Level (dBA):
The sound pressure level in decibels as measured on a sound level meter using the internationally standardized A-weighting filter or as computed from sound spectral data to which A-weighting adjustments have been made. A-weighting de-emphasizes the low and very high frequency components of the sound in a manner similar to the response of the average human ear. A-weighted sound levels correlate well with subjective reactions of people to noise and are universally used for community noise evaluations.

Airborne Sound:
Sound that travels through the air, as opposed to structure-borne sound.

Ambient Noise:
The prevailing general noise existing at a location or in a space, which usually consists of a composite of sounds from many sources near and far.

Community Noise Equivalent Level (CNEL):
The L_{eq} of the A-weighted noise level over a 24-hour period with a 5 dB penalty applied to noise levels between 7 p.m. and 10 p.m. and a 10 dB penalty applied between 10 p.m. and 7 a.m.

Day-Night Sound Level (L_{dn}):
The L_{eq} of the A-weighted noise level over a 24-hour period with a 10 dB penalty applied to noise levels between 10 p.m. and 7 a.m.

Decibel (dB):
The decibel is a measure on a logarithmic scale of the magnitude of a particular quantity (such as sound pressure, sound power and intensity) with respect to a standardized quantity.

Energy Equivalent Level (L_{eq}):
The level of a steady noise that would have the same energy as the fluctuating noise level integrated over the period of interest. L_{eq} is widely used as a single-number descriptor of environmental noise. L_{eq} is based on the logarithmic or energy summation, and it places more emphasis on high noise level periods than does L_{50} or a straight arithmetic average of noise level over time. This energy average is not the same as the average sound pressure levels over the period of interest, but must be computed by a procedure involving summation or mathematical integration.

Frequency (Hz):
The number of oscillations per second of a periodic noise (or vibration) expressed in Hertz (abbreviated Hz). Frequency in Hertz is the same as cycles per second.

Octave Band—1/3 Octave Band:
One octave is an interval between two sound frequencies that have a ratio of two. For example, the frequency range of 200 Hz to 400 Hz is one octave, as is the frequency range of 2,000 Hz to 4,000 Hz. An octave band is a frequency range that is one octave wide. A standard series of octaves is used in acoustics, and they are specified by their center frequencies. In acoustics, to increase resolution, the frequency content of a sound or vibration is often analyzed in terms of 1/3-octave bands, where each octave is divided into three 1/3-octave bands.

Sound Pressure Level (SPL):
The sound pressure level of sound in decibels is 20 times the logarithm to the base of 10 of the ratio of the RMS value of the sound pressure to the RMS value of a reference sound pressure. The standard reference sound pressure is 20 micro-Pascals as indicated in ANSI S1.8-1969, "Preferred Reference Quantities for Acoustical Levels."

Sound Transmission Class (STC):
STC is a single number rating, specified by the American Society for Testing and Materials, which can be used to measure the sound insulation properties for comparing the sound transmission capability, in decibels, of interior building partitions for noise sources such as speech, radio, and television. It is used extensively for rating sound insulation characteristics of building materials and products.

Structure-Borne Sound:
Sound propagating through building structure. Rapidly fluctuating elastic waves in gypsum board, joists, studs, etc.

Statistical Distribution Terms:
L_{50} is a statistical descriptor of the typical avenge background noise (or vibration) levels observed during a measurement period, normally made up of the summation of a large number of sound sources distant from the measurement position and not usually recognizable as individual noise sources. Generally, the prevalent source of this residual noise is distant street traffic. $L_{50\ is}$ not strongly influenced by occasional local motor vehicle pass-bys. However, it can be influenced by stationary sources, such as air conditioning equipment.