3.12 NOISE

3.12.1 INTRODUCTION

This section describes potential noise impacts associated with construction, operation, and maintenance of the project, and concludes that impacts will be less than significant in these areas. The project's potential noise-related effects were evaluated using the significance criteria set forth in Appendix G of the California Environmental Quality Act (CEQA) Guidelines. The conclusions are summarized in Table 3.12-1 and discussed in more detail in Section 3.12.4.

Table 3.12-1: CEQA Checklist for Noise

Would the project:	Potentially Significant Impact	Less-than-Significant Impact with Mitigation Incorporated	Less-than-Significant Impact	No Impact
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
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?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

3.12.1.1 Fundamentals of Noise

Noise is generally defined as unwanted sound. Airborne sound is the fluctuation of air pressure above and below atmospheric pressure. Several ways exist to measure sound, depending on the source, receiver, and reason for the measurement.

Community sound levels are generally presented in terms of A-weighted decibels (dBA). The A-weighting network measures sound in a similar fashion to how a person perceives or hears sound, thus achieving a strong correlation with how people perceive acceptable and unacceptable sound levels.

Table 3.12-2: Typical Sound Levels Measured in the Environment and Industry presents A-weighted sound levels and the general subjective responses associated with common sources of noise in the physical environment.

Table 3.12-2: Typical Sound Levels Measured in the Environment and Industry

Noise Source at a Given Distance	Sound Level in A-weighted Decibels (dBA)	Qualitative Description
Carrier deck jet operation	140	
	130	Pain threshold
Jet takeoff (200 feet)	120	
Auto horn (3 feet)	110	Maximum vocal effort
Jet takeoff (1,000 feet) Shout (0.5 foot)	100	
New York subway station Heavy truck (50 feet)	90	Very annoying; Hearing damage (8-hour, continuous exposure)
Pneumatic drill (50 feet)	80	Annoying
Freight train (50 feet) Freeway traffic (50 feet)	70 to 80 70	Intrusive (telephone use difficult)
Air conditioning unit (20 feet)	60	
Light auto traffic (50 feet)	50	Quiet
Living room Bedroom	40	
Library Soft whisper (5 feet)	30	Very quiet
Broadcasting/Recording studio	20	
	10	Just audible
Source: New York Department of Environmental Conservation 2001		

A-weighted sound levels are typically measured or presented as the 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 commonly is used to measure steady-state sound that is usually dominant. Statistical methods are used to capture the dynamics of a changing acoustical environment. Statistical measurements are typically denoted by L_n, where "n" represents the percentile of time that the sound level is exceeded. Therefore, L_{90} represents the noise level that is exceeded during 90 percent of the measurement period, which typically represents a continuous noise source. Similarly, L_{10} represents the noise level exceeded for ten percent of the measurement period.

Another metric used in determining the impact of environmental noise is the differences in response that people have to daytime and nighttime noise levels. During the evening and at night, exterior background noises generally are lower than 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 evening and nighttime noise levels, the day-night sound level (L_{dn}) (also

referred to as DNL) and the community noise equivalent level (CNEL) were developed. The L_{dn} is a noise metric that accounts for the greater annoyance of noise during the nighttime hours (10 p.m. to 7 a.m.). The CNEL is a noise index that accounts for the greater annoyance of noise during both the evening hours (7 p.m. to 10 p.m.) and nighttime hours.

L_{dn} values are calculated by averaging hourly L_{eq} sound levels for a continuous 24-hour period on an energy basis, applying a weighting factor of 10 decibels (dB) to the nighttime values. CNEL values are calculated similarly, except that a 5-dB weighting factor also is added to evening L_{eq} values. The applicable adjustments, which reflect the increased sensitivity to noise during evening and nighttime hours, are applied to each hourly L_{eq} sound level for the calculation of L_{dn} and CNEL. For the purposes of assessing noise, the 24-hour day is divided into three time periods, with the following adjustments:

- Daytime hours: 7 a.m. to 7 p.m. (12 hours)—adjustment of 0 dBA
- Evening hours (for CNEL only): 7 p.m. to 10 p.m. (3 hours)—adjustment of +5 dBA
- Nighttime hours (for both CNEL and L_{dn}): 10 p.m. to 7 a.m. (9 hours)—adjustment of +10 dBA

The hourly adjusted time-period noise levels are then averaged (on an energy basis) to compute the overall L_{dn} or CNEL value. For a continuous noise source, the L_{dn} value can be computed by adding 6.4 dBA to the overall 24-hour noise level (L_{eq}). For example, if the expected continuous noise level from a noise source is 60.0 dBA, the resulting L_{dn} from the source will be 66.4 dBA. Similarly, the CNEL for a continuous noise source is computed by adding 6.7 dBA to the overall 24-hour L_{eq}.

The general human response to changes in noise levels that are similar in frequency content (such as comparing increases in continuous (L_{eq}) traffic noise levels) are summarized as follows:

- A 3-dB change in sound level is considered to be a barely noticeable difference.
- A 5-dB change in sound level typically is noticeable.
- A 10-dB increase is considered to be a doubling in loudness.

Corona Noise

Corona generates audible noise during operation of high-voltage transmission lines. Under certain conditions, the localized electric field near an energized conductor can be sufficiently concentrated to produce a tiny electric discharge that can ionize air close to the conductors. This partial discharge of electrical energy is called corona discharge, or corona. Several factors, including conductor voltage, shape and diameter, and surface irregularities such as scratches, nicks, dust, or water drops, can affect a conductor's electrical surface gradient and its corona performance. Corona is the physical manifestation of energy loss, and can transform discharge energy into very small amounts of sound, radio noise, heat, and chemical reactions of the air components.

Transmission lines can generate a small amount of sound energy during corona activity. This audible noise from the line can barely be heard in fair weather conditions on higher voltage lines.

During wet weather conditions (such as rain or fog), water drops collect on the conductor and increase corona activity so that a crackling or humming sound may be heard near the line. This noise is caused by small electrical discharges from the water drops. However, during heavy rain, the ambient noise generated by the falling raindrops will typically be greater than the noise generated by corona. Corona noise is generally more noticeable on high-voltage lines, and is usually not a design issue for power lines rated at 230 kilovolt (kV) and lower.

Vibration

Generally speaking, vibration is energy transmitted in waves through the ground. Because energy is lost during the transfer of energy from one particle to another, vibratory energy is reduced with increasing distance from the source. Vibration attenuates at a rate of approximately 50 percent for each doubling of distance from the source. This approach only takes into consideration the attenuation from geometric spreading. Because additional factors reduce vibration over distance (e.g., damping from soil condition), this approach tends to provide for a conservative assessment of vibration level at the receiver.

3.12.2 REGULATORY BACKGROUND AND METHODOLOGY

3.12.2.1 Regulatory Background

Federal

No federal regulations limit overall environmental noise levels; however, federal guidance documents exist that address environmental noise and regulations for specific noise sources. For example, the Federal Highway Administration (FHWA); Department of Transportation (DOT); Federal Railroad Administration (FRA) and Federal Transit Administration (FTA); and Federal Aviation Administration (FAA) and Federal Interagency Committee on Urban Noise (FICUN) provide regulations and guidelines for noise impacts resulting from federal highways, aircraft usage, railroads, and other development, as described in the following paragraphs. While these standards are not directly applicable to utility construction projects, they provide some context for the impact analysis.

Federal Highway Administration

The FHWA noise abatement criteria establish absolute exterior noise levels for varying land use categories where an impact is triggered. The noise abatement criteria require maintenance of L_{eq} for noise levels emitted in lands classified categories “A” (lands for which serenity and quietness are significant), “B” (lands near sensitive receptors, defined as picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals) as 67 dBA, and “C” (developed lands, properties, or activities not included in categories A or B) as 72 dBA.

Department of Transportation

The DOT aviation noise abatement policy provides an L_{dn} value of 65 dBA for areas with a designated noise exposure forecast of 30 or less (noise exposure of 30 or less is defined as having essentially no complaints expected from individuals or groups, but possible noise interference with community activities).

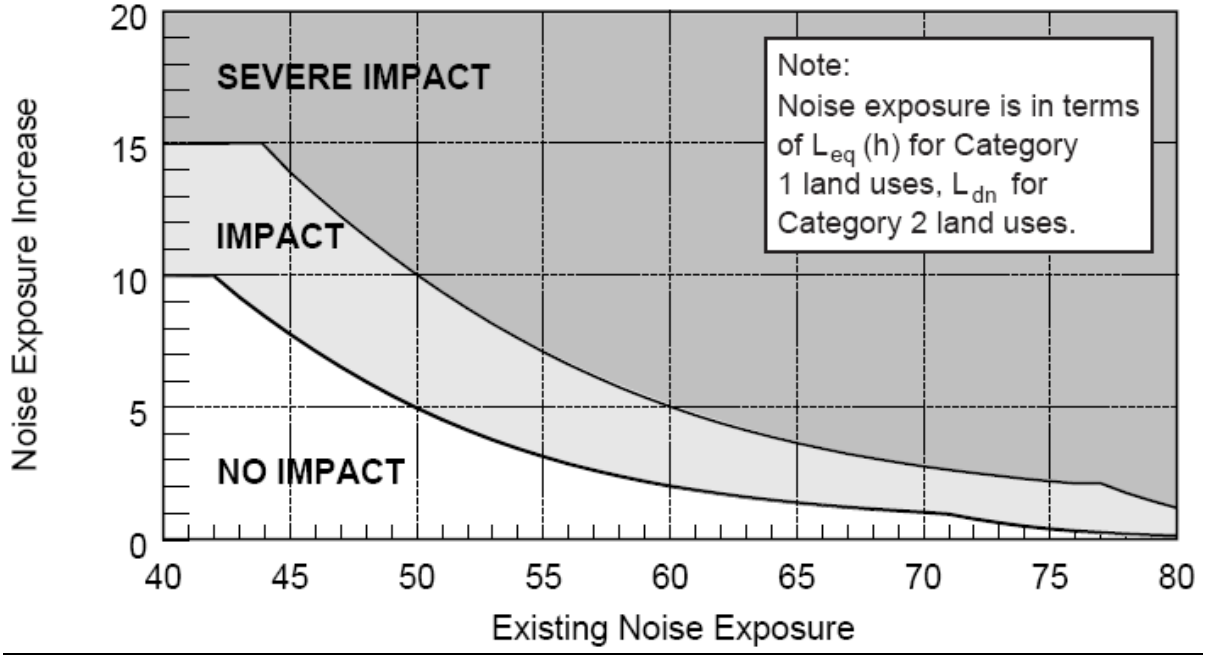
Federal Railroad Administration and Federal Transit Administration

While not applicable to utility construction projects, the FRA and FTA provide guidelines on allowable increases in cumulative noise levels, as shown in Figure 3.12-1: Federal Railroad Administration and FTA Allowable Increase in Cumulative Noise Level. The horizontal axis is the existing noise exposure and the vertical axis is the increase in the cumulative noise level due to a high-speed rail project. This figure suggests the increases in noise exposure that would be acceptable, conditionally acceptable, and unacceptable, based on existing conditions and the level of impact.

Federal Aviation Administration and Federal Interagency Committee on Urban Noise

Finally, the FAA and the FICUN have issued land-use compatibility guidelines indicating that a yearly L_{dn} of less than 65 dBA (59 dBA L_{eq}) is compatible with residential land uses and that, if a community determines it is necessary, levels up to 75 dBA (69 dBA L_{eq}) may be compatible with residential uses and transient lodgings that incorporate noise-reduction features (Title 14 Code of Federal Regulations 150).

Figure 3.12-1: Federal Railroad Administration and FTA Allowable Increase in Cumulative Noise Level



Note: Category 1 land uses are those tracts of land where serenity is essential (e.g., historic landmarks) and Category 2 land uses include residence and buildings where people normally sleep. Source: DOT 2012.

State

California Noise Control Act

The California Noise Control Act states that excessive noise is a serious hazard to public health and welfare. It declares that exposure to certain levels of noise can result in damage, whether it be psychological, physiological, or even economic. This act declares that the State of California

is responsible for protecting the health and welfare of its citizens, and must control, prevent, and abate hazardous noise.

California Department of Transportation- and Construction-Induced Vibration Guidance

This guidance provides practical methodologies on addressing vibration issues associated with construction, operation, and maintenance of California Department of Transportation projects. Continuous/frequent intermittent vibration sources are significant when their peak particle velocity (PPV) exceeds 0.1 inch per second. Table 3.12-3: Human Response to Transient Vibration, outlines additional specific criteria for human annoyance due to vibration. Though the guidance is non-enforceable, it provides a basis for evaluating potential vibration from the proposed project.

Table 3.12-3: Human Response to Transient Vibration

Human Response	PPV (inches/second)
Severe	2.0
Strongly Perceptible	0.9
Distinctly Perceptible	0.24
Barely Perceptible	0.035
Source: Caltrans 2006	

Local

Because the California Public Utilities Commission has exclusive jurisdiction over the siting, design, and construction of the project, the project is not subject to local discretionary noise requirements. This section includes a summary of local noise standards or ordinances in the project area for informational purposes and to assist with CEQA review. Airport Land Use Compatibility Plans are discussed in Section 3.10, Land Use and Planning, and safety concerns around airports are discussed in Section 3.8, Hazards and Hazardous Materials.

The Town of Windsor noise ordinance and the Sonoma County Municipal Code are "nuisance" type ordinances which basically prohibit loud and unreasonable sounds, such as radios and television sets that disturb neighboring residents, unnecessary horns and signaling devices on automobiles, yelling and shouting, and un-muffled exhausts of internal combustion engines. Other unreasonable sounds are also enumerated. The ordinance does not place numerical limits on any noise-generating sources associated with the project.

The Town of Windsor also limits construction to between 7 a.m. and 7 p.m. on weekdays, and 8 a.m. to 7 p.m. on Saturday. The noise ordinance prohibits construction, alteration, or repair activities within its jurisdiction on Sundays. It requires equipment to be equipped with a muffler.

3.12.3 METHODOLOGY

Evaluation of potential noise impacts from the project included reviewing county, community, and city noise standards, characterizing the existing noise environment, and predicting noise levels and related impacts during both construction and operation.

3.12.4 ENVIRONMENTAL SETTING

The project alignment runs between Fulton Substation and Fitch Mountain #1 Tap, on the eastern margin of the Santa Rosa Valley. The project originates in Fulton in Sonoma County, and traverses residential neighborhoods and open space before ascending into the foothills where it runs through vineyards, rangeland, woodland, and open space (see Figure 2.0-1: Project Overview Map).

Contributors to the noise environment primarily consist of continuous sounds of traffic along highways and city roads, airplane noise, sounds emanating from neighborhoods, and naturally occurring sounds (e.g., wind).

3.12.4.1 Sensitive Receptors

Noise-sensitive receptors generally are defined as locations where people reside or where the presence of unwanted sound may adversely affect the existing land use. Typically, noise-sensitive land uses include residences, hospitals, places of worship, libraries, performance spaces, offices, and schools, as well as nature and wildlife preserves, recreational areas, and parks.

The nearest noise-sensitive receptors to the project area are residences, some of which are located as close as 50 feet from the project alignment. No hospitals are located within 1 mile of the project alignment. The nearest schools to the project include Mark West Elementary School, Mark West Charter School, and San Miguel Elementary School, which are located approximately 100 feet from the project. The Cove is a church located approximately 200 feet east of the project; the After School Arts Program at The Cove is located on its property.

Several parks are located within 1 mile of the project. The line traverses Maddux Ranch Regional Park, Shiloh Ranch Regional Park, and Foothill Regional Park. Healdsburg Veterans Memorial Beach is located 0.5 mile from Fitch Mountain Substation, and Badger Park is located 0.3 mile from Fitch Mountain Substation.

No public airports or private air strips were identified within 2 miles of the project alignment.

3.12.5 APPLICANT-PROPOSED MEASURES AND POTENTIAL IMPACTS

The following sections describe significance criteria for noise-related impacts derived from Appendix G of the CEQA Guidelines, provide Applicant-Proposed Measures (APMs), and assess potential project-related construction and operational noise impacts.

3.12.5.1 Significance Criteria

According to Section 15002(g) of the CEQA Guidelines, "a significant effect on the environment is defined as a substantial adverse change in the physical conditions which exist in the area

affected by the proposed project." As stated in Section 15064(b) of the CEQA Guidelines, the significance of an activity may vary with the setting. Per Appendix G of the CEQA Guidelines, the potential significance of project impacts related to noise were evaluated for each of the criteria listed in Table 3.12-1, as discussed in Section 3.12.5.3.

3.12.5.2 Applicant-Proposed Measures

No APMs are proposed.

3.12.5.3 Potential Impacts

Project impacts related to noise were evaluated against the CEQA significance criteria and are discussed below. This section evaluates potential project impacts during the construction phase and the operation and maintenance (O&M) phase.

The project includes reconductoring existing 60 kV and 230 kV electric utility lines between Fulton Substation and Fitch #1 Mountain Tap. The O&M activities required for the reconductored power and transmission lines will not increase from those currently required for the existing system; thus, no operation-related impacts related to noise will occur. Therefore, the impact analysis is focused on construction activities that are required to install the new conductor, replace and remove poles, perform minor substation modifications, and establish required access and work areas, as described in Chapter 2.0, Project Description.

a) Would the project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? *Less-than-Significant Impact*

New light-duty and tubular steel poles are proposed to be installed along much of the alignment. Each pole installation site can be considered a separate construction site. Construction at each pole site will include various activities depending upon pole type, including removing the existing poles, clearing the pole sites, excavating the foundations, grading, placing concrete, installing steel poles, and stringing wire. Construction equipment will also be utilized during the modification of facilities at Fitch Mountain Substation.

Construction will require the temporary use of noise-generating equipment. The construction equipment to be used is generally similar to that used during typical public works projects. Typical noise levels generated by the construction equipment listed in the project description have been calculated previously and published in various reference documents. The expected equipment noise levels listed in the FHWA *Roadway Construction Noise Model User's Guide* (FHWA 2006) were used for this evaluation. The user's guide provides the most recent comprehensive assessment of noise levels from construction equipment. Table 3.12-4: Typical Construction Equipment Noise Levels provides the average (L_{eq}) noise level at a reference distance of 50 feet.

Table 3.12-4: Typical Construction Equipment Noise Levels

Equipment Description	Specified L_{max} at 50 feet (dBA)
All Other Equipment > 5 horsepower	85
Auger Drill Rig	85
Backhoe	80
Crane	85
Dozer	85
Excavator	85
Grader	85
Tractor	84
Truck (Dump Truck, Water Truck)	84
Worker Lift	85
Notes: dBA = A-weighted decibels; L_{eq} = equivalent sound pressure level Source: FHWA 2006	

The equipment presented will not generally be operated continuously, nor will the equipment always operate simultaneously. Therefore, there will be times when no equipment is operating and noise will be at ambient levels. Typical usage factors for this type of construction equipment were obtained from the aforementioned FHWA user's guide, and applied to the provided sound levels to arrive at the average sound level that may occur during a typical workday. These usage factors are applied irrespective of workday duration, and account for the fact that equipment is not always operated at full-throttle conditions and is not used for an entire workday. Table 3.12-5: Construction Noise Levels Adjusted for Workday provides the construction sound levels—adjusted to reflect a typical workday—expected at various distances from a pole site, from 50 feet out to 1,000 feet, covering a range of distances to nearby sensitive receptors.

Table 3.12-5: Construction Noise Levels Adjusted for Workday

Equipment Description	Adjusted Noise Level for Workday (dBA)				
	50 feet	100 feet	200 feet	500 feet	1,000 feet
All Other Equipment > 5 horsepower	82	76	70	62	55
Auger Drill Rig	78	72	66	58	51
Backhoe	76	70	64	56	49
Crane	76	70	64	56	49
Dozer	81	75	69	61	54
Excavator	81	75	69	61	54
Grader	81	75	69	61	54
Tractor / Mower	75	69	63	55	48
Truck (Dump Truck, Water Truck)	81	75	69	61	54
Worker Lift	73	67	61	53	46

Helicopter work could potentially occur at any point along the lines, depending on conditions in the field during construction. Helicopter operation could occur as close as approximately 100 feet to any noise-sensitive area. Table 3.12-6: Maximum Helicopter Sound Levels provides the maximum sound levels at various distances for helicopter use. Helicopter use at any one location will be brief.

Table 3.12-6: Maximum Helicopter Sound Levels

Equipment Description	Maximum Noise Level (dBA)				
	100 feet	200 feet	500 feet	1,000 feet	2,000 feet
Light/Medium Helicopter at Takeoff	84	78	70	62	55
Sikorsky S61	100	94	88	80	73
Sikorsky Skycrane S64	102	96	90	82	75
Sources: TRC 2001; FAA 2004					

The project will utilize light and heavy-lift helicopters for construction. Heavy-lift helicopters generate significantly higher noise levels than light/medium helicopters. No practical mitigation measures exist for helicopter use. If heavy helicopter use is required, the Applicant will notify nearby noise sensitive receptors and advise them of the nature and timing of helicopter use.

Construction activities will be short term at each pole location (1 or 2 days), temporary, and limited to daytime hours, which is compatible with the local requirements. Modifications of the facilities at Fitch Mountain Substation will take approximately 2 months. If nighttime construction is necessary to continue work until a safe stopping point is reached, or if planned electrical outages (clearances) are scheduled at night, activities will be infrequent and short term in nature. Construction is expected to last a total of approximately 1 year, with work occurring between the hours of 7 a.m. and 7 p.m. As an ordinary construction restriction, functional mufflers will be maintained on all equipment to minimize noise levels during construction.

The project does not include a voltage increase and no increase in corona noise is expected. Although modifications are proposed as part of the bus work at the existing substations, no increases in noise are expected to result from the proposed alterations.

Therefore, the project will not exceed local noise standards and will result in less-than-significant impacts related to generation of noise levels in excess of standards established in local plans or ordinances.

b) Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels? *Less-than-Significant Impact*

Construction activities (e.g., ground-disturbing activities, including grading and movement of heavy construction equipment) may generate localized groundborne vibration and noise. The human response thresholds for vibration (refer to Table 3.12-3: Human Response to Transient Vibration) indicate that vibration is barely perceptible with a PPV of 0.035. Table 3.12-7: Vibration Source Levels for Construction Equipment at 50 Feet provides vibration source levels for some construction equipment that is expected to be utilized for the project. The source levels

have been normalized to a reference distance of 50 feet, which is approximately the closest any one single residence would be to any construction area.

Table 3.12-7: Vibration Source Levels for Construction Equipment at 50 Feet

Equipment[1]	PPV at 50 Feet
Caisson Drill (drilling rig)	0.031
Loaded Truck	0.027
Bulldozer	0.001

Notes:
1 Vibration levels listed are for typical equipment used during construction, and not all potential equipment used for the project is listed herein. The equipment used is considered to be representative of the equipment that will be used during construction of the project.
Source: FTA 2006

Referring to the data in Table 3.12-7: Vibration Source Levels for Construction Equipment at 50 Feet, vibration levels will be below the barely perceptible response level. Additionally, groundborne vibration and noise will occur during daytime hours and will be short term in duration. Therefore, construction of the proposed project will result in a less-than-significant impact.

c) Would the project result in substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project? *No Impact*

Project construction will not result in a permanent increase in ambient noise levels.

Operation and maintenance activities for the power line, transmission line, and substations will be similar in scope to existing operation and maintenance activities. Operation of the electrical power and transmission lines will not generate noise. Corona noise is typically not a design issue for electric utility lines rated at 230 kV and lower. No permanent increase in ambient noise levels will occur in the project vicinity. Therefore, there will be no impact.

d) Would the project result in substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project? *Less-than-Significant Impact*

Any increases in ambient noise levels in the project vicinity during construction will be short term, intermittent, and temporary. Adverse construction noise impacts (e.g., nighttime construction near residences) are not anticipated to occur and, if necessary for safety or clearance reasons, will be brief. Therefore, construction-related noise impacts will be less than significant.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, will the project expose people residing or working in the project area to excessive noise levels? *No Impact*

Construction, operation, and maintenance of the project will occur at a distance greater than 2 miles from any public airports; therefore, no impact will occur.

f) For a project within the vicinity of a private airstrip, will the project expose people residing or working in the project area to excessive noise levels? *No Impact*

No private airstrips are located within 2 miles of the project; therefore, no impact will occur.

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