5.13 Noise

5.13.1 Environmental Setting

This analysis evaluates the potential for the proposed project to impact the result in potential noise and vibration impacts.

Fundamentals of Noise and Vibration

Acoustical terms used in this analysis are defined in Table 5.13-1.

Table 5.13-1 Definition of Acoustical Terms

Term	Definition
Noise	Unwanted sound, which occurs as a rapid fluctuation of air pressure above and below the atmospheric pressure. There are two important characteristics of noise: frequency and loudness. The number of pressure variations per second is called the frequency of sound and is measured in Hertz. The higher the frequency, the more high-pitched a sound is perceived to be.
Decibel (dB)	Noise is measured in terms of sound-pressure level using units called decibels (dB). Since the range of intensities that the human ear can detect is large, the scale is based in multiples of 10, the logarithmic scale. Each interval of 10 dB indicates a sound energy 10 times greater. Loudness is measured in decibels; each interval is perceived by the human ear as being roughly twice as loud.
A-weighted decibel (dBA)	The most common system used by regulatory bodies for noise measurement is the A-weighted decibel (dBA) scale. This scale measures sound as an approximate to how a person perceives or hears sound. A-weighted sound levels are typically measured or presented as the equivalent sound pressure level (L_{eq}).
Equivalent sound pressure level (L_{eq})	The average noise level, on an equal energy basis for a stated period of time. Sound levels are usually best represented by an equivalent level over a given time period (L_{eq}) or by an average level occurring over a 24-hour day-night period (L_{dn}).
Statistical noise measurement	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 percentage of time the sound level is exceeded. For example, L_{90} represents the noise level exceeded during 90 percent of the measurement period. Similarly, L_{10} represents the noise level exceeded for 10 percent of the measurement period.
Day–night average sound level (L_{dn}) noise level	The L_{dn}, or day-night average sound level, is equal to the 24-hour A-weighted equivalent sound level that is weighted to account for differences in noise levels and the perception of noise during nighttime hours (10 p.m. to 7 a.m.). Most household noise also decreases at night, however, and exterior noise becomes more noticeable.
Day–night maximum sound level (L_{max}) noise level	The L_{max}, is the highest weighted sound level over a given time.
Community noise equivalent level (CNEL)	CNEL represents the average daytime noise level during a 24-hour day, adjusted to an equivalent level to account for the lower tolerance of people to noise during evening and night time periods relative to the daytime period. CNEL is specific to California.

Noise levels in communities usually relate to the intensity of nearby human activity. Perception of noise is also influenced by existing ambient noise (e.g., a quiet rural area compared to a busy city street). Noise levels are generally considered low below 45 dBA, moderate between 45 to 60 dBA , and high above 60 dBA. In wilderness areas, the L_{dn} is usually below 35 dBA. In small towns or wooded and lightly used residential areas, the L_{dn} is more likely around 50 to 60 dBA.

The general human response to changes in noise levels that are similar in frequency content (e.g., increases in continuous [L_{eq}] traffic noise levels) are summarized as follows:

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

Another community annoyance related to noise is vibration. As with noise, vibration can be described by both its amplitude and frequency. Vibration can be felt outdoors, but the perceived intensity of vibration impacts is much greater indoors, due to the shaking of structures. Factors that influence levels of ground-borne vibration and noise are the vibration source; soil conditions (type, rock layers, soil layering, and depth of water table); and factors related to the vibration receiver (foundation type, building construction, and acoustical absorption). Human response to vibration is difficult to quantify because vibration can be perceived at levels below those required to produce any damage to structures. Table 5.13-2 shows common human and structural response to vibration levels. Human response to vibration is usually assessed using amplitude indicators (root-mean square) or vibration velocity levels measured in inches per second or in decibels (VdB). The background velocity level in residential areas is usually 50 VdB, and the human threshold of perception is 65 VdB (FTA 2006).

Table 5.13-2 Human and Structural Response to Typical Levels of Vibration

Human/Structural Response	Vibration Velocity Level (VdB)	Typical Sources
Threshold, minor cosmetic damage to fragile buildings	100	Blasting from construction projects
Difficulty with tasks (e.g., reading a screen)	90	Bulldozers and other heavy tracked construction equipment
Residential annoyance, transient events	80	Commuter rail, upper range
Residential annoyance, continuous events	70	Rapid transit, typical
Human threshold of perception and limit for vibration sensitive equipment	65	Bus or truck, typical
No human response	50	Typical background vibration

Source: FTA 2006.
Key:
VdB = decibels of vibration velocity

Ambient Noise Sources in the Proposed Project Area

The majority of the project area consists largely of rural residential and agricultural uses, surrounded by undeveloped land with forest and vegetation. Existing noise sources in the proposed project area include agricultural equipment and vehicular traffic. Table 5.13-3 lists the typical sound levels for these existing noise sources, normalized to a reference distance of 50.0 feet.

Table 5.13-3 Existing Noise Sources in the Project Area

Noise Source	Sound Level[3]
Agricultural equipment[1]	56–81 dB L_{dn}
Vehicular traffic, Happy Valley Road[2]	58 dB L_{dn}
Vehicular traffic, Olinda Road[2]	63 dB L_{dn}

Source: Shasta County 2004; GPCAH 2014.
Notes:
[1] Typical agricultural equipment sound levels were obtained from the Great Plains Center for Agricultural Health.
[2] Vehicular traffic sound levels are documented in the Shasta County General Plan.
[3] Sound levels were normalized using the equation: $dB_x = dB_{ref} + 20 \log (d_{ref}/d_x)$, where dB_x is the decibel level at distance x, dB_{ref} is the decibel level at the reference distance, d_{ref} is the reference distance, and d_x is the distance that the desired decibel level (dB_x) is to be calculated for.

Sensitive Receptors

Noise- and vibration-sensitive receptors include residences and schools. Figure 5.13-1 shows all sensitive receptors within 1,000 feet of the proposed alignment, measured based on the distance of the proposed alignment to the physical structures (i.e., school building or house). Sensitive receptors for the proposed project include two schools and 735 residences in low-density settlement patterns. The Happy Valley Elementary School is more the 200 feet from the proposed alignment, and the Igo-Ono Elementary School is more than 600 feet south of the proposed alignment. The nearest residence is 48.2 feet from the proposed alignment and highlighted in Figure 5.13-1.

5.13.2 Regulatory Setting

Federal

The Federal Transit Administration (FTA) provides the following guidelines for construction noise and vibration thresholds along roadways:

- Greater than 90 dBA L_{eq} for daytime construction noise impacts in outdoor areas;
- Greater than 0.2 inch/second perturbation projection vector (PPV) for construction vibration damage to non-engineered timber and masonry buildings; and
- Greater than 75 VdB for human annoyance for groundborne vibration (FTA 2006).

These standards can be used as reference for noise impact analyses; however, there are no federal regulations that apply to the proposed project.

State

California Noise Control Act. Sections 46000 to 46080 of the California Health and Safety Code (i.e., the California Noise Control Act) declare excessive noise as a serious hazard to the public health and welfare and acknowledges the continuous and increasing bombardment of noise in urban, suburban, and rural areas. Furthermore, the state must provide an environment for all Californians free from noise that jeopardizes their health or welfare by protecting citizens' health and welfare through the control, prevention, and abatement of noise.

Local

Shasta County General Plan. Per Government Code Section 65302(f), the Noise element of the Shasta County General Plan is intended to guide the development of a noise-compatible land use pattern in the land use element. The following objectives are outlined in the plan.

- *N-1: To protect county residents from the harmful and annoying effects of exposure to excessive noise.*
- *N-2: To protect the economic base of the county by preventing incompatible land uses from encroaching upon existing or programmed land uses likely to create significant noise impacts.*
- *N-3: To encourage the application of state-of-the-art land use planning methodologies in the area of managing and minimizing potential noise conflicts.*

Shasta County does not have any noise ordinances, but the General Plan includes a policy for noise created by proposed non-transportation land use. Mitigation is required so the action does not exceed noise level standards measured immediately within the property line of adjacent lands designated as noise-sensitive. Tables 5.13-4 and 5.13-5 outline the county's noise level performance standards for new projects affected by, or including, non-transportation sources, as well as maximum allowable noise exposure for transportation noise sources. (Shasta County 2004)

Table 5.13-4 Noise Level Performance Standards for New Projects Affected by or Including Non-Transportation Sources[1]

Noise Level Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly L_{eq}, dB	55	50

Source: Shasta County 2004.

Note:

1 Transportation noise sources are defined as traffic on public roadways, railroad line operation, and aircraft in flight. Control of these noise sources is preempted by federal and state regulations. Other noise sources are presumed to be subject to local regulations, such as a noise control ordinance. Non-transportation noise sources may include industrial operations, outdoor recreation facilities, HVAC units, etc.

Table 5.13-5 Maximum Allowable Noise Exposure for Transportation Noise Sources

Land Use	Outdoor Activity Areas(1) L_{dn}/CNEL, dB	Interior Spaces	
		L_{dn}/CNEL, dB	L_{eq}, dB(2)
Residential	60(3)	45	--
Schools, Libraries, Museums	--	--	45

Source: Shasta County 2004.

Notes:

(1) Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use. Where it is not practical to mitigate exterior noise levels at patios or balconies of apartment complexes, a common area such as a pool or recreation area may be designated as the outdoor activity area.

(2) As determined for a typical worst-case hour during periods of use.

(3) Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, exterior noise levels of up to 65 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

In rural areas where large lots exist, the exterior noise level standards shall be applied at a point 100 feet away from the residence. Industrial, light commercial, commercial, and public service facilities that have the potential to produce objectionable noise levels at nearby noise-sensitive uses are dispersed throughout the county. Fixed-noise sources that are typically of concern include, but are not limited to, air compressors, drill rigs, and heavy equipment. The majority of the proposed project area is used for agriculture, with limited residential and commercial properties dispersed throughout.

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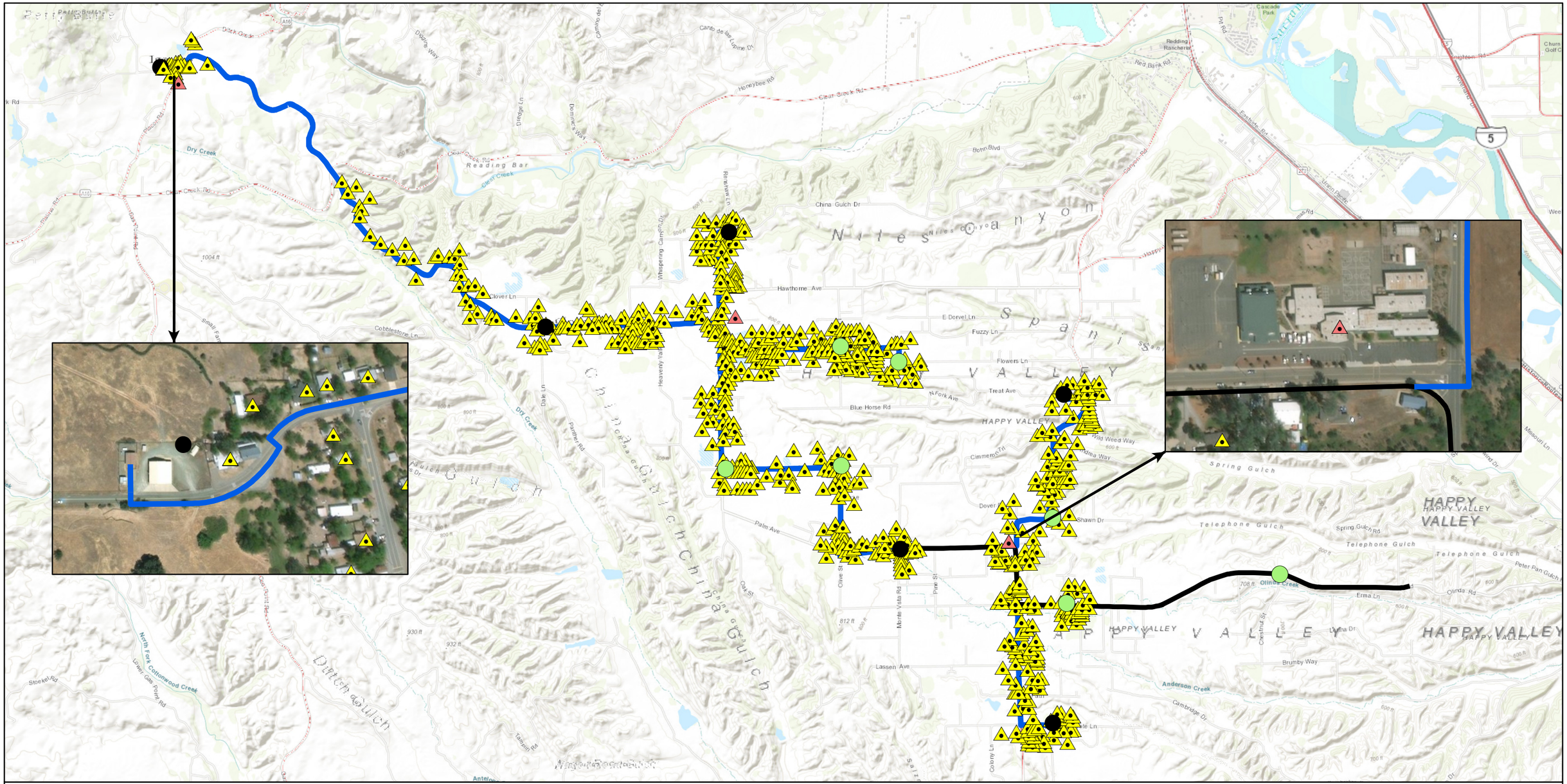

Figure 5.13-1
Sensitive Receptors within 1,000 Feet of the Proposed Alignment

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5.13.3 Environmental Impacts and Mitigation Measures

The impact analysis below identifies and describes the proposed project's potential impacts on ambient noise within the proposed project area. Potential impacts were evaluated according to significance criteria based on the checklist items presented in Appendix G of the CEQA Guidelines and listed at the start of each impact analysis section below. Both the construction and maintenance/operations phases were considered; however, because the construction phase could result in physical changes to the environment, analysis of construction phase effects warranted a more detailed evaluation. The proposed project would not be located within an airport land use plan area, within 2 miles of a public airport or public use airport, or in the vicinity of a private airstrip (the closest airstrip is 6.3 miles away). There would be no impact under criteria (c)), and a detailed discussion is therefore not provided.

Applicant Proposed Measures

The applicant would implement the following APMs to minimize or avoid potential impacts related to noise. Mitigation Measure (MM) GEN-1 requires implementation of these APMs to mitigate impacts on noise and vibration sensitive receptors and the impact analysis in this section applies these APMs to reduce impacts. A list of all project APMs is included in Table 4-2 in Chapter 4.

APM NOI-1: All construction equipment operation shall be limited to the hours of 7 a.m. to 7 p.m. Monday through Friday. No construction operations shall occur on weekends or holidays or during nighttime hours.

Significance Criteria

Table 5.13-6 describes the significance criteria from Appendix G of the CEQA Guidelines' noise checklist, which the CPUC used to evaluate the environmental impacts of the proposed project.

Table 5.13-6 Noise Checklist

Would the project result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b. Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c. 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?	☐	☐	☐	☒

a. Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction-related noise would be temporary, lasting an estimated 60 to 120 days. During construction, equipment operation would generate noise. Table 5.13-7 lists average maximum noise levels at 50 feet for construction equipment operating under full load conditions (i.e., maximum power output). Most of the 735 residences within 1,000 feet of the proposed alignment are more than 100 feet from the proposed alignment and would not be exposed to the maximum noise levels listed in Table 5.13-7. For the nearest sensitive receptor—a residence 48.2 feet from the proposed alignment— would be approximately 83 dBA L_{max} or 76 dBA 1-hour L_{eq} during directional boring operations, and exposure to maximum noise levels would be intermittent, given the transient nature of construction along the proposed alignment.

Table 5.13-7 Construction Equipment Maximum Noise Levels

Equipment	Maximum Noise Level (dBA) at 50 feet[(1)]
Bulldozer	82
Directional boring machine	83
Backhoe	78
Mud sucker	81
Compact excavator	79
Medium-duty truck (5 ton)	76
Air compressor	78
Pickup	75

Source: FHWA 2011

Notes:

(1) Noise levels from equipment would increase or decrease with distance from the construction site at a rate of approximately 6 dBA per doubling of distance.

Directional boring during construction would be used to install 5 miles of the cable alignment in 1,500-foot increments via three to four bore shots per day. Bulldozers would be used along 7 miles of the cable alignment in 1,000-foot increments. Similar noise levels would occur during plowing and trenching. On an hourly average basis, noise from directional boring operations would be within the range of ambient noise levels from agricultural operations, as described on Table 5.13-3. Exposure to maximum noise levels during construction would be intermittent and transient along the proposed alignment and would not be concentrated in one area for extended periods of time. Thus, the period of time a given residence or sensitive receptor may be subject to maximum levels would be on the order of hours, not days.

Shasta County does not have a construction noise ordinance. The standards described in the Noise Element of the general plan (Table 5.13-4) are not applicable for temporary construction noise. Since the proposed project would involve linear construction along existing roadways, the CPUC has selected the FTA referential construction noise threshold of 90 dBA 1-hour L_{eq} (see Section 5.13.2) for this analysis. Construction activities are characterized by variations in the power expended by equipment, with resulting variations in noise levels with time. Time-varying noise levels are converted into a single equivalent noise level (L_{eq}) for each piece of equipment during operation.

Using acoustical usage factors published by the Federal Highway Administration (FHWA), the 1-hour equivalent noise level during directional boring operations would be 76 dBA L_{eq}. This level would be below the 1-hour L_{eq} threshold of 90 dBA. Since the maximum anticipated noise level is below the FTA's threshold, and construction would not be concentrated in one area for extended periods of time, the proposed project would not result in significant exposure of persons to or generation of noise levels in excess of applicable standards.

While the proposed project would not result in generation of noise levels in excess of applicable standards established by the FTA, the applicant would also implement the following measures to minimize any noise impacts. **APM NOI-1** would limit hours for operation of all construction equipment operation to 7 a.m. to 7 p.m. Monday through Friday. Construction would not occur during nighttime hours or on weekends and holidays. Also, per **MM NOI-1**, the applicant would provide written notice to residences and landowners located within 50 feet of the proposed project alignment. The impact of the proposed project on noise would be less than significant with mitigation.

Significance: Less than significant with mitigation.

b. Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Plowing and trenching construction techniques used for buried line installation, as well as directional boring and general operation of construction equipment, would produce groundborne vibration. Plowing and trenching would be performed for 10.3 miles of the proposed alignment's total length (15.3 miles). Directional boring would be performed for 5 miles of the proposed alignment's total length.

At 48.2 feet, the distance of the nearest sensitive receptor, groundborne vibration—calculated for a bulldozer—would be approximately 45 VdB and 0.03 PPV, well below the FTA's threshold of 75 VdB for human annoyance and 0.2 PPV for construction vibration damage to non-engineering timber and masonry buildings. Since groundborne vibration would be well below FTA thresholds, the proposed project would have a less than significant impact.

The fiber-optic telecommunications cable (telecom line) would be buried along existing roads; therefore, operation of the proposed project would not result in any groundborne vibration or groundborne noise levels. The occasional maintenance activities performed by the applicant at the DLC sites would not generate groundborne vibration or groundborne noise levels since these activities would not involve the use of heavy duty equipment or vehicles.

Significance: Less than significant.

Mitigation Measures

See Section 5.43, "Biological Resources Air Quality" for **MM GEN-1**.

MM NOI-1 Notify Local Landowners of Construction Activities. The applicant shall provide written notice to residences and landowners located within 50 feet of proposed project alignment at least within five days of commencement of construction activities at the street where works will occur. The notice shall state the date of planned construction activity in proximity to that landowner's property and the range of hours during which maximum noise levels may be anticipated.

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