## 3.23 Noise

This section focuses on potential noise- and vibration-related impacts from implementing the Proposed Project. The State Water Board did not receive comments related to noise during the NOP public scoping process (Appendix A).

### 3.23.1 Area of Analysis

The Area of Analysis for noise and vibration effects associated with the Proposed Project includes areas in the vicinity of Copco No. 1, Copco No. 2, and Iron Gate reservoirs and along the haul routes in Siskiyou County, California (Figures 3.23-1 and 3.23-2). The Area of Analysis includes locations where there is a potential for noise and vibration impacts on sensitive receptors from construction, waste transportation, and construction worker commutes.

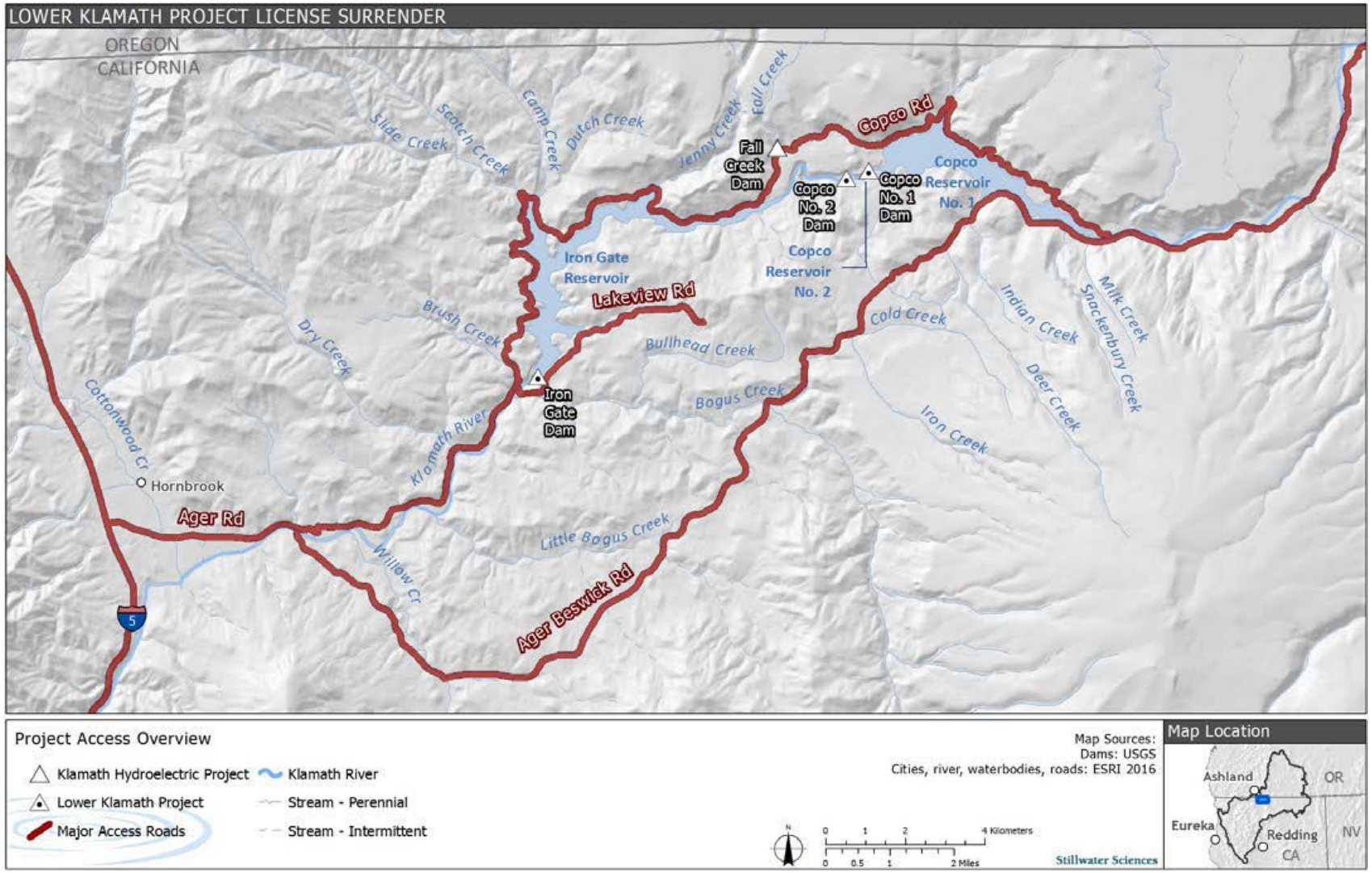


**Figure 3.23-1.** Proposed Project Access Overview.

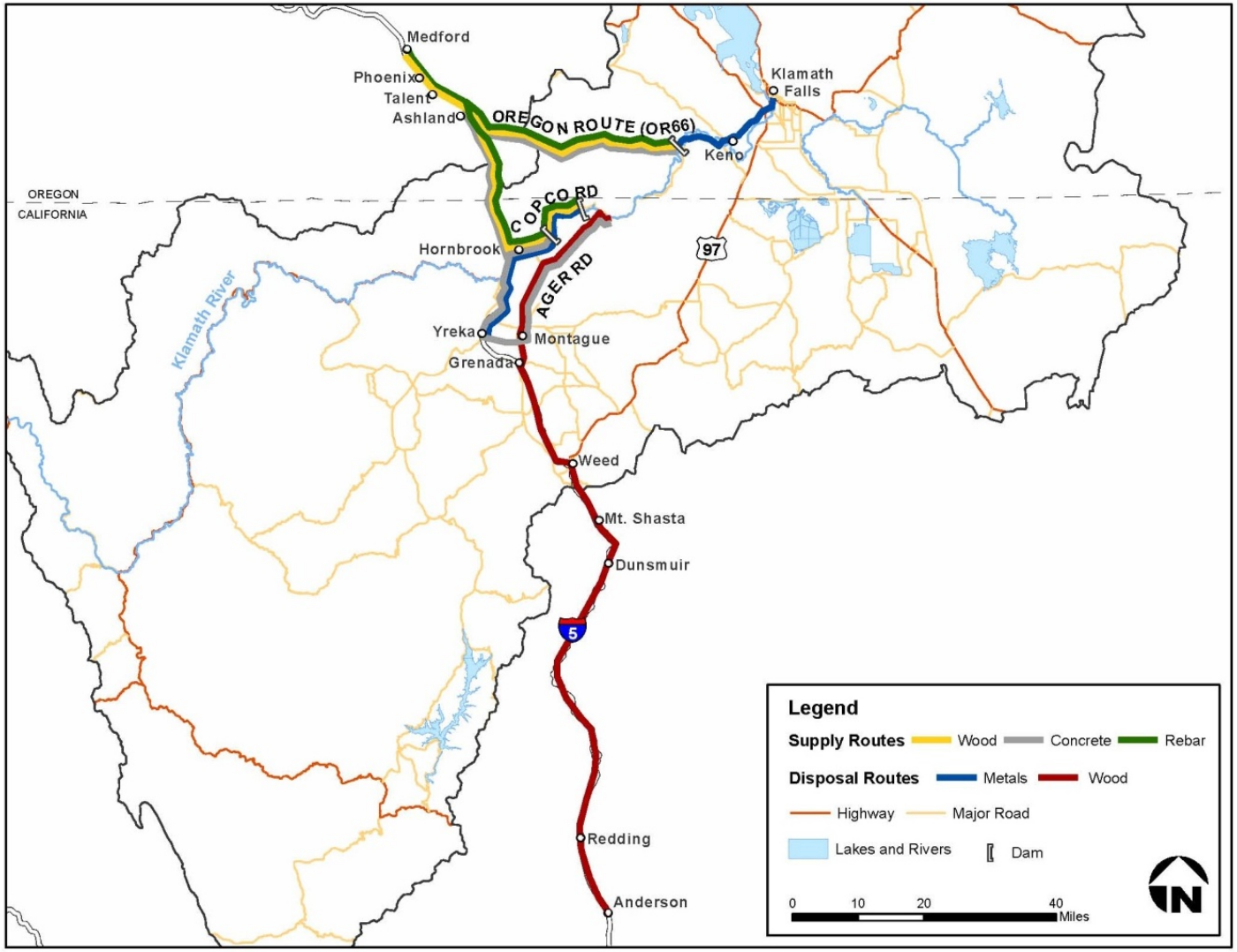


**Figure 3.23-2.** Primary Haul Routes from Lower Klamath Project Dam Sites.

### 3.23.2 Environmental Setting

This section provides a description of the environmental setting for noise and vibration in the Area of Analysis, including a brief overview of existing noise conditions in the Klamath Basin to set the stage for subsequent impact analyses.

#### 3.23.2.1 Noise Characteristics

Excessive human exposure to noise can result in adverse physical and psychological responses (hearing loss and other health effects, anger and frustration); can interfere with sleep, speech, and concentration; or can diminish the quality of life. The perceived loudness of sounds depends on many factors, including sound pressure level and frequency content. Sound pressure level is recorded in decibels (dB). While the threshold of human hearing (near-total silence) is approximately zero dB, in typical noisy environments, the healthy human ear generally does not perceive noise-level changes of one to two dB; however, people can begin to detect three dB increases in noise levels. An increase of 5 dB is generally perceived as distinctly noticeable, and a 10-dB increase generally is perceived as a doubling of loudness.

A doubling of sound energy corresponds to an increase of three dB. In other words, when two sources at a given location are each producing sound of the same loudness, the resulting sound level at a given distance from that location is approximately three dB higher than the sound level produced by only one of the sources. For example, if one automobile produces a sound pressure level of 70 dB when it passes an observer, two cars passing simultaneously do not produce 140 dB; rather, they combine to produce 73 dB.

The perception of loudness is generally predictable and can be approximated through frequency filtering, using the standardized A-weighting network, or A-scale (expressed as dBA). The A-weighting approximates the frequency response of the average young ear when listening to most everyday sounds. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-weighting sound levels of those sounds (California Department of Transportation [Caltrans] 2013). All noise levels reported in this analysis are in terms of A-weighting.

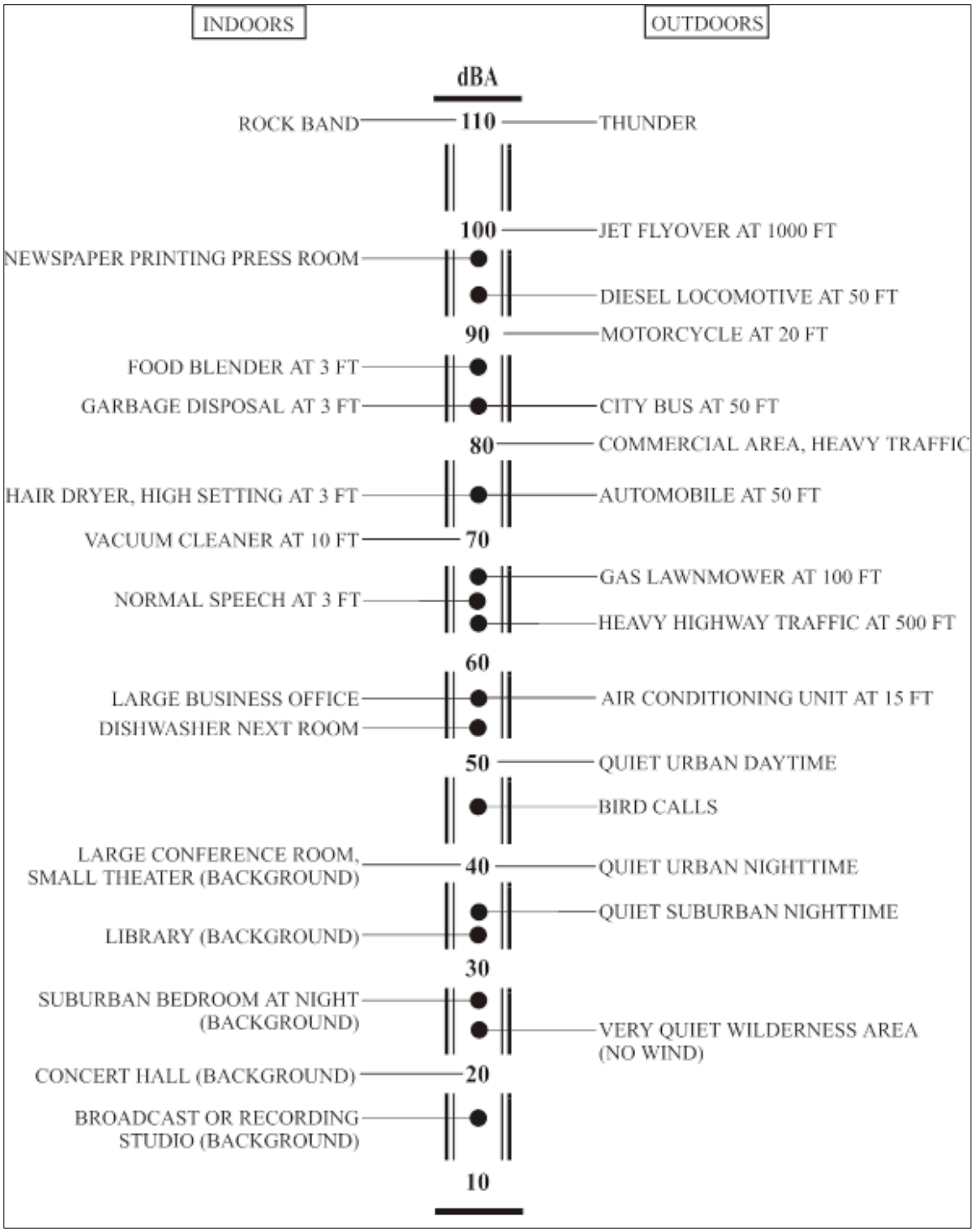


**Figure 3.23-3.** Decibel Scale and Common Noise Sources. Source: Caltrans 2013.

The following are the sound level descriptors commonly used and incorporated into this environmental noise analysis:

- Equivalent sound level ($L_{eq}$): An average of the sound energy occurring over a specified time period. In effect, the $L_{eq}$ is the steady-state sound level containing

the same acoustical energy as the time-varying sound that actually occurs during the same period. The one-hour, A-weighted equivalent sound level ($L_{eq}$[h]) is the energy average of A-weighted sound levels occurring during a one-hour period.

- Peak hour $L_{eq}$: The $L_{eq}$ during the hour with the highest $L_{eq.}$
- Maximum sound level ($L_{max}$): The highest instantaneous sound level measured during a specified period.

Sound from a localized source (i.e., point source) expands (propagates) uniformly outward from the source in a spherical pattern. The sound level attenuates due to the following factors (Caltrans 2013):

- Distance between source and receptor;
- Atmospheric effects and refraction;
- Ground absorption;
- Terrain (shielding by natural and manmade features, noise barriers, diffraction, and reflection).

Generally, sound levels attenuate at a rate of six dB for each doubling of distance from a point source (FHWA 2011). Sound from non-point "line" sources (roadways and highways) attenuates at a rate of three dB for each doubling of distance from the linear source.

### 3.23.2.2 Existing Noise Conditions

Noise-sensitive receptor locations (e.g., rural residences, schools, hospitals, rest homes, churches, long-term care facilities, mental care facilities, residences, convalescent nursing homes, hotels, certain parks) were identified within the Area of Analysis for noise and vibration based on a review of current topographic, aerial, and land use maps. Existing conditions ambient noise levels were identified for both daytime and nighttime. To estimate ambient noise levels at selected receptor locations, the average daytime $L_{eq}$ and nighttime outdoor $L_{eq}$ noise levels from the USEPA's *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (USEPA 1974) were used. Daytime is defined as the hours between 7:00 a.m. and 10:00 p.m. and nighttime is defined as the hours between 10:00 p.m. and 7:00 a.m. (USEPA 1974). Noise levels for rural residential areas in the USEPA document are lower than the levels presented in the Siskiyou County General Plan (Siskiyou County 1978); thus, it is more conservative to analyze the impacts using the USEPA levels. The following describe the ambient noise and existing sensitive receptors near Copco No. 1, Copco No. 2, and Iron Gate dams.

**Copco No. 1 Dam and Associated Facilities**

*Ambient Noise Condition*

The closest noise-sensitive receptor to Copco No. 1 Dam and powerhouse is the Janice Avenue rural residential area, located approximately 2,200 feet to the east of Copco No. 1 Dam (Figure 3.23-5). The estimated existing daytime and nighttime outdoor $L_{eq}$ at the Janice Avenue rural residential area are 40 and 30 dBA, respectively (USEPA 1974) (Table 3.23-1).


**Figure 3.23-4.** Copco 1 and 2 Noise Receptor (Closest Receptor to Copco No. 1 and Copco 2 No. Dams).

**Table 3.23-1.** Existing Noise Levels at Residential Receptors near Construction Sites.

| Construction Site | Nearest Receptor Description[1] | Distance from Construction Site (feet) | Estimated Existing Daytime $L_{eq}$ (dBA)[2] | Estimated Existing Nighttime $L_{eq}$ (dBA)[2] |
|---|---|---|---|---|
| Copco No. 1 Dam | Residential Area on Janice Ave, east of Copco No. 1 Dam | 2,200 | 40 | 30 |
| Copco No. 2 Dam | Residential Area on Janice Ave, east of Copco No. 1 Dam | 3,700 | 40 | 30 |
| Iron Gate Dam | Residential Area on Tarpon Drive, southwest of Iron Gate Dam | 4,500 | 40 | 30 |

Notes:
[1] Source: Google Maps 2018
[2] Source: USEPA 1974
Key:
dBA = A-weighted decibels
$L_{eq}$ = one-hour equivalent noise level

*Existing Roadway Traffic Noise*

Existing roadway traffic noise is present along Copco Road and Ager-Beswick Road, which are the proposed main off-site haul routes from the Copco No. 1 Dam and powerhouse construction site (Figure 3.23-1). The existing peak hour $L_{eq}$ for the Proposed Project haul routes at 50 feet and 500 feet from the edge of the roadway is summarized in Table 3.23-2.

The existing roadway traffic noise is based on the following information. Peak daytime hour noise level results from Traffic Noise Model, Version 2.5 (TNM2.5) were used for generic receptors located 50 and 500 feet from the edge of the road (50 feet represents the minimum distance for a receptor along any roadway, and 500 feet is the maximum recommended receptor distance for traffic noise models) (Caltrans 2013). Also, field observations conducted in 2012 provided the basis for estimating existing 1-hr $L_{eq}$ along Copco Road and Ager-Beswick Road. In 2012, the Federal Highway Administration (FHWA) TNM2.5 was used to estimate the existing daytime peak hour $L_{eq}$s along proposed haul routes (Appendix T). Peak-hour traffic was estimated by multiplying the average daily traffic by 10 percent based on a review of Caltrans 2009 average daily and peak hourly traffic data (Caltrans 2009). Average daily traffic values published by Caltrans (2009) were used to estimate the existing noise levels on Interstate 5 (I-5).

**Table 3.23-2.** Existing Daytime Peak Hour Leq along Proposed Haul and Commute Routes.

| Haul Route/Commute Segment | Existing Daytime Peak hour Leq (dBA)[1] | |
|---|---|---|
| | 50 feet | 500 feet |
| Ager-Beswick Road | 53 | 42 |
| Copco Road | 58 | 46 |
| I-5 between OR-66 and Yreka | 76 | 66 |

Notes:
[1] Daytime one-hour $L_{eq}$ estimated by modeling traffic counts using TNM2.5 (Appendix T).
dBA = A-weighted decibels
$L_{eq}$ = one-hour equivalent noise level
Sources: Caltrans 2009, ODOT 2010, USEPA 1974, Appendix T

## Copco No. 2 Dam and Associated Facilities

*Ambient Noise Condition*

The closest sensitive receptor to Copco No. 2 Dam is the residential area on Janice Avenue described above for Copco No. 1 Dam (Figure 3.23-5). The receptor is approximately 3,700 feet to the east of Copco No. 2 Dam. The estimated existing daytime and nighttime outdoor $L_{eq}$ at the residences on Janice Avenue, based on the USEPA information, are 40 and 30 dBA, respectively (USEPA 1974) (Table 3.23-1).

*Existing Roadway Traffic Noise*

Copco Road and Ager-Beswick Road are the proposed main off-site haul routes from the Copco No. 2 dam construction site (Figure 3.23-1). The existing peak hour $L_{eq}$ for the Proposed Project haul routes at 50 feet and 500 feet from the edge of the roadway is summarized in Table 3.23-2. The existing roadway traffic noise is based on the same information as described for Copco No. 1 Dam facilities.

## Iron Gate Dam and Associated Facilities

*Ambient Noise Condition*

The closest sensitive receptor to Iron Gate Dam is the fish hatchery complex (which includes staff residences as well as egg incubation, rearing, maintenance, and administration facilities), located approximately 1,200 feet downstream (Figure 3.23-6). However, PacifiCorp's residential properties, including the staff residences at the hatchery complex, would be unoccupied during Proposed Project construction activities and thus are not considered as a sensitive receptor for the purposes of this analysis. The next closest sensitive receptor to Iron Gate Dam is the rural residential land on Tarpon Drive, approximately 4,500 feet southwest of the dam, as shown on Figure 3.23-6. Based on the rural residential land use category, the existing daytime outdoor $L_{eq}$ on Tarpon Drive likely is 40 dBA and the existing nighttime outdoor $L_{eq}$ at this receptor is approximately 30 dBA (USEPA 1974) (Table 3.23-1).


**Figure 3.23-5.** Iron Gate Noise Receptors (Closest Sensitive Receptor to Iron Gate Dam).

*Existing Roadway Traffic Noise*
Existing traffic noise is assessed along Copco Road, located approximately 1,100 feet from Iron Gate Dam, as it would be the main off-site haul route from the Iron Gate Dam and powerhouse construction site (Figure 3.23-1). The existing peak hour $L_{eq}$ for the Proposed Project haul routes at 50 feet and 500 feet from the edge of the roadway is summarized in Table 3.23-2. The existing roadway traffic noise is based on the same information as described for Copco No. 1 Dam facilities.

#### 3.23.2.3 Airport Noise Levels

Siskiyou County owns four airports—in Weed, Fort Jones, Montague, and Dorris. The closest public airport to the Lower Klamath Project is Siskiyou County Airport in Montague, California, which is more than 10 miles south of Iron Gate Dam. No private or public airport or airfield is within two miles of the Lower Klamath Project. Airplanes and helicopters are proposed to be used during seeding as part of reservoir restoration activities (Section 2.7.4 *Restoration Within the Reservoir Footprint*), which would involve airport use. However, the airports themselves are not within the Proposed Project's Area of Analysis.

### 3.23.3 Significance Criteria

Significance criteria used for the determination of noise and vibration impacts are based on Appendix G of the CEQA Guidelines (California Code of Regulations title 14, section 15000 et seq.) and professional judgement. Noise and vibration effects are considered significant if the Proposed Project would result in one or more of the following conditions or situations:

- 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;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the Area of Analysis above levels existing without the Proposed Project; or
- A substantial short-term or periodic increase in ambient noise levels in the Area of Analysis above levels existing without the Proposed Project.

This section focuses on noise- and vibration-related impacts to humans. Construction-related noise disturbance and physical vibration (e.g., blasting and use of construction equipment) impacts on wildlife are addressed in Section 3.5 *Terrestrial Resources*.

#### 3.23.3.1 Thresholds of Significance

Noise and vibration levels in the Area of Analysis are regulated by the Siskiyou County General Plan Noise Element (Siskiyou County 1978), which contains criteria for maximum allowable noise levels from construction equipment (Table 3.23-3). There are no other applicable federal, state, or local regulatory levels for noise or vibration in the Area of Analysis.

**Table 3.23-3.** Siskiyou County General Plan Maximum Allowable Noise Levels from Construction Equipment.

| Equipment Type | Peak Noise Level at 100 feet (dBA) | Peak Noise Level at 50 feet (dBA)[1] |
|---|---|---|
| Earthmoving | | |
| Front Loaders | 75 | 81 |
| Backhoes | 75 | 81 |
| Dozers | 75 | 81 |
| Tractors | 75 | 81 |
| Scrapers | 80 | 86 |
| Graders | 75 | 81 |
| Trucks | 75 | 81 |
| Pavers | 80 | 86 |
| Materials Handling | | |
| Concrete Mixers | 75 | 81 |
| Concrete Pumps | 75 | 81 |
| Cranes | 75 | 81 |
| Derricks | 75 | 81 |
| Stationary | | |
| Pumps | 75 | 81 |
| Generators | 75 | 81 |
| Compressors | 75 | 81 |
| Impact | | |
| Pile Drivers | 95 | 101 |
| Jackhammers | 75 | 81 |
| Rock Drills | 80 | 86 |
| Pneumatic Tools | 80 | 86 |
| Other | | |
| Saws | 75 | 81 |
| Vibrators | 75 | 81 |

Source: Siskiyou County 1978

[1] Maximum allowable noise levels from construction equipment at 100 feet from Siskiyou County's General Plan were converted to noise levels at 50 feet (by adding 6 dBA to account for the halving of distance).

## Noise

Although the Proposed Project does not involve highway construction, federal and state highway traffic noise criteria provide a basis for analyzing traffic noise impacts. The FHWA requires highway agencies to define a "substantial" noise increase as an increase of 5 to 15 dBA over existing noise levels (23 CFR Part 772). Caltrans defines a "substantial" increase in noise levels from traffic as a predicted increase greater than or equal to 12 dBA at the receptor over existing 1-hour equivalent noise levels ($L_{eq}$) (Caltrans 2006).

For the purpose of this analysis, an action would be significant if it resulted in any the following:

- Use of construction equipment that exceeds Siskiyou County maximum allowable noise levels from construction equipment; or
- A greater than 10 dBA increase in the daytime or nighttime outdoor one-hour $L_{eq}$ at the receptor from onsite construction operations; or

- A greater than 12 dBA (in California) increase above existing one-hour $L_{eq}$ for traffic-related noise.

The criteria above were based on the characteristics of noise, published studies on vibration effects, and established regulations.

**Vibration**

Vibration from construction projects is caused by general equipment operations, and is usually highest during pile driving, soil compacting, jack hammering, demolition, and blasting activities. A PPV of 0.3 in/sec or greater can damage old residential structures from continuous or frequent vibration sources (Jones and Stokes 2004). The annoyance level for vibration is 72 VdB in residential areas (FTA 2006).

For the purpose of this analysis, an action would be significant if it resulted in any the following:

- A peak particle velocity (PPV) greater than 0.3 inches per second (in/sec) at the receptor
- A vibration velocity level in decibels ($L_v$) greater than 72 VdB at the receptor

The criteria above were based on the characteristics of noise, published studies on vibration effects, and established regulations. Although Siskiyou County does not have local significance criteria for vibration levels, the significance criteria itemized above are expected to provide a conservative analysis of vibration levels.

### 3.23.4 Impact Analysis Approach

Evaluating potential noise and vibration impacts considers the baseline of existing conditions compared with the impacts of the Proposed Project. Noise and vibration levels were determined for proposed construction equipment (including blasting) and construction-related traffic using the methods described below[173]. A more detailed method description, analysis results, and data supporting the analysis are included in Appendix T.

Noise and vibration impacts were modeled in 2011 as part of the 2012 EIS/EIR analysis (Appendix T). Although there have since been some modifications to the Proposed Project schedule, the 2011 noise and vibration impact modeling is still relevant as the construction-related noise and vibration-generating activities for the Proposed Project are materially similar (see Section 3.22 *Transportation and Traffic*) to those modeled in 2011. Minor changes in proposed construction activities between the 2012 EIS/EIR analysis and the Proposed Project are primarily due to the timing associated with removing Iron Gate Dam, Copco No. 1 Dam, and Copco No. 2 Dam. The Proposed Project and the data modeled as part of the 2012 EIS/EIR are compared to the thresholds noted in Section 3.23.3.1 *[Noise] Thresholds of Significance* and analyzed in Section 3.23.5 *[Noise] Potential Impacts and Mitigation*.

Principles and methods described in FHWA's Roadway Construction Noise Model User's Guide (FHWA 2006) were the basis for predicting noise impacts associated with construction equipment (Appendix T). Table 3.23-4 presents noise levels of common

[173] Construction-related impacts are considered to be short-term impacts.

construction equipment operating at full power ($L_{max}$) measured 50 feet from the source, the percentage of time the equipment would be operated at full power (usage factor), and the $L_{eq}$ over a single shift (Appendix T). For equipment whose $L_{max}$ in the Roadway Construction Noise Model exceeds the maximum allowable noise levels from construction equipment in the Siskiyou County General Plan Noise Element (1978), the upper limits from Siskiyou County were used (Siskiyou County 1978).

**Table 3.23-4.** Construction Operations, Equipment Types, and Their Noise Levels.

| Equipment Type | Usage Factor | $L_{max}$ at 50 feet (dBA) | $L_{eq}$ at 50 feet (dBA) |
|---|---|---|---|
| Air Compressor | 40 percent | 78 | 74 |
| Backhoe | 40 percent | 78 | 74 |
| Blasting | 1 percent | 94 | 74 |
| Compactor | 20 percent | 83 | 76 |
| Concrete Mixer Truck | 40 percent | 79 | 75 |
| Concrete Pump Truck[1] | 20 percent | 81 | 74 |
| Crane | 16 percent | 81 | 73 |
| Dozers[1] | 40 percent | 81 | 77 |
| Dump Truck | 40 percent | 77 | 73 |
| Excavator | 40 percent | 81 | 77 |
| Front End Loader | 40 percent | 80 | 76 |
| Generator | 50 percent | 81 | 78 |
| Generator (<25kVA) | 50 percent | 73 | 70 |
| Grader | 40 percent | 85 | 81 |
| Jackhammer[1] | 20 percent | 81 | 74 |
| Mounted Impact Hammer (hoe ram) | 20 percent | 90 | 83 |
| Pickup Truck | 40 percent | 75 | 71 |
| Pumps | 50 percent | 77 | 74 |
| Scraper | 40 percent | 84 | 80 |
| Tractor[1] | 40 percent | 81 | 77 |

Source: Appendix T

[1] Maximum allowable noise levels from construction equipment at 100 feet from Siskiyou County's General Plan were converted to noise levels at 50 feet (by adding 6 dBA to account for the halving of distance).

Groundborne vibration is energy transmitted in waves through the ground. Groundborne vibration can cause building floors to shake, windows to rattle, hanging pictures to fall off walls, and in some cases can damage buildings. Vibration attenuates at a rate of approximately six to nine vibration decibels (VdB) for each doubling of distance from the source (FTA 2006). A conservative reduction rate of six VdB per doubling of distance was used in this study. This approach considers only the attenuation from geometric spreading and tends to provide for a conservative assessment of vibration level at the receiver's location.

The effects of construction-related noise and vibration on wildlife are evaluated in Section 3.5 *Terrestrial Resources*, and the analysis includes potential impacts as a result of noise disturbance greater than ambient conditions. Species-specific noise impacts on northern spotted owl included noise disturbance distances developed in coordination with the Arcata USFWS office using an estimation of auditory and visual disturbance effects (USFWS 2006) including a 1-mile buffer around all dams to account for the

loudest noise disturbance distance associated with blasting, 0.5-mile buffer around all reservoirs to account for the loudest noise disturbance distance associated with helicopter use, and 0.25 mile buffer around all other areas within the Limits of Work to account for noise disturbance associated with heavy equipment.

The following source was assessed to determine the scope of existing local policies relevant to the Proposed Project:

- Siskiyou County General Plan Noise Element (Siskiyou County 1978).

The Siskiyou County General Plan Noise Element (1978) contains criteria for maximum allowable noise levels from construction equipment (Table 3.23-3). These criteria are discussed above in Section 3.23.3.1 *Thresholds of Significance* and the Proposed Project's potential conflict with these criteria is discussed below in Potential Impact 3.23-1.

## 3.23.5 Potential Impacts and Mitigation

This section summarizes the noise and vibration impacts that would be caused by the Proposed Project and recommends noise and vibration mitigation measures. The impact analysis for noise and vibration focuses on short-term construction-related activities, which include the pre-removal period, the dam removal period (zero to one years), and one to five years after dam removal, where the latter includes the majority of anticipated restoration and monitoring activities (Table 2.7-1 and Section 2.7.4 *Restoration Within the Reservoir Footprint*). While sporadic activities would occur throughout these periods and are analyzed herein, the following analysis is focused on the six-month period during the peak of the construction-related activity, when the three California dams would be removed. There would be no long-term noise and vibration impacts due to the Proposed Project as the Lower Klamath Project dam complexes would be removed.

Potential construction-related noise and vibration impacts on special-status wildlife species are evaluated in Section 3.5 *Terrestrial Resources,* including an analysis of potential short-term impacts to nesting birds (Potential Impact 3.5-12), willow flycatcher (Potential Impact 3.5-13), bald and golden eagles (Potential Impact 3.5-14), bats (Potential Impact 3.5-15), and northern spotted owl (Potential Impact 3.5-14).

**Potential Impact 3.23-1 Use of standard construction equipment could exceed Siskiyou County General Plan criteria for maximum allowable noise levels from construction equipment.**

For several specific types of construction equipment (specifically dozers, jackhammers, and tractors), the maximum allowable noise levels identified in the Siskiyou County General Plan Noise Element (Siskiyou County 1978) are lower than the typical noise levels produced by those equipment types according to the FHWA's Roadway Construction Noise Model User's Guide (FHWA 2006). This is summarized in Table 3.23-5. For the other 17 equipment types listed in the noise model, appropriate equipment noise levels consistent with FHWA 2006 were used. Given the maximum allowable noise levels identified in the Siskiyou County General Plan Noise Element (Siskiyou County 1978), any use of dozers, jackhammers, and/or tractors during the Proposed Project would constitute an exceedance of County maximum allowable noise levels and this would be a significant impact.

**Table 3.23-5.** Equipment Types for which Siskiyou County Maximum Allowable Noise Levels Exceed Typical Equipment Noise Levels.

| Equipment Type | Siskiyou County Maximum Allowable Noise Level at 50 feet (dBA)[1] | Typical Equipment Noise Maximum Sound Level at 50 feet (dBA)[2] |
|---|---|---|
| Dozers | 81 | 82 |
| Jackhammers | 81 | 89 |
| Tractors | 81 | 84 |

Source: Siskiyou County 1978, FHWA 2006

[1] Maximum allowable noise levels from construction equipment at 100 feet from Siskiyou County's General Plan were converted to noise levels at 50 feet (by adding 6 dBA to account for the halving of distance).

[2] Typical equipment noise levels at 50 feet are from FHWA 2006.

The Proposed Project includes a Noise and Vibration Control Plan (NVCP) (Appendix B: *Definite Plan – Appendix O5*) that would minimize short-term outdoor noise impacts, and which specifies that a Final NVCP, with additional details, would be required of the construction contractor. The proposed NVCP requires preparation and implementation of the Final NVCP and would be necessary to reduce potential noise impacts to the degree feasible. However the Final NVCP would not cause equipment noise levels from dozers, jackhammers, and tractors to comply with the Siskiyou County maximum allowable noise levels for these specific equipment types since the maximum allowable noise levels are lower than the typical noise levels produced by those equipment types according to the FHWA's Roadway Construction Noise Model User's Guide (FHWA 2006). Therefore, this impact would be significant and unavoidable.

**Significance**

*Significant and unavoidable*

**Potential Impact 3.23-2 Construction activities at Copco No. 1 Dam could cause short-term increases in daytime and nighttime noise levels affecting nearby residents.**

Noise disturbance associated with construction areas was evaluated to assess the potential to result in adverse physical and psychological responses (hearing loss and other health effects, such as anger and frustration), which can interfere with sleep, speech, and concentration; or diminish the quality of life. The Proposed Project would result in significant impacts if construction-related activities resulted in noise levels adversely affecting residents in the area.

The noise model (Appendix T) states that to comply with the Siskiyou County regulation, the maximum allowable noise level in the Siskiyou County General Plan Noise Element (1978) was used for equipment (specifically dozers, jackhammers, and tractors) whose maximum sound level ($L_{max}$) in the FHWA's Roadway Construction Noise Model User's Guide (FHWA 2006) exceeds the Siskiyou County regulation. This would cause the noise model (Appendix T) to slightly underestimate noise levels during construction. However, for the other 17 equipment types listed in the noise model, appropriate equipment noise levels consistent with FHWA 2006 were used.

The Proposed Project includes two shifts of construction workers to deconstruct each of the three California dams - Copco No. 1, Copco No. 2, and Iron Gate. At each dam the first work shift would be 6 a.m. to 4 p.m. and the second work shift would be 6 p.m. to 4 a.m. This would allow for 2-hour breaks between shifts for refueling and maintenance. Blasting would occur at each dam and would be restricted to 8 a.m. to 6 p.m. Note that the noise model (Appendix T) does not account for blasting during Shift 2 at Copco No. 1 Dam or during any work shift at Iron Gate Dam and thus underestimates the potential noise impacts. Both work shifts overlap with the daytime (defined as 7 a.m. to 10 p.m.) and nighttime (defined as 10 p.m. to 7 a.m.) (USEPA 1974). Table 3.23-6 lists the predicted average one-hour $L_{eq}$ at Copco No. 1 Dam and Iron Gate Dam and at the receptors, the existing $L_{eq}$ without the project, and the increase in noise level at the receptors that would occur as a result of the Proposed Project. (Copco No. 2 Dam removal was not analyzed as the line of sight to the closest receptor is assumed to be completely blocked, preventing noise disturbance at this receptor.) Significant increases in $L_{eq}$ caused by the Proposed Project are shown in bold. Although the threshold of significance for this impact is "a greater than 10 dBA increase in the daytime or nighttime outdoor one-hour $L_{eq}$ at the receptor from onsite construction operations," an increase of 9 dBA during Shift 2 at Copco No. 1 Dam was also identified as significant. This was meant to conservatively account for (1) the noise model's omission of blasting during Shift 2, and (2) the noise model's additional underestimation of construction noise due to use of Siskiyou County Maximum Allowable Noise Levels instead of typical noise levels for dozers, jackhammers, and tractors.

**Table 3.23-6.** Summary of Noise Levels from Construction Activities Compared to Existing.

| Location[1] | Time | Work Shift | Time of Day[2, 3] | $L_{eq}$ (dBA) | | | |
|---|---|---|---|---|---|---|---|
| | | | | At Construction Site (50 feet) | At Receptor with Proposed Project | Existing $L_{eq}$ (dBA)[4] | Increase in $L_{eq}$ Caused by Proposed Project[5] |
| Copco No. 1 Dam | midnight–4:00 a.m. | Shift 2 | Nighttime | 88 | 49 | 30 | **19** |
| | 4:00 a.m.–6:00 a.m. | no work | Nighttime | 30 | 30 | 30 | 0 |
| | 6:00 a.m.–7:00 a.m. | Shift 1 | Nighttime | 91 | 52 | 30 | **22** |
| | 7:00 a.m.–4:00 p.m. | Shift 1 | Daytime | 91 | 52 | 40 | **12** |
| | 4:00 p.m.–6:00 p.m. | no work | Daytime | 40 | 40 | 40 | 0 |
| | 6:00 p.m.–7:00 p.m. | Shift 2 | Daytime | 88 | 49 | 40 | **9** |
| | 7:00 p.m.–midnight | Shift 2 | Nighttime | 88 | 49 | 30 | **19** |

| Location[1] | Time | Work Shift | Time of Day[2, 3] | $L_{eq}$ (dBA) | | | |
|---|---|---|---|---|---|---|---|
| | | | | At Construction Site (50 feet) | At Receptor with Proposed Project | Existing $L_{eq}$ (dBA)[4] | Increase in $L_{eq}$ Caused by Proposed Project[5] |
| Iron Gate Dam | midnight–4:00 a.m. | Shift 2 | Nighttime | 91 | 45 | 30 | **15** |
| | 4:00 a.m.–6:00 a.m. | no work | Nighttime | 30 | 30 | 30 | 0 |
| | 6:00 a.m.–7:00 a.m. | Shift 1 | Nighttime | 91 | 45 | 30 | **15** |
| | 7:00 a.m.–4:00 p.m. | Shift 1 | Daytime | 91 | 45 | 40 | 5 |
| | 4:00 p.m.–6:00 p.m. | no work | Daytime | 40 | 40 | 40 | 0 |
| | 6:00 p.m.–7:00 p.m. | Shift 2 | Daytime | 91 | 45 | 40 | 5 |
| | 7:00 p.m.–midnight | Shift 2 | Nighttime | 91 | 45 | 30 | **15** |

Source: Appendix T
Notes:
[1] J.C. Boyle Dam removal was not analyzed because there are no receptors within one mile and it is located in Oregon. Copco No. 2 Dam removal was not analyzed because the line of sight to the closest receptor is assumed to be completely blocked.
[2] Daytime is defined as between the hours of 7:00 a.m. and 10:00 p.m. Source: USEPA 1974.
[3] Nighttime is defined as between the hours of 10:00 p.m. and 7:00 a.m. Source: USEPA 1974.
[4] Source: USEPA 1974. Also see Table 3.23-1.
[5] Bolded numbers indicate exceedances of significance threshold.

The predicted $L_{eq}$ from all construction equipment on a peak construction day at Copco No. 1 Dam is approximately 91 dBA at 50 feet during the first shift (6 a.m. to 4 p.m.) and 88 dBA during the second shift (6 p.m. to 4 a.m.) (Appendix T). Attenuation due to distance, atmospheric effects, ground absorption, and terrain effects would reduce this construction site's $L_{eq}$ by approximately 39 dBA at the nearest receptor. Compared to the daytime and nighttime existing outdoor noise levels of 40 and 30 dBA, the resulting increase at Copco No. 1 Dam ranges from 9 to 22 dBA, depending on the time of day (Table 3.23-6 and Appendix T). Work during both shifts exceeds the significance criteria at all times because of the high source noise level. This increase in outdoor noise levels would have a short-term significant noise impact on the residential area near Copco No. 1 Dam.

The Proposed Project includes a Noise and Vibration Control Plan (NVCP) (Appendix B: *Definite Plan – Appendix O5*) that would minimize short-term outdoor noise impacts, and which specifies that a Final NVCP, with additional details, would be required of the construction contractor. The proposed NVCP requires preparation and implementation of the Final NVCP and would be necessary to reduce potential noise impacts to the degree feasible. However, the Final NVCP would not be enough to reduce short-term construction-related noise impacts to less than significant levels at sensitive receptors. Therefore, noise impacts would remain significant and unavoidable for outdoor receptors during Copco No. 1 Dam deconstruction.

**Significance**
*Significant and unavoidable*

**Potential Impact 3.23-3 Construction activities at Copco No. 2 Dam could cause short-term increases in noise levels affecting nearby residents.**
As described in Potential Impact 3.23-2, the Proposed Project would result in significant impacts if construction-related activities resulted in noise levels adversely affecting residents in the area. The closest noise-sensitive receptor to Copco No. 2 Dam and Powerhouse is the Janice Avenue rural residential area, located approximately 3,700 feet to the east of Copco No. 2 Dam (Figure 3.23-4). The line of sight from the receptor to Copco No. 2 Dam is blocked by a hill. Due to the natural topography surrounding the dam and the distance between the dam and the receptor, noise from on-site construction activities at the Copco No. 2 Dam would be reduced by more than 65 dB (approximately 35 dB by the distance and an additional 30 dB due to the topography). This amount of noise reduction would reduce noise impacts to less than significant levels at sensitive receptors**.** Measures specified in the Final NVCP would further reduce noise levels.

**Significance**
*No significant impact*

**Potential Impact 3.23-4 Construction activities at Iron Gate Dam could cause short-term increases in nighttime noise levels affecting nearby residents.**
As described in Potential Impact 3.23-2, the Proposed Project would result in significant impacts if construction-related activities resulted in noise levels adversely affecting residents in the area. The Proposed Project includes two shifts of construction workers to deconstruct Iron Gate Dam. The first work shift would be 6 a.m. to 4 p.m. and the second work shift would be 6 p.m. to 4 a.m. This would allow for 2-hour breaks between shifts for refueling and maintenance. Blasting would occur at Iron Gate to break mass concrete at any of the facilities to be removed (including intake structures, control structures, fish handling facilities, and powerhouse). Blasting would not occur as part of excavation of the Iron Gate Dam embankment material. Blasting would be restricted to 8 a.m. to 6 p.m. It is noted that the noise model (Appendix T) did not account for blasting during any work shift at Iron Gate Dam. Both work shifts overlap with the daytime (defined as 7 a.m. to 10 p.m.) and nighttime (defined as 10 p.m. to 7 a.m.) (USEPA 1974). Table 3.23-6 lists the predicted average one-hour $L_{eq}$ at Iron Gate Dam and at the receptors, the existing $L_{eq}$ without the project, and the increase in noise level at the receptors that would occur as a result of the Proposed Project. Significant increases in $L_{eq}$ caused by the Proposed Project are shown in bold.

The predicted $L_{eq}$ from the Iron Gate facilities removal is approximately 91 dBA at 50 feet during both shifts (6 a.m. to 4 p.m. and 6 p.m. to 4 a.m.). The combination of existing noise and attenuation due to distance, atmospheric effects, ground absorption, and terrain effects would result in a $L_{eq}$ of approximately 46 dBA at the nearest receptor (Iron Gate Hatchery and associated facilities) (Table 3.23-6) (Appendix T). The estimated noise level at the receptor exceeds the significance criterion for nighttime noise during all proposed night work (7 p.m. to 4 a.m. and 6 a.m. to 7 a.m.). Construction noise would cause a short-term significant noise impact on the residential area near Iron Gate Dam at night. Implementation of the proposed NVCP (as described in Potential Impact 3.23-1) would reduce this noise impact; however, it would not reduce nighttime outdoor noise impacts to less than significant levels at sensitive receptors. Thus, nighttime noise impacts would remain significant and unavoidable for outdoor receptors during Iron Gate Dam nighttime deconstruction.

**Significance**
*Significant and unavoidable*

**Potential Impact 3.23-5 Reservoir restoration activities at Copco No. 1 and Iron Gate could result in short-term increases in noise levels affecting nearby residents.** The Proposed Project would result in significant impacts if reservoir restoration activities resulted in noise levels adversely affecting residents in the area. Equipment, including planes, barges, trucks, and helicopters, would be used for reservoir restoration at the same time as and subsequent to dam deconstruction. This reservoir restoration activity would add to the noise levels generated by dam deconstruction activities in and around the dam sites described above. Hydroseeding methods include by barge along the reservoir bank, by helicopter along steep slopes, by airplane along uneven large areas, and by trailer-mounted blower for areas easily accessible by truck. Equipment noise from embankment restoration would cause a short-term significant noise impact on the residential areas near the Copco No. 1 and Iron Gate reservoirs and contribute to the noise levels generated by dam deconstruction in and around the dam sites. The Proposed Project includes development of a NVCP (Appendix B: *Definite Plan – Appendix O5*) to minimize noise impacts from construction activities. Implementation of the Final NVCP would reduce short-term outdoor noise impacts, but given that they would add to already significant noise levels (Potential Impacts 3.23-2 and 3.23-4), noise impacts would remain significant and unavoidable for outdoor receptors during the reservoir restoration activities.

**Significance**
*Significant and unavoidable*

**Potential Impact 3.23-6 Blasting activities at Copco No. 1, Copco No. 2, and Iron Gate Dams could increase daytime vibration levels affecting nearby residents.** The Proposed Project would result in significant impacts if blasting activities resulted in vibration levels adversely affecting residents in the area. Blasting at each dam is proposed to occur infrequently, would be restricted to the time between 8 a.m. and 6 p.m., and would be dependent on scheduling. The predicted vibration levels at sensitive receptors are summarized in Table 3.23-7. Significant increases in PPV or $L_v$ caused by the Proposed Project are shown in bold. Blasting during the first shift at Copco No. 1 Dam is anticipated to result in PPV and $L_v$ at the nearest receptor of 0.065 in/sec and 84 VdB, respectively. For reference, vibration levels without blasting are 0.002 in/sec and 53 VdB (Table 3.23-7) (Appendix T). Therefore, the first shift at Copco No. 1 Dam would exceed the significance criteria for $L_v$ ($L_v$ greater than 72 VdB at the receptor). Construction activities during the second shift at Copco No. 1 (in which no blasting would occur) are anticipated to result in PPV and $L_v$ at the nearest receptor of 0.001 in/sec and 47 VdB, respectively. The vibration model (Appendix T) did not account for the proposed blasting at either of the other dams. Blasting at Copco No. 2 and Iron Gate is proposed to occur infrequently between 8 a.m. and 6 p.m. Therefore it is conservatively assumed that vibration levels at Copco No. 2 and Iron Gate dams during Shift 1 would also exceed the threshold of significance.

**Table 3.23-7.** Summary of Vibration from Construction Activities.

| Location[1] | Time of Day[2] | PPV at Receptor (in/sec) | $L_v$ at Receptor (VdB)[3] |
|---|---|---|---|
| Copco No. 1 Dam | Shift 1 | 0.065 (0.002 without blasting) | **84** (53 without blasting) |
| | Shift 2 | 0.001 | 47 |
| Copco No. 2 Dam | Shift 1 | **no data available**[4] | **no data available**[4] |
| | Shift 2 | no data available, but no blasting proposed[4] | no data available, but no blasting proposed[4] |
| Iron Gate Dam | Shift 1 | **no data available**[4] | **no data available**[4] |
| | Shift 2 | no data available, but no blasting proposed[4] | no data available, but no blasting proposed[4] |

Source: Appendix T

[1] J.C. Boyle was not analyzed because there are no receptors within one mile and it is in Oregon

[2] Shift 1 is 6:00 a.m. to 4:00 p.m. and Shift 2 is 6:00 p.m. to 4:00 a.m.

[3] Bolded numbers indicate exceedances of significance threshold(s)

[4] The Appendix T noise and vibration model did not include blasting at Copco No. 2 or Iron Gate dams.

Key:
in/sec = inches per second

Construction activities (including blasting) would result in significant human annoyance levels for daytime vibration impacts at receptors near each of the three dams. The Proposed Project includes a Noise and Vibration Control Plan (NVCP) (Appendix B: *Definite Plan – Appendix O5*) that would minimize short-term outdoor noise impacts, and which specifies that a Final NVCP, with additional details, would be required of the construction contractor. The proposed NVCP requires preparation and implementation of the Final NVCP and would be necessary to reduce potential noise impacts to the degree feasible. The Final NVCP would minimize short-term outdoor noise impacts during blasting activities, but would not reduce impacts to less than significant levels at sensitive receptors. Therefore, daytime vibration impacts to humans would remain significant and unavoidable for outdoor receptors during the blasting activities.

**Significance**
*Significant and unavoidable*

**Potential Impact 3.23-7 Transporting waste to off-site landfills and construction worker commutes could cause increases in traffic noise along haul routes affecting nearby residents.**

The Proposed Project would result in significant impacts if hauling or commuting activities resulted in noise levels adversely affecting residents along the haul routes. Noise effects from transporting waste and construction worker commutes were evaluated for receptors at 50 feet and 500 feet from the road. TNM2.5 modeling results showed only minor increases in existing $L_{eq}$ for receptors 50 feet or more from all haul routes analyzed (Table 3.23-8). Transporting waste off-site and construction worker commutes would result in less than significant noise impacts for receptors 50 feet or more from all local roadways. The Proposed Project includes a Noise and Vibration Control Plan (NVCP) (Appendix B: *Definite Plan – Appendix O5*) that would minimize short-term outdoor noise impacts, and which specifies that a Final NVCP, with additional details, would be required of the construction contractor. The proposed NVCP requires preparation and implementation of the Final NVCP and would be necessary to reduce potential noise impacts to the degree feasible. Implementation of the Final NVCP would

reduce short-term construction-related noise impacts along haul routes to less than significant.

**Table 3.23-8.** Summary of Construction-Related Traffic Noise from Off-site Hauling and Construction Worker Commuting for the Proposed Project.

| Haul Route/Commute Segment | Peak 1-hour $L_{eq}$ (dBA) | | Increase in $L_{eq}$ Caused by Proposed Project (dBA)[1] | |
|---|---|---|---|---|
| | 50 ft | 500 ft | 50 ft | 500 ft |
| Ager-Beswick Road | 54 | 43 | 1 | 1 |
| Copco Road | 63 | 51 | 5 | 5 |
| I-5: Between OR-66 and Yreka, CA | 77 | 66 | 0 | 0 |

Source: Appendix T

Notes:

[1] The increase in $L_{eq}$ may appear different when subtracting the existing 1-hour $L_{eq}$ from peak 1-hour $L_{eq}$ values due to rounding.

Key:

ft = feet

**Significance**

*No significant impact*

**Potential Impact 3.23-8 Construction activities associated with the Downstream Flood Control project component (moving or elevating legally established structures with flood risk) could produce noise and vibration associated with construction activities.**

Construction activities associated with the Downstream Flood Control project component (moving or elevating legally established structures located within the altered 100-year floodplain, where feasible) (Section 2.7.8.4 *Downstream Flood Control*) could produce noise and vibration associated with construction activities. The Downstream Flood Control project component includes moving or elevating structures that could be affected by changes to the 100-year flood inundation area as a result of dam removal. These activities would take place before or after the primary construction and deconstruction activities associated with the Proposed Project; therefore, noise from these activities would not add to the noise and vibration impacts. These construction activities are generally smaller efforts, compared to dam removal, and would not cause a substantial increase in noise to sensitive receptors. As a result, construction associated with the Downstream Flood Control project component would cause a less than significant noise and vibration impact to sensitive receptors.

**Significance**

*No significant impact*

**Potential Impact 3.23-9 Construction activities associated with implementation of Mitigation Measure WSWR-1 (modify water intakes) could produce noise and vibration associated with construction activities.**

Mitigation Measure WSWR-1 could produce noise and vibration associated with construction activities. It provides protection for downstream water intakes during the passage of eroded sediment, which may include installing temporary facilities (e.g., settling basins or groundwater wells). These activities would take place before or after the primary construction and deconstruction activities associated with the Proposed

Project; therefore, noise from these activities would not add to the noise and vibration impacts. These construction activities are generally smaller efforts, compared to dam removal, and would not cause a substantial increase in noise to sensitive receptors. As a result, construction associated with Mitigation Measure WSWR-1 would cause a less than significant noise and vibration impact to sensitive receptors.

**Significance**
*No significant impact*

**Potential Impact 3.23-10 Construction activities associated with the deepening or replacement of existing groundwater wells adjacent to the reservoirs could produce noise and vibration affecting nearby residents.**
Construction activities associated with deepening or replacing existing groundwater wells adjacent to the reservoirs (see Potential Impact 3.7-1) would take place before and/or after the primary construction and deconstruction activities associated with the Proposed Project (i.e., dam removal); therefore, they would not add to these noise and vibration impacts. Construction activities associated with the deepening or replacement of wells are generally smaller construction efforts that would not cause a substantial increase in noise to sensitive receptors. Therefore these activities would cause a less than significant noise and vibration impact to sensitive receptors.

**Significance**
*No significant impact*

### 3.23.6 References

Caltrans (California Department of Transportation). 2006. Traffic noise analysis protocol. Available at: http://www.dot.ca.gov/hq/env/noise/pub/2006_protocol.pdf.

Caltrans. 2009. 2009 traffic volumes on California State Highway System. Available at: http://www.dot.ca.gov/trafficops/census/docs/2009_aadt_volumes.pdf.

Caltrans. 2013. Technical noise supplement to the traffic noise analysis protocol. Sacramento, California.

FHWA (Federal Highway Administration). FHWA Roadway Construction Noise Model User's Guide.

FHWA. 2011. Highway traffic noise: analysis and abatement guidance.

FTA (Federal Transit Administration). 2006. Transit noise and vibration impact assessment.

Google Maps. 2018. "Northeastern CA." Available at: https://www.google.com/maps/@41.9398143,-122.4245844,61531m/data=!3m1!1e3. [Accessed November 2018.]

Jones and Stokes. 2004. Transportation- and construction-induced vibration guidance manual. June. (J&S 02-039.) Sacramento, CA. Prepared for California Department of Transportation, Noise, Vibration, and Hazardous Waste Management Office,

Sacramento, CA. Available at: http://www.dot.ca.gov/hq/env/noise/pub/vibrationmanFINAL.pdf. (Accessed 23 August 2017.)

ODOT (Oregon Department of Transportation). 2010. 2009 traffic volumes on state highways. Available at: https://www.oregon.gov/ODOT/TD/TDATA/tsm/docs/TVT_2009.pdf.

Siskiyou County. 1978. Siskiyou County General Plan Noise Element.

USEPA (U.S. Environmental Protection Agency). 1974. Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety.

USFWS (U.S. Fish and Wildlife Service). 2006. Transmittal of guidance: estimating the effects of auditory and visual disturbance to northern spotted owls and marbled murrelets in Northwestern California. Prepared by USFWS, Arcata Fish and Wildlife Office, Arcata, California.