

## 3.13 NOISE AND VIBRATION

This section includes a summary of applicable regulations related to noise and vibration, a description of ambient-noise conditions, and an analysis of potential noise impacts associated with the proposed program. Additional data is provided in Appendix D, "Noise Calculations."

Implementation of treatment activities under the program would not result in the operation of any substantial source of ground vibration, such as pile driving, drilling, boring, or rock blasting. Thus, treatments under the program would not result in the exposure of sensitive receptors to levels of excessive vibration or groundborne noise levels.

Implementation of treatment activities under the program would also not result in the long-term operation of any stationary noise sources or land use development, result in a permanent increase in noise-generating vehicle trips or other long-term or permanent noise-generating activity. Therefore, implementation of the program would not result in a permanent, ongoing increase in ambient noise levels anywhere in the program area. Finally, implementation of treatments under the program would not result in the siting of noise-sensitive land uses or receptors in the vicinity of a private airstrip, airport land use plan, or within two miles of a public airport. Therefore, groundborne vibration, permanent increases in ambient noise, and airport noise exposure are not discussed further.

No comments received on the notice of preparation were related to noise and vibration.

### 3.13.1 Regulatory Setting

#### FEDERAL

##### U.S. Environmental Protection Agency Office of Noise Abatement and Control

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at more local levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to state and local governments. However, documents and research completed by the EPA Office of Noise Abatement and Control continue to provide value in the analysis of noise effects.

##### Tahoe Regional Planning Agency

###### Tahoe Regional Plan

The elements of the Tahoe Regional Planning Agency (TRPA) Tahoe Regional Plan related to noise include the following: Noise Subelement of the Goals and Policies of the Regional Plan (TRPA 2012a); the TRPA Code of Ordinances, Chapter 68, "Noise Limitations" (TRPA 2012b); and plan area statements, community plans, and area plans. These elements are described below, followed by a summary of TRPA's region-wide traffic noise mitigation program.

###### Goals and Policies

The Regional Plan Noise Subelement of the Goals and Policies includes a goal to attain and maintain community noise equivalent level (CNEL) standards that are relevant to the proposed program (Goal N-2) (TRPA 2012a:2-26 through 2-28). The CNEL is 24-hour metric. More specifically, the CNEL is the energy average of the sound levels occurring over a 24-hour period, with a 10-decibel (dB) penalty applied to sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m. and a 5-dB penalty applied to the sound levels occurring during evening hours between 7 p.m. and 10 p.m. The transportation corridor CNEL values override land use-based CNELs within 300 feet of the applicable roadway (TRPA 2012a:2-26).

### Code of Ordinances

Chapter 68, "Noise Limitations," of the TRPA Code is intended to implement the Noise Subelement of the Goals and Policies document and to attain and maintain TRPA's noise-related threshold standards (shown below) (TRPA 2012b:68-1 to 68-5).

TRPA Code Section 68.4, "Community Noise Levels," states that TRPA shall use CNELs to measure community noise levels and that individual plan area statements shall set forth CNELs that shall not be exceeded by any one activity or combination of activities. The CNELs set forth in the plan area statements and area plans are based on the land use classification, the presence of transportation corridors, and the applicable threshold standard. Area plans and plan area statements essentially provide plan CNELs and other standards specific to a local area within the Tahoe Region.

Table 3.13-2 shows the CNEL thresholds established by TRPA for different land use types.

TRPA Code Section 68.9 states that the standards of this chapter shall not apply to noise from TRPA-approved construction or maintenance projects or the demolition of structures provided such activities are limited to the hours between 8:00 a.m. and 6:30 p.m.

### Thresholds

TRPA has established threshold standards for nine resources, including noise. There are two noise threshold indicators: single noise events and cumulative noise events. Both types of noise thresholds are summarized below as context for the current environmental analysis.

#### Single Noise Events

A noise event can be defined as an unexpected increase in acoustic. Single Noise Event Threshold Standards adopted by TRPA are based on the numerical value associated with the maximum measured level in acoustical energy during an event. This threshold establishes maximum noise levels for aircraft, watercraft, motor vehicles, motorcycles, off-road vehicles, and snowmobiles (TRPA 2012a:13–14).

#### Cumulative Noise Events

TRPA adopted CNEL standards for different zones within the Tahoe Basin to account for expected levels of serenity. The standards, established in the Goals and Policies, apply to the entire Lake Tahoe region (TRPA 2012a:14–15) and are shown in Table 3.13-1. These standards are referred to as "land use-based CNEL thresholds." TRPA's transportation corridor CNEL thresholds override land use-based CNELs within 300 feet of the applicable roadway (TRPA 2012a:2-26). TRPA's transportation corridor noise thresholds for US 50 and State Routes (SRs) 431, 28, 89, 207, and 267 override TRPA's land use based CNEL thresholds at all locations within 300 feet from the edge of the roadway.

**Table 3.13-1 TRPA Noise Thresholds**

Single Noise Events	Noise Measurement
<b>[Land Use-Based] Community Noise Equivalent Levels:</b>	
<b>Background levels shall not exceed the following:</b>	
Land Use Category	CNEL, dB
High Density Residential	55
Low Density Residential	50
Hotel/motel facilities	60
Commercial area	60
Industrial	65
Urban Outdoor Recreation	55
Rural Outdoor Recreation	50
Wilderness and Roadless Areas	45
Critical Wildlife Areas	45

Single Noise Events	Noise Measurement
Policy Statement: It shall be a policy of the TRPA Governing Board in the development of the Regional Plan to define, locate, and establish CNEL levels for transportation corridors.	
<b>Transportation [Corridor Noise Standards]<sup>1</sup></b>	
US 50	65 dB CNEL
State Routes 89, 207, 28, 267 and 431	55 dB CNEL
South Lake Tahoe Airport	60 dB CNEL <sup>2</sup>

Notes: CNEL = community noise equivalent level measurements are weighted average of sound level gathered throughout a 24-hour period; dB = decibels; dB = A-weighted decibels; mph = miles per hour; rpm = revolutions per minute.

<sup>1</sup> This transportation corridor noise threshold overrides the land use based CNEL thresholds and is limited to an area within 300 feet from the edge of the road.

<sup>2</sup> This threshold applies to those areas impacted by the approved flight paths.

Source: TRPA 2012b

**Table 3.13-2 Placer County Allowable  $L_{dn}$  Noise Levels Within Specified Zone Districts<sup>1</sup> Applicable to New Projects Affected by or Including Non-Transportation Noise Sources**

Zone District of Receptor	$L_{dn}$ (dB) at Property Line of Receiving Use	Interior Spaces (dB) <sup>2</sup>
Residential Adjacent to Industrial <sup>3</sup>	60	45
Other Residential <sup>4</sup>	50	45
Office/Professional	70	45
Transient Lodging	65	45
Neighborhood/General Commercial/Shopping Center	70	45
Heavy Commercial/Limited Industrial/Highway Service	75	45
Industrial	—	45
Industrial Park	75	45
Industrial Reserve	—	—
Airport	—	45
Unclassified	—	—
Farm/Agriculture Exclusive <sup>5</sup>	—	—
Recreation and Forestry	70	—

Notes:  $L_{dn}$  = Day-Night Noise Level; dB = decibels.

Except where noted otherwise, noise exposures will be those which occur at the property line of the receiving use.

Where existing transportation noise levels exceed the standards of this table, the allowable  $L_{dn}$  shall be raised to the same level as that of the ambient level.

If the noise source generated by, or affecting, the uses shown above consists primarily of speech or music, or if the noise source is impulsive in nature, the noise standards shown above shall be decreased by 5 dB.

Where a use permit has established noise level standards for an existing use, those standards shall supersede the levels specified in this table. Similarly, where an existing use which is not subject to a use permit causes noise in excess of the allowable levels in this table, said excess noise shall be considered the allowable level. If a new development is proposed which will be affected by noise from such an existing use, it will ordinarily be assumed that the noise levels already existing or those levels allowed by the existing use permit, whichever are greater, are those levels actually produced by the existing use.

Existing industry located in industrial zones will be given the benefit of the doubt in being allowed to emit increased noise consistent with the state of the art<sup>6</sup> at the time of expansion. In no case will expansion of an existing industrial operation because to decrease allowable noise emission limits. Increase emissions above those normally allowable should be limited to a one-time 5 dB increase at the discretion of the decision-making body.

The noise level standards applicable to land uses containing incidental residential uses, such as caretaker dwellings at industrial facilities and homes on agriculturally-zoned land, shall be the standards applicable to the zone district, not those applicable to residential uses.

Where no noise level standards have been provided for a specific zone district, it is assumed that the interior and/or exterior spaces of these uses are effectively insensitive to noise.

<sup>1</sup> Overriding policy on interpretation of allowable noise levels: Industrial-zoned properties are confined to unique areas of Placer County, and are irreplaceable. Industries which provide primary wage-earner jobs in the county, if forced to relocate, will likely be forced to leave the county. For this reason, industries operating upon industrial zoned properties must be afforded reasonable opportunity to exercise the rights/privileges conferred upon them by their zoning. Whenever the allowable noise levels herein fall subject to interpretation relative to industrial activities, the benefit of the doubt shall be afforded to the industrial use.

Where an industrial use is subject to infrequent and unplanned upset or breakdown of operations resulting in increased noise emissions, where such upsets and breakdowns are reasonable considering the type of industry, and where the industrial use exercises due diligence in preventing as well as correcting such upsets and breakdowns, noise generated during such upsets and breakdowns shall not be included in calculations to determine conformance with allowable noise levels.

<sup>2</sup> Interior spaces are defined as any locations where some degree of noise-sensitivity exists. Examples include all habitable rooms of residences, and areas where communication and speech intelligibility are essential, such as classrooms and offices.

<sup>3</sup> Noise from industrial operations may be difficult to mitigate in a cost-effective manner. In recognition of this fact, the exterior noise standards for residential zone districts immediately adjacent to industrial, limited industrial, industrial park, and industrial reserve zone districts have been increased by 10 dB as compared to residential districts adjacent to other land uses.

For purposes of the Noise Element, residential zone districts are defined to include the following zoning classifications:

AR, R-1, R-2, R-3, FR, RP, TR-1, TR-2, TR-3, and TR-4.

<sup>4</sup> Where a residential zone district is located within an -SP combining district, the exterior noise level standards are applied at the outer boundary of the -SP district. If an existing industrial operation within an -SP district is expanded or modified, the noise level standards at the outer boundary of the -SP district may be increased as described above in these standards.

Where a new residential use is proposed in an -SP zone, an Administrative Review Permit is required, which may require mitigation measures at the residence for noise levels existing and/or allowed by use permit as described under "NOTES," above, in these standards.

<sup>5</sup> Normally, agricultural uses are noise insensitive and will be treated in this way. However, conflicts with agricultural noise emissions can occur where single-family residences exist within agricultural zone districts. Therefore, where effects of agricultural noise upon residences located in these agricultural zones are a concern, an  $L_{dn}$  of 70 dB will be considered acceptable outdoor exposure at a residence.

<sup>6</sup> State of the art should include the use of modern equipment with lower noise emissions, site design, and plant orientation to mitigate offsite noise impacts, and similar methodology.

Source: Placer County 2013:145

## STATE

### California General Plan Guidelines

The State of California General Plan Guidelines 2017, published by the California Governor's Office of Planning and Research (OPR), provides guidance for the compatibility of projects within areas of specific noise exposure. Acceptable and unacceptable community noise exposure limits for various land use categories have been determined to help guide new land use decisions in California communities (OPR 2017). Many local jurisdictions use these guidelines to derive local noise standards and guidance.

## LOCAL

### Placer County

The Placer County General Plan Noise Element contains noise policies and standards (e.g., exterior and interior noise-level performance standards for new projects affected by or including non-transportation noise sources, and maximum allowable noise exposure levels for transportation noise sources) (Placer County 2013). The Placer County Noise Ordinance (Article 9.36 of the Placer County Code) contains noise limits for sensitive receptors (Placer County 2004). The applicable policies and standards contained in the General Plan and Ordinance are summarized below. Placer County land use noise standards are shown in Table 3.13-2.

#### Placer County General Plan

Policies from the Placer County General Plan that are relevant to the proposed program are described below.

- ▶ **Policy 9.A.2:** The county shall require that noise created by new non-transportation noise sources be mitigated so as not to exceed the noise level standards [as shown below in Table 3.13-2] as measured immediately within the property line of lands designated for noise-sensitive uses.

- **Policy 9.A.5:** Where proposed non-residential land uses are likely to produce noise levels exceeding performance standards [as shown in Table 3.13-2] at existing or planned noise-sensitive uses, the county shall require submission of an acoustical analysis as part of the environmental review process so that noise mitigation may be included in the project design.

The maximum allowable noise exposure limits for transportation noise sources in Placer County are summarized in Table 3.13-3.

**Table 3.13-3 Placer County Maximum Allowable Noise Exposure for Transportation Noise Sources**

Land Use	Outdoor Activity Areas <sup>1</sup> L <sub>dn</sub> /CNEL	Interior Spaces L <sub>dn</sub> /CNEL	Interior Spaces L <sub>eq</sub> dB <sup>2</sup>
Residential	60 <sup>3</sup>	45	
Transient Lodging	60 <sup>3</sup>	45	
Hospitals, Nursing Homes	60 <sup>3</sup>	45	
Theaters, Auditoriums, Music Halls			35
Churches, Meeting Halls	60 <sup>3</sup>		40
Office Buildings			45
Schools, Libraries, Museums			45
Playgrounds, Neighborhood Parks	70		

Note: CNEL = community noise equivalent level.

<sup>1</sup> 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.

<sup>2</sup> As determined for a typical worst-case hour during periods of use.

<sup>3</sup> Where it is not possible to reduce noise in outdoor activity areas to 60 L<sub>dn</sub>/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L<sub>dn</sub>/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.

Source: Placer County General Plan 2013

**Placer County Noise Ordinance**

Article 9.36 Noise of the Placer County Code defines sound level performance standards for sensitive receptors. Relevant standards are listed below.

**Article 9.36 Noise**

Noise level standards for sensitive receptors from Placer County Code Article 9.36 are shown in Table 3.13-4 below. The ordinance states that it is unlawful for any person at any location to create any sound, or to allow the creation of any sound, on property owned, leased, occupied, or otherwise controlled by such a person that causes the exterior sound level, when measured at the property line of any affected sensitive receptor, to exceed the ambient sound level by 5 dB or exceed the sound level standards (as set forth in Table 3.13-4), whichever is greater.

**Table 3.13-4 Placer County Noise Ordinance Noise Level Standards for Sensitive Receptors**

Sound Level Descriptor (dB)	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
Hourly L <sub>eq</sub>	55	45
L <sub>max</sub>	70	65
	— 100 —	

Note: dB = A-Weighted Decibel.

Source: Placer County 2004

Each of the sound level standards specified in Table 3.13-4 shall be reduced by 5 dB for simple tone noises, consisting of speech and music. However, in no case shall the sound level standard be lower than the ambient sound level plus 5 dB.

### Section 9.36.030 Exemptions

According to Section 9.36.030, "Exemptions," some noise-generating activities are exempt from the above noise ordinance standards. These are listed below.

- ▶ Construction that is performed between 6:00 a.m. and 8:00 p.m., Monday through Friday, and between 8:00 a.m. and 8:00 p.m. Saturday and Sunday, provided that all construction equipment is fitted with factory-installed muffler devices and maintained in good working order.
- ▶ Emergencies involving the execution of the duties of duly authorized governmental personnel and others providing emergency response to the general public, including but not limited to sworn peace officers, emergency personnel, utility personnel, and the operation of emergency response vehicles and equipment.

## El Dorado County

### El Dorado County General Plan

El Dorado County's Public Health, Safety, and Noise Element identifies public health and safety issues and provides guidance for protecting the health, safety, and welfare of residents in the county. The county's noise standards are provided within the Public Health, Safety, and Noise Element and vary between community regions, rural centers, and rural regions. The county defines community regions as areas that are appropriate for the highest intensity of self-sustaining compact urban development or suburban development (El Dorado County 2018:11). The county defines rural centers as areas of higher intensity development located throughout the rural areas of the county based on the availability of infrastructure, public services, existing uses, parcel size, and impacts on natural resources. The county classifies all lands not contained within the boundaries of a community region or a rural center as rural regions (El Dorado County 2018:13). The portion of the program area in El Dorado County does not include any designated community regions or rural centers and is considered a rural region. The following noise-related goals and policies identified in the El Dorado County General Plan Public Health, Safety, and Noise Element are applicable to the program (El Dorado County 2015:117–124).

- ▶ **Policy 6.5.1.2:** Where proposed non-residential land uses are likely to produce noise levels exceeding the performance standards of [General Plan] Table 6-2 (presented as Table 3.13-5 in this PTEIR) at existing or planned noise-sensitive uses, an acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be included in the project design.
- ▶ **Policy 6.5.1.3:** Where noise mitigation measures are required to achieve the standards of [General Plan] Tables 6-1 and 6-2 (presented as Tables 3.13-5 and 3.13-6 in this PTEIR), the emphasis of such measures shall be placed upon site planning and project design. The use of noise barriers shall be considered a means of achieving the noise standards only after all other practical design-related noise mitigation measures have been integrated into the project and the noise barriers are not incompatible with the surroundings.
- ▶ **Policy 6.5.1.7:** Noise created by new proposed non-transportation noise sources shall be mitigated so as not to exceed the noise level standards of [General Plan] Table 6-2 (presented as Table 3.13-5 in this PTEIR) for noise-sensitive uses.
- ▶ **Policy 6.5.1.9:** Noise created by new transportation noise sources, excluding airport expansion but including roadway improvement projects, shall be mitigated so as not to exceed the levels specified in [General Plan] Table 6-1 (presented as Table 3.13-6 in this PTEIR) at existing noise-sensitive land uses.
- ▶ **Policy 6.5.1.11:** The standards outlined in [General Plan] Tables 6-3, 6-4, and 6-5 shall not apply to those activities associated with actual construction of a project as long as such construction occurs between the hours of 7 a.m. and 7 p.m., Monday through Friday, and 8 a.m. and 5 p.m. on weekends, and on federally recognized holidays. Further, the standards outlined in Tables 6-3, 6-4, and 6-5 shall not apply to public projects to alleviate traffic congestion and safety hazards. (General Plan Tables 6-3 and 6-4 are not presented in this PTEIR because they apply to Community Regions and Rural Centers, none of which exist in the program area. General Plan Table 6-5 is presented as Table 3.13-7 in this PTEIR.)

- ▶ **Policy 6.5.1.12:** When determining the significance of impacts and appropriate mitigation for new development projects, the following criteria shall be taken into consideration:
  - A. Where existing or projected future traffic noise levels are less than 60 dB  $L_{dn}$  at the outdoor activity areas of residential uses, an increase of more than 5 dB  $L_{dn}$  caused by a new transportation noise source will be considered significant;
  - B. Where existing or projected future traffic noise levels range between 60 and 65 dB  $L_{dn}$  at the outdoor activity areas of residential uses, an increase of more than 3 dB  $L_{dn}$  caused by a new transportation noise source will be considered significant; and
  - C. Where existing or projected future traffic noise levels are greater than 65 dB  $L_{dn}$  at the outdoor activity areas of residential uses, an increase of more than 1.5 dB  $L_{dn}$  caused by a new transportation noise will be considered significant.
  
- ▶ **Policy 6.5.1.13:** When determining the significance of impacts and appropriate mitigation to reduce those impacts for new development projects, including ministerial development, the following criteria shall be taken into consideration:
  - A. In areas in which ambient noise levels are in accordance with the standards in Table 6-2 (presented as Table 3.13-6 in this PTEIR), increases in ambient noise levels caused by new non-transportation noise sources that exceed 5 dB shall be considered significant; and
  - B. In areas in which ambient noise levels are not in accordance with the standards in Table 6-2 (presented as Table 3.13-6 in this PTEIR), increases in ambient noise levels caused by new non-transportation noise sources that exceed 3 dB shall be considered significant.
  
- ▶ **Policy 6.5.1.14:** The county will adopt a noise ordinance to resolve neighborhood conflicts and to control unnecessary noise in the county. Examples of the types of noise sources that can be controlled through the use of a quantitative noise ordinance include noisy mechanical equipment (e.g., swimming pool pumps, HVAC units), and amplified music in commercial establishments.

**Table 3.13-5 El Dorado County Noise Level Performance Standards for Noise-Sensitive Land Uses Affected by Non-Transportation Sources in Community Centers**

Noise Level Descriptor	Daytime 7 a.m. – 7 p.m.	Evening 7 p.m. – 10 p.m.	Night 10 p.m. – 7 a.m.
Hourly $L_{eq}$ , dB	55	50	45
Maximum level, dB	70	60	55

Notes:  $L_{eq}$  = equivalent continuous sound level; dB = decibels.

Each of the noise levels specified above shall be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive tones.

Each of the noise levels specified above shall be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

The county can impose noise level standards which are up to 5 dB less than those specified above based upon determination of existing low ambient noise levels in the vicinity of the project site. In Community areas the exterior noise level standard shall be applied to the property line of the receiving property. The above standards shall be measured only on property containing a noise sensitive land use as defined in Objective 6.5.1. This measurement standard may be amended to provide for measurement at the boundary of a recorded noise easement between all effected property owners and approved by the county.

Source: El Dorado County 2015:121

**Table 3.13-6 El Dorado County Noise Level Standards for Noise-Sensitive Land Uses Affected by Transportation Noise Sources**

Sensitive Receptor	Outdoor Activity Areas <sup>1</sup> L <sub>dn</sub> /CNEL, dB	Interior Spaces L <sub>dn</sub> /CNEL, dB	Interior Spaces L <sub>eq</sub> , dB <sup>2</sup>
Residential	60	45	—
Transient Lodging	60	45	—
Hospitals, Nursing Homes	60	45	—
Theaters, Auditoriums, Music Halls	—	—	35
Churches, Meeting Halls, Schools	60 <sup>3</sup>	—	40
Office Buildings	—	—	45
Libraries, Museums	—	—	45
Playgrounds, Neighborhood Parks	70	—	—

Notes: L<sub>dn</sub> = day-night level; CNEL = community noise equivalent level; dB = decibels.

<sup>1</sup> In Communities and Rural Centers, where the location of outdoor activity areas is not clearly defined, the exterior noise level standard shall be applied to the property line of the receiving land use. For residential uses with front yards facing the identified noise source, an exterior noise level criterion of 65 dB L<sub>dn</sub> shall be applied at the building facade, in addition to a 60 dB L<sub>dn</sub> criterion at the outdoor activity area. In Rural Regions, an exterior noise level criterion of 60 dB L<sub>dn</sub> shall be applied at a 100-foot radius from the residence unless it is within Platted Lands where the underlying land use designation is consistent with Community Region densities in which case the 65 dB L<sub>dn</sub> may apply. The 100-foot radius applies to properties which are five acres and larger; the balance will fall under the property line requirement.

<sup>2</sup> As determined for a typical worst-case hour during periods of use.

<sup>3</sup> Where it is not possible to reduce noise in outdoor activity areas to 60 dB L<sub>dn</sub>/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L<sub>dn</sub>/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.

Source: El Dorado County 2015:120

**Table 3.13-7 El Dorado County Maximum Allowable Noise Exposure for Non-transportation Noise Sources in Rural Regions – Construction Noise**

Land Use Designation	Time Period	Noise Level (dB) Leq	Noise Level (dB) L <sub>max</sub>
All Residential (LDR)	7 a.m. – 7 p.m.	50	60
	7 p.m. – 10 p.m.	45	55
	10 p.m. – 7 a.m.	40	50
Commercial, Recreation, and Public Facilities (C, TR, PF)	7 a.m. – 7 p.m.	65	75
	7 p.m. – 7 a.m.	60	70
Rural Land, Natural Resources, Open Space, and Agricultural Lands (RR, NR, OS, AL)	7 a.m. – 7 p.m.	65	75
	7 p.m. – 7 a.m.	60	70

Notes: dB = decibels; L<sub>eq</sub> = equivalent continuous sound level; L<sub>max</sub> = maximum sound level; LDR = low-density residential; C = commercial; TR = tourist recreational; PF = public facilities; RR = rural residential; NR = natural resource; OS = open space; AL = agricultural lands.

Source: El Dorado County 2015:122

**El Dorado County Code**

The most recent noise standards for El Dorado County are stated in Chapter 130.37 of the zoning ordinance, which was adopted by the county on December 15, 2015. The ordinance includes standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses.

Section 130.37.020 provides an exemption for noise sources associated with construction during daylight hours provided that all construction equipment shall be fitted with factory installed muffling devices and maintained in good working order. This section also states that the use of any mechanical device, apparatus, or equipment related to or connected with emergency activities or emergency work to protect life or property shall be exempt from county noise standards.

Noise-sensitive land uses affected by non-transportation noise sources shall not exceed standards set forth in Table 130.37.060.1 of the County Code (presented as Table 3.13-5 in this PTEIR). Transportation noise shall not exceed thresholds set forth in Table 130.37.060.2 of the County Code (presented as Table 3.13-6 in this PTEIR).

## City of South Lake Tahoe

### General Plan

The Health and Safety Element of the City of South Lake Tahoe General Plan contains the following noise-related goals and policies applicable to the proposed program (City of South Lake Tahoe 2011: HS-9 to HS-13):

- ▶ **Policy HS-8.1: Annoying and Excessive Non-Transportation Noise Protection.** The City shall require all new non-transportation noise sources to not exceed the exterior noise level standards shown in Table HS-1 (presented as Table 3.13-8 in this PTEIR). These standards shall be measured from immediately within the property line of parcels designated as noise-sensitive uses.

**Table 3.13-8 Exterior Noise Level Performance Standards for New Projects Affected by or Including Non-Transportation Noise Sources**

Noise Level Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly $L_{eq}$ , dB	55	45

Note 1: Each of the noise levels specified above shall be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises (e.g., humming sounds, outdoor speaker systems). These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

The city can impose noise level standards that are more restrictive than those specified above based on determination of existing low ambient noise levels.

Fixed noise sources which are typically of concern include, but are not limited to, the following:

HVAC Systems	Cooling Towers/Evaporative Condensers
Pump Stations	Lift Stations
Emergency Generators	Boilers
Steam Valves	Steam Turbines
Generators	Fans
Air Compressors	Heavy Equipment
Conveyor Systems	Transformers
Pile Drivers	Grinders
Drill Rigs	Gas or Diesel Motors
Welders	Cutting Equipment
Outdoor Speakers	Blowers

The types of uses which may typically produce the noise sources described above include but are not limited to: industrial facilities including pump stations, trucking operations, tire shops, auto maintenance shops, metal fabricating shops, shopping centers, drive-up windows, car washes, loading docks, public works projects, batch plants, bottling and canning plants, recycling centers, electric generating stations, race tracks, landfills, sand and gravel operations, and athletic fields.

Note 2: For the purposes of the General Plan, transportation noise sources are defined as traffic on public roadways, railroad line operations, and aircraft in flight. Control of noise from these sources is preempted by federal and state regulations. Non-transportation noise sources may include industrial operations, outdoor recreation facilities, HVAC units, loading docks, etc.

Source: City of South Lake Tahoe 2011: HS-10

- ▶ **Policy HS-8.2: Annoying and Excessive Non-Transportation Noise Mitigation.** In instances where a noise-sensitive use is adversely affected by non-transportation noise levels in excess of standards shown in Table HS-1 (presented as Table 3.13-8 in this PTEIR), the City shall require appropriate mitigation to be incorporated into the project’s design in order to achieve the standards shown in Table HS-1 (presented as Table 3.13-8 in this PTEIR), as measured immediately within the property line or within a designated outdoor activity area of the project (at the discretion of the Community Development Director).
- ▶ **Policy HS-8.3: Overall Background Noise Mitigation.** The City shall not allow any project to increase the overall background noise levels at receiving land uses by 3 dB or more in instances when measured ambient noise levels exceed the standards contained within Table HS-1 (presented as Table 3.13-8 in this PTEIR).

- **Policy HS-8.5: New Transportation Noise Source Mitigation.** The City shall require the mitigation of new transportation noise sources to the levels shown in Table HS-2 (presented as Table 3.13-9 in this PTEIR) at all outdoor activity areas and interior spaces of existing noise-sensitive land uses.

**Table 3.13-9 Maximum Allowable Noise Exposure from Transportation Noise Sources in the City of South Lake Tahoe**

Land Use	Outdoor Activity Areas <sup>1</sup> L <sub>dtn</sub> /CNEL, dB Roadways	Outdoor Activity Areas <sup>1</sup> L <sub>dtn</sub> /CNEL, dB Railroads/Aircraft	Interior Spaces L <sub>dtn</sub> /CNEL, dB	Interior Spaces L <sub>eq</sub> , dB <sup>2</sup>
Residential	60 <sup>3</sup>	65 <sup>5</sup>	45	
Transient Lodging	65 <sup>4,5</sup>	65 <sup>4,5</sup>	45	
Hospitals, Nursing Homes	60 <sup>3</sup>	60 <sup>3</sup>	45	
Theaters, Auditoriums, Music Halls				35
Churches, Meeting Halls	60 <sup>3</sup>	65 <sup>5</sup>		40
Office Buildings				45
Schools, Libraries, Museums				45
Playgrounds, Neighborhood Parks	70	75		

<sup>1</sup> 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 on patios or balconies of apartment complexes, a common area such as a pool or recreation area may be designated as the outdoor activity area.

<sup>2</sup> As determined for a typical worst-case hour during periods of use.

<sup>3</sup> Where it is not possible to reduce noise in outdoor activity areas to 60 dB L<sub>dtn</sub>/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L<sub>dtn</sub>/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.

<sup>4</sup> For hotels, motels, and other transient lodging facilities where outdoor activity areas such as pool areas are not included in the project design, only the interior noise level criterion will apply.

<sup>5</sup> Where it is not possible to reduce noise in outdoor activity areas to 65 dB L<sub>dtn</sub>/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 70 dB L<sub>dtn</sub>/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.

Source: City of South Lake Tahoe 2011: HS-11

Note that the noise standards from the General Plan also apply to the portion of the city within the Tourist Core Area Plan, as stated in Policy LU-7.1 and Policy LU-7.2 of the Tourist Core Area Plan (City of South Lake Tahoe and TRPA 2013:5-3 to 5-4). Thus, land in the Tourist Core Area Plan is subject to both the city’s noise standards shown in Table 3.13-8 and the land use based CNEL standards of the Tourist Core Area Plan.

### 3.13.2 Environmental Setting

#### ACOUSTIC FUNDAMENTALS

Before discussing the noise setting for the program, background information about sound, noise, vibration, and common noise descriptors is needed to provide context and a better understanding of the technical terms referenced throughout this section.

#### Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a human ear. Noise is defined as loud, unexpected, annoying, or unwanted sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors

affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

## Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz, or thousands of hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

## Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.0000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this large range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 mPa.

## Addition of Decibels

Because decibels are logarithmic units, SPLs cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness at the same time, the resulting sound level at a given distance would be 3 dB higher than if only one of the sound sources was producing sound under the same conditions. For example, if one idling truck generates an SPL of 70 dB, two trucks idling simultaneously would not produce 140 dB; rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level approximately 5 dB louder than one source.

## A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz and perceive sounds within this range better than sounds of the same amplitude with frequencies outside of this range. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an “A-weighted” sound level (expressed in units of A-weighted decibels) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgment correlates well with the A-scale sound levels of those sounds. Thus, noise levels are typically reported in terms of A-weighted decibels. All sound levels discussed in this section are expressed in A-weighted decibels. Table 3.13-10 describes typical A-weighted noise levels for various noise sources.

**Table 3.13-10 Typical A-Weighted Noise Levels**

Common Outdoor Activities	Noise Level (dB)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1,000 feet	— 100 —	
Gas lawn mower at 3 feet	— 90 —	
Diesel truck at 50 feet at 50 miles per hour	— 80 —	Food blender at 3 feet, Garbage disposal at 3 feet

Common Outdoor Activities	Noise Level (dB)	Common Indoor Activities
Noisy urban area, daytime, Gas lawn mower at 100 feet	— 70 —	Vacuum cleaner at 10 feet, Normal speech at 3 feet
Commercial area, Heavy traffic at 300 feet	— 60 —	
Quiet urban daytime	— 50 —	Large business office, Dishwasher next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime	— 30 —	Library, Bedroom at night
Quiet rural nighttime	— 20 —	
	— 10 —	Broadcast/recording studio
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: California Department of Transportation (Caltrans) 2013a:2-20

## Human Response to Changes in Noise Levels

The doubling of sound energy results in a 3-dB increase in the sound level. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different from what is measured.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear can discern 1-dB changes in sound levels when exposed to steady, single-frequency (“pure-tone”) signals in the mid-frequency (1,000–8,000 Hz) range. In general, the healthy human ear is most sensitive to sounds between 1,000 and 5,000 Hz and perceives both higher and lower frequency sounds of the same magnitude with less intensity (Caltrans 2013b:2-18). In typical noisy environments, changes in noise of 1–2 dB are generally not perceptible. However, it is widely accepted that people can begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness (Caltrans 2013b:2-10). Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3-dB increase in sound would generally be perceived as barely detectable.

## Common Noise Descriptors

Noise in our daily environment fluctuates over time. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors used throughout this section.

**Equivalent Continuous Sound Level ( $L_{eq}$ ):**  $L_{eq}$  represents an average of the sound energy occurring over a specified period. In effect,  $L_{eq}$  is the steady-state sound level containing the same acoustical energy as the time-varying sound level that occurs during the same period (Caltrans 2013b:2-48). For instance, the 1-hour-equivalent sound level, also referred to as the hourly  $L_{eq}$ , is the energy average of sound levels occurring during a 1-hour period.

**Maximum Sound Level ( $L_{max}$ ):**  $L_{max}$  is the highest instantaneous sound level measured during a specified period (Caltrans 2013b:2-48; FTA 2006:2-16).

**Day-Night Level ( $L_{dn}$ ):**  $L_{dn}$  is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB “penalty” applied to sound levels occurring during nighttime hours between 10 p.m. and 7 a.m. (Caltrans 2013b:2-48; FTA 2006:2-22).

**Community Noise Equivalent Level (CNEL):** CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m. and a 5-dB penalty applied to the sound levels occurring during evening hours between 7 p.m. and 10 p.m. (Caltrans 2013b:2-48).

**Single Event [Impulsive] Noise Level (SENL):** The SENL describes a receiver’s cumulative noise exposure from a single impulsive noise event (e.g., an automobile passing by or an aircraft flying overhead), which is defined as an acoustical event of short duration and involves a change in sound pressure above some reference value. SENLs typically represent the noise events used to calculate the  $L_{eq}$ ,  $L_{dn}$ , and CNEL.

## Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which a noise level decreases with distance depends on the following factors:

### Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Roads and highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources, thus propagating at a slower rate in comparison to a point source. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.

### Ground Absorption

The propagation path of noise from a source to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling provides additional attenuation associated with geometric spreading. Traditionally, this additional attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver, such as soft dirt, grass, or scattered bushes and trees), additional ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the attenuate rate associated with cylindrical spreading, the additional ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance. This would hold true for point sources, resulting in an overall drop-off rate of up to 7.5 dB per doubling of distance.

### Atmospheric Effects

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels, as wind can carry sound. Sound levels can be increased over large distances (e.g., more than 500 feet) from the source because of atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also affect sound attenuation.

### Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction (Caltrans 2013b:2-41; FTA 2006:5-6, 6-25). Barriers higher than the line of sight provide increased noise reduction (FTA 2006:2-12). Vegetation between the source and receiver is rarely effective in reducing noise because it does not create a solid barrier unless there are multiple rows of vegetation (FTA 2006:2-11).

## EXISTING NOISE ENVIRONMENT

### Existing Noise- and Vibration-Sensitive Land Uses

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels, and because of the potential for nighttime noise to result in sleep disruption. Additional land uses such as schools, transient lodging, historic sites, cemeteries, and places of worship are also generally considered sensitive to increases in noise levels.

Noise-sensitive receptors near the program area include single family homes, multifamily residential dwellings, and schools.

## Existing Noise Sources and Ambient Levels

The predominant noise source in the program area is vehicle traffic traveling on SRs 28, 89, and 267 and U.S. 50. Other noise sources include motorized watercraft activity on Lake Tahoe, landscape maintenance and snow removal activities (e.g., grass cutting, leaf blowing, snow plowing and blowing) at residential and commercial land uses and along local roads, and activities typical of urban and suburban environments, such as people recreating outside. Helicopters and other aircraft also generate noise in the program area.

TRPA conducts a comprehensive evaluation of threshold standard status every 5 years. The most recent evaluation was completed in 2015 (TRPA 2016:10-4 through 10-6). This threshold evaluation determined that:

- ▶ the following areas in the Tahoe region are “somewhat worse than their target” with respect to their CNEL-based TRPA noise thresholds (as shown in Table 3.13-1): high-density residential areas, South Lake Tahoe Airport transportation corridor, and the SR 28, SR 89, SR 207, and SR 267 transportation corridors;
- ▶ there was insufficient data to determine the attainment status of the following areas in the Tahoe region with respect to their CNEL-based TRPA noise thresholds (as shown in Table 3.13-1): low-density residential areas, hotel/motel areas, commercial areas, industrial areas, urban outdoor recreation areas, rural outdoor recreation areas, wilderness and roadless areas, and the SR 431 and U.S. 50 transportation corridors; and
- ▶ some of the critical wildlife habitat areas are “considerably worse than target” with respect to TRPA’s 45 CNEL noise threshold for these areas.

TRPA is currently working on a new threshold evaluation that is expected to be completed in 2020.

## 3.13.3 Environmental Impacts and Mitigation Measures

### METHODOLOGY

The analysis of noise impacts focuses on the potential for nearby noise-sensitive receptors to experience a substantial temporary or permanent increase in ambient noise levels as a result of treatment implementation. Significance determinations account for the influence of relevant SPRs, which are incorporated into treatment design and listed below (also see Appendix B).

- ▶ **SPR NOI-1 Limit Heavy Equipment Use, Truck Hauling, and Helicopter to Daytime Hours:** The project proponent will require that operation of heavy equipment associated with treatment activities (heavy off-road equipment, tools, and delivery of equipment and materials) and hauling of equipment, merchantable timber, and biomass will occur during daytime hours if such noise would be audible to noise-sensitive receptors (e.g., residential land uses, schools, hospitals, places of worship). Placer County, El Dorado County, and the City of South Lake Tahoe exempt construction-noise (which would apply to noise generated by treatment activity) from locally established noise standards during particular daytime hours. The project proponent shall comply with the most stringent applicable local limits as listed in greater detail below:
  - In Placer County: 6:00 a.m. to 8:00 p.m., Monday through Friday, and 8:00 a.m. to 8:00 p.m. Saturday and Sunday;
  - In unincorporated areas of El Dorado County: all daylight hours; and
  - In the City of South Lake Tahoe: 8:00 a.m. to 6:30 p.m. on all days of the week.
- ▶ **SPR NOI-2 Equipment Maintenance:** The project implementer will require that all powered treatment equipment and power tools will be used and maintained according to manufacturer specifications. All diesel- and gasoline-powered treatment equipment will be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers’ recommendations.
- ▶ **SPR NOI-3 Engine Shroud Closure:** The project proponent will require that engine shrouds be closed during equipment operation.

- ▶ **SPR NOI-4 Locate Staging Areas and Landings Away from Noise-Sensitive Land Uses:** The project proponent will locate landings, equipment, and equipment staging areas away from nearby noise-sensitive land uses (e.g., residential land uses, schools, hospitals, places of worship), to the extent feasible, to minimize noise exposure. This would apply only to mechanical treatments.
- ▶ **SPR NOI-5 Restrict Equipment Idle Time:** The project proponent will require that all motorized equipment be shut down when not in use. Idling of equipment and haul trucks will be limited to 5 minutes.
- ▶ **SPR NOI-6 Notify Nearby Off-Site Noise-Sensitive Receptors:** For treatment activities utilizing heavy equipment, the project proponent will notify noise-sensitive receptors (e.g., residential land uses, schools, hospitals, places of worship) located within 1,500 feet of the treatment activity. Notification will include anticipated dates and hours during which treatment activities are anticipated to occur and contact information, including a daytime telephone number, of the project representative. Recommendations to assist noise-sensitive land uses in reducing interior noise levels (e.g., closing windows and doors) will also be included in the notification. This SPR applies only to mechanical treatment activities.
- ▶ **SPR NOI-7 Restrict Helicopter Flight Patterns:** Helicopter flight patterns will be designed to avoid and minimize flights over residential areas, the Granite Chief Wilderness, and the Desolation Wilderness. This would apply only to manual and mechanical treatments.

To assess noise generated by treatment activity, sensitive receptors that have the potential to be impacted and their relative exposure were identified in the program area. Treatment-generated noise levels were determined based on methodologies, reference noise levels, and usage factors from FTA's *Guide on Transit Noise and Vibration Impact Assessment* (FTA 2006), and other sources as needed for specialized equipment such as helicopters and wood chippers. See Appendix D for detailed calculations of treatment-generated noise levels. Reference noise levels for specific equipment and treatment activities are well documented and application of reference noise levels is a common practice in the field of acoustics.

As described in Section 3.13.2, "Environmental Setting," the SENL describes a receiver's cumulative noise exposure from a single impulsive noise event (e.g., a passing truck, a truck downshifting to engine brake, or an aircraft flying overhead), which is a rating of a discrete noise event that compresses the total sound energy of the event into a 1-second period, measured in decibels (Caltrans 2011). These noise events can be more startling to receptors if they occur when ambient noise levels are quieter, such as during nighttime hours.

Many studies have been conducted regarding the effects of single-event noise on sleep disturbance, but due to the wide variation in the reactions of test subjects to SENLs of various levels, no definitive consensus has been reached with respect to a universal criterion to apply. Based on its review of studies about sleep disturbance and SENLs, the Federal Interagency Committee on Aviation Noise (FICAN) provided estimates of the percentage of people expected to be awakened when exposed to specific SENLs inside a home (FICAN 1997). According to FICAN's review, 10 percent of the population is estimated to be awakened by an SENL interior noise level of 81 dB. An estimated 5 to 10 percent of the population is affected when the SENL interior noise level is between 65 and 81 dB, and few sleep awakenings (less than 5 percent) are predicted if the interior SENL is less than 65 dB. The SENL analysis is based on reference noise levels published by EPA.

## THRESHOLDS OF SIGNIFICANCE

Thresholds of significance are based on Appendix G of the State CEQA Guidelines, relevant TRPA thresholds, and reference SNEL noise levels published by EPA. A treatment implemented under the proposed program would result in a significant noise-related impact if it would:

- ▶ generate 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;
- ▶ for project areas located within the vicinity of a private airstrip or 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, expose people residing or working in the project area to excessive noise levels; or

- ▶ result in the exposure of residential receptors to sleep disturbance, including SENLs generated by trucks or helicopters at night.

## IMPACTS AND MITIGATION MEASURES

### Impact 3.13-1: Result in a Substantial Short-Term Increase in Exterior Ambient Noise Levels During Treatment Implementation

Treatment activities implemented under the proposed program would adhere local noise policies and ordinances to the extent that treatment activity is subject to them, limit later treatment activities to daytime hours, ensure proper notification of nearby sensitive receptors, locate treatment activities and staging areas away from sensitive receptors to minimize noise exposure, and design helicopter flight patterns to avoid and minimize flights over residential areas and wilderness areas. Additionally, any increase in noise exposure at nearby receptors would be temporary and periodic. Therefore, implementation of the proposed program would not result in the exposure of noise-sensitive receptors to a substantial temporary increase in ambient noise levels. This impact would be **less than significant**.

Treatment activities would typically be applied in combination to treat an area. Treatment methods would vary across the program area based on the fuel conditions, site topography, accessibility, ecological conditions, and other factors. The most noise-intensive treatment activities would be prescribed burns, mechanical treatment, and manual treatment. The typical equipment used for each noise-generating treatment activity, as described in Section 2.4 of Chapter 2, "Program Description," is summarized in Table 3.13-11.

**Table 3.13-11 Equipment by Treatment Activity**

Treatment Activity	Equipment Types
Manual Treatments	Chainsaws (4 to 8) Masticators Cable Skidder or Grapple Skidder Fire Engine Chippers (only used occasionally) Logging Trucks (only used occasionally) Helicopter (only used occasionally)
Mechanical Treatments	Chain Saws Harvesters Forwarders Skid Steer Excavators Dozers Loaders Chippers Masticators Feller-Buncher Rubber-tired Skidder Fire Engine Chippers (only used occasionally) Logging Trucks (only used occasionally)
Prescribed Burn	Fire Engines (2 to 10 engines) Bulldozers (up to 2) Masticators or Track Chippers Water Truck

Source: Compiled by Ascent Environmental in 2019

Reference noise levels for individual equipment used in treatment activities are summarized in Table 3.13-12.

**Table 3.13-12 Noise Levels from Individual Treatment Equipment**

Equipment Type	Typical Noise Level (dB) at 50 Feet <sup>1</sup>
Chain Saw	85
Dozer	85
Shears (on Backhoe)	85
Excavator	85
Flat Bed Trucks	84
Wood Chipper	75 <sup>2</sup>
Helicopter	83 dBA SENL @ 492 feet <sup>3</sup>

Notes: Reference noise levels are for equipment when fitted with a properly maintained and operational noise control device, per manufacturer specifications. Noise levels listed are manufacturer-specified noise levels for each equipment type.

<sup>1</sup> Reference noise levels from FTA 2006 except where indicated otherwise.

<sup>2</sup> Source: Berger et. al. 2010

<sup>3</sup> Source: Acoustical Analysis Associates 1993

### **Noise Generated by Ground Equipment**

As shown in Table 3.13-13, noise levels generated by individual ground equipment range from 75 to 85 dB at 50 feet from the noise source. Though multiple pieces of equipment would be operated simultaneously to implement a treatment they would typically be spread out (i.e., usually more than 100 feet apart) rather than operating next to each other. This is particularly true of larger, heavy-duty off-road equipment such as masticators, chippers, bulldozers, skid steers, and excavators that could be used in mechanical treatments. This helps ensure worker safety and maximizes efficiency.

Although all pieces of heavy equipment could operate simultaneously during some treatments, because of the size of the treatment sites and the spatial operational constraints of heavy equipment—not many could operate in close proximity to one another because of function and size—it is unlikely that all pieces of equipment would operate in close proximity to each other near the boundaries of an individual treatment site. Therefore, it is unlikely that noise from multiple pieces of equipment would combine to affect the same noise-sensitive receptor for an extended period. However, this analysis conservatively assumes that four of the highest noise-generating pieces of equipment could operate simultaneously in close proximity to the same off-site noise-sensitive receptor.

Table 3.13-13 shows the combined noise level at 50 feet from the source for each noise-generating treatment activity, assuming four of the loudest pieces of equipment listed in Table 3.13-12 are operated next to each other. See Appendix D for the specific equipment assumed to be operated under each treatment activity and the associated noise calculations.

**Table 3.13-13 Noise Levels from Treatment Activities**

Treatment Activity	Noise Level (L <sub>eq</sub> dB) at 50 feet	Noise Level (L <sub>max</sub> dB) at 50 feet
Manual Treatment	87	91
Mechanical Treatment	87	91

Notes: dB = decibels; L<sub>eq</sub> = Equivalent Continuous Sound Level.

Noise levels assume all equipment is fitted with a properly maintained and operational noise control device, per manufacturer specifications. Noise levels listed are manufacture-specified noise levels for each piece of heavy construction equipment. Noise levels do not include periodic and occasional helicopter use.

Source: FTA 2006

As shown in Table 3.13-14, the highest noise-generating pieces of equipment used for manual treatment or mechanical treatment produce the same noise levels, 87 dB  $L_{eq}$  and 91 dB  $L_{max}$ . The same equipment may also be involved in the preparation work conducted before a prescribed understory burn or to gather vegetative material for a pile burn. Manual treatment activity could take place on sites adjacent to residential parcels and mechanical treatments would more often be performed in locations further from residences and other developed lands. Thus, it is assumed that noise-sensitive receptors near treatment activity sites could experience elevated noise levels. However, any increase in ambient noise levels exposure at nearby receptors would be temporary and periodic.

### Helicopter Noise

A helicopter may be used to remove merchantable timber from areas that cannot be easily accessed by haul trucks. The noise level generated from operating a Kaman K-Max K-1200 helicopter, which has a maximum takeoff load of 6,000 pounds, is approximately 83 dB SENL below the helicopter and at a hover distance of 492 feet above the ground (Acoustical Analysis Associates 1993:1). The equivalent continuous sound level (i.e.,  $L_{eq}$ ) generated by a helicopter would vary according to multiple factors, including height, speed, the amount of time it spends hovering in one place, the engine load, and relative orientation to the receptor.

Due to the inherently remote nature of the program area where helicopters might be used, it is assumed that noise-sensitive receptors would not be in close proximity to these treatment sites. Noise-sensitive receptors could be exposed to helicopter noise during approach and takeoff procedures or when it travels to and from these remote sites. Thus, a helicopter would not be used near the same noise-sensitive land use for an entire day. Additionally, for safety and visibility reasons, helicopters would be used only during the day. Therefore, overall, any exposure of sensitive receptors to noise generated by helicopter activity would be brief, infrequent, and, pursuant to SPR NOI-1, would not occur during noise-sensitive evening and nighttime hours. Also, pursuant to SPR NOI-7, helicopter flight patterns will be designed to avoid and minimize flights over residential areas, the Granite Chief Wilderness, and the Desolation Wilderness.

### **Conclusion**

Treatment activities under the proposed program would integrate various SPRs into treatment design to reduce exposure to noise generated by treatment activities. SPRs that avoid and minimize noise exposure are SPRs NOI-1, NOI-4, NOI-6, and NOI-7. SPR NOI-1 restricts treatment activities to daytime hours if such noise would be audible to noise-sensitive receptors (e.g., residential land uses, schools, hospitals, places of worship). SPR NOI-4 would require treatment activities and landing areas be located away from sensitive receptors to the extent feasible to minimize noise exposure. SPR NOI-6 requires notification be provided to nearby sensitive receptors when heavy equipment would be used for a treatment. Additionally, SPR NOI-7 required helicopters to avoid and minimize flights over residential areas, the Granite Chief Wilderness, and the Desolation Wilderness.

SPRs to reduce noise levels during treatment would also be integrated into treatment design. SPR NOI-2 requires all equipment to be maintained appropriately and equipped with the proper intake and exhaust shrouds. SPR NOI-3 requires all equipment engine shrouds to be closed during operation. SPR NOI-5 restricts equipment idling time.

Each later treatment activity under the proposed program would be required to adhere to the applicable SPRs identified above that avoid and minimize exposure to noise and reduce noise levels during treatment. Any increase in noise exposure at nearby receptors would only occur during daytime hours; thus, avoiding the potential to cause sleep disturbance to residents during the more noise-sensitive evening and nighttime hours. Although noise-sensitive receptors near treatment sites could experience a temporary increase in ambient noise levels, this increase would not be substantial with implementation of SPRs. This impact would be **less than significant**.

### **Mitigation Measures**

No mitigation is required for this impact.

### Impact 3.13-2: Result in a Substantial Short-Term Increase in Truck-Generated SENLs During Treatment Activities

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Because treatment activities conducted under the proposed program would be required to adhere to SPR NOI-1, which limits treatment activities to daytime hours, SENLs generated by associated haul truck trips would not have the potential to result in sleep disturbance during noise-sensitive evening and nighttime hours. For this reason, implementation of the program would not result in a substantial temporary increase in SENLs during treatment activities. This impact would be **less than significant**.

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Treatment activity would result in worker trips and haul truck trips to and from the treatment sites. There would be up to 10 workers per manual or mechanical treatment crew and 20–25 workers per prescribed burn treatment crew (including fire engines and support crews). Heavy-duty truck trips would be associated with the hauling of equipment, hauling of merchantable timber to mills, and hauling of chipped biomass to biomass power facilities. The number of haul trips and worker trips to and from the treatment sites would vary based on the size of the area being treated, the type of treatment being implemented, and the duration of the treatment activities. The roadway segments affected by treatment activities analyzed under the proposed program would vary by treatment site. Additionally, treatment activities under the proposed program would be temporary in nature; and thus, would not result in long-term operational increases in vehicular traffic along roadways surrounding treatment sites. Therefore, treatment-related vehicle trips would not generate a substantial permanent increase in traffic noise levels along affected roadways.

However, many of these haul truck trips would use roads that would pass by residential receptors and the event of each passing truck by could generate a SENL that could be noticeable to residents. Reference SENLs for heavy truck passbys were measured by Bollard Acoustical Consultants and reported in an EIR for a proposed commercial center (City of Ceres 2010). The outdoor measurements conducted for the study indicate that SENLs generated by heavy truck passbys range from 77 to 85 dB SENL, with a mean of 83 dB SENL at a reference distance of 50 feet. It is assumed that SENLs from engine braking (i.e., Jake braking) are at least as loud.

As described above, the SENL describes a receiver's cumulative noise exposure from a single impulsive noise event, which is a rating of a discrete noise event that compresses the total sound energy of the event into a 1-second period, measured in decibels (Caltrans 2011). These noise events can be more startling to receptors if they occur when ambient noise levels are quieter, such as during nighttime hours. Assuming the average exterior-to-interior noise level reduction of 20 dB provided by wood frame buildings with the windows closed (Caltrans 2011), the highest SENL in the interior of rooms located closer than 50 feet from a passing truck would exceed 65 dB SENL. Because some houses along routes used by haul trucks could have inhabitable rooms located closer than 50 feet to the roadway, these rooms would experience SENLs that exceed the criterion of 65 dB and, therefore, the percentage of people expected to be awakened when inside the affected homes would exceed 5 percent. However, SPR NOI-1 restricts hauling of equipment and materials to daytime hours; and thus, the haul truck passbys associated with treatment activity would not occur during more noise-sensitive evening and nighttime hours. Also, the increase in SENL-generating haul truck passbys associated with treatment activity at any particulate treatment site would be temporary. For these reasons, this impact would be **less than significant**.

#### Mitigation Measures

No mitigation is required for this impact.

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