3.15 NOISE AND VIBRATION

This section includes definitions of common descriptions for noise and ground vibration; descriptions of applicable regulations, acoustic fundamentals, and existing ambient noise conditions; and an analysis of potential short- and long-term noise and vibration impacts associated with implementation of the project alternatives.

Comments received on the Notice of Preparation related to noise addressed the potential noise effects on wildlife. Potential effects of the project alternatives on wildlife are addressed in Section 3.16, "Biological Environment."

None of the alternatives would locate noise-sensitive uses where they would be subject to single-event noise level concerns and none of the alternatives would be expected to affect the frequency or intensity of single-event noise incidences. None of the alternatives would affect the type or number of aircraft operations at Lake Tahoe Airport. Similarly, no changes to levels of activity by recreational watercraft, motorcycles, off-road vehicles, and over-snow vehicles are anticipated with any of the alternatives because they are not expected to result in additional recreational boating facilities, trails, or recreation areas for these types of vehicles. Furthermore, the types of recreational watercraft, motorcycles, off-road vehicles, and over-snow vehicles, as well as on-road vehicles, would not change as a result of any of the alternatives. TRPA single-event noise standards, shown in Table 3.15-4 below, would continue to apply to all of these noise sources. These issues are not addressed further.

The project site is not located in the planning area of the Lake Tahoe Airport Comprehensive Land Use Plan (City of South Lake Tahoe 2007), the land use plan of any other airport, or within the vicinity of an active private airstrip where people would be exposed to excessive aircraft-generated noise levels. This issue is not addressed further.

3.15.1 Regulatory Setting

Key federal, state, and local regulatory and conservation planning issues applicable to the project for noise-related impacts are discussed below. Prior to discussing these issues, background information on acoustical fundamentals is needed to place the regulatory and planning issues into perspective.

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 hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying 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 (0.00000000001) 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 huge 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, SPL cannot be added or subtracted through ordinary arithmetic. With 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, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB; rather, they would combine to produce 73 dB. With the decibel scale, three sources of equal loudness together produce a sound level 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 that range better than sounds of the same amplitude in higher or lower frequencies. 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. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with highway-traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels. Table 3.15-1 describes typical A-weighted noise levels for various noise sources. All sound levels expressed as dB in this section are A-weighted sound levels.

Table 3.15-1 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		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	— 70 —	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	— 60 —	
		Large business office
Quite urban daytime	— 50 —	Dishwasher next room
Quite urban nighttime	— 40 —	Theater, large conference room (background)
Quite suburban nighttime		
	— 30 —	Library
Quite rural nighttime		Bedroom at night, concert
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Notes: dB = A-weighted Noise Levels

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

HUMAN RESPONSE TO CHANGES IN NOISE LEVELS

As discussed above, the doubling of sound energy results in a 3-dB increase in sound. 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 is able to 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 typical noisy environments, changes in noise of 1–2 dB are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a readily noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness. 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 perceptible (Caltrans 2013a:2-45).

VIBRATION

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, (e.g., operating factory machinery or transient in nature, explosions). Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (Federal Transit Administration [FTA] 2006:7-3; Caltrans 2013b:6). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a 1-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2006:7-3). This is based on a reference value of 1 micro inch per second (µin/sec).

The typical background vibration-velocity level in residential areas is approximately 50 VdB. Groundborne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA 2006:7-8).

Typical outdoor sources of perceptible ground vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Construction activities can generate ground vibrations, which can pose a risk to nearby structures. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants.

Construction vibrations can be transient, random, or continuous. Transient construction vibrations are generated by blasting, impact pile driving, and wrecking balls. Continuous vibrations result from vibratory pile drivers, large pumps, and compressors. Random vibration can result from jackhammers, pavement breakers, and heavy construction equipment. Table 3.15-2 describes the general human response to different levels of ground vibration-velocity levels.

Table 3.15-2 Human Response to Different Levels of Ground Noise and Vibration

Vibration-Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Notes: VdB = vibration decibels referenced to 1 µ inch/second and based on the root mean square (RMS) velocity amplitude.

Source: FTA 2006:7-5

COMMON NOISE DESCRIPTORS

Noise in our daily environment fluctuates over time. Some fluctuations are minor, but some are substantial. Some noise levels occur in regular patterns, but others are random. Some noise levels fluctuate rapidly, but others fluctuate slowly. Some noise levels vary widely, but others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors most commonly used in traffic noise analysis.

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 that actually occurs during the same period. The 1-hour A-weighted equivalent sound level ($L_{eq[h]}$) is the energy average of A-weighted sound levels occurring during a 1-hour period and is the basis for noise abatement criteria (NAC) used by Caltrans and Federal Highway Administration (FHWA).

Percentile-Exceeded Sound Level (L_{XX}): L_{XX} represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10 percent of the time, and L_{90} is the sound level exceeded 90 percent of the time).

Maximum Sound Level (L_{max}): L_{max} is the highest instantaneous sound level measured during a specified period.

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 A-weighted sound levels occurring during nighttime hours between 10:00 p.m. and 7:00 a.m.

Community Noise Equivalent Level (CNEL) or Day-Evening-Night Level (L_{den}): Similar to L_{dn}, CNEL or L_{den} is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10:00 p.m. and 7:00 a.m. and a 5-dB penalty applied to the A-weighted sound levels occurring during evening hours between 7:00 p.m. and 10:00 p.m.

SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces 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. 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. 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 highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess 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), an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 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. Sound levels can be increased at large distances (e.g., more than 500 feet) from the highway because of atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects.

Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver can substantially 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. Walls are often constructed between a source and a receiver specifically to reduce noise. 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. Taller barriers provide increased noise reduction. Vegetation between the highway and receiver is rarely effective in reducing noise because it does not create a solid barrier.

FEDERAL

The National Environmental Policy Act (NEPA) of 1969 and the California Environmental Quality Act (CEQA) provide the broad basis for analyzing and abating highway traffic noise effects. The intent of these laws is to inform government decision-making regarding potential environmental impacts, alternatives, and mitigation measures, if needed. The requirements for noise analysis and consideration of noise abatement and/or mitigation, however, differ between NEPA, TRPA regulations, and CEQA.

Highway Traffic Noise Regulation (23 CFR 772)

This regulation provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. Under 23 CFR 772.7, projects are categorized as Type 1, Type 2, or Type 3 projects. FHWA defines a Type 1 project as a proposed federal or federal-aid highway project for the construction of a highway on a new location, or the physical alteration of an existing highway where there is either substantial horizontal or substantial vertical alteration, or increases the number of through-traffic lanes. A Type 2 project is a noise barrier retrofit project that involves no changes to highway capacity or alignment. A Type 3 project is a project that does not meet the classifications of a Type 1 or Type 2 project. Type 3 projects do not require a noise analysis.

Type 1 projects include the addition of through traffic lanes that function as high-occupancy vehicle lanes, high-occupancy toll lanes, bus lanes, or truck climbing lanes. Type 1 projects include the addition of an auxiliary lane (except when an auxiliary lane is a turn lane); addition or relocation of interchange lanes or ramps; restriping existing pavement for the purpose of adding a through-traffic lane or auxiliary lane; and the addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza. Projects unrelated to increased noise levels, such as striping, lighting, signing, and landscaping projects, are not considered Type 1 projects.

Alternatives B, C, and D include realignment of US 50 with substantial horizontal alteration. Therefore, the realignments of US 50 with Alternatives B, C, and D are considered to be Type 1 projects. Alternatives A and E are Type 3 projects. The mixed-use land uses, including replacement housing, at any of the three redevelopment sites identified as part of Alternatives B, C, and D are also considered Type 3 projects and, therefore, do not require a noise analysis for FHWA.

In accordance with 23 CFR 772.11, noise abatement must be considered for Type 1 projects that result in a traffic noise impact. In such cases, 23 CFR 772 requires that the project proponent “consider” noise abatement before adoption of the final NEPA document. This process involves identification of noise abatement measures that are reasonable, feasible, and likely to be incorporated into the project, and of noise impacts for which no apparent solution is available.

Traffic noise impacts, as defined in 23 CFR 772.5, occur when the predicted noise level in the design year approaches or exceeds the NAC specified in 23 CFR 772, or a predicted noise level substantially exceeds the existing noise level (i.e., a "substantial" noise increase). Design year is defined in 23 CFR 772.5 as "the future year used to estimate the probable traffic volume for which a highway is designed. A time, 10 to 20 years, from the start of construction is usually used" (CFR 772.5a). Year 2040 is the design year for this project (Wood Rodgers 2016:22).

The NAC shown in Table 3.15-3 correspond to various land use activity categories. The NAC use an $L_{eq[h]}$ metric, which is the average of sound levels occurring during a 1-hour period. Activity categories and related traffic noise impacts are determined based on the actual land use in a given area.

Table 3.15-3 Federal Highway Administration's Activity Categories and Noise Abatement Criteria

Activity Category	Activity $L_{eq[h]}$	Evaluation Location	Description of Activities
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	Exterior	Residential.
C[2]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A through D or F.
F	—[3]		Agriculture, airports, bus Facilities, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail facilities, retail facilities, ship facilities, utilities (water resources, water treatment, electrical), and warehousing.
G	—[3]		Undeveloped lands that are not permitted.

Notes: $L_{eq(h)}$ = 1-hour equivalent continuous sound level

[1] The $L_{eq(h)}$ activity criteria values are for impact determination only and are not design standards for noise abatement measures.
[2] Includes undeveloped lands permitted for this activity category.

[3] FHWA has not established noise abatement criteria for Activity Categories F and G.

Source: FHWA 23 CFR 772

In identifying noise impacts, primary consideration is given to exterior areas of frequent human use. In situations where there are no exterior activities, or where the exterior activities are far from the roadway or physically shielded in a manner that prevents an impact on exterior activities, the interior criterion (Activity Category D) is used as the basis for determining a noise impact.

TAHOE REGIONAL PLANNING AGENCY

The elements of the Tahoe Regional Planning Agency (TRPA) Lake Tahoe Regional Plan related to noise include the following: Noise Subelement of the Goals and Policies of the Regional Plan (TRPA 2012a); Code of Ordinances (Code), Chapter 68, Noise Limitations (TRPA 2012b); plan area statements (PASs), community plans, and area plans; and detailed modeling parameters (TRPA 2012c).

Lake Tahoe Regional Plan

Goals and Policies

The Noise Subelement of the Goals and Policies includes a goal to attain and maintain CNEL standards that are relevant to the project (Goal N-2) (TRPA 2012a:2-26 to 2-28). The underlying policies intended to help

achieve that goal include: reducing noise from transportation corridors using a variety of approaches, including setbacks, earthen berms, and barriers (Policy N-2.1), and establishing CNEL values for certain transportation corridors (e.g., US 50 and SR 207 within the study area) (Policy N-2.3). The transportation corridor CNEL values override land use-based CNELs within 300 feet of the applicable roadway (TRPA 2012a:2-26). The full text of these goals and policies, along with a discussion of the project's consistency with the goals and policies, is included in Appendix E, "Goals and Policies Consistency Analysis."

Code of Ordinances

Chapter 68, "Noise Limitations," of the TRPA Code of Ordinances (Code) is intended to implement the Noise Subelement of the Goals and Policies and to attain and maintain the TRPA Environmental Threshold Carrying Capacities (shown below) (TRPA 2012b:68-1 to 68-5).

Section 68.4, "Community Noise Levels," states that TRPA shall use CNELs to measure community noise levels and that PASs shall set forth CNELs that shall not be exceeded by any one activity or combination of activities (see PASs below). The CNELs set forth in the PASs are based on the land use classification, the presence of transportation corridors, and the applicable threshold standard. Exhibit 3.15-1 shows applicable PASs and Area Plans within the study area and the designated CNEL standards.

Environmental Threshold Carrying Capacities

TRPA has established environmental thresholds for nine resources, including noise. There are two noise threshold indicators: single noise events and cumulative noise events. The Lake Tahoe Basin's status in 2015 was non-attainment for single noise events and for cumulative noise. However, TRPA's 2015 *Threshold Evaluation Report* (TRPA 2016) indicates that the feasibility of meeting the currently adopted single and cumulative noise events standards (maximum allowable ambient noise levels) should be evaluated to ensure the standards are protective and realistically achievable.

Single Noise Events

A single noise event can be defined as an unexpected, short-term increase in acoustic level. 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.

Cumulative Noise Events

TRPA adopted CNEL standards for different zones within the Region to account for expected levels of serenity. The standards, established in the Goals and Policies, apply to the entire Lake Tahoe Region. Table 3.15-4 summarizes thresholds for single events (L_{max}) and thresholds for community noise events.

The noise limitations established in Chapter 68 of the TRPA Code, including the noise standards of individual PASs, community plans, and area plans, do not apply to noise from TRPA-approved construction or maintenance projects, or the demolition of structures, provided that such activities are limited to the hours between 8:00 a.m. and 6:30 p.m. Further, the noise limitations of Chapter 68 shall not apply to emergency work to protect life or property.

As indicated in Note 4 of Table 3.15-4, TRPA's transportation corridor noise threshold for US 50 overrides TRPA's land use-based CNEL thresholds at all locations within 300 feet from the edge of the roadway.

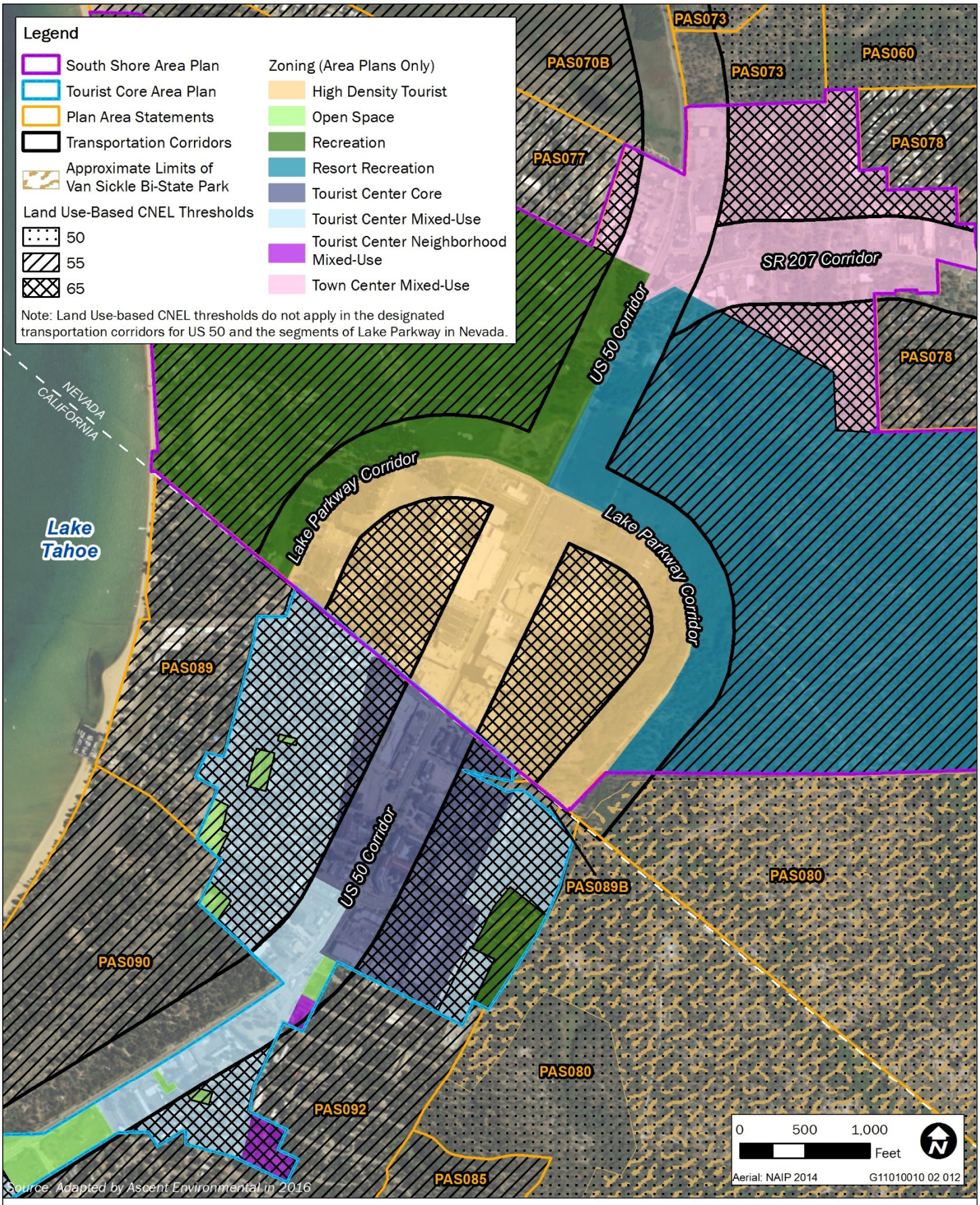

Exhibit 3.15-1 **Applicable CNEL Noise Standards**

Table 3.15-4 TRPA Noise Thresholds[1]

Single Noise Events	Noise Measurement
Boats (not to exceed any of 3 tests)	82 dB measured at 50 feet with engine at 3,000 rpm
	SAE test J1970 or SAEJ1970, Shoreline Test, 75 dB (standard adopted 7/03)
	SAE Test J2005, Stationary Test, 88 dB if watercraft manufactured on or after 1/1/93 and 90 dB if watercraft manufactured before 1/1/93 (standard adopted 7/03)
Motor Vehicles (less than 6,000 pounds GVW)	76 dB running at <35/mph (82 dB running at >35/mph) measured at 50 feet
Motor Vehicles (greater than 6,000 pounds GVW)	82 dB running at <35/mph (86 dB running at >35/mph) measured at 50 feet
Motorcycles	77 dB running at <35/mph (86 dB running at >35/mph) measured at 50 feet
Off-road Vehicles	72 dB running at <35/mph (86 dB running at >35/mph) measured at 50 feet
Snowmobiles	82 dB running at <35/mph measured at 50 feet
[Land Use-Based] Community Noise Equivalent Levels: Background levels shall not exceed the following:[2]	
Land Use Category	CNEL, dB
High Density Residential	55
Low Density Residential	50
Hotel/motel facilities	55
Commercial area	65
Industrial	65
Urban Outdoor Recreation	55
Rural Outdoor Recreation	50
Wilderness and Roadless Areas	45
Critical Wildlife Areas	45
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.	
Transportation [Corridor Noise Standards][3]	
US 50	65[4] dB CNEL
State Routes 89, 207, 28, 267 and 431	55[4] dB CNEL
South Lake Tahoe Airport	60[5] dB CNEL

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

[1] The title of this table used in the TRPA Code is "TRPA Regional Plan Cumulative Noise Levels."

[2] For this analysis, these standards are referred to as "land use-based CNEL thresholds."

[3] For this analysis, these CNEL standards are referred to as "transportation corridor noise thresholds."

[4] This transportation corridor noise threshold overrides the land use CNEL thresholds and is limited to an area within 300 feet from the edge of the road.

[5] This threshold applies to those areas impacted by the approved flight paths.

Source: TRPA Code of Ordinances, Chapter 68 (TRPA 2012b)

A critical distinction exists between two of the types of TRPA noise thresholds presented in Table 3.15-4:

1. TRPA's CNEL thresholds for land use types, which are referred to in this EIR/EIS/EIS as land use-based noise thresholds; and

2. TRPA's noise threshold for transportation noise corridors.

TRPA's land use-based noise thresholds indicate maximum levels of noise exposure for specific types of land uses (e.g., High Density Residential, Low Density Residential, Hotel/Motel Facilities). TRPA's transportation corridor noise standards, including its threshold for the US 50 transportation corridor, are referred to as contour-based noise threshold. TRPA's transportation corridor noise standards indicate how loud traffic noise can be at a distance of 300 feet from the edge of the highway. The transportation corridor noise threshold for US 50 specifies that the 65 CNEL noise contour generated by traffic on US 50 shall not extend more than 300 feet from the highway's edge. Note that that if the 65 CNEL of a segment of US 50 extends

to 300 feet from the highway edge the traffic noise levels will be greater than 65 CNEL at locations closer to the highway (e.g., approximately 68-69.5 CNEL 150 feet from the highway and approximately 71-72 CNEL 75 feet from the highway, applying the standard attenuation rate for roadway noise) and this condition is considered to be in attainment of the noise threshold expressed for US 50 transportation corridor. Thus, the land use-based noise thresholds and contour-based transportation corridor noise thresholds established by TRPA are fundamentally different metrics.

This distinction was not made in the noise impact analysis for the *Regional Transportation Plan/Sustainable Communities Strategy Draft Environmental Impact Report/Environmental Impact Statement* (RTP/SCS EIR/EIS) (TMPO and TRPA 2012). The traffic noise impact analysis in the RTP/SCS EIR/EIS was a program-level analysis appropriate at a regional scale that focused primarily on the degree in which the RTP/SCS would result in noticeable traffic noise increases (i.e., increases of 3 dB or greater). The traffic noise levels presented in the RTP/SCS EIR/EIS are considered coarse estimates, because they did not take into account the noise-attenuating effects of topography or the presence of nearby stands of forest or man-made structures. As shown in Appendix E to the RTP/SCS EIR/EIS, traffic noise levels were estimated using spreadsheet calculations and the highway transportation corridors in the entire Tahoe Region were broken down into 24 highway segments. The summary of traffic noise level estimates presented in the program-level analysis of the RTP/SCS EIR/EIS were at a distance of 100 feet from the centerline of each highway segment (TMPO and TRPA 2012:3.6-22). In comparison, the more precise FHWA Traffic Noise Model, Version 2.5 was used to provide refined estimates of traffic noise levels at 167 different discrete receptors, taking into account the effects of nearby features (FHWA 2004, as cited in Caltrans 2015b).

The 2017 Regional Transportation Plan (2017 RTP), which is an update to the 2012 RTP, and its joint CEQA/TRPA environmental document have been circulated for public review. The projects listed in the 2017 RTP are substantially similar to those in the 2012 RTP, and the US 50/South Shore Community Revitalization Project is included in both documents. TRPA and TMPO have prepared a joint CEQA Initial Study/TRPA Initial Environmental Checklist (IS/IEC) for the 2017 plan as a supplement to the 2012 RTP EIS/EIR, that relies largely on that document's analysis of potential environmental impacts and mitigation measures. Because the IS/IEC has been prepared for the 2017 RTP as a supplement to the RTP/SCS EIR/EIS and does not result in new significant environmental impacts, the analysis herein continues to rely on the EIR/EIS.

The distinction between TRPA's land use-based noise thresholds and TRPA's contour-based transportation corridor noise thresholds is emphasized in this EIR/EIS/EIS. This distinction has already been applied in the *Placer County Tahoe Basin Area Plan and Tahoe City Lodge EIR/EIS* (Placer County and TRPA 2016:13-15 to 13-16, 13-19 to 13-22) and is discussed further under the "Methods and Assumptions" section below.

Best Construction Practices Policy for the Minimization of Exposure to Construction-Generated Noise and Ground Vibration

TRPA requires the following standard conditions for all project construction activity that involves grading; these conditions also apply to the construction of residential projects (TRPA [no date]a:6; TRPA [no date]b:4 to 5).

- Any normal construction activities creating noise in excess of the TRPA noise standards shall be considered exempt from said standards provided all such work is conducted between the hours of 8:00 a.m. and 6:30 p.m.

- Engine doors shall remain closed during periods of operation except during necessary engine maintenance.

- Stationary equipment (e.g. generators or pumps) shall be located as far as feasible from noise-sensitive receptors and residential areas. Stationary equipment near sensitive noise receptors or residential areas shall be equipped with temporary sound barriers.

- Sonic pile driving shall be utilized instead of impact pile driving, wherever feasible. Pile driving holes shall be predrilled to the extent feasible subject to design engineer's approval.

Plan Area Statements, Area Plans, and Community Plans

The study area includes lands addressed in the following documents:

- South Shore Area Plan (Douglas County and TRPA 2013:24)
- Tourist Core Area Plan (City of South Lake Tahoe and TRPA 2013:C-13)
- Stateline/Ski Run Community Plan (PAS 089B) (TRPA 1994)
- PAS 080 Kingsbury Drainage (TRPA 2002a)
- PAS 089 Lakeside Park (TRPA 2014)
- PAS 090 Tahoe Meadows (TRPA 2002b)
- PAS 092 Pioneer/Ski Run (TRPA 2002c)

Exhibit 3.15-1 shows the CNEL standards that have been established by these local plans.

South Shore Area Plan

The South Shore Area Plan, the boundaries of which are demarcated in Exhibit 3.15-1, reiterates the CNEL standards in Chapter 68 of the TRPA Code. In addition, the South Shore Area Plan designates a transportation noise corridor standard of 65 CNEL for the portions of Lake Parkway in Nevada that is limited to 300 feet from the edge of the right-of-way (Douglas County and TRPA 2013:24 [of the Douglas County Development Code, Title 20, Chapter 20.703]).

Tourist Core Area Plan

The Tourist Core Area Plan, the boundaries of which are also shown in Exhibit 3.15-1, includes land use-based CNEL standards of 55 CNEL for areas designated for Recreation, Open Space, and the Shorezone portion of Tourist Center Gateway; and 65 CNEL for areas designated as Tourist Center Core, Tourist Center Mixed-Use, Tourist Center Mixed-Use Corridor, and the non-Shorezone portion of Tourist Center Gateway (City of South Lake Tahoe and TRPA 2013:C-13). The Tourist Core Area Plan also mentions the 65 CNEL transportation corridor noise standard for US 50, which extends to 300 feet from the edge of the roadway.

Policies LU-7.1 and LU-7.2 of the Tourist Core Area Plan also reiterate the noise standards of the City of South Lake General Plan that are shown in Table 3.15-5 (City of South Lake Tahoe and TRPA 2013:5-3 to 5-4).

Local Plan Area Statements and Community Plans

A noise standard of 55 CNEL is established for areas in PAS 089 Lakeside Park, PAS 090 Tahoe Meadows, and within PAS 092 Pioneer/Ski Run (TRPA 2014:4; TRPA 2002b:3; TRPA 2002c:3). A noise standard of 50 CNEL is established for areas in PAS 080 Kingsbury Drainage that are not within 300 feet of the edge of US 50 or SR 207 (TRPA 2002a:4). Almost all of the area that was included in the Stateline/Ski Run Community Plan (PAS 089B) became part of the Tourist Core Area Plan and is now subject to the noise standards of that plan. However, a single California Tahoe Conservancy-owned parcel between the Forest Suites Resort and the Harrah's resort-casino parking lot is part of the Stateline/Ski Run Community Plan (PAS 089B), including portions of Special Areas 1B and 2A; these areas are subject to a noise standard of 65 CNEL (TRPA 1994:II-3, II-39).

STATE

California

California Environmental Quality Act

The CEQA involves an analysis of baseline versus build conditions to assess whether a project would have a noise impact. If a project is determined to have a significant noise impact under CEQA, then mitigation measures must be incorporated into the project to the extent feasible to reduce the noise impact. The rest of

this section includes NEPA 23 Code of Federal Regulations (CFR) 772 noise analysis and noise analysis under CEQA and evaluation of compliance with TRPA noise requirements.

California State Building Code Title 24

The State of California's noise insulation standards are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, California Building Code. Title 24 is applied to new construction in California and states that interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room. An acoustical analysis documenting compliance with the interior sound level standards shall be prepared for structures containing habitable rooms within the CNEL noise contours of 60-dB or greater.

California Department of Transportation Standard Specification 14-8.02

Caltrans Standard Specification 14-8.02, Noise Control, states that noise levels from construction activity between the hours of 9:00 p.m. and 6:00 a.m. shall not exceed 86 dB L_{max} at a distance of 50 feet from the construction site (Caltrans 2015a:215).

California Department of Transportation Traffic Noise Analysis Protocol

Caltrans published the Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects (Caltrans 2011). The protocol specifies the policies, procedures, and practices to be used by agencies that sponsor new construction or reconstruction of federal or federal-aid highway projects. The NAC specified in the protocol are the same as those specified in 23 CFR 772. The protocol defines a noise increase as substantial if the predicted noise level with project implementation in the design year would exceed the existing noise level by 12 dB. The protocol also states that a sound level is considered to approach an NAC level when the predicted sound level in the design year would be within 1 dB of the NAC identified in 23 CFR 772 (e.g., 66 dB is considered to approach the NAC of 67 dB, but 65 dB is not).

If it is determined that the project would have noise impacts, then potential noise abatement measures must be considered. Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans and specifications. This document discusses noise abatement measures that would likely be incorporated in the project.

Caltrans Traffic Noise Analysis Protocol sets forth the criteria for determining when a noise abatement measure is reasonable and feasible. Feasibility of noise abatement is basically an engineering concern. A minimum 7 dB reduction (for projects using the 2011 Noise Protocol) in the future noise level must be achieved for a noise abatement measure to be considered feasible. Other considerations include topography, access requirements, other noise sources, and safety considerations. The reasonableness determination is basically a cost-benefit analysis. Factors used in determining whether a proposed noise abatement measure is reasonable include: residents' acceptance and the cost per benefited residence.

Nevada

Nevada Department of Transportation

The Nevada Department of Transportation (NDOT) Traffic and Construction Noise Analysis and Abatement Policy defines how NDOT applies FHWA's Highway Traffic Noise Regulation contained in 23 CFR 772 and the FHWA Highway Traffic Noise: Analysis and Abatement Guidance (FHWA 2011). The NAC specified in the NDOT policy are the same as those specified in 23 CFR 772. NDOT's policy defines a noise increase as substantial when the predicted noise levels in the design year with project implementation would exceed existing noise levels by 15 dB. The policy also states that a sound level is considered to approach an NAC level when the sound level is 1 dB less than the NAC identified in 23 CFR 772.

LOCAL

Douglas County

The Environmental Resources and Conservation Element of the 2011 Douglas County Master Plan refers to the noise standards established in the Douglas County Code (Douglas County 2011:6); the following standards apply to the project:

- 20.702.180 Noise Standards.
  - Exterior noise levels must comply with the provisions in the PASs, Community Plans, or Sub-section N of Section 20.690.030, whichever is most restrictive.
  - Interior noise levels must comply with the provisions in sub-section N of section 20.690.030.
- 20.690.030 Section L, Hours of Construction.
  - The hours of operation for all building construction activities not within a dedicated road right-of-way are as follows: 7:00 a.m. to 7:00 p.m. Monday through Friday; 8:00 a.m. to 7:00 p.m. Saturday and Sunday.
- 20.690.030 Section N, Noise.

  The following provisions shall apply:

  1. No exterior noise level shall exceed 65 dB CNEL exterior and 45 dB CNEL interior in residential areas.
  2. All residential developments shall incorporate the following standards to mitigate noise levels:
     a. Increase the distance between the noise source and receiver;
     b. Locate land uses not sensitive to noise, which include but are not limited to parking lots, garages, maintenance facilities, and utility areas, between the noise source and the receiver;
  3. The minimum acceptable surface weight for a noise barrier is four pounds per square foot (equivalent to ¾-inch plywood). The barrier shall be of a continuous material which is resistant to sound including:
     a. Masonry block;
     b. Pre-cast concrete;
     c. Earth berm or a combination of earth berm with block concrete.
  4. Noise barriers shall interrupt the line-of-sight between noise source and receiver.
- 20.690.030 Section X, Vibration.
  - No vibration associated with any use shall be permitted which is discernible beyond the boundary line of the property.

City of South Lake Tahoe

General Plan

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

- **Policy HS-8.4: Annoying and Excessive Transportation Noise Protection.** The City shall not allow noise-sensitive land uses in areas exposed to existing or projected transportation noise levels that exceed the standards shown in Table HS-2 [Table 3.15-5 in this document], unless the project design includes

effective mitigation measures to reduce exterior noise and noise levels in interior spaces to the levels at or below those shown in Table HS-2 [Table 3.15-5 in this document]. [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 3.15-5 and the land use-based CNEL standards of the Tourist Core Area Plan].

Table 3.15-5 Maximum Allowable Noise Exposure from Transportation Noise Sources in the City of South Lake Tahoe

Land Use	Outdoor Activity Areas[1] L_{dn}/CNEL, dB		Interior Spaces	
	Roadways	Railroads/Aircraft	L_{dn}/CNEL, dB	L_{eq}, dB[2]
Residential	60[3]	65[5]	45	
Transient Lodging	65[4,5]	65[4,5]	45	
Hospitals, Nursing Homes	60[3]	60[3]	45	
Theaters, Auditoriums, Music Halls				35
Churches, Meeting Halls	60[3]	65[5]		40
Office Buildings				45
Schools, Libraries, Museums				45
Playgrounds, Neighborhood Parks	70	75		

[1] Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use. Where it is not practical to mitigate exterior noise levels 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.

[2] As determined for a typical worst-case hour during periods of use.

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

[4] 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.

[5] Where it is not possible to reduce noise in outdoor activity areas to 65 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 70 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

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

- **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 [Table 3.15-5 in this document] at all outdoor activity areas and interior spaces of existing noise-sensitive land uses.

- **Policy HS-8.6: Acoustical Analysis Preparation.** The City shall require an acoustical analysis as part of the environmental review process when noise-sensitive land uses are proposed in areas exposed to existing or projected exterior noise levels exceeding the levels shown in Table HS-1 [non-transportation noise standards are not included in this environmental review document] and Table HS-2 [Table 3.15-5 in this document], so noise mitigation may be included in the project design. All acoustical analysis shall:

  A. Be the financial responsibility of the applicant;

  B. Be prepared by a qualified person experienced in the fields of environmental noise assessment and architectural acoustics;

  C. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions and the predominant noise sources; and

D. Estimate existing and projected cumulative (20 year) noise levels in terms of L_{dn} or CNEL and/or the standards shown in Table HS-1 [non-transportation noise standards, not included in this document], and compare those levels to the policies in this section;

E. Recommend appropriate mitigation to achieve compliance with the adopted policies and standards in this section, giving preference to proper site planning and design over mitigation measures which require the construction of noise barriers or structural modifications to buildings which contain noise-sensitive land uses;

F. Estimate noise exposure after the prescribed mitigation measure(s) has been implemented; and

G. Describe a post-project assessment program that could be used to evaluate the effectiveness of the proposed mitigation measures.

South Lake Tahoe City Code

Sections 5 through 8 of the City Code refer to TRPA's noise ordinance. The TRPA Code Section 68.9 states that the noise standards in Chapter 68 (in the TRPA Code) will not apply to 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. Activities conducted outside of these hours are subject to the noise standards set forth by PASs, community plans, and area plans (Caltrans 2015b:22 and 23).

El Dorado County

Small areas of unincorporated El Dorado County could be affected by changes in traffic noise levels with some action alternatives, such as parts of Van Sickle Bi-State Park near Lake Parkway. Although El Dorado County does not have authority over state lands, El Dorado County's policies and standards are relevant to the impact analysis.

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 zoning ordinance includes noise standards for outdoor activity areas of different types of land uses. The transportation noise standard established by the county that is most applicable to the unincorporated areas of the county that lie within the state park is 70 CNEL, which has been designated for playgrounds and neighborhood parks (El Dorado County 2015:71).

Section 130.37.20 of the zoning ordinance exempts construction noise from all of the county's standards during daylight hours provided that all construction equipment is fitted with factory-installed muffling devices and maintained in good working order.

3.15.2 Affected Environment

Noise is produced from various sources throughout the study area, but vehicle traffic on US 50 and local roadways is generally considered the dominant noise source. Other noise sources include aircraft, motorized watercraft, music from summer concerts, and machinery associated with refuse collection and snow removal. Less pronounced noise sources in the study area include those typical of urban and suburban environments, such as landscaping activities (e.g., grass cutting, leaf blowing, snow blowing), heating and air conditioning units, and conversation.

Traffic on US 50 and local roadways is the predominant noise source in the study area. The extent to which existing land uses in the study area are affected by existing traffic noise depends on their proximity to the roadways and sensitivity to noise.

Table 3.15-6 shows the modeled distance of the 65 CNEL traffic noise contour from the edge of various segments of US 50 that pass through the study area for existing conditions, as well as the segments of Lake Parkway on the Nevada side. These values were obtained from the traffic noise analysis prepared for the project (Caltrans 2015b:167). Existing traffic noise contours were modeled in accordance with the FHWA

Traffic Noise Model, Version 2.5 (FHWA 2004). The traffic noise modeling results presented in Table 3.15-6 are based on existing traffic volumes and speeds obtained from the *Traffic Operations Analysis Update, US 50/South Shore Community Revitalization Project* (Wood Rodgers 2013). Key inputs to the traffic noise model were the locations of roadways, shielding features (e.g., topography and buildings), noise barriers, ground type, and receptors. Three-dimensional representations of these inputs were developed using Computer-Aided Design drawings, aerials, and topographic contours provided by Wood Rodgers (Caltrans2015b:40). Twenty-eight sound level measurements were conducted in the study area, 19 of which were used to calibrate the traffic noise model with concurrent traffic volume counts; the other nine sound level measurements were not used for model calibration because traffic was not the predominant noise source at their locations (Caltrans2015b:vi). Four long-term measurement sites were recorded to capture the diurnal traffic noise level pattern in the study area (Caltrans 2015b:31, 39).

As shown in Table 3.15-6, the existing 65 CNEL contour along US 50 and Lake Parkway does not extend more than 300 feet from the roadway's edge. Thus, noise levels generated by traffic on US 50 and Lake Parkway in the study area are in attainment of TRPA's 65 CNEL contour threshold for US 50 and the portions of Lake Parkway in Nevada.

Table 3.15-6 Modeled Existing 65 CNEL Contours along Major Transportation Corridors within the Study Area

Major Transportation Corridor Segment	Distance to 65 CNEL Contour from Roadway Edge (ft)
US 50 South of Pioneer Trail	61
US 50 between Pioneer Trail and Park Avenue	62
US 50 between Park Avenue and Friday Avenue	58
US 50 between Friday Avenue and Stateline Avenue	56
US 50 North of Stateline Avenue	50
US 50 South of Loop Road/Lake Parkway	52
US 50 North of Loop Road/Lake Parkway	71
Lake Parkway between Park Avenue and Harrah's Road	<62
Lake Parkway between Harrah's Road and US 50	<62
Lake Parkway West of US 50	<68
Lake Parkway North of Stateline Avenue	<68

Notes: CNEL = community noise equivalent level, expressed in A-weighted decibels; ft = feet
Refer to Appendix K for detailed traffic noise modeling input data and output results.
Source: Caltrans 2015b:167

Table 3.15-7 summarizes the modeled existing traffic noise levels of local roadways in the study area. Table 3.15-7 shows the CNEL at a distance of 50 feet from the centerline of the near travel lane of each local roadway. These traffic noise levels were obtained from a traffic noise analysis prepared for the project (Caltrans 2015b:167), which also used traffic volumes and speeds from the traffic analysis prepared for the project (Wood Rodgers 2013). Short-term noise monitoring data was collected at the following times on several different days (Caltrans 2015b:47):

- between 7:25 a.m. and 12:00 p.m. on August 25, 2011;
- between 8:30 a.m. and 6:40 p.m. on July 14, 2014;
- between approximately 10:00 a.m. and 3:45 p.m. on July 15, 2014;
- at 9:10 a.m. on July 16, 2014; and
- between approximately 10:00 a.m. and 12:00 p.m. on September 9, 2014.

Table 3.15-7 Modeled Existing Traffic Noise Levels along Local Roadways

Local Roadway Segment	CNEL (dB) at 50 feet from the Centerline of the Closest Travel Lane
Pioneer Trail South of US 50	60.6
Park Avenue East of Pine Boulevard	58.0
Park Avenue West of US 50	59.0
Heavenly Village Way East of US 50	57.0
Heavenly Village Way West of Lake Parkway	56.4
Stateline Avenue West of Pine Boulevard	51.7
Stateline Avenue East of Pine Boulevard	52.7
Stateline Avenue West of US 50	57.2
Pine Boulevard South of Stateline Avenue	56.6
Pine Boulevard North of Park Avenue	56.9
Lake Parkway between Park Avenue and Harrah's Road[1]	60.1
Lake Parkway North of Stateline Avenue[1]	60.2

Notes: CNEL = community noise equivalent level; dB = A-weighted decibel

[1] The segments of Lake Parkway between Park Avenue in the table are located on the California side and therefore not subject to the 65 CNEL transportation corridor standard of the South Shore Area Plan.

Refer to Appendix K for detailed traffic noise modeling input data and output results.

Source: Caltrans 2015b:167

3.15.3 Environmental Consequences

METHODS AND ASSUMPTIONS

Construction-Related Noise and Vibration

The potential for construction activities to expose receptors to excessive noise levels was assessed based on the types of construction equipment that would be used, the noise levels typically generated by these types of equipment, the proximity of construction activity to existing receptors, and whether construction noise would be generated during noise-sensitive evening and nighttime hours. Referenced noise levels for typical construction equipment are from the FHWA's Roadway Construction Noise Model (FHWA 2006).

The potential for construction activities to expose receptors to excessive levels of noise or ground vibration was assessed based on the types of construction activity that would be performed, the levels of ground vibration they would produce, and the proximity of construction activity to existing nearby structures.

The analysis of exposure to construction-generated noise and vibration also considers the requirements of TRPA's Best Construction Practices Policy for the Minimization of Exposure to Construction-Generated Noise and Ground Vibration.

Traffic Noise Increases at Existing Receptors

Changes in traffic noise levels throughout the study area with each of the alternatives were modeled and presented in the Noise Study Report (Caltrans 2015b). Traffic noise modeling was conducted for all affected roadway segments using the FHWA Traffic Noise Model Version 2.5 (TNM2.5, FHWA 2006). This modeling estimated the traffic noise level at 167 different discrete modeling receptor sites (the locations of which are displayed in Figure 3 of the Noise Study Report incorporated by reference here; Caltrans 2015b:33). The discrete modeling receptor sites are often referred to as "receptors" in this EIR/EIS/EIS; however, a single discrete modeling receptor site may be representative of multiple other nearby receptors (e.g., surrounding

homes) that are equidistant or closer to the nearby source of roadway noise. Thus, this EIR/EIS/EIS recognizes that an exceedance of an applicable noise standard at a single modeled receptor site may indicate exposure that would be experienced by land uses equidistant or closer to the highway in that area. The traffic noise modeling was based on data from a project-specific traffic analysis prepared in 2013 (Wood Rodgers 2013). The traffic analysis has been revised since the Noise Study Report was prepared using the most recent set of traffic counts collected in the study area. The revised traffic analysis is presented in a Traffic Operations Analysis Update dated February 2016 (Wood Rodgers 2016) and discussed in Section 3.6, "Traffic and Transportation." A comparison of the two sets of traffic volume estimates indicates that the traffic volume estimates used in the traffic noise modeling (i.e., from the earlier data set) are substantially higher than the updated estimates, particularly for the higher-volume roadway segments that are the predominant noise sources in the study area. Therefore, the traffic noise level estimates from the Noise Study Report may be somewhat overstated. The word "somewhat" is used here because of the logarithmic nature of adding and subtracting sound pressure levels when expressed in decibels. With the decibel scale, a halving of sound energy—such as a halving of a traffic volume—corresponds to a 3-dB decrease. Nonetheless, the traffic noise estimates used to conduct this impact analysis are conservative. Moreover, the traffic volumes used in the traffic noise modeling presented in the Noise Study Report (i.e., from the older traffic study) are also higher than the more accurate, revised traffic volumes even with the addition of trips associated with the three mixed-use development sites. Thus, the traffic noise estimates provided in the Noise Study Report are conservative enough (i.e., tending to somewhat overstate levels) such that they also adequately account for the noise generation from traffic related to development of the three mixed-use development sites.

The traffic noise modeling presented in the Noise Study Report is also based on short- and long-term noise measurements, the reference noise emission levels for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and ground attenuation factors. Truck usage and vehicle speeds on roadways in the study area were estimated from field observations and data developed in support of the preliminary traffic analysis (see Section 3.6, "Traffic and Transportation"). Another reason the noise modeling represents a conservative noise evaluation (i.e., tending to somewhat overstate impacts) is because it does not account for the potential noise attenuating character of any natural or human-made shielding (e.g., the presence of vegetation, berms, walls, or buildings). Thus, for those receptors located in heavily forested areas of Van Sickle Bi-State Park, adjustments were made to the modeled noise levels to account for the additional attenuation provided by stands of trees based on applicable guidance (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013a:7-8). Modeling and calculations in Appendix K presents results for both 2018 and 2038, which are representative of analysis years 2020 and 2040, the years evaluated in the Traffic Operations Analysis Update. For complete details on model inputs, outputs, and assumptions see the Noise Study Report conducted for the project alternatives incorporated here by reference (Caltrans 2015b). To evaluate impacts, noise and vibration effects were determined based on comparisons to applicable regulations, including FHWA and Caltrans criteria, TRPA thresholds, TRPA significance criteria, and the noise standards of local jurisdictions.

Because TRPA's traffic noise threshold for US 50 overrides the land use-based CNEL thresholds at all locations within 300 feet of the highway's edge, as shown in Table 3.15-4, analysis was conducted to determine whether the 65 CNEL noise contour of US 50 would extend more than 300 feet beyond the highway's edge, which would indicate exceedance of the threshold. The same analysis was conducted for the segments of Lake Parkway in Nevada because these roadway segments also have a contour-based traffic noise threshold override, which was established by the South Shore Area Plan. The traffic noise contour-based analysis for both of these transportation corridors addresses whether the noise level at land uses located within 300 feet of these roadway segments are compliant with TRPA's noise thresholds for these transportation corridors.

For those land uses located more than 300 feet from the edge of US 50 or the segments of Lake Parkway in Nevada, including noise-sensitive receptors (e.g., residences), a separate analysis was conducted to

determine whether these receptors would be exposed to noise levels that exceed the applicable TRPA land use-based CNEL threshold.

This analysis also recognizes that the realignment of US 50 with Alternatives B, C, and D would change which type of TRPA noise threshold, either the land use-based CNEL threshold or the transportation overlay CNEL threshold, would apply at a particular location. The transportation corridor overlay 65 CNEL threshold would move with any realignment of the US 50 transportation corridor to the proposed alignment. This means that the type of TRPA noise threshold (i.e., transportation corridor-contour-based or land use-based) and the applicable CNEL noise threshold level applicable at a discrete receptor location could change with Alternatives B, C, and D, if the distance between the realigned US 50 highway edge and the receptor is modified to be 300 feet or closer).

Noise-Land Use Compatibility of the Mixed-Use Development Sites

For the mixed-use development sites in the City of South Lake Tahoe with Alternatives B, C, and D, the analysis examines whether the replacement housing and residential land uses included at these redevelopment sites would be exposed to noise levels that exceed applicable TRPA thresholds and/or traffic noise standards established by the City of South Lake Tahoe. This analysis is based on the traffic noise contour distances reported in Tables D-10, D-11, and D-12 of the Noise Study Report (Caltrans 2015b).

SIGNIFICANCE CRITERIA

Significance criteria relevant to noise and vibration are summarized below. All significance criteria regard exterior noise levels unless otherwise noted.

NEPA Criteria

An environmental document prepared to comply with NEPA must consider the context and intensity of the environmental effects that would be caused by or result from the locally preferred action. Under NEPA, the significance of an effect is used solely to determine whether an EIS must be prepared. In accordance with FHWA, Caltrans, and NDOT criteria for traffic noise impacts, a project would cause a substantial increase in noise if:

- construction generated a noise level greater than 86 dB L_{max} at a distance of 50 feet from the construction site between the hours of 9:00 p.m. and 6:00 a.m.;
- the traffic noise levels at sensitive receptor locations during the design year (i.e., 2040) is predicted to approach or exceed the NAC for the corresponding activity category (as listed in Table 3.15-3). A sound level is considered to approach an NAC level if the sound level is 1 dB less than the NAC. For the purposes of this project the following significance criteria are applicable to the proposed project:
  - 66 dB at residential land uses (i.e., the level approaching the NAC for Activity Category B),
  - 66 dB at campgrounds, picnic areas, parks, or recreational areas (i.e., the level approaching the NAC for Activity Category C), or
  - 72 dB at hotels, motels, or other tourist accommodation units (i.e., the level approaching the NAC for Activity Category E); or
- the predicted worst-hour traffic noise level ($L_{eq[h]}$) would increase by 12 dB or more at a noise-sensitive receptor in California or by 15 dB at a noise-sensitive receptor in Nevada compared to the corresponding modeled existing worst-hour noise level.

TRPA Criteria

The noise and vibration criteria from the TRPA Initial Environmental Checklist were used to evaluate the noise and vibration impacts of the alternatives. In accordance with TRPA's checklist, a project would cause a significant effect if it would:

- increase existing CNELs beyond those permitted in the applicable Plan Area Statement, Community Plan or Master Plan (i.e., noise generated by construction or demolition activity that would exceed applicable TRPA noise standards outside of the hours of 8:00 a.m. to 6:30 p.m., for which construction noise is exempt from TRPA standards by Chapter 68 of the TRPA Code); or if traffic noise levels would exceed the applicable TRPA noise threshold standards, expressed in CNEL, including the land use-based TRPA Regional Plan Cumulative Noise Level thresholds shown in Table 3.15-4 or the transportation corridor noise thresholds in that same table);

- expose people to severe noise level increases (i.e., a long-term noise level increase of 3 dB or greater at a noise-sensitive receptor such as a residence, hotel, or tourist accommodation unit);

- expose existing structures to levels of ground vibration that could result in structural damage (i.e., exceedance of Caltrans's recommended level of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings or FTA's maximum acceptable level of 80 VdB with respect to human response for residential uses [i.e., annoyance] at nearby existing vibration-sensitive land uses, including residences, hotels, and tourist accommodation units);

- place residential or tourist accommodation uses in areas where the existing CNEL exceeds 60 dB or is otherwise incompatible; or

- place uses that would generate an incompatible noise level in close proximity to existing residential or tourist accommodation uses.

CEQA Criteria

In accordance with Appendix G of the State CEQA Guidelines, a project would cause a significant noise or vibration impact if it would:

- cause a substantial temporary (or periodic) increase in ambient noise levels in the project vicinity above levels existing without the project (i.e., construction noise levels that impact noise-sensitive receptors in the City of South Lake Tahoe outside the hours of 8:00 a.m. to 6:30 p.m., as established in Section 5-8 of the City of South Lake Tahoe Code; or construction noise levels that impact noise-sensitive receptors in El Dorado County during non-daylight hours, for which construction noise is not exempt from the County's noise standards by Section 130.37.20 of the El Dorado County zoning ordinance);

- expose persons to or generation of excessive ground vibration or ground noise levels (i.e., exceed Caltrans's recommended level of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings or FTA's maximum acceptable level of 80 VdB with respect to human response for residential uses [i.e., annoyance] at nearby existing vibration-sensitive land uses, including residences, hotels, and tourist accommodation units);

- expose 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 (i.e., exceed the maximum allowable noise exposure levels from transportation noise sources established by the City of South Lake Tahoe, as shown in Table 3.15-5, or the CNEL standards established in the El Dorado County zoning ordinance); or

- cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project (i.e., a long-term noise level increase of 3 dB or greater at a noise-sensitive receptor).

ENVIRONMENTAL EFFECTS OF THE PROJECT ALTERNATIVES

Impact 3.15-1: Short-term construction noise levels

Alternative A would not include any noise-generating construction or demolition activity. Construction and demolition activity that would occur with the Alternatives B, C, and D transportation improvements and replacement housing at the mixed-use development sites would take place during the less noise-sensitive time of day and comply with the requirements of TRPA's Best Construction Practices Policy for the Minimization of Exposure to Construction-Generated Noise and Ground Vibration. Alternative E would include construction activity during noise-sensitive evening nighttime hours that could result in exceedances of applicable TRPA land use-based noise thresholds at noise sensitive receptors, as well as exceedances of interior noise standards at nearby hotels and residences.

NEPA Environmental Consequences:	The design features of Alternatives B, C, and D would avoid or minimize the impacts related to short-term construction noise such that no additional mitigation measures are needed or feasible to implement; Mitigation Measure 3.15-1 has been incorporated into Alternative E to further reduce to the extent feasible adverse construction-related noise; No Impact for Alternative A
CEQA/TRPA Impact Determinations:	Less than Significant for Alternatives B, C, and D; Significant and Unavoidable for Alternative E after implementation of Mitigation Measure 3.15-1; No Impact for Alternative A

Alternative A: No Build (No Project)

With Alternative A there would be no improvements to existing US 50, Lake Parkway, or other roadways; and no existing housing units or other buildings would undergo demolition within the project site boundaries. Therefore, there would be **no impact** pertaining to the exposure of noise-sensitive receptors to excessive noise levels generated by construction equipment with Alternative A for purposes of NEPA, CEQA, and TRPA.

Alternative B: Triangle (Locally Preferred Action)

Transportation Improvements

Alternative B would include the demolition of buildings that would be acquired for the right of way of New US 50; construction of realigned US 50 from just west of the Pioneer Trail in California to Lake Parkway in Nevada; corridor improvements and enhanced bicycle, transit, and pedestrian facilities as part of the conversion of the existing US 50 to a local or main street; multiple intersection improvements including construction of a roundabout at US 50/Lake Parkway; construction of a new pedestrian bridge over realigned US 50 and a new shared-use path to provide a connection between the tourist core and Van Sickle Bi-State Park; and realignment of utility lines and stormwater drainage improvements.

Construction activity would be expected to include standard equipment used in roadway and highway construction such as haul trucks and mixers, excavators, compactors, dozers, loaders, pavers, scrapers, and graders. Demolition activities associated with Alternative B would likely include use of cranes, excavators, bulldozers, and haul trucks to off-haul demolition material. Pile drivers may be used during construction of the pedestrian bridge over the realigned US 50 alignment. No blasting would be performed as part of construction or demolition activities.

Table 3.15-8 shows the maximum noise levels generated by the types of equipment and activities that are anticipated to be used for construction and demolition activities.

Table 3.15-8 Typical Construction Equipment Noise Levels

Type of Equipment	Noise Level (dB L_{max}) at 50 feet
Impact Pile Driver	101
Vibratory Pile Driver	101
Crane	85
Excavator	85
Dozer	85
Grader	85
Paver	85
Scraper	85
Concrete Mixer Truck	85
Dump Truck	84
Concrete Pump Truck	82
Generator	82
Backhoe	80
Compactor	80
Front End Loader	80

Notes: dB = decibels; L_{max} = maximum noise level
Source: FHWA 2006:3

As shown in Table 3.15-8, pile driving would generate the highest noise levels, emitting up to 101 dB L_{max} at a distance of 50 feet. Pile driving may be required during construction of the pedestrian bridge across realigned US 50, depending on final design of the footings. In addition to being loud, pile driving can be annoying due to the pulsating nature of the sound it produces. The loudest types of equipment that would be used at other locations do not produce a pulsating noise and generate noise levels as high as 85 dB L_{max} at a distance of 50 feet. Due to the linear nature of the project and the relatively short duration of construction activity in any one place, no single receptor location would be exposed to construction-related noise for an excessive period of time.

As stated in Chapter 2, "Proposed Project and Project Alternatives," construction activities related to Alternatives B would occur between 8:00 a.m. and 6:30 p.m.; it is not anticipated that any construction activities would be required outside of these hours without specific noise-reduction requirements imposed by TRPA, the City of South Lake Tahoe and/or Douglas County, Caltrans, and NDOT. This is consistent with TRPA's Best Construction Practices Policy for the Minimization of Exposure to Construction-Generated Noise and Ground Vibration (TRPA [no date]a:6; TRPA [no date]b:4 to 5); the City of South Lake Tahoe City Code (Caltrans2015b:22 and 23); and part 20.690.030 of the Environmental Resources and Conservation Element of the 2011 Douglas County Master Plan (Douglas County 2011:6). It would also be consistent with the requirements of Caltrans's Standard Specification 14-8.02, which requires that construction noise levels not exceed 86 dB at a distance of 50 feet between the hours of 9:00 p.m. and 6:00 a.m. (Caltrans 2015a:215). All construction activity would be required to comply with other requirements of TRPA's Best Construction Practices Policy for the Minimization of Exposure to Construction-Generated Noise and Ground Vibration, including locating stationary equipment (such as generators or pumps) as far as feasible from noise-sensitive receptors and residential areas, equipping stationary equipment near sensitive noise receptors or residential areas with temporary sound barriers, and using sonic pile driving instead of impact pile driving, wherever feasible. Construction noise would not be generated during the more noise-sensitive times of the day (i.e., outside the hours exempt by TRPA and the local jurisdiction) unless a site-specific analysis determines that the resultant noise levels would not exceed applicable standards or require specific noise reduction measures. For these reasons, construction-generated noise associated with the Alternative B transportation improvements would be **less than significant** for purposes of TRPA and CEQA.

For the purposes of NEPA, design features of the transportation improvements included in Alternative B would avoid or minimize short-term construction noise such that no additional mitigation measures are needed or feasible to implement.

Mixed-Use Development including Replacement Housing

Alternative B includes the option to redevelop three multi-use development sites, which could provide replacement housing for displaced residents as well as other commercial uses (e.g., retail, restaurant). Redevelopment of these sites would involve the full and partial acquisition of additional parcels. Thus, demolition and construction activity would occur on the redevelopment sites in addition to the construction activities that would occur without mixed use development. Because all construction activity would be required to comply with the requirements of TRPA's Best Construction Practices Policy for the Minimization of Exposure to Construction-Generated Noise and Ground Vibration, including the requirement to only take place during less-sensitive times of day, and be temporary in nature, construction-generated noise would be **less than significant** for purposes of TRPA and CEQA.

For the purposes of NEPA, design features of the mixed-use development sites, including replacement housing, included in Alternative B would avoid or minimize short-term construction noise such that no additional mitigation measures are needed or feasible to implement. Construction of replacement housing at a location other than the three mixed-use development sites could result in similar potential short-term construction noise impacts as described for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of short-term construction noise impacts would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Conclusion

For the purposes of CEQA and TRPA, taken as a whole, the Alternative B transportation improvements and mixed-use development, including replacement housing, would result in a **less-than-significant** impact related to short-term construction noise.

For the purposes of NEPA, the design features of the transportation improvements and the mixed-use development sites as part of Alternative B would minimize short-term construction noise such that no additional mitigation measures are needed or feasible to implement.

Alternative C: Triangle One-Way

Transportation Improvements

Alternative C would involve demolition and construction activity in the same locations as Alternative B and involve the same types of noise-generating construction equipment listed in Table 3.15-8.

Similar to Alternative B, construction activities for Alternative C would occur between 8:00 a.m. and 6:30 p.m. and it is not anticipated that any construction activities would be required outside of these hours without specific noise-reduction requirements imposed by TRPA, the City of South Lake Tahoe and/or Douglas County, Caltrans, and NDOT. Also similar to Alternative B, no single receptor would be exposed to construction-related noise for an excessive period of time due to the linear nature of the project; all construction activity would occur during less noise-sensitive times of day pursuant to the requirements of TRPA, local jurisdictions, and Caltrans; and all construction activity would be required to comply with TRPA's Best Construction Practices Policy for the Minimization of Exposure to Construction-Generated Noise and Ground Vibration. Therefore, the impact of construction-generated noise associated with the Alternative C transportation improvements would be **less than significant** for purposes of TRPA and CEQA.

For the purposes of NEPA, design features of the transportation improvements included in Alternative C would avoid or minimize short-term construction noise such that no additional mitigation measures are needed or feasible to implement.

Mixed-Use Development including Replacement Housing

Alternative C would include the option to demolish additional existing buildings and construct new mixed-use land uses on the same redevelopment sites as Alternative B. Redevelopment of these sites would involve the full and partial acquisition of additional parcels. Thus, demolition and construction activity would occur on the redevelopment sites in addition to all the construction activities that would occur without the mixed-use development. Because all construction activity would be required to comply with the requirements of TRPA's Best Construction Practices Policy for the Minimization of Exposure to Construction-Generated Noise and Ground Vibration, including the requirement to only take place during less-sensitive times of day, and be temporary in nature, the impact of construction-generated noise associated the Alternative C mixed-use development, including replacement housing, would be **less than significant** for purposes of TRPA and CEQA.

For the purposes of NEPA, design features of the mixed-use development sites, including replacement housing, included in Alternative C would avoid or minimize short-term construction noise such that no additional mitigation measures are needed or feasible to implement. Construction of replacement housing at a location other than the three mixed-use development sites could result in a similar potential for short-term construction noise impacts as described above for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of short-term construction noise impacts would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Conclusion

For the purposes of CEQA and TRPA, taken as a whole, the Alternative C transportation improvements and mixed-use development, including replacement housing, would result in a **less-than-significant** impact related to short-term construction noise.

For the purposes of NEPA, the design features of the transportation improvements and the mixed-use development sites as part of Alternative C would minimize short-term construction noise such that no additional mitigation measures are needed or feasible to implement.

Alternative D: Project Study Report Alternative 2

Transportation Improvements

Alternative D would involve demolition and construction activity in the same general locations as Alternative B and involve the same types of noise-generating construction equipment listed in Table 3.15-8.

Similar to Alternative B, construction activities with Alternatives D would occur between 8:00 a.m. and 6:30 p.m. and it is not anticipated that any construction activities would be required outside of these hours without specific noise-reduction requirements imposed by TRPA, the City of South Lake Tahoe and/or Douglas County, Caltrans, and NDOT. Also similar to Alternative B, no single receptor would be exposed to construction-related noise for an excessive period of time due to the linear nature of the project; all construction activity would occur during less noise-sensitive times of day pursuant to the requirements of TRPA, local jurisdictions, and Caltrans; and all construction activity would be required to comply with TRPA's Best Construction Practices Policy for the Minimization of Exposure to Construction-Generated Noise and Ground Vibration. Therefore, the impact of construction-generated noise associated with the Alternative D transportation improvements would be **less than significant** for purposes of TRPA and CEQA.

For the purposes of NEPA, design features of the transportation improvements included in Alternative D would avoid or minimize short-term construction noise such that no additional mitigation measures are needed or feasible to implement.

Mixed-Use Development including Replacement Housing

Alternative D also includes the option to demolish additional existing buildings and construct new mixed-use land uses; however, one of the redevelopment sites would be different from Alternative B, as shown in Exhibit 2-11. Redevelopment of these sites would involve the full and partial acquisition of additional

parcels. Thus, demolition and construction activity would occur on the redevelopment sites in addition to the construction activities that would occur with the transportation improvements. Because all construction activity would be required to comply with the requirements of TRPA's Best Construction Practices Policy for the Minimization of Exposure to Construction-Generated Noise and Ground Vibration, including the requirement to only take place during less-sensitive times of day, and be temporary in nature, the impact of construction-generated noise associated with Alternative D with mixed-use development, including replacement housing, would be **less than significant** for purposes of TRPA and CEQA.

For the purposes of NEPA, design features of the mixed-use development sites, including replacement housing, included in Alternative D would avoid or minimize short-term construction noise such that no additional mitigation measures are needed or feasible to implement.

Construction of replacement housing at a location other than the three mixed-use development sites could result in a similar potential for short-term construction noise impacts as described above for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of short-term construction noise impacts would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Conclusion

For the purposes of CEQA and TRPA, taken as a whole, the Alternative D transportation improvements and mixed-use development, including replacement housing, would result in a **less-than-significant** impact related to short-term construction noise.

For the purposes of NEPA, the design features of the transportation improvements and the mixed-use development sites as part of Alternative D would minimize short-term construction noise such that no additional mitigation measures are needed or feasible to implement.

Alternative E: Skywalk

Alternative E would include the construction of a concrete deck in the tourist core, called a skywalk, as shown in Exhibit 2-13. Pile driving would be performed during construction of the skywalk. The types of construction equipment that would be used for Alternative E, and their reference noise levels, are shown in Table 3.15-8. While pile driving would only occur during daytime hours, it is likely that Alternative E would require some construction activity to be performed outside of the daytime hours between 8:00 a.m. and 6:30 p.m. to minimize traffic conflicts. Nighttime construction activity could involve the use of multiple types of equipment at the same time, adversely affecting existing nearby visitor-serving land uses. Land uses around the California end of the Alternative E pedestrian platform are zoned as Tourist Center by the Tourist Core Area Plan with a TRPA land use-based noise threshold of 65 CNEL (City of South Lake Tahoe and TRPA 2013:5-7 and C-13). Land uses around the Nevada end of the pedestrian deck are zoned as Tourist and are also subject to a TRPA land use-based noise threshold of 65 CNEL (Douglas County and TRPA 2013:24 and 50).

Erection of the skywalk, for instance, could involve operation of a crane, a heavy-duty forklift (e.g., Gradall), a concrete mixing truck, and a concrete pump in close proximity to each other. Some equipment may even be operated on portions of the skywalk that are already built. Applying the reference noise levels for these equipment types listed in Table 3.15-8, as well as usage factors provided by FHWA (FHWA 2006:3), the combined 24-hour noise level generated by pile driving activity would be 92 CNEL at 50 feet, even if no construction noise were generated during daytime hours. With any intervening barriers the 65 CNEL contour of nighttime construction activity would extend as far as 1,110 feet from the site. Thus, land uses located within this distance of the pedestrian deck could be exposed to noise levels that exceed TRPA's land use-based noise threshold of 65 CNEL. Also, assuming a standard exterior-to-interior noise reduction of 24 dB (EPA 1978:11), buildings located within 700 feet of construction activity could experience interior noise levels that exceed the interior noise standard of 45 CNEL, including the neighboring resort-casinos and hotels, where visitors could experience sleep disturbance. (See detailed noise calculations in Appendix K.) Estimated noise contour distances do not account for reductions from intervening barriers, including walls, trees, vegetation, or structures of any type; or a tunneling effect that may be generated by the tall buildings

that surround the skywalk site. As a result, the impact of construction-generated noise associated with Alternative E would be a **significant** impact for the purposes of CEQA and TRPA.

For the purposes of NEPA, additional mitigation measures have been incorporated into the construction of Alternative E to further reduce to the extent feasible the environmental consequences related to short-term construction noise.

Impact 3.15-2: Ground vibration during construction

Alternative A would not include any construction or demolition activity that generates ground vibration. Pile driving activity performed during construction of the pedestrian bridge associated with the Alternative B, C, and D transportation improvements along with construction of the mixed-use development sites could expose nearby buildings to ground vibration levels that exceed FTA's vibration 80-VdB standard for human response at residential land uses. Pile driving activity performed during construction of the Skywalk under Alternative E could expose nearby buildings and structures to ground vibration levels that exceed FTA's vibration standard of 0.20 in/sec PPV for structural damage and FTA's vibration standard of 80 VdB for human response at residential land uses.

NEPA Environmental Consequences:	Mitigation Measure 3.15-2a has been incorporated into Alternatives B, C, and D, and Mitigation Measure 3.15-2b has been incorporated into Alternative E to further reduce to the extend feasible adverse construction-related ground vibration; No Impact for Alternative A
CEQA/TRPA Impact Determinations:	Less Than Significant for Alternatives B, C, and D after implementation of Mitigation Measure 3.15-2a; Significant and Unavoidable for Alternative E after implementation of Mitigation Measure 3.15-2b; No Impact for Alternative A

None of the alternatives would include the development of any new major permanent stationary sources of ground vibration. They type of ground vibration that would be generated during construction activity under each alternative is discussed separately below.

Alternative A: No Build (No Project)

With Alternative A there would be no improvements to existing US 50, Lake Parkway, or other roadways; and no existing housing units or other buildings would undergo demolition within the project site boundaries. Therefore, there would be **no impact** pertaining to the exposure of buildings or structures to levels of construction-generated ground vibration that could result in structural damage or human annoyance generated by construction equipment for purposes of NEPA, CEQA, and TRPA.

Alternative B: Triangle (Locally Preferred Action)

Transportation Improvements

As described above under Impact 3.15-1, demolition and construction activities performed for Alternative B would involve the use of heavy-duty trucks and off-road construction equipment. The use of these equipment could generate ground vibration in close proximity to existing structures and buildings, including residential buildings and tourist accommodation units. Operation of heavy construction equipment, particularly pile driving, create seismic waves that radiate along the surface of the earth and downward into the earth. These surface waves can be felt as ground vibration. Vibration from operation of this equipment can result in effects ranging from annoyance of people to damage of structures. Varying geology and distance result in different vibration levels containing different frequencies and displacements. In all cases, vibration amplitudes decrease with increasing distance.

Construction activities generate varying degrees of temporary ground vibration, depending on the specific construction equipment used and activities involved. Ground vibration generated by construction equipment

spreads through the ground and diminishes in magnitude with increases in distance. Construction-related ground vibration is normally associated with impact equipment such as pile drivers, jackhammers, and the operation of some heavy-duty construction equipment, such as dozers and trucks. Blasting activities also generate relatively high levels of ground vibration but demolition and construction activities are not anticipated to include blasting. The effects of ground vibration may be imperceptible at the lowest levels, result in low rumbling sounds and detectable vibrations at moderate levels, and high levels of vibration can cause sleep disturbance in places where people normally sleep or annoyance in buildings that are primarily used for daytime functions and sleeping. Ground vibration can also potentially damage the foundations and exteriors of existing structures even if it does not result in a negative human response. Table 3.15-9 shows ground vibration levels for typical construction equipment.

Pile driving produces the highest levels of ground vibration and can result in structural damage to existing buildings. Impact pile drivers produce a high level of vibration for short periods (0.2 seconds) with sufficient time between impacts to allow the resonant effects on a building to decay before the next vibration event (FTA 2006:12 to 14). As shown in Table 3.15-9, impact pile driving can produce vibration levels up to 1.518 in/sec PPV or 112 VdB at 25 feet. Assuming normal propagation conditions, this level would propagate to less than FTA's vibration standard of 0.20 in/sec PPV for structural damage at a distance of 100 feet and to levels less than FTA's vibration standard of 80 VdB for human response at residential land uses at a distance of 300 feet. Ground vibration levels from sonic pile driving would propagate to less than FTA's vibration standard of 0.20 in/sec PPV for structural damage at a distance of 60 feet and to levels less than FTA's vibration standard of 80 VdB for human response at residential land uses at a distance of 175 feet. All propagation adjustment calculations are included in Appendix F of the Lake Tahoe Regional Transportation Plan/Sustainable Communities Strategy Draft EIR/EIS and incorporated here by reference (Tahoe Metropolitan Planning Organization [TMPO] and TRPA 2012).

Table 3.15-9 Representative Ground Vibration and Noise Levels for Construction Equipment

Type of Equipment	PPV at 25 feet (in/sec)	Approximate Lv (VdB) at 25 feet
Pile Driver (impact) upper range	1.518	112
typical	0.644	104
Pile Driver (sonic) upper range	0.734	105
typical	0.170	93
Blasting[1]	1.13	109
Large Dozer	0.089	87
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Rock Breaker	0.059	83
Jackhammer	0.035	79
Small Dozer	0.003	58

Notes: PPV = peak particle velocity; LV = the root mean square velocity expressed in vibration decibels (VdB), assuming a crest factor of 4.

[1] Blasting would not take place with Alternatives A, B, C, D, and E.

Source: FTA 2006:12-6 and 12-8.

Pile driving would only be performed during construction of the pedestrian bridge over the realigned US 50 alignment. The closest building to the site of the proposed pedestrian bridge is part of the Forest Suites Resort and is approximately 200 feet from where the nearest location where pile driving could occur. Because this building is more than 100 feet from where pile driving could occur it would not be exposed to levels of ground vibration that exceed FTA's vibration standard of 0.20 in/sec PPV for structural damage. However, because this building is located within 300 feet of where the pedestrian bridge would be

constructed, it would be exposed to ground vibration levels that exceed FTA's vibration 80-VdB standard for human response at residential land uses. Therefore, this would be a **significant** impact for the purposes of CEQA and TRPA.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements included in Alternative B to further reduce to the extent feasible the environmental consequences related to ground vibration during construction.

Mixed-Use Development including Replacement Housing

In addition to the vibration impacts discussed above, demolition and construction of new mixed-use development on the three redevelopment sites (shown in Exhibit 2-9) to include replacement housing would involve more vibration-generating construction activity at these locations. However, it is assumed that no pile driving, blasting, or other high ground vibration-generating activity would occur at these sites. It is not anticipated that the other types of heavy-duty equipment that would be used would expose any nearby buildings to ground vibration levels greater than FTA's vibration standard of 0.20 in/sec PPV for structural damage or expose any nearby housing units or tourist accommodations to ground vibration levels greater than FTA's vibration standard of 80 VdB for human response at residential land uses. For these reasons, the impact related to construction of the mixed-use development sites, including replacement housing, would be **less than significant** for the purposes of CEQA and TRPA.

For the purposes of NEPA, the design features of the replacement housing at the mixed-use development sites as part of Alternative B would avoid or minimize the environmental consequences related to ground vibration during construction such that no additional mitigation measures are needed or feasible to implement.

Construction of replacement housing at a location other than the three mixed-use development sites could result in similar potential impacts related to ground vibration during construction as described above for the replacement housing for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of the impacts of ground vibration during construction would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Conclusion

For the purposes of CEQA and TRPA, taken as a whole, the Alternative B transportation improvements and mixed-use development, including replacement housing, would result in a **significant** impact related to ground vibration during construction.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements and the mixed-use development sites included in Alternative B to further reduce to the extent feasible the environmental consequences related to ground vibration during construction.

Alternative C: Triangle One-Way

Transportation Improvements

Alternative C would involve demolition and construction activity in the same locations as Alternative B and using the same types of ground vibration-generating construction equipment listed in Table 3.15-9. Similar to Alternative B, pile driving performed during construction of the pedestrian bridge over realigned US 50, if required, could expose buildings at the Forest Suites Resort to ground vibration levels that exceed FTA's vibration standard of 80 VdB for human response at residential land uses. This would be a **significant** impact for the purposes of CEQA and TRPA.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements included in Alternative C to further reduce to the extent feasible the environmental consequences related to ground vibration during construction.

Mixed-Use Development including Replacement Housing

Alternative C would include the demolition of existing buildings and construction of new mixed-use land uses, including replacement housing, on the same redevelopment sites as Alternative B shown in Exhibit 2-9. However, it is assumed that the types of activity that would occur on these sites would not include pile driving, blasting, or other high ground vibration-generating activity. Similar to Alternative B, it is not anticipated that the other types of heavy-duty equipment that would be used would expose any nearby buildings to ground vibration levels greater than FTA's vibration standard of 0.20 in/sec PPV for structural damage or expose any nearby housing units or tourist accommodations to ground vibration levels greater than FTA's vibration standard of 80 VdB for human response at residential land uses. For these reasons, the impact related to construction of the mixed-use development sites, including replacement housing, would be **less than significant** for the purposes of CEQA and TRPA.

For the purposes of NEPA, the design features of the replacement housing at the mixed-use development sites as part of Alternative C would avoid or minimize the environmental consequences related to ground vibration during construction such that no additional mitigation measures are needed or feasible to implement.

Construction of replacement housing at a location other than the three mixed-use development sites could result in similar potential impacts related to ground vibration during construction as described above for the replacement housing for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of the impacts of ground vibration during construction would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Conclusion

For the purposes of CEQA and TRPA, taken as a whole, the Alternative C transportation improvements and mixed-use development, including replacement housing, would result in a **significant** impact related to ground vibration during construction.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements and the mixed-use development sites included in Alternative C to further reduce to the extent feasible the environmental consequences related to ground vibration during construction.

Alternative D: Project Study Report Alternative 2

Transportation Improvements

Alternative D would involve demolition and construction activity in generally the same locations as Alternative B and using the same types of ground vibration-generating construction equipment listed in Table 3.15-9. Similar to Alternative B, pile driving performed during construction of the pedestrian bridge over realigned US 50 could expose buildings at the Forest Suites Resort to ground vibration levels that exceed FTA's vibration standard of 80 VdB for human response at residential land uses. This would be a **significant** impact for the purposes of CEQA and TRPA.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements included in Alternative D to further reduce to the extent feasible the environmental consequences related to ground vibration during construction.

Mixed-Use Development including Replacement Housing

Alternative D would include the demolition of existing buildings and construction of new mixed-use land uses, including replacement housing, at the redevelopment sites shown in Exhibit 2-11. However, it is assumed that the types of activity that would occur on these sites would not include pile driving, blasting, or other high ground vibration-generating activity. Similar to Alternative B, it is not anticipated that the other types of heavy-duty equipment that would be used would expose any nearby buildings to ground vibration levels greater than FTA's vibration standard of 0.20 in/sec PPV for structural damage or expose any nearby

housing units or tourist accommodations to ground vibration levels greater than FTA's vibration standard of 80 VdB for human response at residential land uses. For these reasons, the impact related to construction of the mixed-use development sites, including replacement housing, would be **less than significant** for the purposes of CEQA and TRPA.

For the purposes of NEPA, the design features of the replacement housing at the mixed-use development sites as part of Alternative D would avoid or minimize the environmental consequences related to ground vibration during construction such that no additional mitigation measures are needed or feasible to implement.

Construction of replacement housing at a location other than the three mixed-use development sites could result in similar potential impacts related to ground vibration during construction as described above for the replacement housing for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of the impacts of ground vibration during construction would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Conclusion

For the purposes of CEQA and TRPA, taken as a whole, the Alternative D transportation improvements and mixed-use development, including replacement housing, would result in a **significant** impact related to ground vibration during construction.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements and the mixed-use development sites included in Alternative D to further reduce to the extent feasible the environmental consequences related to ground vibration during construction.

Alternative E: Skywalk

The types of ground vibration-generating construction equipment that would be used for construction of the skywalk with Alternative E, and the levels of ground vibration they typically generate, are listed in Table 3.15-9. Pile driving would produce the highest levels of ground vibration during construction. As explained for Alternative B above, ground vibration generated by impact pile drivers would propagate to less than FTA's vibration standard of 0.20 in/sec PPV for structural damage at a distance of 100 feet and to levels less than FTA's vibration standard of 80 VdB for human response at residential land uses at a distance of 300 feet assuming normal propagation conditions. Ground vibration levels from sonic pile driving would propagate to less than FTA's vibration standard of 0.20 in/sec PPV for structural damage at a distance of 60 feet and to levels less than FTA's vibration standard of 80 VdB for human response at residential land uses at a distance of 175 feet assuming normal propagation conditions. All propagation adjustment calculations are included in Appendix F of the *Lake Tahoe Regional Transportation Plan/Sustainable Communities Strategy Draft EIR/EIS* (TMPO and TRPA 2012).

The skywalk construction site would be located between buildings along both sides of US 50 and the distance between the buildings on each side of US 50 is approximately 80 feet. Thus, pile driving activity could expose these buildings to levels of ground vibration that exceed FTA's vibration standard of 0.20 in/sec PPV for structural damage and FTA's vibration standard of 80 VdB for human response at residential land uses. Therefore, this would be a **significant** impact for the purposes of CEQA and TRPA.

For the purposes of NEPA, additional mitigation measures have been incorporated into Alternative E to further reduce to the extent feasible the environmental consequences related to ground vibration during construction.

Impact 3.15-3: Traffic noise exposure at existing receptors

Alternative A would not result in changes to traffic noise levels along US 50 or local roadways.

With Alternatives B, C, and D the 65 CNEL contours along the realigned segments of US 50 would not extend more than 300 feet from the roadway edge for any of the alternatives. Therefore, the Environmental Threshold Carrying Capacity established by TRPA for the transportation corridor would not be exceeded with Alternatives B, C, and D.

With Alternatives B, C, and D one or more noise-sensitive receptors would be exposed to noise levels greater than the applicable FHWA noise abatement criteria by the design year (i.e., 2040).

With Alternatives B, C, and D multiple existing noise-sensitive receptors in California would experience increases in traffic noise that are considered substantial by 23 CFR 772 criteria (i.e., increase of 12 dB or more).

With Alternatives B, C, D, and E one or more existing noise-sensitive receptors located outside of a TRPA transportation corridor would be exposed to noise levels that exceed TRPA's applicable land use-based CNEL threshold.

With Alternatives B, C, D, and E multiple noise-sensitive receptors would be exposed to traffic noise levels that exceed the applicable traffic noise standard established by the City of South Lake Tahoe.

With Alternatives B, C, and D multiple noise-sensitive receptors would experience a CNEL increase equal to or greater than 3 dB, which is a TRPA significance criterion and a CEQA significance criterion for receptors located in California.

With Alternatives B, C, D, and E one or more existing hotels would be exposed to interior noise levels that exceed the interior noise standard of 45 CNEL.

These exceedances would occur under existing-plus-project conditions (2020) and/or under cumulative-plus-project conditions (2040) with a considerable contribution of the exceedance directly resulting from the implementation of the selected alternative. The intensity of these impacts would not be substantially different with development of the replacement housing at the mixed-use redevelopment sites with Alternatives B, C, and D.

NEPA Environmental Consequences:	Mitigation Measures 3.15-3a, 3-15-3b, and 3.15-3c have been incorporated into Alternatives B, C, and D, and Mitigation Measure 3.15-3d has been incorporated into Alternative E, to further reduce to the extent feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels; No Impact for Alternative A
CEQA/TRPA Impact Determinations:	Significant and Unavoidable for Alternatives B, C, and D after implementation of Mitigation Measures 3.15-3a, 3.15-3b, and 3.15-3c; Less Than Significant for Alternative E after implementation of Mitigation Measure 3.15-3d; No Impact for Alternative A

The level of traffic noise at receptors in the study area is primarily affected by their proximity to US 50, the volume of traffic and speed of travel along the highway, and the degree to which surrounding buildings, other structures, and trees and vegetation reflect and/or absorb noise.

With Alternatives B, C, and D, US 50 would be realigned, as shown in Exhibits 2-2, 2-3, and 2-4, respectively. This would include the modification of local roadways, widening of existing roadways, construction of a

pedestrian path and modifications to the existing US 50 to become a local street, and the realignment of neighborhood streets to connect with the highway. With these alternatives, vehicle activity on US 50 would be moved closer to some noise-sensitive receptors, resulting in increased levels of noise exposure at those receptors. However, this noise source would also be moved further away from other noise-sensitive receptors in the tourist core, resulting in decreased levels of noise exposure at those receptors. No realignment of US 50 or other roadways would occur under Alternatives A and E.

Traffic noise modeling was conducted for all affected roadway segments under all the alternatives using the FHWA Traffic Noise Model Version 2.5 and data from a project-specific traffic analysis prepared in 2013 (Caltrans 2015b:55).

Table 3.15-10 summarizes changes that would occur to the 65 CNEL traffic contour along US 50 under all the alternatives.

As shown in Table 3.15-10, the 65 CNEL contours along the affected segments of US 50 and the affected portions of Lake Parkway in Nevada would not extend more than 300 feet from the roadway edge for any of the alternatives. Therefore, the Environmental Threshold Carrying Capacity established by TRPA for these transportation corridors would not be exceeded.

Table 3.15-10 Noise Contour Distances along Major Transportation Corridors under Cumulative Conditions

Roadway Segments with Contour-Based Noise Thresholds[1]	Distance from Edge of Roadway to 65 CNEL Contour (feet) under Cumulative Conditions (2040)[2]				
	Existing Conditions/Alt. A[3]	Alt. B[4]	Alt. C[4]	Alt. D[4]	Alt. E[3]
US 50 South of Pioneer Trail	97	97	97	97	97
US 50 between Pioneer Trail and Park Avenue	97	46	84	46	97
US 50 between Park Avenue and Friday Avenue	73	<18	52	<18	73
US 50 between Friday Avenue and Stateline Avenue	71	<18	50	<18	71
US 50 North of Stateline Avenue	66	<18	45	<18	66
US 50 South of Loop Road/Lake Parkway	70	<20	42	<20	70
US 50 North of Loop Road/Lake Parkway	97	98	99	98	97
Realigned US 50/Lake Parkway between Heavenly Village Way and Harrah's Road	<38	132	86	132	<38
Realigned US 50/Lake Parkway between Harrah's Road and existing US 50	<38	120	79	120	<38
Lake Parkway West of US 50 (to Golf Course Entrance Road)	<32	<32	<32	<32	<32
Lake Parkway North of Stateline Avenue (to Golf Course Entrance Road)	<32	<32	<32	<32	<32

Notes: CNEL = community noise equivalent level

[1] The contour-based threshold of 65 CNEL at 300 feet from the edge of US 50 is contained in TRPA's Regional Plan (TRPA 2012a:2-26). The contour-based threshold of 65 CNEL at 300 feet from the edge of the segments of Lake Parkway in Nevada was established by the South Shore Area Plan (Douglas County and TRPA 2013:24).

[2] Contour distances would be closer under existing-plus-Alternative B conditions.

[3] Alternatives A and E would not include new mixed-use development to provide new housing because no housing units would be removed under these alternatives.

[4] With Alternatives B, C, and D, new mixed-use development may occur to replace housing units that are removed to accommodate the realignment of US 50. However, traffic noise levels would not be substantially different with or without the addition of new mixed-use development.

Detailed modeling parameters are provided in the Noise Study Report and are incorporated by reference here (Caltrans2015b).

Source: Modeling by LSA Associates in Caltrans 2015b; Post-processing by Ascent Environmental in 2016

Nonetheless, because the location of the TRPA transportation corridor would move with the realigned segments of US 50 under Alternatives B, C, and D, the applicable TRPA noise threshold would change for some receptors. This is due to the relationship between TRPA's land use-based noise thresholds and TRPA's contour-based noise threshold for the US 50 transportation corridor. As explained in Table 3.15-4 in the

regulatory setting and in the "Methods and Assumptions" sections above, TRPA's traffic noise threshold for the US 50 transportation corridor is a contour-based noise threshold that overrides the land use-based CNEL thresholds within 300 feet of the highway's edge. This means that some receptors currently subject to a TRPA land use-based noise standard (because they beyond 300 feet from the existing alignment of US 50) would instead become subject to the contour-based noise threshold of US 50 because the realigned highway would move to within 300 feet of them. For instance, under existing conditions Receptor 63 is subject to the land use-based noise standard of 55 CNEL established in PAS 092 Pioneer Ski/Run (TRPA 2002c:3). However, implementation of Alternative B would result in Receptor 63 being subject to the TRPA contour-based noise standard for US 50, because Receptor 63 would be within 300 feet of the realigned segment of US 50. The opposite change occurs at other receptors; that is, some receptors currently subject to TRPA's contour-based noise threshold for US 50 would become subject to one of TRPA's land use-based noise thresholds. For example, receptors located within 300 feet of the existing segment of US 50 between Pioneer Trial and Lake Parkway are currently subject to the TRPA's contour-based threshold for US 50; however, they would be subject to the applicable land use-based threshold after US 50 is realigned under Alternatives B, C, and D. Additional analysis of the noise impacts to discrete receptors located inside and outside of the US 50 transportation corridor is provided below.

Alternative A: No Build (No Project)

There would be no change in traffic noise levels as a result of Alternative A because this alternative would not result in realignment of any segments of US 50, or changes in the traffic volumes or travel speeds of various segments of US 50, Lake Parkway, or other local roads. For this reason, there would be **no impact** related to traffic noise under Alternative A for the purposes of NEPA, CEQA, and TRPA.

Alternative B: Triangle (Locally Preferred Action)

Transportation Improvements

Table 3.15-11 summarizes the predicted noise levels that would be experienced at those noise-sensitive receptors that would be most affected by Alternative B (but would not be acquired through the right-of-way acquisition process). Exhibit 3.15-2 shows the locations of these receptors and the type of impact(s) they would experience.

As shown in Table 3.15-11, one receptor, Receptor 136, would experience noise levels greater than the applicable FHWA noise abatement criteria by the design year (i.e., 2040) and 15 receptors would experience increases in traffic noise that are considered substantial by Caltrans criteria (i.e., 12 dB or more)—all of these receptors are located in California. Six receptors would be exposed to noise levels that exceed TRPA's applicable land use-based CNEL threshold, 18 receptors would be exposed to noise levels that exceed the transportation noise standards established by the City of South Lake Tahoe, and 30 receptors would experience a CNEL increase equal to or greater than 3 dB, which is a TRPA significance criterion (and a CEQA significance criterion for receptors located in California). Also, Receptor 55, which is a motel called the South Shore Inn, could be exposed to interior noise levels that exceed 45 CNEL. These exceedances would occur under existing-plus-Alternative B conditions and/or under cumulative-plus-Alternative B conditions with a considerable contribution of the exceedance directly resulting from the implementation of Alternative B. As shown in Exhibit 3.15-2, the locations of these receptors would be closer to the realigned segment of US 50 that would exist under Alternative B than the existing alignment of US 50. Fundamentally, Alternative B would move a segment of US 50 (both west- and east-bound traffic), which is the predominant noise source in the area, closer to these receptors. Most of the receptors that would be impacted are located in the Rocky Point neighborhood southwest of the Heavenly Village Center along Fern Road, Echo Road, Moss Road, Primrose Road, Rocky Point Road, and Chonokis Road. Receptors 1, 4, and 5 are residential land uses located along a segment of US 50 that would not be realigned but these receptors would be exposed to traffic noise levels in 2040 that exceed the City of South Lake Tahoe's noise standard of 60 CNEL with a considerable contribution by Alternative B. Receptor 136 is a motel called the Cedar Inn & Suites located on the corner of Stateline Avenue and Pine Boulevard that would be exposed to a noise levels greater than 65 CNEL, which is the threshold established by TRPA in the Tourist Core Area Plan (City of South Lake Tahoe and TRPA 2013:C-13). For these reasons this impact for the Alternative B transportation improvements would be **significant** for purposes of TRPA and CEQA.

Table 3.15-11 Summary of Traffic Noise Impacts at Discrete Noise-Sensitive Receptors under Alternative B

Receptor No.[3]	Modeled Traffic Noise Levels[1] ($L_{eq[h]}$, CNEL)[2]							NEPA Impact Analysis			TRPA Impact Analysis			CEQA Impact Analysis[9]			
	Existing	Existing-Plus-Alternative B	Change from Existing to Existing-Plus-Alternative B	2038-No-Project	2038-Plus-Alternative B	Change from 2038-No-Project to 2038-Plus-Alternative B	Change from Existing to 2038-Plus-Alternative B	FHWA Noise Abatement Criteria, $L_{eq[h]}$[4]	Noise Abatement Criterion Exceeded or Approached?[5]	NEPA Incremental Increase Criterion Exceeded?[6]	TRPA Land Use-Based Noise Threshold Under Alternative B (CNEL)[7]	Exceed (or Contribute to an Exceedance of) TRPA Land Use-Based Noise Standard?	TRPA Incremental Increase Criterion Exceeded?[8]	Local Jurisdiction	Noise Standard of Local Jurisdiction (CNEL)[10]	Exceed (or Contribute to an Exceedance of) Local Noise Standard?	CEQA Incremental Increase Criterion Exceeded?[8]
1	59	60	1	61	62	1	3	67	No	No	NA	NA	No	CSLT	60	No	No
4	59	60	1	61	62	1	3	67	No	No	NA	NA	No	CSLT	60	No	No
5	57	59	2	60	61	1	4	67	No	No	NA	NA	No	CSLT	60	No	No
31	44	54	10	46	55	9	11	67	No	No	55	No	**Yes**	CSLT	60	**Yes**	No
32	44	53	9	46	54	8	10	67	No	No	55	No	**Yes**	CSLT	60	**Yes**	No
33	43	52	9	45	53	8	10	67	No	No	55	No	**Yes**	CSLT	60	**Yes**	No
34	61	66	5	63	67	4	6	72	No	No	NA	NA	No	CSLT	65	No	No
37	43	56	13	45	57	12	14	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
38	43	56	13	45	57	12	14	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
39	43	56	13	44	57	13	14	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
43	44	58	14	46	59	13	15	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
49	45	64	19	47	65	18	20	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
50	45	63	18	47	64	17	19	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
51	44	61	17	46	62	16	18	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
52	44	60	16	46	61	15	17	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
53	36	40	4	37	41	4	5	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
54	37	48	11	38	48	10	11	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
55	64	69	5	66	71	5	7	72	No	No	NA	NA	No	CSLT	65	No	No
63	48	59	11	50	60	10	12	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
64	49	56	7	50	57	7	8	67	NA	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
65	62	65	3	64	67	3	5	72	No	No	NA	NA	No	CSLT	65	No	No
67	48	60	12	50	61	11	13	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
68	50	60	10	52	60	8	10	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
69	50	60	10	52	61	9	11	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
70	48	63	15	50	64	14	16	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
71	49	62	13	51	62	11	13	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
72	47	65	18	49	66	17	19	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
73	47	67	20	48	68	20	21	67	**Yes**	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
80	54	57	3	56	58	2	4	67	No	No	55	**Yes**	**Yes**	CSLT	60	**Yes**	No
81	50	58	8	52	59	7	9	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No

Table 3.15-11 Summary of Traffic Noise Impacts at Discrete Noise-Sensitive Receptors under Alternative B

Receptor No.[3]	Modeled Traffic Noise Levels[1] ($L_{eq[h]}$, CNEL)[2]							NEPA Impact Analysis			TRPA Impact Analysis			CEQA Impact Analysis[9]			
	Existing	Existing-Plus-Alternative B	Change from Existing to Existing-Plus-Alternative B	2038-No-Project	2038-Plus-Alternative B	Change from 2038-No-Project to 2038-Plus-Alternative B	Change from Existing to 2038-Plus-Alternative B	FHWA Noise Abatement Criteria, $L_{eq[h]}$[4]	Noise Abatement Criterion Exceeded or Approached?[5]	NEPA Incremental Increase Criterion Exceeded?[6]	TRPA Land Use-Based Noise Threshold Under Alternative B (CNEL)[7]	Exceed (or Contribute to an Exceedance of) TRPA Land Use-Based Noise Standard?	TRPA Incremental Increase Criterion Exceeded?[8]	Local Jurisdiction	Noise Standard of Local Jurisdiction (CNEL)[10]	Exceed (or Contribute to an Exceedance of) Local Noise Standard?	CEQA Incremental Increase Criterion Exceeded?[8]
82	50	59	9	51	59	8	9	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
83	48	58	10	50	58	8	10	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
84	47	60	13	49	61	12	14	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
88	54	56	2	56	57	1	3	67	No	No	55	**Yes**	No	CSLT	60	No	No
89	54	56	2	56	57	1	3	67	No	No	55	**Yes**	No	CSLT	60	No	No
90	53	56	3	55	56	1	3	67	No	No	55	**Yes**	**Yes**	CSLT	60	**Yes**	No
91	51	56	5	53	57	4	6	67	No	No	55	**Yes**	**Yes**	CSLT	60	**Yes**	No
92	49	57	8	51	58	7	9	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
136	65	66	1	67	68	1	3	72	No	No	65	**Yes**	No	CSLT	65	No	No

Notes: dB = decibel, $L_{eq[h]}$ = peak-hour noise level, FHWA = Federal Highway Administration. CNEL = Community Noise Equivalent Level, CSLT = City of South Lake Tahoe, California, EDC = El Dorado County, NA = not applicable

1 Detailed traffic noise modeling inputs and results are provided in the Noise Study Report (Caltrans2015b); relevant excerpts from the Noise Study Report are included in Appendix K.

2 All noise modeling estimated the hourly average noise level during the peak traffic hour ($L_{eq[h]}$) for a summer day and the Noise Study Report determined that the CNEL values would be similar to the ($L_{eq[h]}$) values based on a 24-hour noise level measurement conducted in the project area (Caltrans2015b:40 and 238). All noise levels are expressed in A-weighted decibels.

3 This table only includes discrete modeling receptor sites where one or more NEPA, TRPA, CEQA significance criteria and/or a TRPA land use-based CNEL threshold would be exceeded. No significance criteria or TRPA thresholds were predicted to be exceeded at all other modeled discrete receptors. The discrete modeling receptor sites are often referred to as "receptors" in this table and in this EIR/EIS/EIS; however, a single discrete modeling receptor site may be representative of multiple nearby receptors that are equidistant or closer to the nearby roadway that is the predominant source of noise at those receptors. Thus, this EIR/EIS/EIS recognizes that and exceedance of an applicable noise standard at a single modeled receptor site may indicate exposure that would be experienced by land uses equidistant or closer to the highway in that area. Receptor 142, which is located on the sidewalk next to the entrance driveway to Van Sickle Bi-State Park, was not included in this table because it does not represent an outdoor activity area or distinct destination where people gather or otherwise spend time.

4 This significance criterion for the NEPA impact analysis is equivalent to the Noise Abatement Criterion (NAC) for the applicable activity category listed in Table 3.15-3. The NAC have been adopted as significance standards by both Caltrans and NDOT.

5 The applicable NAC is compared to the predicted noise level for the design year (i.e., 2040) at a noise-sensitive receptor. This comparison is used for both the project-level and cumulative impact analysis. A sound level is considered to "approach" an NAC level if the sound level is 1 dB less than the NAC.

6 The NEPA incremental increase criteria are compared to the change in the traffic noise level between existing conditions and the design year (i.e., 2040). This comparison is also used for both the project-level and cumulative impact analysis.

7 TRPA's land use-based noise thresholds are listed in Table 3.15-4 and do not apply to receptors located within 300 feet of the edge of US 50 or the edge of the segments of Lake Parkway in Nevada. These receptors are marked with "NA"

8 For the TRPA and CEQA analyses, an incremental increase significance criterion of 3 dB is compared to the difference between existing noise levels and existing-plus-alternative noise levels.

9 The CEQA impact analysis only applies to receptors located in California.

10 For receptors located in the City of South Lake Tahoe the applicable noises standard is based on the standards in Table 3.15-5. As explained in Table 3.15-5, for hotels, motels, and other transient lodging facilities that do not have an outdoor activity area such as a pool, the city's exterior noise standard of 65 CNEL does not apply. For receptors located in the unincorporated area of El Dorado County, the transportation noise standard from Chapter 130.37 of the County's zoning ordinance is applied.

Source: Traffic noise levels modeled by LSA (Caltrans2015b); Impact analysis conducted by Ascent Environmental 2016

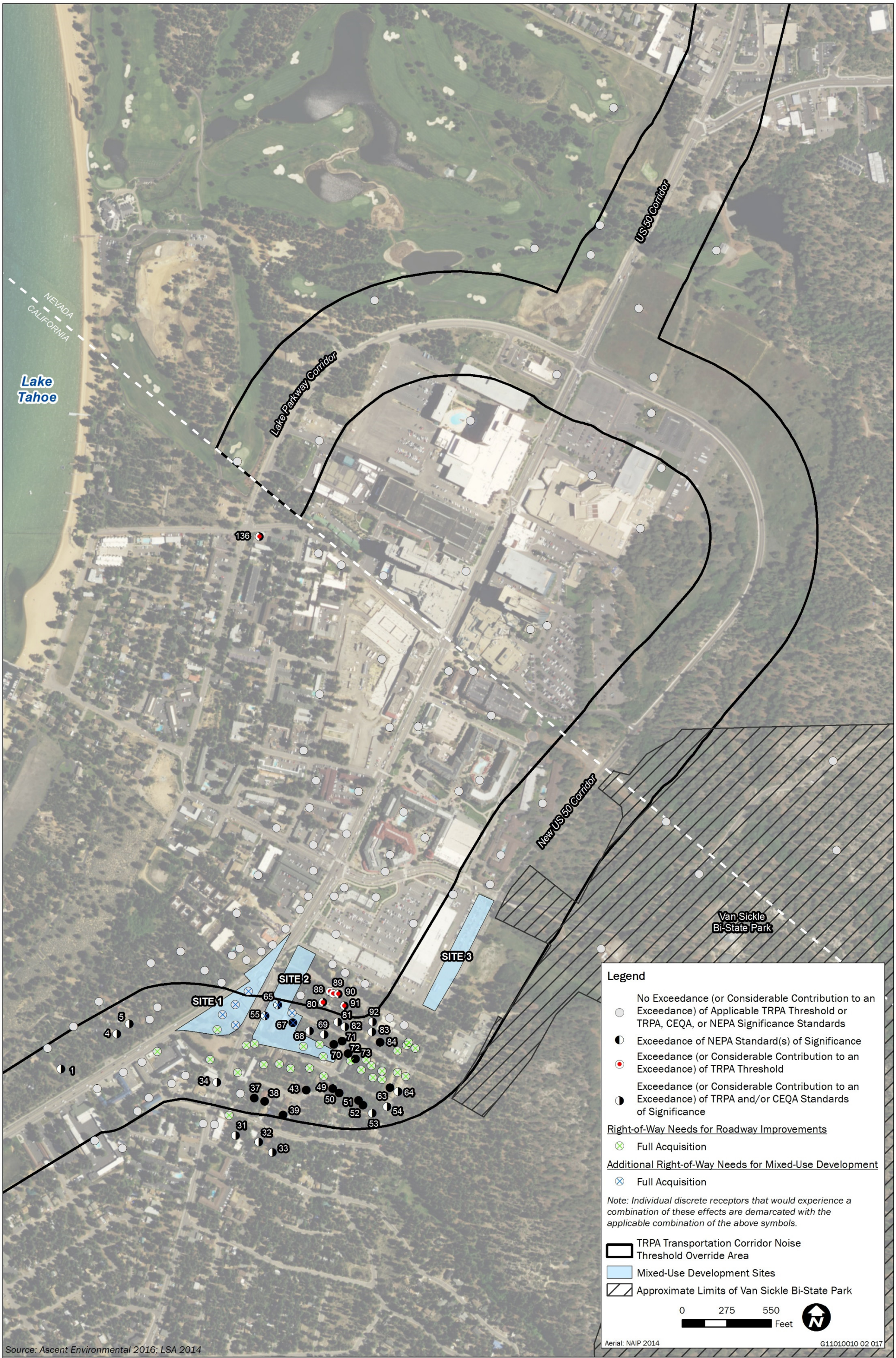

Exhibit 3.15-2 **Alternative B Noise Receptors and Noise Impacts**

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements included in Alternative B to further reduce to the extent feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Mixed-Use Development including Replacement Housing

Alternative B includes the redevelopment of three multi-use development sites, which would provide replacement housing for displaced residents as well as other commercial uses (e.g., retail, restaurant). Redevelopment of these sites would involve the full and partial acquisition of additional parcels including, as shown in Exhibit 3.15-2, full acquisition of Receptors 55, 56, 65, and 67. Thus, these receptors would not experience the noise impacts listed in Table 3.15-11 after they are removed.

Operation of the land uses constructed on the three multi-use development sites would add additional noise-generating vehicles to the local roadway network. As explained in the "Methods and Assumptions" section above, the traffic volumes used to estimate traffic noise levels in the Noise Study Report were conservatively high such that they also account for the additional vehicle trips that would be generated by operation of the three mixed-use development sites. Also explained above is that the difference in traffic volumes with the transportation improvements and the mixed-use development sites is not substantial given the logarithmic nature of adding and subtracting noise levels (i.e., it takes a doubling of the noise-generating activity, in this case the traffic volume, to result in a 3-dB noise increase). Therefore, there would be no measurable difference in traffic noise levels generated under Alternative B with or without the mixed-use development. As shown in Table 3.15-11, the 65 CNEL contour along the affected segments of US 50 and the affected portions of Lake Parkway in Nevada would not extend more than 300 feet from the roadway edge and, thus, the Environmental Threshold Carrying Capacity established by TRPA for these transportation corridors would not be exceeded. Similarly, there would be no measurable difference in the traffic noise levels predicted at existing discrete sensitive receptors, which are summarized in Table 3.15-11. Therefore, the traffic noise impacts in Alternative B with the mixed-use development at existing discrete receptors would be the same as those with the transportation improvements and this impact would be **significant** for purposes of TRPA and CEQA.

For the purposes of NEPA, additional mitigation measures have been incorporated into the mixed-use development sites included in Alternative B to further reduce to the extent feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels. Construction of replacement housing at a location other than the three mixed-use development sites could result in similar potential impacts related to the exposure of sensitive receptors to increased traffic noise levels as described above for the replacement housing for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of the exposure of sensitive receptors at another location to increased traffic noise levels would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Conclusion

For the purposes of CEQA and TRPA, taken as a whole, the Alternative B transportation improvements and mixed-use development, including replacement housing, would result in a **significant** impact related to the exposure of sensitive receptors to increased traffic noise levels.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements and the mixed-use development sites included in Alternative B to further reduce to the extent feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Alternative C: Triangle One-Way

Transportation Improvements

Table 3.15-12 summarizes the predicted noise levels that would be experienced at those noise-sensitive receptors that would be most affected under Alternative C (but would not be acquired). Exhibit 3.15-3 shows the locations of these receptors and the type of impact(s) they would experience.

As shown in Table 3.15-12, one receptor, Receptor 55, would experience noise levels greater than the applicable FHWA noise abatement criteria by the design year (i.e., 2040) and 10 receptors would experience increases in traffic noise that are considered substantial by Caltrans criteria (i.e., 12 dB or more)—all of these receptors are located in California. One receptor would be exposed to noise levels that exceed TRPA's applicable land use-based CNEL threshold. Receptor 136, a motel called the Cedar Inn & Suites located on the corner of Stateline Avenue and Pine Boulevard, would be exposed to a noise levels greater than 65 CNEL, which is the threshold established by TRPA in the Tourist Core Area Plan (City of South Lake Tahoe and TRPA 2013:C-13). Ten receptors would be exposed to noise levels that exceed the transportation noise standards established by the City of South Lake Tahoe, and 27 receptors would experience a CNEL increase equal to or greater than 3 dB, which is a TRPA significance criterion (and a CEQA significance criterion for receptors located in California). Receptor 55, which is a motel called the South Shore Inn, could also be exposed to interior noise levels that exceed 45 CNEL. These exceedances would occur under existing-plus-Alternative C conditions and/or under cumulative-plus-Alternative C conditions with a considerable contribution of the exceedance directly resulting from the implementation of Alternative C. As shown in Exhibit 3.15-3, the locations of these receptors would be closer to the realigned segment of east bound US 50 than the existing alignment of US 50. Essentially, Alternative C would move the east-bound segment of US 50, thereby moving a portion of the predominant noise source in the area closer to these receptors. Most of the receptors that would be impacted are located in the Rocky Point neighborhood along Echo Road, Moss Road, Primrose Road, Rocky Point Road, and Chonokis Road. For these reasons, this impact would be **significant** for purposes of TRPA and CEQA.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements included in Alternative C to further reduce to the extent feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Mixed-Use Development including Replacement Housing

Alternative C includes the redevelopment of three multi-use development sites, which would provide replacement housing for displaced residents as well as other commercial uses (e.g., retail, restaurant). Redevelopment of these sites would involve the full and partial acquisition of additional parcels including, as shown in Exhibit 3.15-3, full acquisition of Receptors 23, 55, 65, and 67. Thus, these receptors would not experience the noise impacts listed in Table 3.15-12 after they are removed.

Similar to Alternative B, operation of the land uses constructed on the three multi-use development sites with Alternative C would add additional noise-generating vehicles to the local roadway network. As explained in the "Methods and Assumptions" section above, the traffic volumes used to estimate traffic noise levels in the Noise Study Report were conservatively high such that they also account for the additional vehicle trips that would be generated by operation of the three mixed-use development sites. Also explained above is that the difference in traffic volumes with the transportation improvements and the mixed-use development sites is not substantial given the logarithmic nature of adding and subtracting noise levels (i.e., it takes a doubling of the noise-generating activity, in this case the traffic volume, to result in a 3-dB noise increase). Therefore, there would be no measurable difference in traffic noise levels generated under Alternative C with or without the mixed-use development. As shown in Table 3.15-12, the 65 CNEL contour along the affected segments of US 50 and the affected portions of Lake Parkway in Nevada would not extend more than 300 feet from the roadway edge and, thus, the Environmental Threshold Carrying Capacity established by TRPA for these transportation corridors would not be exceeded. Similarly, there would be no measurable difference in the traffic noise levels predicted at existing discrete sensitive receptors, which are summarized in Table 3.15-12. Therefore, the traffic noise impacts with the mixed-use development at existing discrete receptors would be the same as those with the transportation improvements and this impact would be **significant** for purposes of TRPA and CEQA.

For the purposes of NEPA, additional mitigation measures have been incorporated into the mixed-use development sites included in Alternative C to further reduce to the extent feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Table 3.15-12 Summary of Traffic Noise Impacts at Discrete Noise-Sensitive Receptors under Alternative C

Receptor No.[3]	Modeled Traffic Noise Levels[1] ($L_{eq[h]}$, CNEL)[2]							NEPA Impact Analysis			TRPA Impact Analysis			CEQA Impact Analysis[9]			
	Existing	Existing-Plus-Alternative C	Change from Existing to Existing-Plus-Alternative C	2038-No-Project	2038-Plus-Alternative C	Change from 2038-No-Project to 2038-Plus-Alternative C	Change from Existing to 2038-Plus-Alternative C	FHWA Noise Abatement Criteria, $L_{eq[h]}$[4]	Noise Abatement Criterion Exceeded or Approached?[5]	NEPA Incremental Increase Criterion Exceeded?[6]	TRPA Land Use-Based Noise Threshold Under Alternative C (CNEL)[7]	Exceed (or Contribute to an Exceedance of) TRPA Land Use-Based Noise Standard?	TRPA Incremental Increase Criterion Exceeded?[8]	Local Jurisdiction	Noise Standard of Local Jurisdiction (CNEL)[10]	Exceed (or Contribute to an Exceedance of) Local Noise Standard?	CEQA Incremental Increase Criterion Exceeded?[8]
31	44	53	9	46	54	8	10	67	No	No	55	No	**Yes**	CSLT	60	**Yes**	No
32	44	51	7	46	53	7	9	67	No	No	55	No	**Yes**	CSLT	60	**Yes**	No
33	43	50	7	45	51	6	8	67	No	No	55	No	**Yes**	CSLT	60	**Yes**	No
34	61	66	5	63	67	4	6	72	No	No	NA	NA	No	CSLT	65	No	No
36	53	62	9	54	64	10	11	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
37	43	55	12	45	56	11	13	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
38	43	55	12	45	56	11	13	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
39	43	54	11	44	55	11	12	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
43	44	52	8	46	54	8	10	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
49	45	59	14	47	61	14	16	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
50	45	58	13	47	59	12	14	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
51	44	56	12	46	57	11	13	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
52	44	55	11	46	56	10	12	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
54	37	44	7	38	45	7	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
55	64	72	8	66	73	7	9	72	**Yes**	No	NA	NA	No	CSLT	65	No	No
63	48	55	7	50	56	6	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
65	62	67	5	64	69	5	7	72	No	No	NA	NA	No	CSLT	65	No	No
67	48	57	9	50	59	9	11	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
68	50	57	7	52	58	6	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
69	50	57	7	52	58	6	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
70	48	59	11	50	61	11	13	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
71	49	58	9	51	59	8	10	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
72	47	62	15	49	63	14	16	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
73	47	63	16	48	65	17	18	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
78	50	55	5	52	56	4	6	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No

Table 3.15-12 Summary of Traffic Noise Impacts at Discrete Noise-Sensitive Receptors under Alternative C

Receptor No.[3]	Modeled Traffic Noise Levels[1] ($L_{eq[h]}$, CNEL)[2]							NEPA Impact Analysis			TRPA Impact Analysis			CEQA Impact Analysis[9]			
	Existing	Existing-Plus-Alternative C	Change from Existing to Existing-Plus-Alternative C	2038-No-Project	2038-Plus-Alternative C	Change from 2038-No-Project to 2038-Plus-Alternative C	Change from Existing to 2038-Plus-Alternative C	FHWA Noise Abatement Criteria, $L_{eq[h]}$[4]	Noise Abatement Criterion Exceeded or Approached?[5]	NEPA Incremental Increase Criterion Exceeded?[6]	TRPA Land Use-Based Noise Threshold Under Alternative C (CNEL)[7]	Exceed (or Contribute to an Exceedance of) TRPA Land Use-Based Noise Standard?	TRPA Incremental Increase Criterion Exceeded?[8]	Local Jurisdiction	Noise Standard of Local Jurisdiction (CNEL)[10]	Exceed (or Contribute to an Exceedance of) Local Noise Standard?	CEQA Incremental Increase Criterion Exceeded?[8]
79	58	60	2	60	62	2	4	67	No	No	NA	NA	No	CSLT	60	No	No
81	50	55	5	52	56	4	6	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
82	50	55	5	51	56	5	6	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
83	48	54	6	50	55	5	7	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
84	47	56	9	49	58	9	11	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
92	49	54	5	51	55	4	6	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
136	65	66	1	67	67	0	2	72	No	No	65	**Yes**	No	CSLT	65	No	No

Notes: dB = decibel, $L_{eq[h]}$ = peak-hour noise level, FHWA = Federal Highway Administration. CNEL = Community Noise Equivalent Level, CSLT = City of South Lake Tahoe, California, EDC = El Dorado County, NA = not applicable

1 Detailed traffic noise modeling inputs and results are provided in the Noise Study Report (Caltrans2015b); relevant excerpts from the Noise Study Report are included in Appendix K.

2 All noise modeling estimated the hourly average noise level during the peak traffic hour ($L_{eq[h]}$) for a summer day and the Noise Study Report determined that the CNEL values would be similar to the ($L_{eq[h]}$) values based on a 24-hour noise level measurement conducted in the project area (Caltrans2015b:40 and 238). All noise levels are expressed in A-weighted decibels.

3 This table only includes discrete modeling receptor sites where one or more NEPA, TRPA, CEQA significance criteria and/or a TRPA land use-based CNEL threshold would be exceeded. No significance criteria or TRPA thresholds were predicted to be exceeded at all other modeled discrete receptors. The discrete modeling receptor sites are often referred to as "receptors" in this table and in this EIR/EIS/EIS; however, a single discrete modeling receptor site may be representative of multiple nearby receptors that are equidistant or closer to the nearby roadway that is the predominant source of noise at those receptors. Thus, this EIR/EIS/EIS recognizes that and exceedance of an applicable noise standard at a single modeled receptor site may indicate exposure that would be experienced by land uses equidistant or closer to the highway in that area. Receptor 142, which is located on the sidewalk next to the entrance driveway to Van Sickle Bi-State Park, was not included in this table because it does not represent an outdoor activity area or distinct destination where people gather or otherwise spend time.

4 This significance criterion for the NEPA impact analysis is equivalent to the Noise Abatement Criterion (NAC) for the applicable activity category listed in Table 3.15-3. The NAC have been adopted as significance standards by both Caltrans and NDOT.

5 The applicable NAC is compared to the predicted noise level for the design year (i.e., 2040) at a noise-sensitive receptor. This comparison is used for both the project-level and cumulative impact analysis. A sound level is considered to "approach" an NAC level if the sound level is 1 dB less than the NAC.

6 The NEPA incremental increase criteria are compared to the change in the traffic noise level between existing conditions and the design year (i.e., 2040). This comparison is also used for both the project-level and cumulative impact analysis.

7 TRPA's land use-based noise thresholds are listed in Table 3.15-4 and do not apply to receptors located within 300 feet of the edge of US 50 or the edge of the segments of Lake Parkway in Nevada. These receptors are marked with "NA"

8 For the TRPA and CEQA analyses, an incremental increase significance criterion of 3 dB is compared to the difference between existing noise levels and existing-plus-alternative noise levels.

9 The CEQA impact analysis only applies to receptors located in California.

10 For receptors located in the City of South Lake Tahoe the applicable noises standard is based on the standards in Table 3.15-5. As explained in Table 3.15-5, for hotels, motels, and other transient lodging facilities that do not have an outdoor activity area such as a pool, the City's exterior noise standard of 65 CNEL does not apply. For receptors located in the unincorporated area of El Dorado County, the transportation noise standard from Chapter 130.37 of the County's zoning ordinance is applied.

Source: Traffic noise levels modeled by LSA (Caltrans2015b); Impact analysis conducted by Ascent Environmental 2016

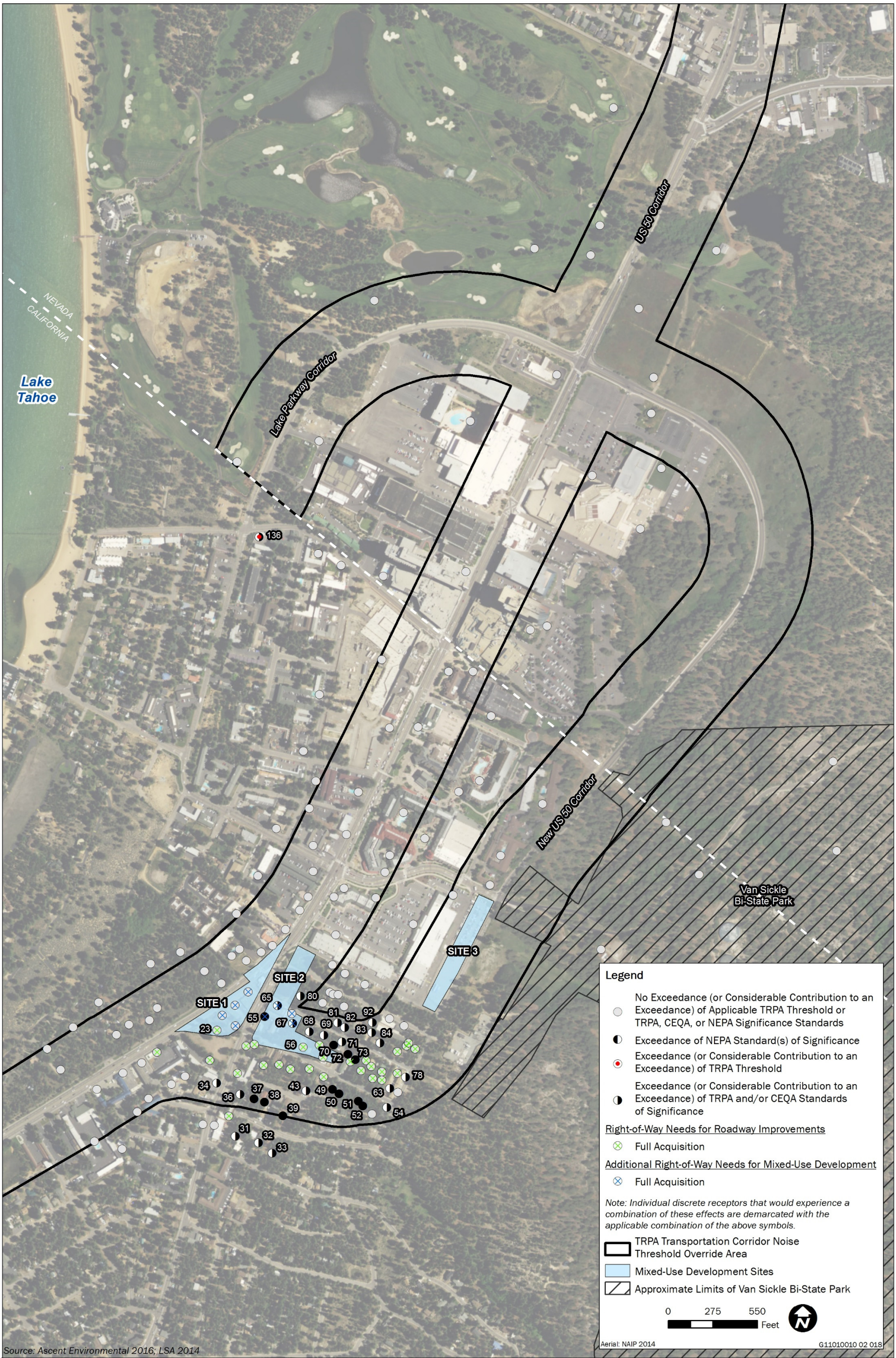

Exhibit 3.15-3 **Alternative C Noise Receptors and Impacts**

Construction of replacement housing at a location other than the three mixed-use development sites could result in similar potential impacts related to the exposure of sensitive receptors to increased traffic noise levels as described above for the replacement housing for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of the exposure of sensitive receptors at another location to increased traffic noise levels would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Conclusion

For the purposes of CEQA and TRPA, taken as a whole, the Alternative C transportation improvements and mixed-use development, including replacement housing, would result in a **significant** impact related to the exposure of sensitive receptors to increased traffic noise levels.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements and the mixed-use development sites included in Alternative C to further reduce to the extent feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Alternative D: Project Study Report Alternative 2

Transportation Improvements

Table 3.15-13 summarizes the predicted noise levels that would be experienced at those noise-sensitive receptors that would be most affected by Alternative D (but would not be acquired). Exhibit 3.15-4 shows the locations of these receptors and the type of impact(s) they would experience.

As shown in Table 3.15-13, no receptors would experience noise levels greater than the applicable FHWA noise abatement criteria by the design year (i.e., 2040).

Receptors 42, 68, 71, 83, and 84 would experience increases in traffic noise that are considered substantial by Caltrans criteria (i.e., 12 dB or more) by the design year. All of these receptors are located in California.

Receptors 30, 97, and 98 are single-family homes that would become exposed to noise levels that exceed the TRPA land use-based noise threshold of 55 CNEL established in PAS 092 Pioneer/Ski Run (TRPA 2002c:3).

Receptor 136, a motel called the Cedar Inn & Suites located on the corner of Stateline Avenue and Pine Boulevard, would become exposed to a noise level greater than 65 CNEL, which is the threshold established by TRPA in the Tourist Core Area Plan (City of South Lake Tahoe and TRPA 2013:C-13).

Receptor 29, a multi-family residence on the east side of Pioneer Trial, has an existing noise level of 64 CNEL that already exceeds the TRPA land use-based noise threshold of 55 CNEL established in PAS 092 Pioneer/Ski Run (TRPA 2002c:3). Receptor 29 would experience a noise level of 67 CNEL under existing-plus-Alternative D conditions and 68 CNEL under cumulative-plus-Alternative D conditions. Thus, implementation of Alternative D would increase the degree to which Receptor 29 would experience traffic noise levels that exceed the applicable TRPA threshold.

Receptors 1, 5, and 8, which are single-family homes along a segment of US 50 that would not be realigned, would be exposed to traffic noise levels in 2040 that exceed the City of South Lake Tahoe's noise standard of 60 CNEL with a measurable contribution from Alternative D.

Table 3.15-13 Summary of Traffic Noise Impacts at Discrete Noise-Sensitive Receptors under Alternative D

Receptor No.[3]	Modeled Traffic Noise Levels[1] ($L_{eq[h]}$, CNEL)[2]							NEPA Impact Analysis			TRPA Impact Analysis			CEQA Impact Analysis[9]			
	Existing	Existing-Plus-Alternative D	Change from Existing to Existing-Plus-Alternative D	2038-No-Project	2038-Plus-Alternative D	Change from 2038-No-Project to 2038-Plus-Alternative D	Change from Existing to 2038-Plus-Alternative D	FHWA Noise Abatement Criteria, $L_{eq[h]}$[4]	Noise Abatement Criterion Exceeded or Approached?[5]	NEPA Incremental Increase Criterion Exceeded?[6]	TRPA Land Use-Based Noise Threshold Under Alternative D (CNEL)[7]	Exceed (or Contribute to an Exceedance of) TRPA Land Use-Based Noise Standard?	TRPA Incremental Increase Criterion Exceeded?[8]	Local Jurisdiction	Noise Standard of Local Jurisdiction (CNEL)[10]	Exceed (or Contribute to an Exceedance of) Local Noise Standard?	CEQA Incremental Increase Criterion Exceeded?[8]
1	59	60	1	61	62	1	3	67	No	No	NA	NA	No	CSLT	60	No	No
5	57	59	2	60	61	1	4	67	No	No	NA	NA	No	CSLT	60	No	No
8	58	60	2	60	61	1	3	67	No	No	NA	NA	No	CSLT	60	No	No
20	67	68	1	70	70	0	3	72	No	No	NA	NA	No	CSLT	65	No	Yes
29	64	67	3	65	68	3	4	72	No	No	55	Yes	No	CSLT	65	No	No
30	52	56	4	54	58	4	6	67	No	No	55	Yes	**Yes**	CSLT	60	**Yes**	No
31	44	48	4	46	50	4	6	67	No	No	55	No	**Yes**	CSLT	60	**Yes**	No
32	44	47	3	46	49	3	5	67	No	No	55	No	**Yes**	CSLT	60	**Yes**	No
33	43	47	4	45	49	4	6	67	No	No	55	No	**Yes**	CSLT	60	**Yes**	No
34	61	65	4	63	66	3	5	72	No	No	NA	NA	No	CSLT	65	No	No
35	62	65	3	64	67	3	5	72	No	No	NA	NA	No	CSLT	65	No	No
36	53	57	4	54	58	4	5	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
37	43	47	4	45	50	5	7	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
38	43	46	3	45	49	4	6	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
39	43	47	4	44	50	6	7	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
42	43	47	4	45	58	13	15	67	No	Yes	NA	NA	**Yes**	CSLT	60	**Yes**	No
43	44	50	6	46	52	6	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
44	60	64	4	62	66	4	6	72	No	No	NA	NA	No	CSLT	65	No	No
45	46	51	5	48	53	5	7	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
46	46	51	5	48	53	5	7	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
47	47	54	7	49	55	6	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
48	46	53	7	48	55	7	9	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
49	45	52	7	47	53	6	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
50	45	51	6	47	53	6	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No

Table 3.15-13 Summary of Traffic Noise Impacts at Discrete Noise-Sensitive Receptors under Alternative D

Receptor No.[3]	Modeled Traffic Noise Levels[1] ($L_{eq[h]}$, CNEL)[2]							NEPA Impact Analysis			TRPA Impact Analysis			CEQA Impact Analysis[9]			
	Existing	Existing-Plus-Alternative D	Change from Existing to Existing-Plus-Alternative D	2038-No-Project	2038-Plus-Alternative D	Change from 2038-No-Project to 2038-Plus-Alternative D	Change from Existing to 2038-Plus-Alternative D	FHWA Noise Abatement Criteria, $L_{eq[h]}$[4]	Noise Abatement Criterion Exceeded or Approached?[5]	NEPA Incremental Increase Criterion Exceeded?[6]	TRPA Land Use-Based Noise Threshold Under Alternative D (CNEL)[7]	Exceed (or Contribute to an Exceedance of) TRPA Land Use-Based Noise Standard?	TRPA Incremental Increase Criterion Exceeded?[8]	Local Jurisdiction	Noise Standard of Local Jurisdiction (CNEL)[10]	Exceed (or Contribute to an Exceedance of) Local Noise Standard?	CEQA Incremental Increase Criterion Exceeded?[8]
51	44	50	6	46	52	6	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
52	44	50	6	46	51	5	7	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
54	37	40	3	38	42	4	5	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
57	49	58	9	51	59	8	10	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
58	46	52	6	48	54	6	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
59	47	55	8	49	56	7	9	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
60	46	53	7	48	55	7	9	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
61	45	52	7	47	54	7	9	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
62	45	52	7	47	54	7	9	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
63	48	53	5	50	55	5	7	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
64	49	53	4	50	55	5	6	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
68	50	60	10	52	62	10	12	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
69	50	59	9	52	61	9	11	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
70	48	58	10	50	59	9	11	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
71	49	59	10	51	61	10	12	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
72	47	57	10	49	58	9	11	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
73	47	54	7	48	55	7	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
74	44	51	7	46	53	7	9	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
75	45	52	7	47	54	7	9	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
76	44	53	9	46	55	9	11	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
78	50	55	5	52	56	4	6	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
83	48	64	16	50	66	16	18	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
84	47	59	12	49	60	11	13	67	No	**Yes**	NA	NA	**Yes**	CSLT	60	**Yes**	No
85	47	54	7	48	55	7	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No

Table 3.15-13 Summary of Traffic Noise Impacts at Discrete Noise-Sensitive Receptors under Alternative D

Receptor No. [3]	Modeled Traffic Noise Levels[1] ($L_{eq[h]}$, CNEL)[2]							NEPA Impact Analysis			TRPA Impact Analysis			CEQA Impact Analysis[9]			
	Existing	Existing-Plus-Alternative D	Change from Existing to Existing-Plus-Alternative D	2038-No-Project	2038-Plus-Alternative D	Change from 2038-No-Project to 2038-Plus-Alternative D	Change from Existing to 2038-Plus-Alternative D	FHWA Noise Abatement Criteria, $L_{eq[h]}$ [4]	Noise Abatement Criterion Exceeded or Approached? [5]	NEPA Incremental Increase Criterion Exceeded? [6]	TRPA Land Use-Based Noise Threshold Under Alternative D (CNEL) [7]	Exceed (or Contribute to an Exceedance of) TRPA Land Use-Based Noise Standard?	TRPA Incremental Increase Criterion Exceeded? [8]	Local Jurisdiction	Noise Standard of Local Jurisdiction (CNEL) [10]	Exceed (or Contribute to an Exceedance of) Local Noise Standard?	CEQA Incremental Increase Criterion Exceeded? [8]
86	48	55	7	50	57	7	9	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
87	47	52	5	48	54	6	7	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
95	49	56	7	50	57	7	8	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
96	55	59	4	57	60	3	5	67	No	No	NA	NA	**Yes**	CSLT	60	**Yes**	No
97	52	57	5	54	59	5	7	67	No	No	55	**Yes**	**Yes**	CSLT	60	**Yes**	No
98	50	59	9	51	60	9	10	67	No	No	55	**Yes**	**Yes**	CSLT	60	**Yes**	No
136	65	66	1	67	68	1	3	72	No	No	65	**Yes**	No	CSLT	65	No	No

Notes: dB = decibel, $L_{eq[h]}$ = peak-hour noise level, FHWA = Federal Highway Administration. CNEL = Community Noise Equivalent Level, CSLT = City of South Lake Tahoe, California, EDC = El Dorado County, NA = not applicable

1 Detailed traffic noise modeling inputs and results are provided in the Noise Study Report (Caltrans2015b); relevant excerpts from the Noise Study Report are included in Appendix K.

2 All noise modeling estimated the hourly average noise level during the peak traffic hour ($L_{eq[h]}$) for a summer day and the Noise Study Report determined that the CNEL values would be similar to the ($L_{eq[h]}$) values based on a 24-hour noise level measurement conducted in the project area (Caltrans2015b:40 and 238). All noise levels are expressed in A-weighted decibels.

3 This table only includes discrete modeling receptor sites where one or more NEPA, TRPA, CEQA significance criteria and/or a TRPA land use-based CNEL threshold would be exceeded. No significance criteria or TRPA thresholds were predicted to be exceeded at all other modeled discrete receptors. The discrete modeling receptor sites are often referred to as "receptors" in this table and in this EIR/EIS/EIS; however, a single discrete modeling receptor site may be representative of multiple nearby receptors that are equidistant or closer to the nearby roadway that is the predominant source of noise at those receptors. Thus, this EIR/EIS/EIS recognizes that an exceedance of an applicable noise standard at a single modeled receptor site may indicate exposure that would be experienced by land uses (e.g., other surrounding homes) equidistant or closer to the highway in that area. Receptor 142, which is located on the sidewalk next to the edge of pavement at the entrance driveway to Van Sickle Bi-State Park, was not included in this table because it does not represent an outdoor activity area or distinct destination where people gather or otherwise spend time.

4 This significance criterion for the NEPA impact analysis is equivalent to the Noise Abatement Criterion (NAC) for the applicable activity category listed in Table 3.15-3. The NAC have been adopted as significance standards by both Caltrans and NDOT.

5 The applicable NAC is compared to the predicted noise level for the design year (i.e., 2040) at a noise-sensitive receptor. This comparison is used for both the project-level and cumulative impact analysis. A sound level is considered to "approach" an NAC level if the sound level is 1 dB less than the NAC.

6 The NEPA incremental increase criteria are compared to the change in the traffic noise level between existing conditions and the design year (i.e., 2040). This comparison is also used for both the project-level and cumulative impact analysis.

7 TRPA's land use-based noise thresholds are listed in Table 3.15-4 and do not apply to receptors located within 300 feet of the edge of US 50 or the edge of the segments of Lake Parkway in Nevada. These receptors are marked with "NA"

8 For the TRPA and CEQA analyses, an incremental increase significance criterion of 3 dB is compared to the difference between existing noise levels and existing-plus-alternative noise levels.

9 The CEQA impact analysis only applies to receptors located in California.

10 For receptors located in the City of South Lake Tahoe the applicable noises standard is based on the standards in Table 3.15-5. As explained in Table 3.15-5, for hotels, motels, and other transient lodging facilities that do not have an outdoor activity area such as a pool, the City's exterior noise standard of 65 CNEL does not apply. For receptors located in the unincorporated area of El Dorado County, the transportation noise standard from Chapter 130.37 of the County's zoning ordinance is applied.

Source: Traffic noise levels modelled by LSA (Caltrans2015b). Impact analysis conducted by Ascent Environmental 2016.

Exhibit 3.15-4 **Alternative D Noise Receptors and Noise Impacts**

Thirteen receptors would be exposed to noise levels that exceed the transportation noise standards established by the City of South Lake Tahoe, and 46 receptors would experience a CNEL increase equal to or greater than 3 dB, which is a TRPA significance criterion (and a CEQA significance criterion for receptors located in California). These exceedances would occur under existing-plus-Alternative D conditions and/or under cumulative-plus-Alternative D conditions with a considerable contribution of the exceedance directly resulting from the implementation of Alternative D.

As shown in Exhibit 3.15-4, many of these receptors would be closer to the realigned segment of US 50 that would occur with Alternative D than the highway's existing alignment. Fundamentally, Alternative D would move a segment of US 50 (both west- and east-bound lanes), which is the predominant noise source in the area, closer to these receptors. Most of the receptors that would be impacted are located in the Rocky Point neighborhood along Fern Road, Echo Road, Moss Road, Primrose Road, Rocky Point Road, and Chonokis Road.

Receptor 20, which is a motel called the Trailhead Motel located along the east side of US 50 that would not be realigned, could be exposed to interior noise levels that exceed 45 CNEL.

For these reasons this impact would be **significant** for purposes TRPA and CEQA.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements included in Alternative D to further reduce to the extent feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Mixed-Use Development including Replacement Housing

Alternative D includes the redevelopment of three multi-use development sites, which would provide replacement housing for displaced residents as well as other commercial uses (e.g., retail, restaurant). Redevelopment of these sites would involve the full and partial acquisition of additional parcels including, as shown in Exhibit 3.15-4, full acquisition of Receptors 68, 96, 97, and 98. Thus, these receptors would not experience the noise impacts listed in Table 3.15-13 after they are removed.

Operation of the land uses constructed on the three multi-use development sites would add additional noise-generating vehicles to the local roadway network. As explained in the "Methods and Assumptions" section above, the traffic volumes used to estimate traffic noise levels in the Noise Study Report were conservatively high such that they also account for the additional vehicle trips that would be generated by operation of the three mixed-use development sites. Also explained above is that the difference in traffic volumes with the transportation improvements and the mixed-use development sites is not substantial given the logarithmic nature of adding and subtracting noise levels (i.e., it takes a doubling of the noise-generating activity, in this case the traffic volume, to result in a 3-dB noise increase). Therefore, there would be no measurable difference in traffic noise levels generated under Alternative D with or without the mixed-use development. As shown in Table 3.15-13, the 65 CNEL contour along the affected segments of US 50 and the affected portions of Lake Parkway in Nevada would not extend more than 300 feet from the roadway edge and, thus, the Environmental Threshold Carrying Capacity established by TRPA for these transportation corridors would not be exceeded. Similarly, there would be no measurable difference in the traffic noise levels predicted at existing discrete sensitive receptors, which are summarized in Table 3.15-13. Therefore, the traffic noise impacts with the mixed-use development sites at existing discrete receptors would be the same as those with the transportation improvements and this impact would be **significant** for purposes of TRPA and CEQA.

For the purposes of NEPA, additional mitigation measures have been incorporated into the mixed-use development sites included in Alternative D to further reduce to the extent feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Construction of replacement housing at a location other than the three mixed-use development sites could result in similar potential impacts related to the exposure of sensitive receptors to increased traffic noise levels as described above for the replacement housing for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of the exposure of sensitive

receptors at another location to increased traffic noise levels would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Conclusion

For the purposes of CEQA and TRPA, taken as a whole, the Alternative D transportation improvements and mixed-use development, including replacement housing, would result in a **significant** impact related to the exposure of sensitive receptors to increased traffic noise levels.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements and the mixed-use development sites included in Alternative D to further reduce to the extent feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Alternative E: Skywalk

Alternative E would not include the realignment of US 50. Alternative E would feature a concrete deck over the entire width and length of existing US 50 within the tourist core between a location about 100 feet south of Stateline Avenue and a location near the northern end of the Montbleu Resort (about 450 feet south of Lake Parkway). None of the existing receptors would be acquired because there would not be any realignment of the US 50 right of way.

Table 3.15-14 summarizes the predicted noise levels that would be experienced at the noise-sensitive receptors that would be most affected by Alternative E. The receptors listed in Table 3.15-14 are those that would experience exceedance of applicable thresholds or significance criteria under existing-plus-Alternative E conditions and/or under cumulative-plus-Alternative E conditions with a considerable contribution of the exceedance directly resulting from the implementation of Alternative E. The locations of all the impacted receptors and the type of noise impact they would experience (i.e., NEPA, TRPA, and/or CEQA) are shown in Exhibit 3.15-5.

With Alternative E, none of the receptors would be exposed to noise levels greater than the applicable FHWA noise abatement criteria or experience increases in traffic noise that are considered substantial by Caltrans or NDOT by the design year (i.e., 2040). Therefore, the environmental consequences from traffic noise exposure of implementing Alternative E would **not be adverse** for purposes of NEPA.

Receptor 136, which is a motel called the Cedar Suites & Inn located on the corner of Stateline Avenue and Pine Boulevard, would be exposed to a noise level greater than the 65 CNEL threshold established in the Tourist Core Area Plan (City of South Lake Tahoe and TRPA 2013:C-13). This exceedance would occur under the cumulative-plus-Alternative E condition with a 1 dB contribution by Alternative E. See the discussion below regarding the 3-dB increase significance standard TRPA uses for environmental compliance.

None of the modeled receptors would experience a CNEL increase equal to or greater than 3 dB, which is both a TRPA significance criterion and a CEQA significance criterion for receptors located in California. Alternative E, however, would result in or contribute to an exceedance of exceed the applicable transportation noise standards established by the City of South Lake Tahoe, including Receptors 20, 99, 102, 107, 135, and 136. Receptor 20, which is a motel called the Trailhead Motel, and Receptor 107, which is a motel called the Park Tahoe Aspen Court, could also potentially experience interior noise levels that exceed 45 CNEL under cumulative conditions, with a measurable contribution from Alternative E. Therefore, this impact would be **significant** for purposes of TRPA and CEQA.

For the purposes of NEPA, additional mitigation measures have been incorporated into the transportation improvements included in Alternative E to further reduce to the extent feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Table 3.15-14 Summary of Traffic Noise Impacts at Discrete Noise-Sensitive Receptors under Alternative E

Receptor No.[3]	Modeled Traffic Noise Levels[1] ($L_{eq[h]}$, CNEL)[2]							NEPA Impact Analysis			TRPA Impact Analysis			CEQA Impact Analysis[9]			
	Existing	Existing-Plus-Alternative E	Change from Existing to Existing-Plus-Alternative E	2038-No-Project	2038-Plus-Alternative E	Change from 2038-No-Project to 2038-Plus-Alternative	Change from Existing to 2038-Plus-Alternative E	FHWA Noise Abatement Criteria, $L_{eq[h]}$[4]	Noise Abatement Criterion Exceeded or Approached?[5]	NEPA Incremental Increase Criterion Exceeded?[6]	TRPA Land Use-Based Noise Threshold Under Alternative E (CNEL)[7]	Exceed (or Contribute to an Exceedance of) TRPA Land Use-Based Noise Standard?	TRPA Incremental Increase Criterion Exceeded?[8]	Local Jurisdiction	Noise Standard of Local Jurisdiction (CNEL)[10]	Exceed (or Contribute to an Exceedance of) Local Noise Standard?	CEQA Incremental Increase Criterion Exceeded?[8]
20	67	68	1	70	70	0	3	72	No	No	NA	NA	No	CSLT	65	**Yes**	No
99	65	66	1	67	67	0	2	72	No	No	NA	NA	No	CSLT	65	**Yes**	No
102	67	68	1	69	69	0	2	72	No	No	NA	NA	No	CSLT	65	**Yes**	No
107	69	70	1	71	71	0	2	72	No	No	NA	NA	No	CSLT	65	**Yes**	No
135	66	67	1	68	68	0	2	72	No	No	NA	NA	No	CSLT	65	**Yes**	No
136	65	64	-1	67	68	1	3	72	No	No	65	Yes	No	CSLT	65	**Yes**	No

Notes: dB = decibel, $L_{eq[h]}$ = peak-hour noise level, FHWA = Federal Highway Administration. CNEL = Community Noise Equivalent Level, CSLT = City of South Lake Tahoe, California, EDC = El Dorado County, NA = not applicable

1 Detailed traffic noise modeling inputs and results are provided in the Noise Study Report (Caltrans2015b); relevant excerpts from the Noise Study Report are included in Appendix K.

2 All noise modeling estimated the hourly average noise level during the peak traffic hour ($L_{eq[h]}$) for a summer day and the Noise Study Report determined that the CNEL values would be similar to the ($L_{eq[h]}$) values based on a 24-hour noise level measurement conducted in the project area (Caltrans2015b:40 and 238). All noise levels are expressed in A-weighted decibels.

3 This table only includes discrete modeling receptor sites where one or more NEPA, TRPA, CEQA significance criteria and/or a TRPA land use-based CNEL threshold would be exceeded. No significance criteria or TRPA thresholds were predicted to be exceeded at all other modeled discrete receptors. A single discrete modeling receptor site may be representative of multiple nearby receptors (e.g., surrounding homes) that are equidistant or closer to the nearby roadway noise source. Thus, this EIR/EIS/EIS recognizes that and exceedance of an applicable noise standard at a single modeled receptor site may indicate exposure that would be experienced by land uses equidistant or closer to the highway in that area.

4 This significance criterion for the NEPA impact analysis is equivalent to the Noise Abatement Criterion (NAC) for the applicable activity category listed in Table 3.15-3. The NAC have been adopted as significance standards by both Caltrans and NDOT.

5 The applicable NAC is compared to the predicted noise level for the design year (i.e., 2040) at a noise-sensitive receptor. This comparison is used for both the project-level and cumulative impact analysis. A sound level is considered to "approach" an NAC level if the sound level is 1 dB less than the NAC.

6 The NEPA incremental increase criteria are compared to the change in the traffic noise level between existing conditions and the design year (i.e., 2040). This comparison is also used for both the project-level and cumulative impact analysis.

7 TRPA's land use-based noise thresholds are listed in Table 3.15-4 and do not apply to receptors located within 300 feet of the edge of US 50 or the edge of the segments of Lake Parkway in Nevada. These receptors are marked with "NA"

8 For the TRPA and CEQA analyses, an incremental increase significance criterion of 3 dB is compared to the difference between existing noise levels and existing-plus-alternative noise levels.

9 The CEQA impact analysis only applies to receptors located in California.

10 For receptors located in the City of South Lake Tahoe the applicable noises standard is based on the standards in Table 3.15-5. As explained in Table 3.15-5, for hotels, motels, and other transient lodging facilities that do not have an outdoor activity area such as a pool, the City's exterior noise standard of 65 CNEL does not apply. For receptors located in the unincorporated area of El Dorado County, the transportation noise standard from Chapter 130.37 of the County's zoning ordinance is applied.

Source: Traffic noise levels modelled by LSA (Caltrans2015b). Impact analysis conducted by Ascent Environmental 2016.

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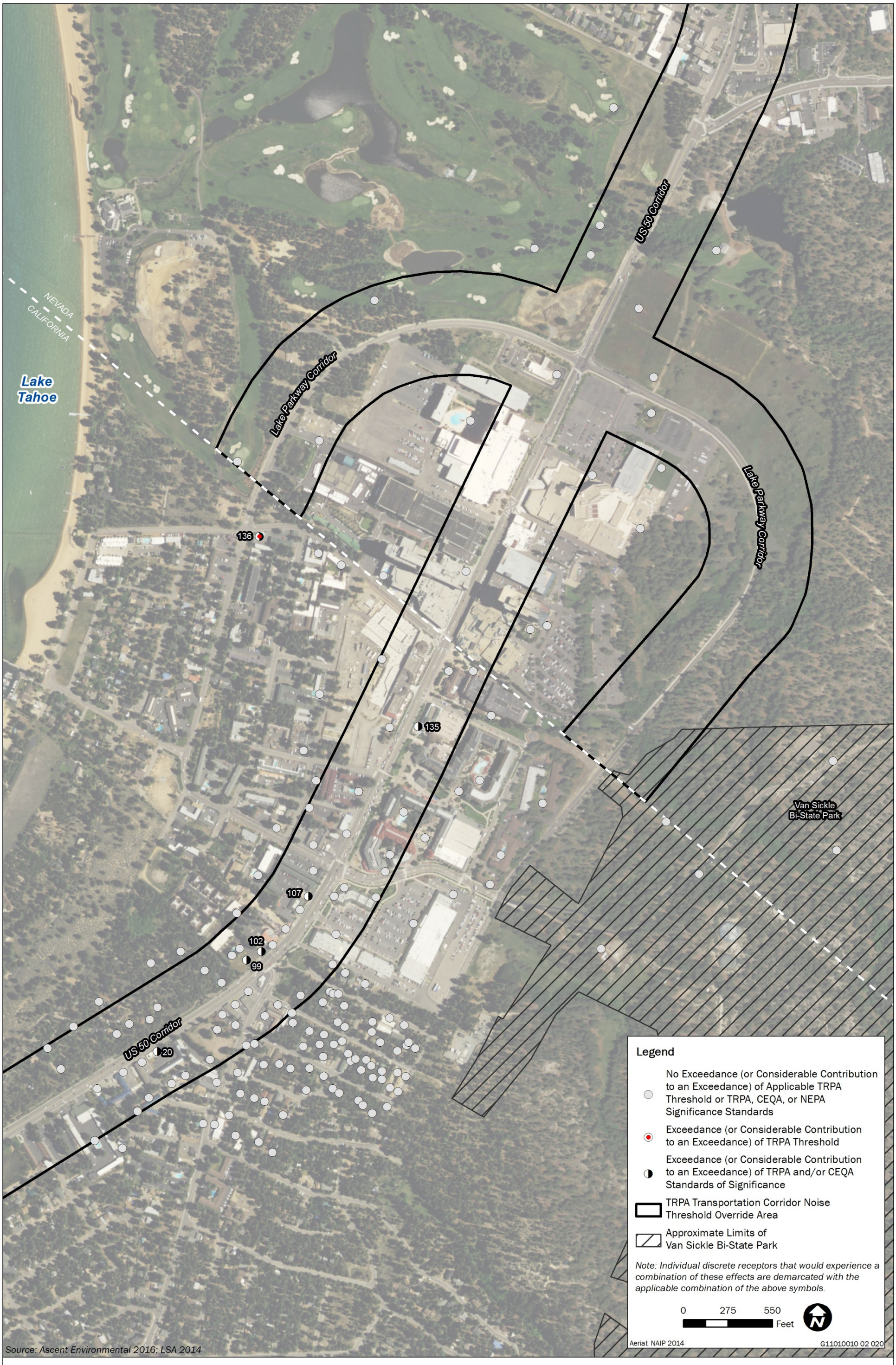

Exhibit 3.15-5 **Alternative E Noise Receptors and Noise Impacts**

Impact 3.15-4: Noise/land use compatibility of mixed-use redevelopment sites

Alternatives A and E would not include the redevelopment of any areas within the project site that would expose new land uses to excessive noise levels.

With Alternatives B, C, and D, the mixed-use redevelopment sites would not be located where they would be exposed to noise levels that exceed TRPA transportation corridor contour-based noise thresholds or TRPA land-use based noise thresholds. Therefore, this impact would be less than significant for purposes of TRPA threshold compliance.

Common outdoor activity areas could be included on the mixed-use redevelopment sites that would potentially be developed under Alternatives B, C, and D. These common outdoor activity areas could be exposed to traffic noise levels that exceed the City of South Lake Tahoe's 60 CNEL standard.

NEPA Environmental Consequences:	Mitigation Measure 3.15-4 has been incorporated into Alternatives B, C, and D to further reduce to the extent feasible the potential to expose land uses to an incompatible noise environment; No Impact for Alternatives A and E
CEQA/TRPA Impact Determinations:	Less than Significant for Alternatives B, C, and D after implementation of Mitigation Measure 3.15-4; No Impact for Alternatives A and E

Alternative A: No Build (No Project)
Alternative A does not include the redevelopment of any areas within the project site. Therefore, Alternative A would not locate new noise-sensitive receptors where they would be exposed to noise levels that exceed applicable federal noises standards, TRPA noise thresholds or standards, or noise standards established by the local City or County. There would be **no impact** pertaining to the exposure of new land uses to excessive noise levels for NEPA, CEQA, and TRPA purposes.

Alternative B: Triangle (Locally Preferred Action)
Alternative B would include the redevelopment of three sites with a mix of residential and commercial uses. Details about design of these mixed-use redevelopment sites are not known at this time. The purpose of the redevelopment sites would be to provide relocation opportunities for dislocated residents and business owners in the immediate vicinity. The location and potential mix of uses that could be developed at these sites are shown in Exhibit 3.15-2, as well as Exhibits 2-9 and 2-10. Multi-family housing units would be the most noise-sensitive of the land uses located on these sites.

Site 1 and Site 3 are part of the Tourist Core Area Plan and are zoned as Tourist Center Mixed-Use and Tourist Center Core, respectively, both with a TRPA land use-based noise threshold of 65 CNEL (City of South Lake Tahoe and TRPA 2013:5-7 and C-13). However, as shown in Exhibit 3.15-2, the southern portion of Site 1 and all of Site 3 would be located within 300 feet of the edge of the realigned US 50 where TRPA's land use-based 65 CNEL threshold would not apply. Instead, TRPA's contour-based highway standard for US 50 would apply.

Site 2 currently includes areas with three separate land use designations. One portion of Site 2 is part of the Tourist Core Area Plan and zoned as Tourist Center Neighborhood Mixed-Use with a TRPA noise threshold of 65 CNEL (City of South Lake Tahoe and TRPA 2013:5-7 and C-13). Another portion of Site 2 is also part of the Tourist Core Area Plan but is zoned as Open Space with a TRPA noise threshold of 55 CNEL (City of South Lake Tahoe and TRPA 2013:5-7 and C-13). A third portion of Site 2 is currently part of PAS 092 Pioneer/Ski Run with a TRPA noise threshold of 55 CNEL (TRPA 2002c:3). It is assumed that the portion of Site 2 that is currently zoned as Open Space would be rezoned and assigned a TRPA noise threshold of 65 CNEL that would be consistent with other areas zoned for mixed-use. Similar to the southern portion of Site 1, the

southern portion of Site 2, including the portion in the PAS 092 Pioneer/Ski Run, would be located within 300 feet of the edge of the realigned US 50 where TRPA's contour-based highway standard for US 50 would apply in place of TRPA's land use-based CNEL thresholds. This is also shown in Exhibit 3.15-2.

As shown in Table 3.15-10, the 65 CNEL contour along the nearest segment of realigned US 50 would not extend more than 300 feet from the edge of the highway under cumulative-plus-Alternative B conditions. Therefore, no portions of Sites 1, 2, and 3 would be exposed to noise levels that exceed TRPA noise thresholds. This impact would be less than significant for purposes of TRPA threshold compliance.

Interior noise levels of these developments would be required to meet interior noise level standards pursuant to Title 24 of the California Code of Regulations.

Common outdoor activity areas on these development sites, particularly those associated with residential use, would be subject to the City of South Lake Tahoe's 60 CNEL standard presented in Table 3.15-5. According to the Noise Study Report, the 60 CNEL traffic noise contour would extend 304 feet from the centerline of the nearby segment of realigned US 50 (Caltrans 2015b:173). Thus, some areas of Site 1 and Site 2 and all of Site 3 would be located within the 60 CNEL traffic noise contour. If any outdoor activity areas were located within this distance without any intervening buildings or structures to provide noise protection, then they would be exposed to noise levels that exceed the noise standard established by the City of South Lake Tahoe under cumulative-plus-Alternative B conditions. Moreover, traffic on local roadways could also contribute to noise on the sites (i.e., Lake Tahoe Boulevard west of Site 1, Pioneer Trail between Sites 1 and 2, Heavenly Village Way north of Site 3). As a result, this would be a **potentially significant** impact for purposes of CEQA and TRPA.

Conclusion

For the purposes of NEPA, additional mitigation measures have been incorporated into Alternative B to further reduce to the extent feasible the environmental consequences related to the potential to expose land uses to an incompatible noise environment.

Construction of replacement housing at a location other than the three mixed-use development sites could result in similar potential impacts related to the exposure of land uses to an incompatible noise environment as described above for the replacement housing for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of the noise/land use compatibility impacts would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Alternative C: Triangle One-Way

Alternative C would also include the redevelopment of three sites with a mix of residential and commercial uses. The location of the three development sites would be the same as with Alternative B and shown in Exhibit 3.15-3, as well as Exhibits 2-9 and 2-10. The new realigned portion of US 50 would only carry east-bound traffic and the existing US 50 alignment would continue to carry west-bound traffic. Thus, as shown in Exhibit 3.15-3, all of Sites 1, 2, and 3 would be located within 300 feet of the edge of east-bound US 50 and/or west-bound US 50 where TRPA's contour-based highway standard for US 50 would apply in place of TRPA's land use-based CNEL thresholds.

As shown in Table 3.15-10, the 65 CNEL contour along the nearest segment of both the east- and west-bound segments of US 50 would not extend more than 300 feet from the edge of the highway under cumulative-plus-Alternative C conditions. Therefore, no portions of Sites 1, 2, and 3 would be exposed to noise levels that exceed TRPA noise thresholds. This impact would be less than significant for purposes of TRPA threshold compliance.

As with Alternative B, interior noise levels of these developments would be required to meet interior noise level standards pursuant to Title 24 of the California Code of Regulations.

Common outdoor activity areas on these development sites, particularly those associated with residential use, would be subject to the City of South Lake Tahoe's 60 CNEL standard presented in Table 3.15-5. According to the Noise Study Report, the 60 CNEL traffic noise contour along nearby east-bound US 50 would extend 190 feet from the centerline of the nearby segment of east-bound US 50 and the 263 feet from the centerline of the nearby segment of west-bound US 50 (Caltrans 2015b:174). Thus, most of Site 1 and Site 2 and all of Site 3 would be located within the 60 CNEL traffic noise contour. If any outdoor activity areas were located within this distance without any intervening buildings or structures to provide noise protection, then they would be exposed to noise levels that exceed the noise standard established by the City of South Lake Tahoe. Moreover, traffic on local roadways could also contribute to noise on the sites (i.e., Pioneer Trail between Sites 1 and 2, Heavenly Village Way north of Site 3). As a result, this would be a **potentially significant** impact for purposes of CEQA and TRPA.

Conclusion

For the purposes of NEPA, additional mitigation measures have been incorporated into Alternative C to further reduce to the extent feasible the environmental consequences related to the potential to expose land uses to an incompatible noise environment.

Construction of replacement housing at a location other than the three mixed-use development sites could result in similar potential impacts related to the exposure of land uses to an incompatible noise environment as described above for the replacement housing for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of the noise/land use compatibility impacts would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Alternative D: Project Study Report Alternative 2

Alternative D would include the redevelopment of three sites with a mix of residential and commercial uses. The locations of the three development sites are shown in Exhibit 3.15-4, as well as Exhibits 2-11 and 2-12.

As shown in Exhibit 3.15-4, all of the redevelopment sites would be located within 300 feet of the edge of the realigned portion of US 50. Thus, TRPA's contour-based highway standard of for US 50 would apply to all the redevelopment sites.

As shown in Table 3.15-10, the 65 CNEL contour along the nearest segment of realigned US 50 would not extend more than 300 feet from the edge of the highway under cumulative-plus-Alternative D conditions. Therefore, no portions of the redevelopment sites would be exposed to noise levels that exceed TRPA noise thresholds. This impact would be less than significant for purposes of TRPA threshold compliance.

Interior noise levels of these developments would be required to meet interior noise level standards pursuant to Title 24 of the California Code of Regulations.

Common outdoor activity areas and outdoor activity areas of single family homes on these development sites would be subject to the City of South Lake Tahoe's 60 CNEL standard presented in Table 3.15-5. According to the Noise Study Report, the 60 CNEL traffic noise contour would extend 304 feet from the centerline of the nearby segment of realigned US 50 (Caltrans 2015b:175). Thus, all of the sites would be located within the 60 CNEL traffic noise contour. If any outdoor activity areas were located within this distance without any intervening buildings or structures to provide noise protection, then they would be exposed to noise levels that exceed the noise standard established by the City of South Lake Tahoe. Moreover, traffic on local roadways could also contribute to noise on the sites (e.g., Lake Tahoe Boulevard west of Site 1A, Pioneer Trail that splits between Sites 1A and 1B, Heavenly Village Way north of Site 3). As a result, this would be a **potentially significant** impact for purposes of TRPA and CEQA.

Conclusion
For the purposes of NEPA, additional mitigation measures have been incorporated into Alternative D to further reduce to the extent feasible the environmental consequences related to the potential to expose land uses to an incompatible noise environment.

Construction of replacement housing at a location other than the three mixed-use development sites could result in similar potential impacts related to the exposure of land uses to an incompatible noise environment as described above for the replacement housing for the mixed-use development sites. However, because the location of replacement housing elsewhere is unknown, analysis of the noise/land use compatibility impacts would be speculative at this time. Full, project-level environmental review of replacement housing somewhere other than the mixed-use development sites would be required prior to construction of replacement housing and displacement of existing residents.

Alternative E: Skywalk
Alternative E does not include the redevelopment of any areas within the project site. Therefore, Alternative E would not locate new noise-sensitive receptors where they would be exposed to noise levels that exceed applicable federal noises standards, TRPA noise thresholds or standards, or noise standards established by the local City or County. There would be **no impact** pertaining to the exposure of new land uses to excessive noise levels for purposes of NEPA, CEQA, and TRPA.

3.15.4 Avoidance, Minimization, and/or Mitigation Measures

Mitigation Measure 3.15-1: Implement measures to reduce exposure of sensitive receptors to noise generated by nighttime construction activity

The following noise abatement measures would apply for Alternative E only for the purposes of NEPA, CEQA, and TRPA.

The project proponent shall implement the following measures to reduce the level of construction noise exposure during the evening and nighttime hours between 6:30 p.m. and 8:00 a.m. The measures are in addition to the measures already required by TRPA's Best Construction Practices Policy for the Minimization of Exposure to Construction-Generated Noise and Ground Vibration (TRPA [no date]a:6; TRPA [no date]b:4 to 5).

- No noise-generating construction activity shall be performed at night unless necessary to minimize traffic conflicts.
- Designate a disturbance coordinator and post that person's telephone number conspicuously around all construction sites and provide to nearby residences. The disturbance coordinator shall receive all public complaints and be responsible for determining the cause of the complaint and implementing any feasible measures to alleviate the problem.
- Provide advanced notice to owners of all residential land uses, tourist accommodations, and commercial land uses located within 1,110 feet where nighttime construction activity would take place. This noticing shall inform the recipients of when and where nighttime construction would occur and the types of measures being implemented to lessen the impact at potentially affected receptors. This noticing shall also provide the contact information for the designated disturbance coordinator.
- Place temporary noise barriers or noise curtains as close to the noise source or receptor as possible such that it will break the line of sight between the source and receptor.
- Coordinating with owners of all tourist accommodation units within this distance to limit nighttime construction activity during those times of year and days of the week when tourist occupancy is the lowest, to the extent feasible.

- At equipment staging areas used to support nighttime construction activity, locate all equipment as far as possible from nearby noise-sensitive receptors. Temporary noise barriers shall be placed at these equipment staging areas to shield nearby noise-sensitive receptors from excessive noise generated at staging areas.

- Prohibit backup alarms on all trucks and equipment used during nighttime activity and provide an alternate warning system, such as a flagman or radar-based alarm, which is compliant with state regulations. Alternatively, use back up alarms that are programed to generate noise levels no more than 10 dB louder than background noise levels.

- Arrival of trucks hauling construction materials and equipment to staging areas and construction sites shall occur only between the hours of between 8:00 a.m. and 6:30 p.m. Departure of trucks hauling away debris from staging areas and construction sites shall also occur only between the hours of between 8:00 a.m. and 6:30 p.m. This requirement shall be provided to all haulers at the time of the initial hauling request.

- Offer hotel accommodations to residents who would temporarily be exposed to interior noise levels that exceed the interior noise standard of 45 CNEL. Alternative overnight accommodations should be in a location that is not impacted by construction noise.

Significance after Mitigation

Implementation of Mitigation Measure 3.15-1 would reduce the level of noise exposure at receptors located near locations where nighttime construction activity would occur with Alternative E. However, it's not certain that noise exposure levels would be reduced to less than the TRPA applicable land use-based CNEL thresholds. Because residents may refuse the offer of alternative overnight accommodations, they could still experience noise levels that would result in sleep disturbance. Therefore, this impact would be **significant and unavoidable** for Alternative E for the purposes of CEQA and TRPA.

For the purposes of NEPA, additional mitigation measures have been incorporated into the construction of Alternative E to further reduce to the extend feasible the environmental consequences related to short-term construction noise.

Mitigation Measure 3.15-2a: Implement measures to reduce levels of ground vibration to limit the level of human annoyance

The following noise abatement measures would apply to the Alternative B, C, and D transportation improvements for the purposes of NEPA, CEQA, and TRPA.

The project proponent shall require the following measures be implemented for all pile driving activity, if required, related to construction of the pedestrian bridge:

- All necessary piles shall be driven with sonic pile drivers instead of impact pile drivers;

- To further reduce pile-driving ground vibration impacts, holes shall be predrilled to the maximum feasible depth. This would reduce the number of blows and/or the amount of time required to seat the pile, and would concentrate the pile-driving activity closer to the ground where noise can be attenuated more effectively;

- Pile driving, earth moving, and ground-disturbance activities shall be phased so as not to occur simultaneously in areas close to off-site sensitive receptors. The total vibration level produced could be substantially less when each vibration source is operated separately; and

- Designate a disturbance coordinator and post that person's telephone number conspicuously around the locations where pile driving would be performed. The disturbance coordinator shall receive all public complaints and be responsible for determining the cause of the complaint and implementing any feasible

measures to alleviate the problem. The contact information of the disturbance coordinator shall also be provided to the owners of all properties for which a pre-inspection survey is performed.

Mitigation Measure 3.15-2b: Implement measures to reduce exposure of buildings and other structures to levels of ground vibration that could result in structural damage and to limit the level of human annoyance

The following noise abatement measures would apply for Alternative E only for the purposes of NEPA, CEQA, and TRPA.

The project proponent shall hire a qualified Nevada- and California-registered geotechnical engineer to perform site-specific study of the geotechnical conditions at the proposed skywalk site. The study shall determine the propagation rate of ground vibration in the area, taking into account local soil conditions, the age of the nearby buildings, and other factors. The study shall determine whether nearby structures and buildings could experience structural damage from pile driving activity at the skywalk site. The study shall also determine whether nearby residential dwellings, tourist accommodation units, and/or commercial land uses would experience levels of ground vibration that exceed FTA's vibration standard of 80 VdB for human response.

The study shall also include a geotechnical inspection of all buildings and structures located within 100 feet of locations where impact pile driving would occur or within 60 feet where sonic pile driving would occur. The inspection shall document pre-existing conditions, including any pre-existing structural damage. The pre-inspection survey of the buildings shall be completed with the use of photographs, videotape, or visual inventory, and shall include inside and outside locations. All existing cracks in walls, floors, driveways shall be documented with sufficient detail for comparison during and upon completion of pile driving activities to determine whether new actual vibration damage has occurred. The results of both surveys shall be provided to the project proponent for review and acceptance of conclusions. Should damage occur during construction, construction operations shall be halted until the problem activity can be identified. Once identified, the problem activity shall be modified to eliminate the problem and protect the adjacent buildings. Any damage to nearby buildings shall be repaired back to the pre-existing condition at the expense of the project proponent.

The study shall also identify site-specific measures to lessen the potential for structural damage and to reduce the potential for human response from ground vibration associated with construction of the skywalk and the project proponent shall require construction contractor(s) to implement the measures identified in the study. Such measures shall include, but are not limited to, the following:

- All necessary piles shall be driven with sonic pile drivers instead of impact pile drivers, unless sonic pile driving is determined to be infeasible by a qualified geotechnical engineer;
- To the extent feasible, project structures shall be designed so that impact-driven piles are placed a sufficient distance from nearby buildings and structures to minimize the potential to cause structural damage (e.g., 100 feet, assuming normal propagation conditions), and sonic-driven piles are placed at least 60 feet from nearby buildings and structures to minimize the potential to cause structural damage (e.g., 60 feet, assuming normal propagation conditions);
- To the extent feasible, project structures shall be designed so that impact-driven piles are placed a sufficient distance from residences and tourist accommodation units to minimize human response (e.g., 300 feet, assuming normal propagation conditions), and sonic-driven piles are placed a sufficient distance from nearby buildings and structures to minimize human response (e.g., 175 feet, assuming normal propagation conditions);
- To further reduce pile-driving ground vibration impacts, holes shall be predrilled to the maximum feasible depth. This would reduce the number of blows and/or the amount of time required to seat the pile, and would concentrate the pile-driving activity closer to the ground where noise can be attenuated more effectively;

- Pile driving, earth moving, and ground-disturbance activities shall be phased so as not to occur simultaneously in areas close to off-site sensitive receptors. The total vibration level produced could be substantially less when each vibration source is operated separately;

- Designate a disturbance coordinator and post that person's telephone number conspicuously around the skywalk construction site and provide to nearby residences. The disturbance coordinator shall receive all public complaints and be responsible for determining the cause of the complaint and implementing any feasible measures to alleviate the problem. The contact information of the disturbance coordinator shall also be provided to the owners of all properties for which a pre-inspection survey is performed; and

- Provide advanced notice to owners of all residential land uses, tourist accommodations, and commercial land uses located within 300 feet of where impact pile driving would take place or within 175 feet of where sonic pile driving would take place. This noticing shall inform the recipients of when and where pile driving would occur and the types of measures being implemented to lessen the impact at potentially affected receptors. This noticing shall also provide the contact information for the designated disturbance coordinator.

Significance after Mitigation

With implementation of Mitigation Measure 3.15-2a, the level of construction-generated groundborne vibration experienced at nearby buildings for Alternatives B, C, and D would be reduced to less than FTA's vibration standard of 80 VdB for human response at residential land uses. Therefore, implementation of Mitigation Measure 3.15-2a would reduce the ground vibration impact to a **less-than-significant** level for Alternatives B, C, and D for the purposes of CEQA and TRPA.

With implementation of Mitigation Measure 3.15-2b, the potential for groundborne vibration generated by pile driving at the skywalk site with Alternative E to result in structural damage to nearby buildings and structures and to adversely affect occupants of nearby residential dwellings and tourist accommodations units would be reduced. However, because pile driving would occur in close proximity to existing structures and buildings, it is not certain that the measures required by Mitigation Measure 3.15-2b would reduce ground vibration levels at nearby structures to less than FTA's vibration standard of 0.20 in/sec PPV for structural damage. Moreover, because pile driving would occur in close proximity to existing residential dwellings, tourist accommodation units, and commercial land uses it is not certain that the measures required by Mitigation Measure 3.15-2b would reduce ground vibration at these receptors to levels less than FTA's vibration standard for human response. Therefore, this impact would be **significant and unavoidable** with Alternative E for the purposes of CEQA and TRPA.

For the purposes of NEPA, additional mitigation measures have been incorporated into Alternatives B, C, D, and E to further reduce to the extent feasible the environmental consequences related to ground vibration during construction.

Mitigation Measure 3.15-3a: Implement traffic noise reduction measures to reduce traffic noise exposure at affected receptors

The following noise abatement measures would apply to the Alternative B transportation improvements and mixed-use redevelopment sites for the purposes of NEPA, CEQA, and TRPA.

Performance Requirements

Traffic noise reduction measures shall be implemented to achieve the following:

1. Ensure that Receptors 80, 88, 89, 90, and 91 are not exposed to an average daily traffic noise level that exceeds the land use-based 55 CNEL threshold established in TRPA's Pioneer/Ski Run Plan Area Statement 092 (TRPA 2002c:3) and that Receptor 136 is not exposed to an average daily traffic noise level that exceeds the land use-based 65 CNEL threshold established in TRPA's Tourist Core Area Plan (City of South Lake Tahoe and TRPA 2013:5-3 to 5-4) under cumulative conditions. These land use-based CNEL

thresholds apply at all portions of these receptor parcels that are more than 300 feet from the edge of US 50. This performance requirement shall take priority over Performance Requirements 3 and 4;

2. TTD shall offer to retrofit the South Shore Inn (Receptor 55) sufficiently to ensure that its ambient interior noise levels do not exceed 45 CNEL with windows and doors closed. However, the owners of the motel may choose to refuse this offer;

3. To the extent feasible, reduce traffic noise levels at those receptors identified in Table 3.15-11 that would experience traffic noise levels that exceed or approach the applicable NAC and/or experience a traffic noise level increase greater than Caltrans's incremental increase criterion of 12 dB. For NEPA purposes, the feasibility of achieving this performance requirement can be based on the Noise Abatement Decision Report prepared for the project (Caltrans 2016), which was prepared pursuant to guidance in Caltrans's Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects (Caltrans 2011) and 23 CFR 772; and

4. To the extent feasible, reduce traffic noise levels at those receptors identified in Table 3.15-11 that would experience a traffic noise level that exceeds the applicable local noise standard (established by the City of South Lake Tahoe), and/or would experience a traffic noise level increase of 3 dB or greater.

Noise Reduction Features

Noise-reduction features may include, but are not limited to, any combination of the following:

- Paving the nearby segment of roadway with rubberized hot-mix asphalt (RHMA) or equivalent surface treatment with known noise-reducing properties on top of the roadway surface. The RHMA overlay shall be designed with appropriate thickness and rubber component quantity (typically 15 percent by weight of the total blend), such that traffic noise levels are reduced by an average of 4 to 6 dB (noise levels vary depending on travel speeds, meteorological conditions, and pavement quality) as compared to noise levels generated by vehicle traffic traveling on standard asphalt. RHMA has been found to achieve this level of noise reduction in other parts of California (Sacramento County 1999). Pavement will require more frequent than normal maintenance and repair to maintain its noise attenuation effectiveness.

- Installation of outdoor sound barriers between affected receptors and the roadway segments that are the predominant noise source at the receptors. The sound barriers must be constructed of solid material (e.g., wood, brick, adobe, an earthen berm, boulders, or combination thereof). The reflectivity of each sound barrier will be minimized to ensure that traffic noise reflected off the barrier does not contribute to an exceedance of applicable TRPA CNEL standards at other receptors. The level of sound reflection from a barrier can be minimized with a textured or absorptive surface or with vegetation on or next to the barrier. Scenic quality factors will be taken into account during design, such as using more natural materials (e.g., berms and boulders) to reduce the visible mass of a wall. Mitigation Measure 3.7-3 also proposes the use of a sound barrier to attenuate impacts from headlights shining onto residential properties and describes details to ensure the barriers would not cause negative visual impacts (see Section 3.7, "Visual Resources/Aesthetics"). All barriers will be designed to blend into the restored landscape along the highway, to the extent feasible. Ensuring a character consistent with the surrounding area may involve the use of strategically placed boulders, native trees, or other vegetation; the addition of special materials (e.g., wood or stonework) on the façade of the sound wall; and/or a sound wall that is covered in vegetation. The location and design of sound barriers shall adhere to any space requirements for snow removal on the adjacent roadway. If desired a sound barrier can be divided into two overlapping segments with a gap in the overlapped portion to provide pedestrian access from one side to the other.

  The specific location, length, height, and design of noise barriers for Alternative B must be defined during engineering design development. It is not feasible to provide engineering details of noise barriers prior to the initiation of preliminary engineering for the transportation improvements. For conceptual planning purposes, however, based on the environmental planning-level noise analysis in this document, the approximate location and height of noise barriers for Alternative B are as follows:

- Barriers would need to be built on both the north and south sides of the realigned US 50 alignment to protect affected residences behind them. The approximate length is estimated to be in the range of 1,000 to 1,200 feet on each side of the highway. The height needed for an approximately 5 dB attenuation would be between 6 to 8 feet above the road surface. Noise barriers would be entirely within the public right-of-way.

- The conceptual extent of the south barrier would be from the intersection of realigned US 50 and Pioneer Trail (near the existing 90-degree bend in Primrose Road close to Pioneer Trail) east to the curve of the highway onto the Montreal Road alignment (near the existing intersection of Echo Road and Montreal Road).

- The conceptual extent of the north barrier would be from the intersection of realigned US 50 and Pioneer Trail (near the existing intersection of Moss Road and Pioneer Trail) east to beyond Fern Road (near the existing corner of the back parking area of Heavenly Village Center).

- Reduced vehicle speeds through posted speed limits, advisory signs, and/or design features that serve as traffic calming elements (e.g., median barrier, center islands, and raised crosswalks). The design of any special traffic-calming features shall not prevent the ability to provide adequate snow removal of any surfaces used for driving, walking, or biking.

- Offer to the property owners of residences, motels/hotels, or other tourist accommodation units where the interior noise levels would exceed 45 CNEL, increased noise insulation of exterior walls to improve the Sound Transmission Class (STC) of those walls, including but not limited to added insulation, upgrades to drywall, acoustical sound absorption panels, new windows, and new exterior siding. For residences or tourist accommodation units that do not currently have air conditioning, install an air conditioning system if necessary to ensure that residents can close all windows and doors during nighttime hours and maintain adequate interior comfort.

- Acquire properties where the noise level would exceed TRPA thresholds, applicable Caltrans noise abatement criteria, and/or applicable local noise standards; or where traffic noise levels would increase by 3 dB CNEL or greater. Acquisition of additional properties shall only occur if other feasible noise reduction measures are not available to achieve the applicable standards or minimize traffic noise increases to less than 3 dB CNEL.

Selection and Design Process

The selection and design of specific traffic noise reduction measures shall be supported by a site-specific noise abatement assessment conducted by a qualified acoustical engineer or consultant selected by the project proponent. This study shall be fully funded by the project proponent and approved by the project proponent, TRPA, and Caltrans prior to project construction. If necessary to support the effectiveness of selected noise reduction measures, the site-specific noise abatement assessment may involve additional sound level measurements and/or the use of detailed site-specific modeling with software such as FHWA's Traffic Noise Model (FHWA 2006), SoundPLAN (SoundPLAN 2015) or CadnaA (DataKustik 2015).

For those receptors predicted to experience an exceedance of NEPA significance criteria for traffic noise, as identified in Table 3.15-11, the feasibility of constructing a sound barrier, for NEPA purposes, shall be based on the results of the Noise Abatement Decision Report (Caltrans 2016), which was prepared pursuant to guidance in Caltrans's Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects (Caltrans 2011) and 23 CFR 772.

TTD shall prepare a study supplemental to the Noise Abatement Decision Report to identify all necessary measures to ensure attainment of all applicable TRPA land use-based CNEL thresholds. The supplemental study shall also identify all feasible measures to reduce traffic noise increases to less than 3 dB and/or reduce traffic noise levels to less than the applicable local noise standards, with specific attention to the application of the City's noise standard at the outdoor activity areas of residential and tourist accommodation land uses. In

addition, the supplemental study shall identify, and TTD shall select, the set of feasible noise reduction measures that would benefit the most receptors and prioritize the attainment of applicable NAC ahead of the applicable local noise standard.

Significance after Mitigation

Implementation of Mitigation Measure 3.15-3a would, at a minimum, ensure that receptors located more than 300 feet from the edge of US 50 would not be exposed to traffic noise levels that exceed applicable TRPA land use-based exterior CNEL thresholds. Based on the traffic noise modeling summarized in Table 3.15-11, this would be achieved with reductions of 3, 2, 2, 1, 2, and 3 dB at Receptors 80, 88, 89, 90, 91, and 136, respectively. A sound barrier that is just tall enough to break the line of sight between vehicles traveling on a roadway and ground level receptors results in at least 5 dB of noise reduction and can achieve an approximate 1 dB additional reduction for each 2 feet of height above where the sound barrier breaks the line of sight (with a maximum theoretical total reduction of 20 dB) (FHWA 2011:56). The use of RMHM typically provides a reduction of 4 to 6 dB compared to standard asphalt (Sacramento County 1999). Because the necessary reductions would be achievable through the use of sound barriers and/or RMHA, this impact would be reduced to less than the applicable TRPA land use-based noise thresholds. (Note: an illustration depicting the appearance of sound barriers is included as Exhibit 3.7-21 in Section 3.7, "Visual Resources/Aesthetics." A discussion of the secondary visual effects of the barrier is also included following Mitigation Measure 3.7-3.)

Providing additional noise insulation features to the South Shore Inn (Receptor 55) could ensure that interior noise levels at the motel would not exceed 45 CNEL with windows and doors closed. However, it is not certain that the property owner would accept this offer or that interior noise levels could be reduced to less than the 45 CNEL standard through implementation of off-site noise reduction measures alone (e.g., sound barriers, RHMA).

The Noise Abatement Decision Report determined that the estimated cost of constructing sound barriers to protect residential units from exposure to traffic noise levels that exceed applicable NEPA criteria with Alternative B would not be reasonable relative to the allowance of money per benefited residence for traffic noise abatement (Caltrans 2016:56). If funding for a sound barrier is not available from FHWA or Caltrans, then funding could be provided by TTD or other agencies.

It is also uncertain whether feasible traffic noise abatement measures could be implemented to ensure outdoor traffic noise levels at all receptors would be less than the applicable NAC and less than the applicable local exterior CNEL standard, and ensure traffic noise increases would be less than Caltrans's incremental increase standard of 12 dB or even less than 3 dB, which is the TRPA significance criterion and the CEQA significance criterion used for receptors in California. Relatively large noise reductions would be needed at receptors located along both sides of the segment of realigned US 50 that would pass through the Rocky Point neighborhood; however, it may not be feasible to construct sound barriers along both sides of the highway that meet aesthetic and snow removal requirements and avoid measurable levels of noise reflection. Multiple receptors in this neighborhood would need noise abatement that achieves reductions of 10 dB or more. For instance, a 17-dB reduction would be needed at Receptor 73 on the north side of the highway and a 15-dB reduction would be needed at Receptor 50 on the south side of the same segment. Locating sound barriers along both sides of the highway could potentially result in a tunneling effect that exposes receptors located near the ends of the sound barriers to additional noise. Therefore, this impact in Alternative B would be **significant and unavoidable** for the purposes of CEQA and TRPA.

For the purposes of NEPA, additional mitigation measures have been incorporated into Alternative B to further reduce to the extend feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Mitigation Measure 3.15-3b: Implement traffic noise reduction measures to reduce traffic noise exposure at affected receptors

The following noise abatement measures would apply to the Alternative C transportation improvements and mixed-use development sites for the purposes of NEPA, CEQA, and TRPA.

Performance Requirements

Traffic noise reduction measures shall be implemented to achieve the following:

1. Ensure that Receptor 136 is not exposed to an average daily traffic noise level that exceeds the land use-based 65 CNEL threshold established in TRPA's Tourist Core Area Plan (City of South Lake Tahoe and TRPA 2013:5-3 to 5-4) under cumulative conditions. This performance requirement shall take priority over Performance Requirements 2, 3 and 4;

2. TTD shall offer to retrofit the South Shore Inn (Receptor 55) sufficiently to ensure that its ambient interior noise level does not exceed 45 CNEL with windows and doors closed. However, the owner of the motel may choose to refuse this offer;

3. To the extent feasible, reduce traffic noise levels at those receptors identified in Table 3.15-12 that would experience a traffic noise level that exceeds or approaches the applicable NAC and/or experience a traffic noise level increase greater than Caltrans's incremental increase criterion of 12 dB. For NEPA purposes, the feasibility of achieving this performance requirement can be based on the Noise Abatement Decision Report prepared for the project (Caltrans 2016), which was prepared pursuant to guidance in Caltrans's Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects (Caltrans 2011) and 23 CFR 772; and

4. To the extent feasible reduce traffic noise levels at those receptors identified in Table 3.15-12 that would experience a traffic noise level that exceeds the applicable local noise standard (established by the City of South Lake Tahoe), and/or would experience a traffic noise level increase of 3 dB or greater.

Noise Reduction Features

Noise reduction features may include, but are not limited to, the same features identified for Alternative B in Mitigation Measure 3.15-3a.

The specific location, length, height, and design of noise barriers for Alternative C must be defined during engineering design development and, as described for Alternative B, adhere to Mitigation Measure 3.7-3 to avoid negative visual impacts (see Section 3.7, "Visual Resources/Aesthetics"). It is not feasible to provide engineering details of noise barriers prior to the initiation of preliminary engineering for the transportation improvements. For conceptual planning purposes, however, based on the environmental planning-level noise analysis in this document, the approximate location and height of noise barriers for Alternative C are as follows (similar to Alternative B):

- Barriers would need to be built on both the north and south sides of the realigned US 50 alignment to protect affected residences behind them. The approximate length is estimated to be in the range of 1,000 to 1,200 feet on each side of the highway. The height needed for an approximately 5 dB attenuation would be between 6 to 8 feet above the road surface. Noise barriers would be entirely within the public right-of-way.

- The conceptual extent of the south barrier would be from the intersection of realigned US 50 and Pioneer Trail (near the existing 90-degree bend in Primrose Road close to Pioneer Trail) east to the curve of the highway onto the Montreal Road alignment (near the existing intersection of Echo Road and Montreal Road).

- The conceptual extent of the north barrier would be from the intersection of realigned US 50 and Pioneer Trail (near the existing intersection of Moss Road and Pioneer Trail) east to beyond Fern Road (near the existing corner of the back parking area of Heavenly Village Center).

Selection and Design Process

The selection and design of specific traffic noise reduction measures to reduce traffic noise impacts under Alternative C shall adhere to the same requirements identified for Alternative B in Mitigation Measure 3.15-5a.

Significance after Mitigation

Implementation of Mitigation Measure 3.15-3b would, at a minimum, ensure that receptors located more than 300 feet from the edge of US 50 would not be exposed to traffic noise levels that exceed applicable TRPA land use-based exterior CNEL thresholds. Based on the traffic noise modeling summarized in Table 3.15-12, this would be achieved with a reduction of 2 dB at the Cedar Inn & Suites (Receptor 136). A sound barrier that is just tall enough to break the line of sight between vehicles traveling on a roadway and ground level receptors result in at least 5 dB of noise reduction and can achieve an approximate 1 dB additional reduction for each 2 feet of height above where the sound barrier breaks the line of sight (with a maximum theoretical total reduction of 20 dB) (FHWA 2011:56). The use of RMHM typically provides a reduction of 4 to 6 dB compared to standard asphalt (Sacramento County 1999). Because the necessary reductions would be achievable through the use of sound barriers and/or RMHA, this impact would be reduced to less than the applicable TRPA land use-based noise thresholds. (Note: an illustration depicting the appearance of sound barriers is included as Exhibit 3.7-21 in Section 3.7, “Visual Resources/ Aesthetics.” A discussion of the secondary visual effects of the barrier is also included following Mitigation Measure 3.7-3.)

Providing additional noise insulation features to the South Shore Inn (Receptor 55) could ensure that interior noise levels at the motel would not exceed 45 CNEL with windows and doors closed. However, it is not certain that the property owner would accept this offer or that interior noise levels could be reduced to less than the 45 CNEL standard through implementation of off-site noise reduction measures alone (e.g., sound barriers, RHMA).

Based on the Noise Abatement Decision Report prepared for the project, Caltrans would incorporate noise abatement in the form of a barrier along the west side of US 50 between Fern Road and Echo Road, with a length of approximately 214 feet and average heights of 6 feet. Calculations based on preliminary design data show that this barrier would reduce noise levels by 5 to 7 dB for two residences at a cost of $134,820 (Caltrans 2016:56). If during final design conditions have substantially changed, noise abatement may not be necessary. The final decision of the noise abatement will be made upon completion of the project design.

The Noise Abatement Decision Report determined that the estimated cost of constructing sound barriers at other locations to protect residential units from exposure to traffic noise levels that exceed applicable NEPA criteria with Alternative C would not be reasonable relative to the allowance of money per benefited residence for traffic noise abatement (Caltrans 2016:56). If funding for a sound barrier is not available from FHWA or Caltrans, then funding could be provided by TTD or other agencies.

It is also uncertain whether feasible traffic noise abatement measures could be implemented to ensure outdoor traffic noise levels at all receptors would be less than the applicable NAC and less than the applicable local CNEL standard, and ensure traffic noise increases would be less than Caltrans’s incremental increase standard of 12 dB or even less than 3 dB, which is the TRPA significance criterion and the CEQA significance criterion used for receptors in California. Relatively large noise reductions would be needed at receptors located along both sides of the segment of realigned east-bound US 50 that would pass through the Rocky Point neighborhood; however, it may not be feasible to construct sound barriers along both sides of the highway that meet aesthetic and snow removal requirements and avoid measurable levels of noise reflection. Multiple receptors in this neighborhood would need noise abatement that achieves reductions of 10 dB or more. For instance, a 13-dB reduction would be needed at Receptor 73 on the north side of the highway and an 11-dB reduction would be needed at Receptor 49 on the south side of the same

segment. Locating sound barriers along both sides of the highway could potentially result in a tunneling effect that exposes receptors located near the ends of the sound barriers to additional noise. Therefore, this impact in Alternative C would be **significant and unavoidable** for the purposes CEQA and TRPA.

For the purposes of NEPA, additional mitigation measures have been incorporated into Alternative C to further reduce to the extend feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Mitigation Measure 3.15-3c: Implement traffic noise reduction measures to reduce traffic noise exposure at affected receptors

The following noise abatement measures would apply to the Alternative D transportation improvements and mixed-use development sites for the purposes of NEPA, CEQA, and TRPA.

Performance Requirements

Traffic noise reduction measures shall be implemented to achieve the following:

1. Ensure that Receptors 30, 97, and 98 are not exposed to an average daily traffic noise level that exceeds the land use-based 55 CNEL threshold established in TRPA's Pioneer/Ski Run Plan Area Statement 092 (TRPA 2002c:3) and that Receptor 136 is not exposed to an average daily traffic noise level that exceeds the land use-based 65 CNEL threshold established in TRPA's Tourist Core Area Plan (City of South Lake Tahoe and TRPA 2013:5-3 to 5-4). These land use-based CNEL thresholds apply to all portions of these receptor parcels that are more than 300 feet from the edge of US 50. Also ensure that Receptor 29 is not exposed to more than its existing noise level of 65 CNEL under cumulative-plus-Alternative D conditions, which currently exceeds the TRPA land use-based noise threshold of 55 CNEL established in PAS 092 Pioneer/Ski Run (TRPA 2002c:3) and is expected to be exposed to 65 CNEL under cumulative-no-project conditions. This performance requirement shall take priority over Performance Requirements 2, 3, and 4;

2. TTD shall offer to retrofit the Trailhead Motel (Receptor 20) with sufficient noise insulation to ensure that its ambient interior noise levels do not exceed 45 CNEL with windows and doors closed. However, the owners of the motel may choose to refuse this offer;

3. To the extent feasible reduce traffic noise levels at Receptors 42, 68, 71, 83, and 84 so they would not experience a traffic noise level that exceeds or approaches the applicable NAC and/or experience a traffic noise level increase greater than Caltrans's incremental increase criterion of 12 dB. For NEPA purposes, the feasibility of achieving this performance requirement can be based on the Noise Abatement Decision Report prepared for the project (Caltrans 2016), which was prepared pursuant to guidance in Caltrans's Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects (Caltrans 2011) and 23 CFR 772 and is included in Appendix E to the RTP/SCS EIR/EIS; and

4. To the extent feasible reduce traffic noise levels at those receptors identified in Table 3.15-13 that would experience a traffic noise level that exceeds the applicable local noise standard established by the City of South Lake Tahoe, and/or would experience a traffic noise level increase greater than 3 dB.

Noise Reduction Features

Noise reduction features may include, but are not limited to, the same features identified for Alternative B in Mitigation Measure 3.15-3a.

Noise analysis indicates the need for a barrier on the south side of the relocated highway for Alternative D. The specific location, length, height, and design of noise barrier for Alternative D must be defined during engineering design development and, as described for Alternative B, adhere to Mitigation Measure 3.7-3 to avoid negative visual impacts (see Section 3.7, "Visual Resources/Aesthetics"). It is not feasible to provide engineering details of a noise barrier prior to the initiation of preliminary engineering for the transportation

improvements. For conceptual planning purposes, however, based on the environmental planning-level noise analysis in this document, the approximate location and height of the noise barrier for Alternative D are as follows:

- A barrier would need to be built on the south side of the realigned US 50 alignment to protect affected residences behind it. The approximate length is estimated to be in the range of 800 to 1,000 feet. The height needed for an approximately 5 dB attenuation would be between 6 to 8 feet above the road surface. The noise barrier would be entirely within the public right-of-way. The conceptual extent of the south barrier would be from the intersection of realigned US 50 and Pioneer Trail (near the existing intersection of Echo Road and Pioneer Trail) east to the curve of the highway onto the Montreal Road alignment (near the existing corner of the Heavenly Village Center parking lot).

- If the existing residential land uses along Fern Road (represented by Receptors 96, 97, and 98) are not replaced with mixed-use redevelopment prior to completion of the realigned US 50 alignment, then a barrier would also need to be built on the north side of the realigned US 50 alignment to protect these affected residences. The approximate length of the barrier on the north side of the realigned US 50 alignment is estimated to be approximately 600 to 800 feet.

Selection and Design Process

The selection and design of specific traffic noise reduction measures to reduce traffic noise impacts under Alternative D shall adhere to the same requirements identified for Alternative B in Mitigation Measure 3.15-5a.

Significance after Mitigation

Implementation of Mitigation Measure 3.15-3c would, at a minimum, ensure that Receptors 30, 97, 98, and 136 would not be exposed to traffic noise levels that exceed applicable TRPA land use-based exterior CNEL thresholds. Based on the traffic noise modeling summarized in Table 3.15-13, this would be achieved with reductions of 3, 4, 5, and 3 dB at Receptors 30, 97, 98, and 136, respectively. Implementation of Mitigation Measure 3.15-5c would also ensure that the noise level at Receptor 29 would not exceed its existing noise level, requiring a reduction of 3 dB under cumulative-plus-Alternative D conditions. A sound barrier that is just tall enough to break the line of sight between vehicles traveling on a roadway and ground level receptors results in at least 5 dB of noise reduction and can achieve an approximate 1 dB additional reduction for each 2 feet of height above where the sound barrier breaks the line of sight (with a maximum theoretical total reduction of 20 dB) (FHWA 2011:56). The use of RMHM typically provides a reduction of 4 to 6 dB compared to standard asphalt (Sacramento County 1999). Because the necessary reductions would be achievable through the use of sound barriers and/or RMHA, this impact would be reduced to less than the applicable TRPA land use-based noise thresholds. (Note: an illustration depicting the appearance of sound barriers is included as Exhibit 3.7-21 in Section 3.7, “Visual Resources/Aesthetics.” A discussion of the secondary visual effects of the barrier is also included following Mitigation Measure 3.7-3.)

Providing additional noise insulation features to the Trailhead Motel (Receptor 20) could ensure that interior noise levels at the motel would not exceed 45 CNEL with windows and doors closed. However, it is not certain that property owner would accept this offer or that interior noise levels could be reduced to less than the 45 CNEL standard through implementation of off-site noise reduction measures alone (e.g., sound barriers, RHMA).

The Noise Abatement Decision Report determined that the estimated cost of constructing sound barriers to protect residential units from exposure to traffic noise levels that exceed applicable NEPA criteria with Alternative D would not be reasonable relative to the allowance of money per benefited residence for traffic noise abatement (Caltrans 2016:56). If funding for a sound barrier is not available from FHWA or Caltrans, then funding could be provided by TTD or other agencies.

It is also uncertain whether feasible traffic noise abatement could be implemented to ensure traffic noise levels at all receptors would be less than the applicable NAC and less than the applicable local CNEL standard, and ensure traffic noise increases would be less than Caltrans’s incremental increase standard of

12 dB or even less than 3 dB, which is the TRPA significance criterion and the CEQA significance criterion used for receptors in California. Relatively large noise reductions would be needed at receptors located along both sides of the segment of realigned US 50 that would pass through the Rocky Point neighborhood; however, it may not be feasible to construct sound barriers along both sides of the highway that meet aesthetic and snow removal requirements and avoid measurable levels of noise reflection. Multiple receptors in this neighborhood would need noise abatement that achieves reductions of 6 dB or more. For instance, a 13-dB reduction would be needed at Receptor 83 on the south side of the highway and a 6-dB reduction would be needed at Receptor 98 on the north side of the same segment. Therefore, this impact in Alternative D would be **significant and unavoidable** for the purposes CEQA and TRPA.

For the purposes of NEPA, additional mitigation measures have been incorporated into Alternative D to further reduce to the extend feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Mitigation Measure 3.15-3d: Implement traffic noise reduction measures to reduce traffic noise exposure at affected receptors

The following noise abatement measures would apply for Alternative E for the purposes of CEQA and TRPA.

Performance Requirements

Traffic noise reduction measures shall be implemented to achieve the following:

1. Ensure that implementation of Alternative E does not contribute to an exceedance of the land use-based 65 CNEL threshold established in TRPA's Tourist Core Area Plan (City of South Lake Tahoe and TRPA 2013:5-3 to 5-4) at Receptor 136 under cumulative conditions. This means that noise reduction measures shall be implemented to reduce the traffic noise level by a minimum of 1 dB under the cumulative-plus-Alternative E condition. (This performance requirement would also ensure that Alternative E does not contribute to an exceedance of the 65 CNEL transportation noise standard established by the City of South Lake Tahoe.) This performance requirement shall take priority over Performance Requirements 2 and 3;

2. Reduce exterior traffic noise levels at Receptors 20, 99, 102, 107, 135, and 136 by a minimum of 1 dB to offset the contribution by Alternative E under cumulative conditions to an exceedance of the 65 CNEL standard established by the City of South Lake Tahoe for these land uses; and

3. TTD shall offer to retrofit the Trailhead Motel (Receptor 20) and the Park Tahoe Aspen Court (Receptor 107) sufficiently to ensure that its ambient interior noise levels do not exceed 45 CNEL with windows and doors closed. However, the owners of these motels may choose to refuse this offer.

Noise Reduction Features

Noise reduction features may include, but are not limited to, the same features identified for Alternative B in Mitigation Measure 3.15-3a.

Selection and Design Process

The selection and design of specific traffic noise reduction measures to reduce traffic noise impacts under Alternative E shall adhere to the same requirements identified for Alternative B in Mitigation Measure 3.15-5a.

Significance after Mitigation

Implementation of Mitigation Measure 3.15-3d would ensure that Alternative E would not contribute to the exceedance of the land use-based 65 CNEL threshold established in TRPA's Tourist Core Area Plan (City of South Lake Tahoe and TRPA 2013:5-3 to 5-4) at Receptor 136 under cumulative conditions. It would also ensure that Alternative E would not contribute to the exceedance of the 65 CNEL threshold established by the City of South Lake Tahoe at Receptors 20, 99, 102, 107, 135, and 136, and ensure that Alternative E

would not contribute to the exceedance of the 45 CNEL interior noise standard at the Trailhead Motel (Receptor 20) and the Park Tahoe Aspen Court (Receptor 107). Based on the traffic noise modeling summarized in Table 3.15-14, this would be achieved with a reduction of 1 dB. Even if there may not be room on the public right of way to construct a new sound barrier, or a property owner does not agree to provide adequate space to locate a sound barrier, or a property owner of the Trailhead Motel (Receptor 20) and/or the Park Tahoe Aspen Court (Receptor 107) does not allow building retrofits, the resurfacing of the nearby roadway segment with RMHA would provide a noise reduction of 4 to 6 dB compared to standard asphalt (Sacramento County 1999). Because the necessary 1 dB reduction would be achievable at all impacted receptors through the use of RMHA, this impact in Alternative E would be reduced to **less than significant** for the purposes of TRPA and CEQA.

For the purposes of NEPA, additional mitigation measures have been incorporated into Alternative E to further reduce to the extend feasible the environmental consequences related to the exposure of sensitive receptors to increased traffic noise levels.

Mitigation Measure 3.15-4: Implement noise protection measures to ensure that outdoor activity areas on the mixed-use redevelopment sites are not exposed to noise levels greater than 60 CNEL

The following noise abatement measures would apply to the Alternative B, C, and D mixed-use development sites for the purposes of NEPA, CEQA, and TRPA.

Performance Requirement

Developers of each mixed-use redevelopment site shall be required to ensure that ambient traffic noise levels do not exceed 60 CNEL at all common outdoor activity areas (not including parking lots or walkways between parking lots and building entrances). This performance standard shall be achieved at each site prior to occupancy of any of the housing units and under the cumulative-plus-project condition for Alternatives B, C, and D.

Noise Reduction Features

Measures to reduce noise exposure levels may include, but are not limited to, any combination of the following:

- Setting back common outdoor activity areas as far as possible from the nearest segment(s) of US 50;
- Strategically locating buildings to shield common outdoor activity areas from noise generated by traffic on the nearby segment(s) of US 50. An example of this type of design layout exists at the existing Forest Suites Resort on the corner of Lake Parkway and Heavenly Village Way;
- Installing outdoor sound barriers on the redevelopment property between the outdoor activity areas and the nearby segment(s) of US 50. The sound barriers must be constructed of solid material (e.g., wood, brick, adobe, an earthen berm, boulders, or combination thereof). The reflectivity of each sound barrier shall be minimized to ensure that traffic noise reflected off the barrier does not contribute to an exceedance of applicable noise standards at other off-site receptors. The level of sound reflection from a barrier can be minimized with a textured or absorptive surface or with vegetation on or next to the barrier. All barriers shall blend into the overall landscape and have an aesthetically pleasing appearance that agrees with the character of the surrounding area, and not become the dominant visual element of the area. Ensuring a character consistent with the surrounding area may involve the use of strategically placed boulders, native trees, or other vegetation; the addition of special materials (e.g., wood or stonework) on the façade of a sound wall; and/or a sound wall that is covered in vegetation. Special icon panels depicting works of art or emblems meaningful to the area may be included on sound barriers so long as they comply with any applicable local guidelines for public art. The location and design of sound barriers shall adhere to any space requirements for snow removal on US 50. Where desired a sound barrier can be divided into two overlapping segments with a gap to provide pedestrian access from one side to the other; and/or

- Locating outdoor activity areas, such as swimming pools or patios, on building rooftops.

Selection and Design Process

The selection and design of specific measures to reduce noise exposure at outdoor activity areas at each mixed-use redevelopment site shall be conducted by a qualified acoustical engineer or consultant pursuant to Policy HS-8.6 of the City of South Lake Tahoe General Plan. The study for each site shall be fully funded by the applicant seeking to develop the site and approved by City staff prior to project construction. If necessary to support the effectiveness of selected noise reduction measures, the site-specific noise abatement assessment may involve additional sound level measurements and/or the use of detailed site-specific modeling with software such as FHWA's Traffic Noise Model (FHWA 2006), SoundPLAN (SoundPLAN 2015) or CadnaA (DataKustik 2015).

Significance after Mitigation

Implementation of Mitigation Measure 3.15-4 would ensure that all common outdoor activity areas and the outdoor activity areas developed on the redevelopment sites would not be exposed to traffic noise levels that exceed 60 CNEL. For each doubling of the setback distance between a roadway and an outdoor activity area, the level of traffic noise exposure from that roadway is reduced by 3 to 4.5 dB depending on the acoustical softness of the intervening land (Caltrans 2013a:2-29). A sound barrier that is just tall enough to break the line of sight between vehicles traveling on a roadway and ground level receptors results in at least 5 dB of noise reduction and can achieve an approximate 1 dB additional reduction for each 2 feet of height above where the sound barrier breaks the line of sight (with a maximum theoretical total reduction of 20 dB) (FHWA 2011:56). Multiple-story buildings strategically located to shield outdoor activity areas from highway noise can result in 3-10 dB of noise reduction depending on the building sizes, spacing of buildings, and site geometry (Caltrans 2013a:2-35). Because the necessary reductions would be achievable through these design measures in Alternatives B, C, and D, this impact would be reduced to **less than significant** for purposes of CEQA and TRPA.

For the purpose of NEPA, additional mitigation measures have been incorporated into Alternatives B, C, and D to further reduce to the extend feasible the environmental consequences related to the potential to expose land uses to an incompatible noise environment.

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