4.5 Noise

Introduction

This section of the DEIR addresses potential noise-related impacts to sensitive receptors in Plumas County. The environmental setting presents background and terminology with respect to acoustics, and provides a summary of known noise sources in the County. The regulatory setting provides a description of applicable federal, state, and local regulatory policies. A description of the potential impacts of the proposed project is also provided and includes the identification of feasible mitigation (general plan policies where applicable) to avoid or lessen the impacts.

Summary of NOP Comments

No specific comments related to noise or vibration issues were received as part of the public and agency comments received during the NOP scoping period.

Summary of Impact Conclusions

A summary of the noise impacts described in this section are provided below in **Table 4.5-1**.

TABLE 4.5-1
SUMMARY OF NOISE IMPACTS

Impact Number	Impact Topic	Impact Conclusion	Impact After Mitigation
Impact 4.5-1	Mobile Noise Sources	Potentially Significant	Significant and Unavoidable
Impact 4.5-2	Short-Term Construction Noise	Less Than Significant	Less Than Significant
Impact 4.5-3	Ground-Borne Vibration	Less Than Significant	Less Than Significant
Impact 4.5-4	Aviation Noise Sources	Less Than Significant	Less Than Significant
Impact 4.5-5	Stationary Noise Sources	Less Than Significant	Less Than Significant

Key Terms and Background

Given the highly technical nature of this resource topic, the following background information is provide regarding how noise is defined and the manner in which it is measured.

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). Noise is generally defined as unwanted sound (i.e., loud, unexpected, or annoying sound). Acoustics is defined as the physics of sound. In acoustics, the fundamental scientific 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. Acoustics addresses primarily the propagation and control of sound.

Frequency

The number of sound pressure peaks travelling past a given point in a single second is referred to as the frequency, expressed in cycles per second or Hertz (Hz). A given sound may consist of energy at a single frequency (pure tone) or in many frequencies over a broad frequency range (or band). Human hearing is generally affected by sound frequencies between 20 Hz and 20,000 Hz. (20 kHz).

Amplitude

The amplitude of pressure waves generated by a sound source determines the perceived loudness of that source. Sound pressure amplitude is measured in micro-Pascals (µPa). One µPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 µPa to 100,000,000 µPa. Because of this huge range of values, sound is rarely expressed in terms of pressure. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of human hearing (near total silence) is approximately 0 dB which corresponds to 20 µPa.

Addition of Decibels

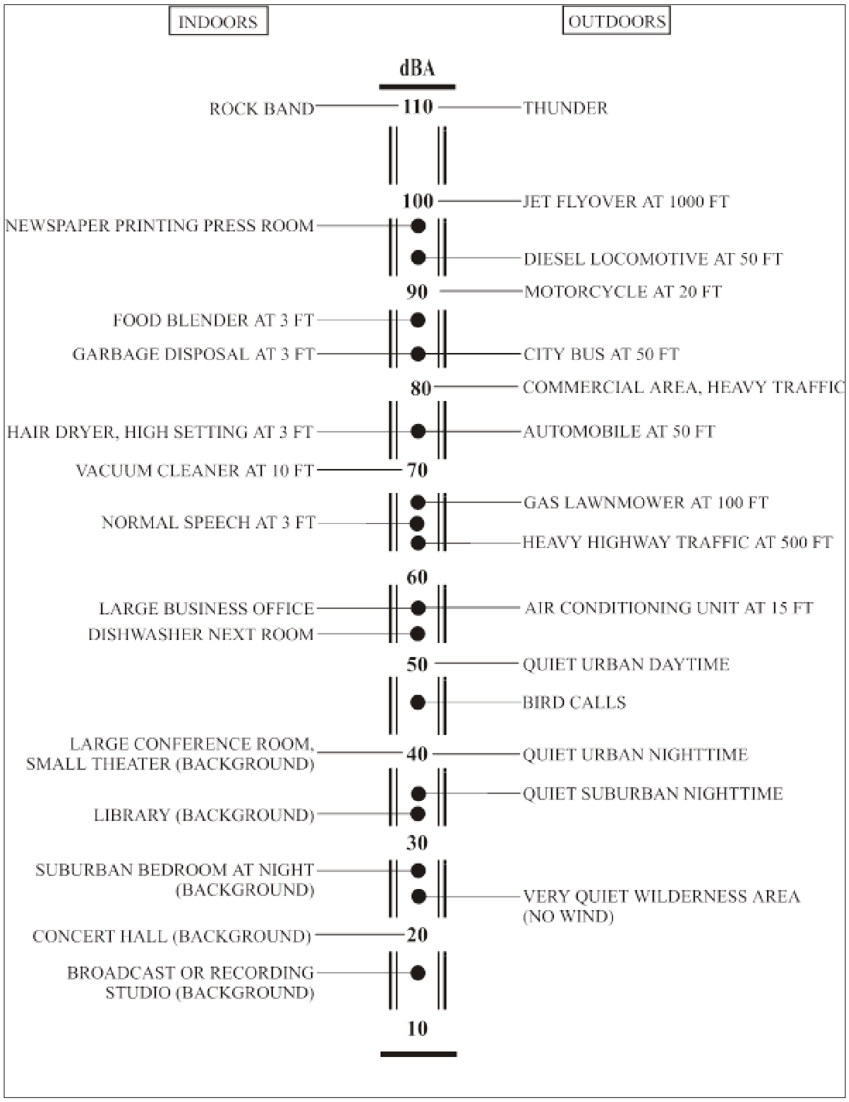
Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic means. Under the decibel scale, a doubling of sound energy corresponds to a 3 dB increase. In other words, when two sources are each producing sound of the same loudness, the resulting sound level at a given distance would be approximately 3 dB higher than one of the sources 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. Under the decibel scale, three sources of equal loudness together produce a sound level of approximately 5 dB louder than one source, and ten sources of equal loudness together produce a sound level of approximately 10 dB louder than the single source.

A-Weighted Decibels

Figure 4.5-1 (shown below) illustrates sound levels associated with common sound sources. The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental sound levels, perception of loudness is relatively predictable, and can be approximated by frequency filtering using the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard descriptor for environmental noise assessment. All noise levels reported in this section are in terms of A-weighting.

Human Response to Changes in Noise Levels

As discussed above, doubling 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 than what is measured.



SOURCE: Caltrans TeNS, 2009

Figure 4.5-1
Decibel Scale and Common Noise Sources

Under controlled conditions in a laboratory setting, 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 range (1,000 Hz–8,000 Hz). In typical noisy environments, changes in noise of 1 to 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 distinctly noticeable increase, and a 10 dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy that would result in a 3 dB increase in sound pressure level would generally be perceived as barely detectable, as shown in **Table 4.5-2**.

TABLE 4.5-2
APPROXIMATE RELATIONSHIP BETWEEN INCREASES IN ENVIRONMENTAL NOISE LEVEL AND HUMAN PERCEPTION

Noise level increase, dB	Human perception (typical)
up to about 3	generally not perceptible
about 3	barely perceptible
about 6	distinctly noticeable
about 10	twice as loud
about 20	four times as loud

SOURCE: Egan, 1988

Noise Sensitive Land Uses

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Noise-sensitive land uses typically include residences, hospitals, schools, daycares, transient lodging, libraries, and certain types of recreational uses. Noise-sensitive, residential receivers are found throughout the County**.**

Noise Descriptors

Noise in our daily environments 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 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 environmental noise analysis, and may be applicable to this study:

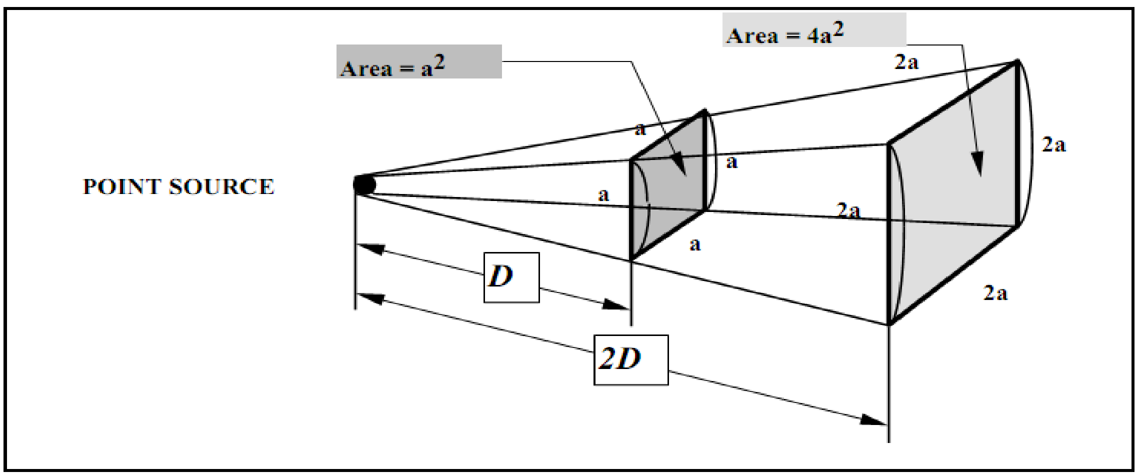
- **Equivalent Sound Level (L_{eq}):** The L_{eq} represents an average of the sound energy occurring over a specified time period. In effect, the L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour, 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 the FHWA.
- **Percentile-Exceeded Sound Level (L_n):** The L_n represents the sound level exceeded "n" percentage of a specified period (e.g., L_{10} is the sound level exceeded 10% of the time, and L_{90} is the sound level exceeded 90% of the time).
- **Maximum Sound Level (L_{max}):** The L_{max} is the highest instantaneous sound level measured during a specified period.
- **Day-Night Average Level (L_{dn}):** The 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 (10 p.m.-7 a.m.). The L_{dn} is often noted as the DNL.
- **Community Noise Equivalent (CNEL):** Similar to Ldn, CNEL 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 (10 p.m.-7 a.m.), and a 5 dB penalty applied to the A-weighted sound levels occurring during evening hours (7 p.m.-10 p.m.). The CNEL is usually within 1 dB of the Ldn, and for all intents and purposes, the two are interchangeable. As it is easier to compute and of more common use, the Ldn is used as the long-term noise measure in this study.

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:

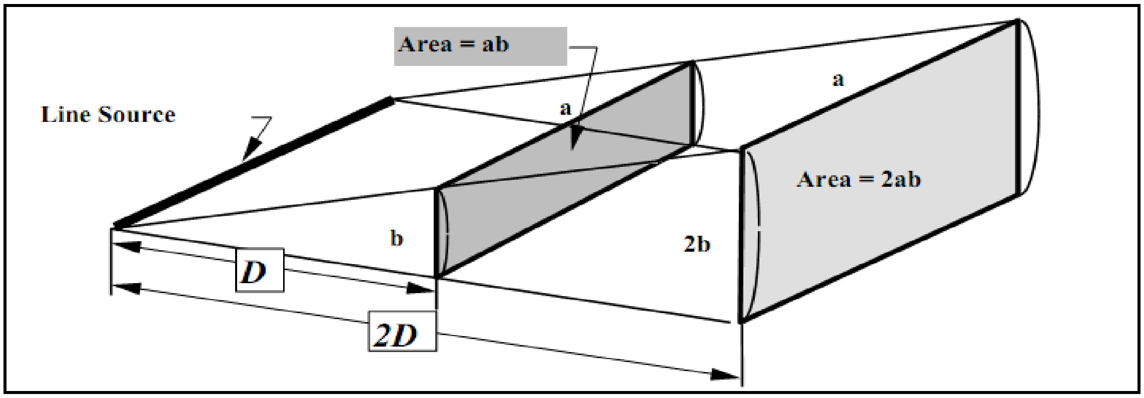
Geometric Spreading. Sound from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern; therefore, this type of propagation is called *spherical spreading*. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point/stationary source as its energy is continuously spread out over a spherical surface, as shown in **Figure 4.5-2**.



SOURCE: Caltrans TeNS, 2009

Figure 4.5-2
Point Source Spreading with Distance

Roadways and highways, and to some extent, moving trains, consist of several localized noise sources on a defined path, and hence are treated as "line" sources, which approximate the effect of several point sources, as shown in **Figure 4.5-3**. Noise from a line source propagates over a cylindrical surface, often referred to as *cylindrical spreading*. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. Therefore, noise due to a line sources attenuates less with distance than that of a point source with increased distance.

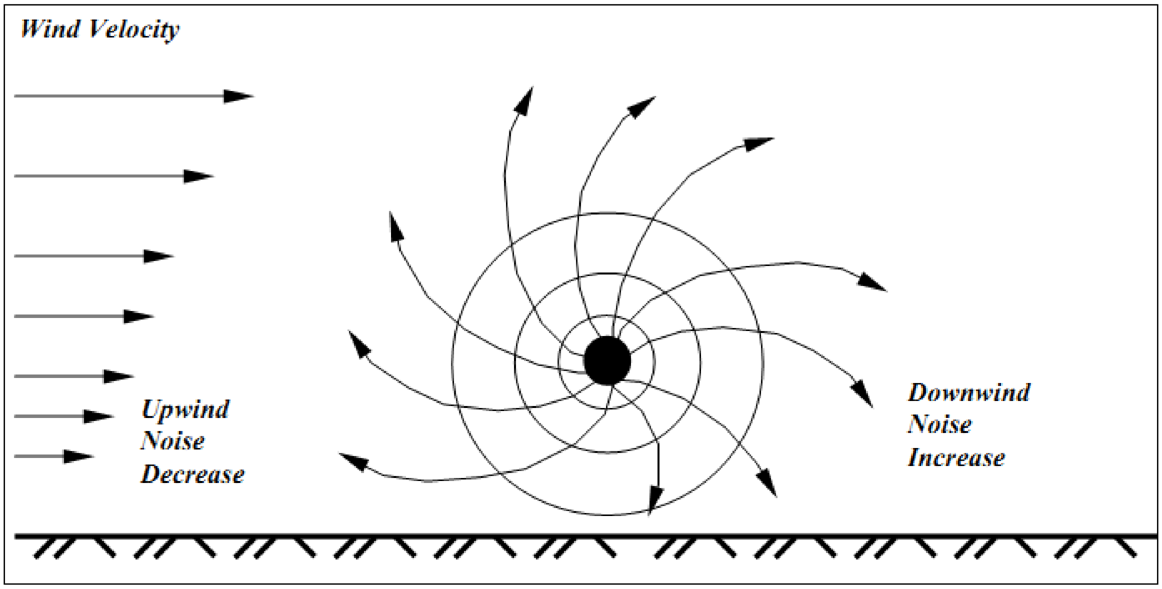


SOURCE: Caltrans TeNS, 2009

Figure 4.5-3
Line Source Spreading with Distance

Ground Absorption. The propagation path of noise from many typical sources such as roadways 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. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a paved parking lot or body of water,), no excess ground attenuation is generally 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 decibels per doubling of distance is typically assumed. When added to cylindrical spreading from traffic noise sources, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance. When added to spherical spreading (point sources), it results in overall drop-off rates of approximately 7.5 dB. These approximations are generally only applicable for receivers within 300 feet of the noise source(s), and should not be applied to sound path lengths of more than 300 feet.

Atmospheric Effects. Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas receivers upwind from the source can have lowered noise levels. This is illustrated in **Figure 4.5-4**, below.

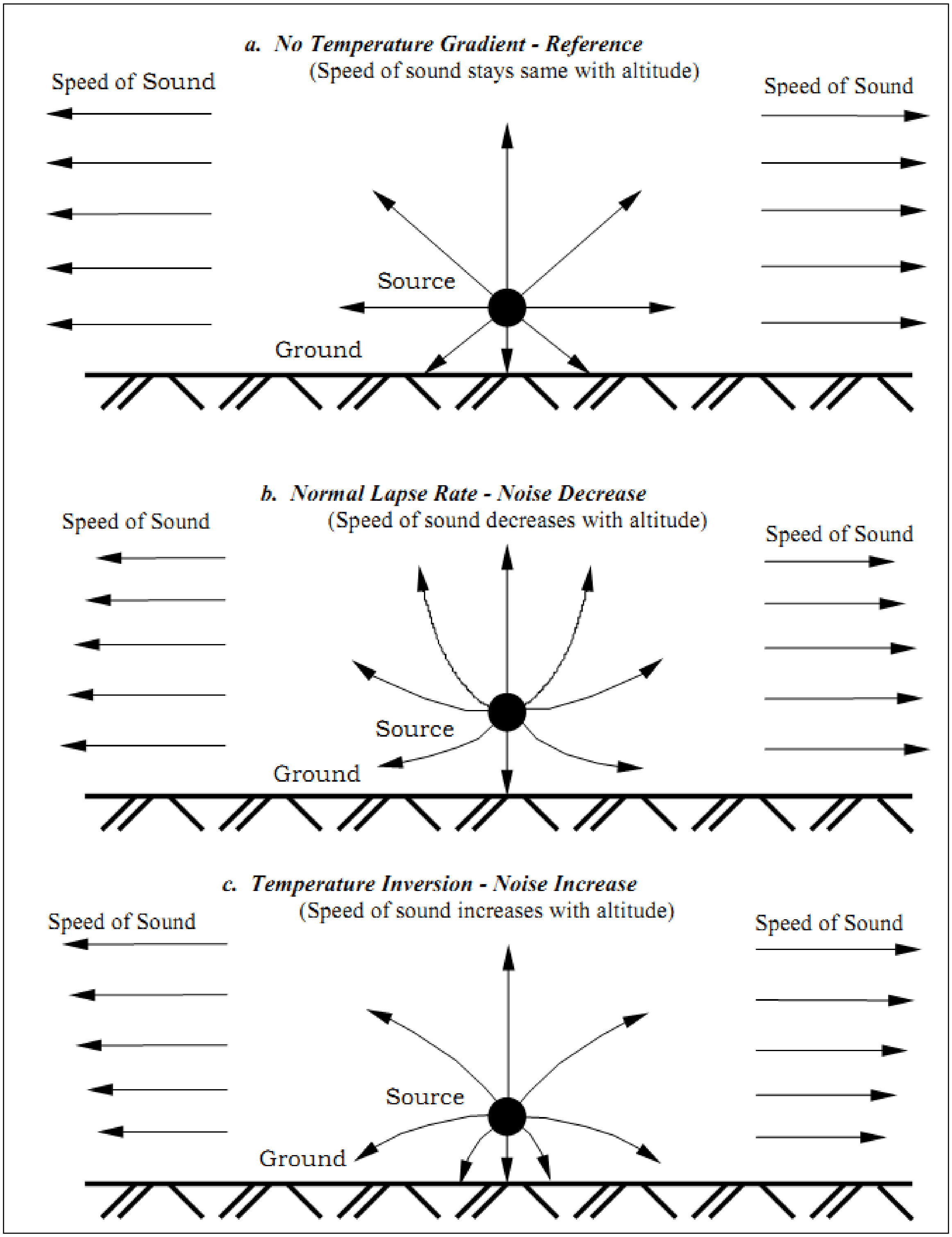


SOURCE: Caltrans TeNS, 2009

Figure 4.5-4
Wind Effects on Noise Levels

In addition to the enhancing effect produced by wind, sound levels can increase at large distances from the source (e.g., more than 500 feet) due to atmospheric temperature inversions (i.e., increasing temperature with elevation) or can decrease with distance from the source at a higher rate than the typical spreading loss with distance rate (see Figures 4.5-2 and 4.5-3) due to a temperature lapse condition (i.e., decreasing temperature with elevation).

Temperature inversions are a common part of the meteorological environment in California. During a temperature inversion the air temperature at the ground is cooler than that several hundred feet above the ground. These temperature inversions are typically caused when a warm, sunny day is followed by a cold, clear night; generally this occurs more frequently and with higher intensity in the fall and the spring seasons. The sun warms the earth surface during the day and generally the air temperature near the ground is higher than the air temperature at higher elevations, but when the sun sets, the earth cools quickly by infrared radiation into space and so does the air mass at lower elevations, so that the temperature of air at high elevations soon becomes warmer than that of the air near the ground. The speed of sound is higher in warmer air, and this inverted temperature profile causes the sound waves in the warmer air to overtake those travelling in cooler air, thus the sound "bends" back toward the ground, as shown in **Figure 4.5-5**.



SOURCE: Caltrans TeNS, 2009

Figure 4.5-5
Effects of Temperature Gradients on Noise

Other factors such as air temperature, humidity, and turbulence can also have significant effects on sound propagation. For instance, air temperature and humidity have a significant effect on the rate of molecular absorption as sound travels large distances. A sound consisting primarily of middle frequencies such as speech or animal vocalization attenuates approximately five additional decibels for every 1,000 feet of travel with an air temperature of 70 degrees Fahrenheit and a humidity of 30 to 40%. This atmospheric effect is in addition to the other effects discussed above.

Vibration

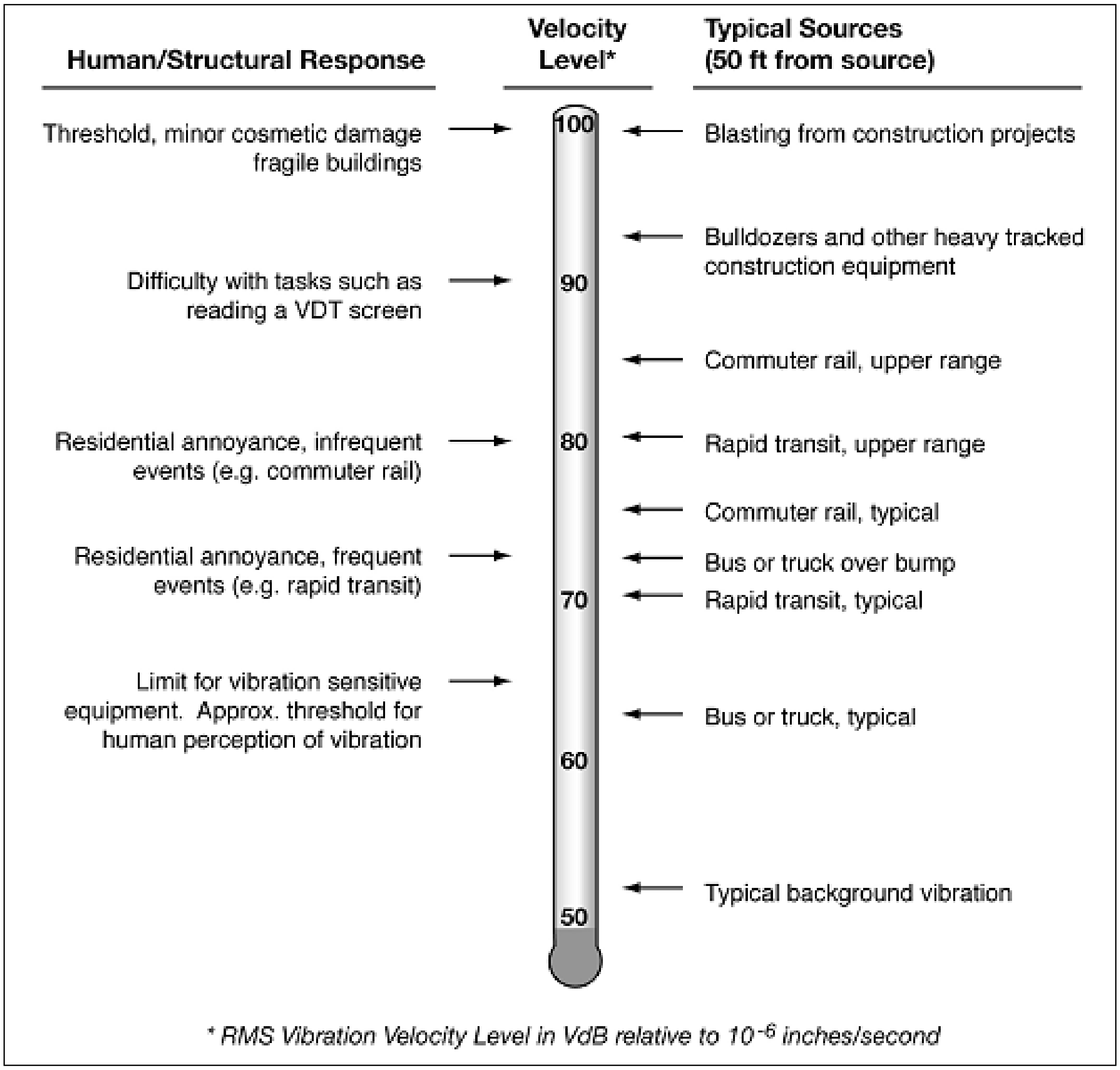
Vibration can be interpreted as energy transmitted in waves through the ground or man-made structures. These energy waves generally dissipate with distance from the vibration source. Because energy is lost during the transfer of energy from one particle to another, vibration becomes less perceptible with increasing distance from the source. Vibration attenuates at a rate of approximately 50% for each doubling of distance from the source. This approach only takes into consideration the attenuation from geometric spreading; since there are additional factors that reduce vibration, such as damping from soil condition, this approach tends to underestimate attenuation and therefore, provides a conservative estimate of vibration at the receptor.

Vibration is an oscillatory motion that can be described in terms of particle displacement, velocity, or acceleration. Vibration is typically described by its peak amplitude and its root-mean-square (RMS) amplitude. The RMS value can be considered an average value over a given time interval. The peak vibration velocity is the same as the peak particle velocity (PPV), where PPV refers to the peak vibration in units of inches per second (in/sec). Peak particle velocity is defined as the maximum instantaneous positive or negative peak of the vibration signal, and is commonly used to assess the potential for damage to buildings and structures. The RMS amplitude is generally used for assessing human annoyance to vibration.

Responses to Vibration

Responses of human receptors and structures are influenced by a combination of factors, including soil or rock type, distance, duration, and the number of perceived events. Energy transmitted through the ground as vibration can reach levels that can cause structural damage; however, humans can be quite sensitive to vibration, and the amplitudes that are often perceived by humans may be well below the amplitudes which could potentially cause architectural or structural damage.

Common background sources of vibration in the County include construction and industrial equipment sources, truck traffic, trains, and occasional earthquakes. **Figure 4.5-6** illustrates typical amplitudes of vibration for transit sources in terms of RMS velocity and typical human response. Here, both the peak and RMS velocities are given in inches per second (in/sec). For example, a freight train passing 100 feet from an observer can cause vibration amplitudes in excess of 0.1 in/sec PPV, while a strong earthquake can produce vibration amplitudes in excess of 10 in/sec PPV. The threshold of human perception for continuous vibration is approximately 0.006 in/sec PPV measured at the surface on which the person is lying down, sitting, or standing.



SOURCE: FTA Guidance Manual, May 2006

Figure 4.5-6
Typical Vibration Levels

Studies indicate that people are less aware of short-duration events than events of longer duration. Transient vibration with duration of 30 seconds or less may be barely perceptible at 0.03 in/sec PPV, whereas short duration vibrations of 0.13 in/sec PPV may be distinctly perceptible.

Groundborne Noise

Noise caused by vibration propagated through soil and building structures is groundborne noise. It is normally radiated by the ground in open air and by walls, floors and ceilings inside a building as a result of groundborne vibration.

Groundborne noise in buildings is generated when interior surfaces (walls and floors) are vibrated, or “excited”, into motion by ground vibration transmitted into the structure. For example, ground vibration could cause windows to rattle or items on shelves to move. The construction features of a building's foundation, structure, and walls determine the building's response to incident ground vibration. Groundborne noise can be calculated in the building based on the projected RMS vibration of the ground surface at the building.

Groundborne noise is less of a concern in the presence of airborne noise because the airborne noise usually dominates acoustic environment. Groundborne noise is typically of concern for highly sensitive and isolated buildings (e.g., recording studio) or for projects which involve underground construction at night where there is little or no project airborne noise component and when airborne noise levels are less (i.e., less traffic noise).

Regulatory Setting

Federal Regulations

Noise Control Act

The Federal Noise Control Act (1972) addressed the issue of noise as a threat to human health and welfare, particularly in urban areas. In response to the Noise Control Act, the U.S. Environmental Protection Agency (U.S. EPA) published *Information of Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (*Levels*). **Table 4.5-3** summarizes the U.S. EPA recommendations for residential and other noise-sensitive land uses. Essentially, the yearly average L_{eq} should not exceed 70 dB to prevent measurable hearing loss over a lifetime, and the L_{dn} should not exceed 55 dB outdoors and 45 dB indoors to prevent significant activity interference and annoyance in noise-sensitive areas. The U.S. EPA did not promote these findings as universal standards or regulatory goals with mandatory applicability to all communities, but rather as advisory exposure levels below which there would be no reason to expect that people would be at risk from any of the identified health or welfare effects of noise. The U.S. EPA *Levels* report also identified a 5 dB increment as an adequate margin of safety relative to a baseline noise exposure level of 55 dB L_{dn} before a noticeable increase in adverse community reaction would be expected.

The Federal Transit Administration (FTA) has developed extensive methodology and significance criteria to evaluate noise and vibration impacts from surface transportation sources (i.e., private motor vehicles, trucks, buses, and rail), as presented in *Transit Noise Impact and Vibration Assessment* (May 2006). The scientific rationale for the FTA's criteria is clearly explained and is widely accepted by acousticians. The FTA incremental noise impact criteria are presented in **Table 4.5-4**. These criteria are based on the U.S. EPA findings (as presented in *Levels* and summarized in Table 4.5-3) and subsequent studies of annoyance in communities affected by transportation noise. Starting from the U.S. EPA's definition of minimal noise impact as a 5 dB increase from a "safe" ambient level of 50 dB (L_{dn} or peak hour L_{eq}, depending on the FTA's Land Use Category), the FTA extended the incremental impact criteria to higher baseline ambient levels by requiring that increased adverse community reaction be kept below a defined minimal level (i.e., a 2% increase in the number of residents reporting a "high" level of annoyance, as measured by survey).

TABLE 4.5-3
SUMMARY OF NOISE LEVELS IDENTIFIED AS REQUISITE TO PROTECT PUBLIC HEALTH AND WELFARE WITH AN ADEQUATE MARGIN OF SAFETY[1]

Effect	Level	Area
Hearing	L_{eq}(24 hr.) < 70 dB	All areas
Outdoor activity interference and annoyance	L_{dn} < 55 dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use
Outdoor activity interference and annoyance	L_{eq}(24-hr.) < 55 dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	L_{dn} < 45 dB	Indoor residential areas
Indoor activity interference and annoyance	L_{eq}(24-hr.) < 45 dB	Other indoor areas with human activities such as schools, etc.

1. Yearly average equivalent sound levels in decibels; the exposure period which results in hearing loss at the identified level is a period of forty years.

SOURCE: U.S. Environmental Protection Agency, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974.

TABLE 4.5-4
FTA IMPACT CRITERIA FOR NOISE-SENSITIVE USES

Existing Noise Level dB L_{dn} or L_{eq} [1,2,3]	Land Use Categories 1 & 2[1,2]			Land Use Category 3[3]		
	Project Impact Threshold	Combined Noise Level	Allowable Noise Increment	Project Impact Threshold	Combined Noise Level	Allowable Noise Increment
45	52	53	8	57	57	12
50	53	55	5	58	59	9
55	55	58	3	60	61	6
60	58	62	2	63	65	5
65	61	66	1	66	68	3
70	64	71	1	69	73	3
75	65	75	0	70	76	1
80	65	80	0	70	80	0

Impact criteria are L_{dn} or L_{eq} (peak hour) depending on Land Use Category given below:

1. *Land Use Category 1:* Tracts of land where quiet is an essential element in their intended purposes. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor uses. Also included are recording studios and concert halls. The noise metric for Category 1 is the outdoor L_{eq} during the noisiest hour of activity.
2. *Land Use Category 2:* Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance. The noise metric for Category 2 is the outdoor L_{dn}.
3. *Land Use Category 3:* Institutional land uses with primarily daytime and evening uses. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds, and recreational facilities can also be considered in this category. Certain historical sites and parks are also included. The noise metric for Category 3 is the outdoor L_{eq} during the noisiest hour of activity.

SOURCE: Federal Transit Administration, *Transit Noise Impact and Vibration Assessment*, May 2006.

As baseline ambient levels increase, it takes a smaller and smaller increment to produce the same increase in annoyance (e. g., in residential areas with a baseline ambient noise level of 50 dB L_{dn}, a 5 dB increase in noise levels would be expected to increase community annoyance by 2%, but at a baseline ambient noise level of 70 dB L_{dn}, a 1 dB increase in noise levels would be expected to have the same effect on community annoyance levels).

The FTA has also developed criteria for estimating the significance of vibration levels at acoustically sensitive receptors. These criteria are summarized in **Table 4.5-5**.

TABLE 4.5-5
GROUNDBORNE VIBRATION IMPACT CRITERIA FOR GENERAL ASSESSMENT

	GVB Impact Levels (VdB re: 1 micro-inch/second)		
Land Use Category	**Frequent Events[1]**	**Occasional Events[2]**	**Infrequent Events[3]**
Category 1: Buildings where vibration would interfere with interior operations	65[4]	65[4]	65[4]
Category 2: Residences and buildings where people normally sleep	72	75	80
Category 3: Institutional land uses with primarily daytime uses	75	78	83

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same source per day.
4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels.

SOURCE: Federal Transit Administration, Transit Noise Impact and Vibration Assessment, May 2006.

Federal Aviation Regulations Part 150

Federal Aviation Regulation (FAR) Part 150, Airport Noise Compatibility Planning, prescribes the procedures, standards, and methodology governing the development, submission, and review of airport noise exposure maps and airport noise compatibility programs, including the process for evaluating and approving or disapproving these programs. FAR Part 150 also prescribes a system for measuring airport noise impacts and presents guidelines for identifying incompatible land uses. Noise exposure maps are to be depicted in terms of annual-average L_{dn} or CNEL contours. For the purposes of federal regulation, all land uses are considered compatible with noise levels less than 65 dB L_{dn}/CNEL. At higher noise exposures, increasing restrictions are applied depending upon the nature of the use and the degree of exterior-to-interior noise attenuation expected.

The effect of aviation noise on sleep and sleep disturbance is a long-recognized concern of those interested in addressing the impacts of noise on people. Based on substantial field research carried out on sleep disturbance, the Federal Interagency Committee on Aviation Noise (FICAN) has recommended the adoption of a dose-response curve based on single-event aviation noise events, as quantified by its single event noise exposure levels (SEL), for predicting the maximum percent of an exposed population (not including children) expected to be awakened in long-term residential settings (see **Table 4.5-6**).[1] In order to reduce potential aviation-related sleep disruption to acceptable levels in areas near airports, it may be necessary to install additional acoustic insulation above that required to maintain interior L_{dn} or CNEL at the generally accepted 45 dB or less criterion.

TABLE 4.5-6
SLEEP DISTURBANCE FREQUENCY AS A FUNCTION OF AIRCRAFT SINGLE-EVENT NOISE EXPOSURE LEVELS (SEL)

Indoor SEL	Average Percent Awakened[1]	Maximum Percent Awakened[2]
45 dB	0.8%	1.1%
50 dB	1.0%	1.9%
55 dB	1.2%	2.8%
60 dB	1.5%	3.8%
65 dB	1.8%	5.1%
70 dB	2.2%	6.4%
75 dB	2.8%	7.9%
80 dB	3.4%	9.6%
85 dB	4.2%	11.3%

Sources:
1. Finegold and Bartholomew, A Predictive Model of Noise Induced Awakenings from Transportation Noise Sources, Noise Control Engineering Journal, 2001; The formula:%Awakened = 0.58 + (4.30 * 10-8) * SEL4.11 was found to give the best-fit to the data.
2. Federal Interagency Committee on Aviation Noise (FICAN) in Effects of Aviation Noise on Awakenings from Sleep, June 1997, as presented in the Oakland International Airport ADP SEIR, September 2003.

State Regulations

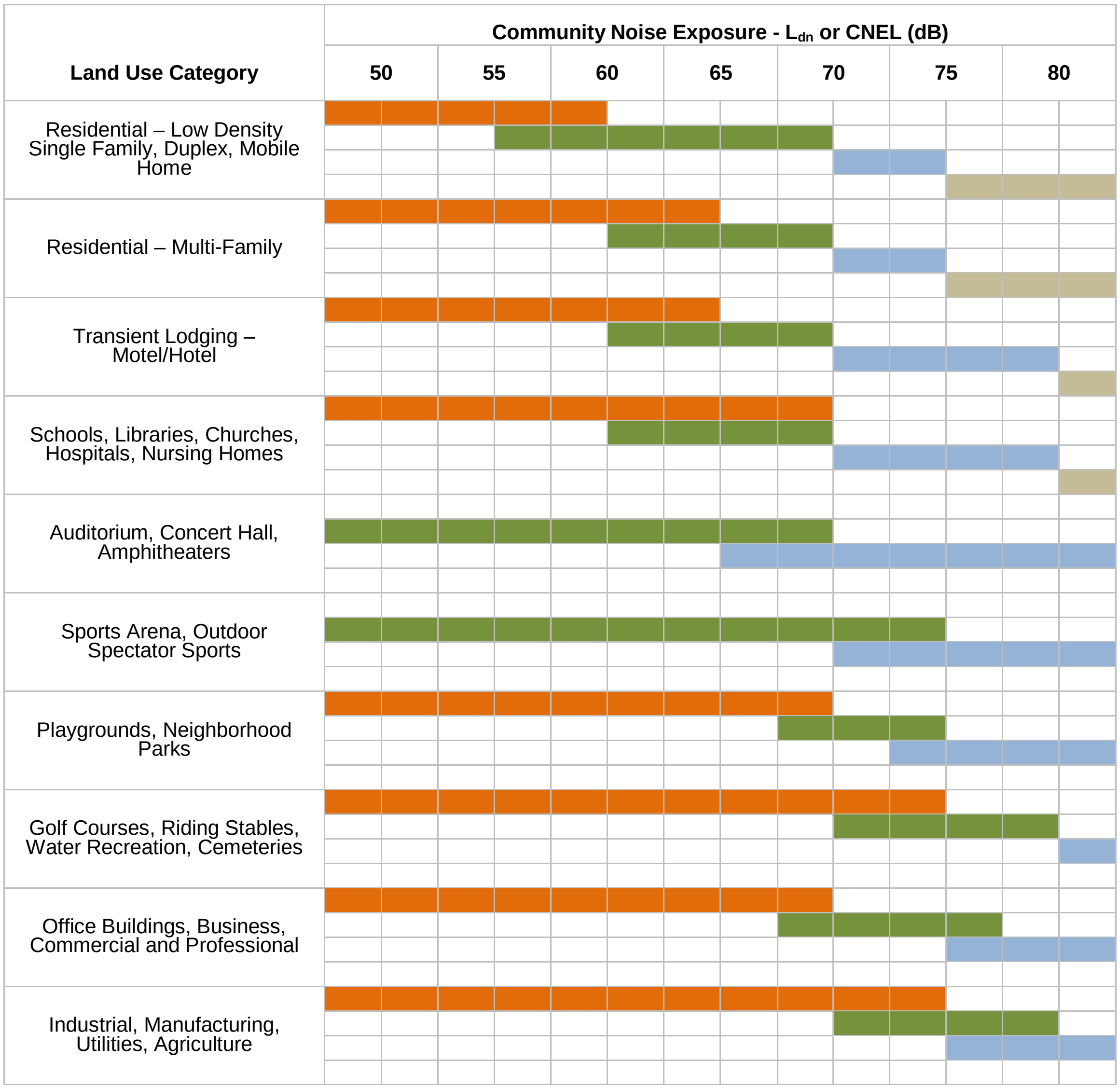
California General Plan Guidelines

The State of California *General Plan Guidelines 2003* (*Guidelines*) promotes use of L_{dn} or CNEL for evaluating noise compatibility of various land uses with the expected degree of noise exposure, as illustrated in **Figure 4.5-7**. The designation of a level of noise exposure as "normally acceptable" for a given land use category implies that the expected interior noise would be acceptable to the occupants without the need for any special acoustical construction improvements. The *Guidelines* identify the suitability of various types of construction relative to the range of customary outdoor noise exposures. The *Guidelines* provide each local community some leeway in setting local noise standards that allow for the variability in individual perceptions of noise in that community. Findings presented in the U.S. EPA's *Levels* document (see discussion above under "Noise Control Act") have had an obvious influence on the recommendations of the State *Guidelines*, most importantly in the latter's choice of noise exposure metrics (i.e., L_{dn} or CNEL) and in the upper limits for the "normally acceptable" exposure of noise-sensitive uses (i.e., no higher than 60 dB L_{dn} or CNEL for low-density

[1] Note that the tabulated awakening percentages (P_{ind}) apply only to a single aircraft noise event. The occurrence of multiple aviation noise events during a night (or day) would result in a higher compound awakening percentage for those exposed than that expected for one event. This compound awakening percentage (P_{tot}) would increase as the individual SEL and the number of events (n) increase according to the following formula:

$$P_{tot} = 1 - (1- P_{ind})^n$$

For example, if the individual awakening probability for one event is 5%, with 10 such events per night the compound awakening probability would be 40 percent.



	Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements
	Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.
	Normally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirement must be made and needed noise insulation features included in the design.
	Clearly Unacceptable	New construction or development generally should not be undertaken.

SOURCE: State of California, Governor's Office of Planning and Research, 2003. *General Plan Guidelines*

Figure 4.5-7
Land Use Compatibility for Community Noise Environment

residential, which is just at the upper limit of the 5 dB “margin of safety” define by the U.S. EPA for noise-sensitive land use categories).

The types of land uses addressed by the state standards and the acceptable noise categories for each are presented in Figure 4.5-7. There is some overlap between the categories, indicating the importance of judgment required when determining the applicability of the numbers in certain situations.

California Noise Insulation Standards

The California Noise Insulation Standards (California Code of Regulations, Title 24) codifies Sound Transmission Control requirements, which establishes uniform minimum noise insulation performance standards for new hotels, motels, dormitories, apartment houses, and dwellings other than detached single-family dwellings. Specifically, Title 24 states that interior noise levels attributable to exterior sources shall not exceed 45 dB L_{dn}/CNEL in any habitable room of new dwellings. Acoustical studies must be prepared for proposed multiple unit residential and hotel/motel structures where exterior noise exposure is expected to be 60 dB L_{dn}/CNEL or higher. The studies must demonstrate that the design of the building would reduce interior noise to 45 dB L_{dn}/CNEL or lower. Dwellings are to be designed so that interior noise levels would meet this standard for at least 10 years from the time of building permit application. Generally speaking, the calculated noise exposure would represent a 20-30 year future scenario. Interior noise levels can be reduced through the use of noise insulating windows and exterior doors, and by using sound isolation materials when constructing walls and ceilings. Additionally, specific acoustical mechanical system design may be required to satisfy the 45 dB L_{dn}/CNEL or less criterion.

Local Regulations

Locally, noise levels are regulated via the noise standards identified under the existing general plan and through noise complaints submitted to the County. These standards are used for planning purposes. The County does not currently have an adopted noise ordinance, which would be used for code enforcement purposes and addressing noise complaints.

Environmental Setting

Ambient noise levels vary throughout the County, and differ greatly between rural and urban settings. Noise sources are primarily associated with transportation facilities such as roadways, airports and railroads. Noise associated with these uses have the potential to exceed health and welfare criteria for noise exposure for sensitive land uses, including residences, hotels/motels and other forms of lodging, schools, libraries, churches, hospitals and nursing homes.

The dominant sources of noise in Plumas County are mobile, related to vehicle (including truck traffic), aircraft and train transportation, to a lesser extent. Common stationary sources in the county include lumber mills and aggregate mining and processing facilities. To a smaller extent, construction sites are also considered a stationary source of short-term, or temporary, noise in the County. Common noise sources within the various Planning Areas of Plumas County are identified in **Table 4.5-7**.

TABLE 4.5-7
PROMINENT NOISE SOURCES WITHIN THE PLANNING AREAS OF PLUMAS COUNTY

	Noise Sources		
Planning Area	**Roads and Railroads**	**Airports**	**Stationary and Recreation-Related**
Almanor Geographic Area			
Canyon Dam	SR 89/BNSF Railway	-	-
Chester	SR 36	Rogers Field Airport and Helipad	Collins Pine Sawmill and Co-Gen Plant, Chester Pit Mine, and motorized watercraft
Lake Almanor Peninsula / LACC / Hamilton Branch	County Road A13, SR 147, and BNSF Railway	-	Motorized watercraft and PG&E Powerhouse
Lake Almanor West	SR 89	-	Motorized watercraft
Prattville	SR 89	-	Motorized watercraft
American Valley Geographic Area			
Bucks Lake	-	-	Motorized watercraft
East Quincy / Quincy	SR 70, Quincy Railroad, and BNSF Railway	Gansner Field Airport and Hospital Helipad	Plumas County Fairgrounds and Sierra Pacific Industries Sawmill and Co-Gen Plant
Spanish Ranch	-	-	Soper Pit mining operation
Indian Valley Geographic Area			
Beldon	SR 70 and UPRR	-	PG&E Powerhouse
Crescent Mills	SR 89 and BNSF Railway	-	-
Greenville	SR 89 and BNSF Railway	Helipad	-
Keddie	SR 89 and UPRR Railway	-	-
Tobin	SR 70 and UPRR	-	Tobin Quarry
Twain	SR 70 and UPRR	-	Twain Enterprises Quarry
Mohawk Valley Geographic Area			
Blairsden	SR 70 and UPRR	-	-
Clio	SR 89	-	-
Delleker	SR 70 and UPRR Railway	-	Plumas County Transfer Station and Industrial uses along Delleker Road
Graeagle	SR 89	-	-
Sloat / Cromberg	SR 70 and UPRR Railway	-	Sierra Pacific Industries/Sloat Pit and Riverside Rock Mining Operations

TABLE 4.5-7 (continued)
PROMINENT NOISE SOURCES WITHIN THE PLANNING AREAS OF PLUMAS COUNTY

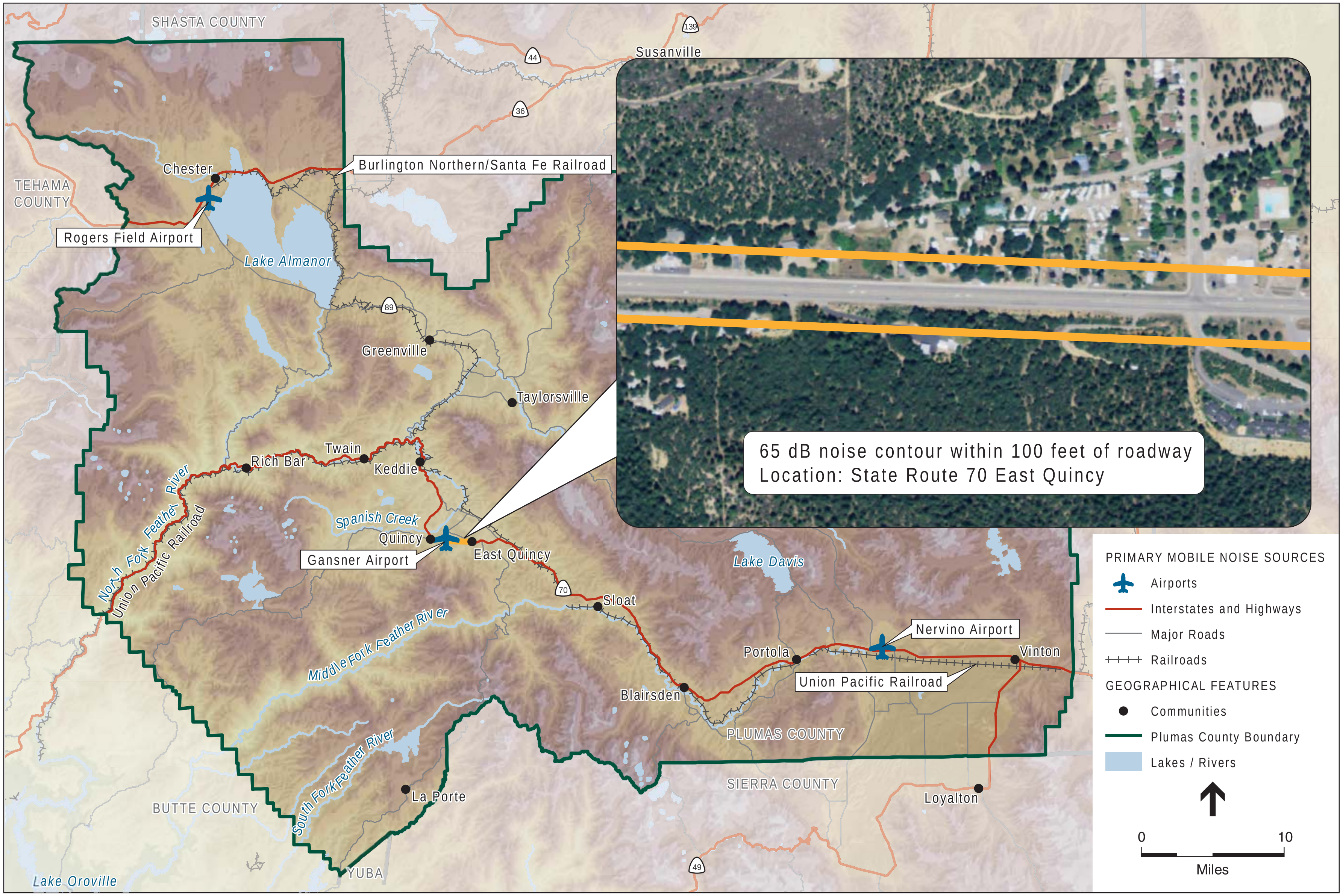
	Noise Sources		
Planning Area	**Roads and Railroads**	**Airports**	**Stationary and Recreation-Related**
Beckwourth	SR 70	Beckwourth-Nervino Airport	Sierra Aggregates Quarry – Beckwourth and Calpine Road
City of Portola	SR 70 and UPRR Railway	-	Plumas County borrow pit site
Vinton / Chilcoot	SR 70 and UPPR Railway	-	-

Traffic Noise

The primary factors that determine roadway noise levels are traffic volumes, percentage of heavy trucks and buses on individual roadways, average vehicle speed, and presence of natural or human-made noise attenuation features such as sound walls and landscaping. Given the predominately rural nature of the County, roadway noise impacts are those associated with the larger regional, or Statewide, network. **Table 4.5-8** identifies existing traffic noise level estimates for selected roadways with available traffic data.

Compared to more urbanized areas of California, traffic volumes along County roadways are fairly low, with many roadways experiencing fewer than 3,000 vehicles per year. Consequently, noise levels along these roadways are considered fairly low. As shown in Table 3.5-8, noise levels along local County roadways or major arteries are typically between an Ldn of 65 and 70 dB. An increase in traffic volumes means a comparable increase in sound energy. For example, ten times as many vehicles per hour results in ten times as much sound energy, resulting in a 10 dB increase and a perceived doubling of noise levels.

Corresponding with the information found in Table 4.5-8, the 65 dB noise contour for a segment of State Route 70 from its junction with State Route 89 through a portion of East Quincy is presented in **Figure 4.5-8**. It should be noted, that the contours shown in Figure 4.5-8 do not consider a variety of site specific topographic conditions, such as sound berms or vegetation barriers that would serve to reduce the noise levels experienced at individual locations along the roadway.



SOURCE: ESA, 2007

Figure 4.5-8
Primary Mobile Noise Sources

TABLE 4.5-8
EXISTING TRAFFIC NOISE LEVEL ESTIMATES

State Route	Roadway Segment	Autos(1)	Trucks(1)	Heavy Trucks (1)	Ldn
36	Tehama County to SR 89	1,250	126	49	65 dB within 100 feet of roadway
36	SR 89 to Lassen County	1,550	214	83	70 dB within 100 feet of roadway
49	All segments	750	277	130	70 dB within 100 feet of roadway
70	Butte County to Junction SR 89	1,250	233	117	70 dB within 100 feet of roadway
70	Junction SR 89 to Portola	3,000	209	50	65 dB within 100 feet of roadway
70	Portola to Lassen County	3,000	258	100	70 dB within 100 feet of roadway
89	Sierra County to Junction SR 70	705	100	49	65 dB within 100 feet of roadway
89	Junction SR 70 to Junction SR 147	1,325	87	35	65 dB within 100 feet of roadway
89	Junction SR 147 to Junction SR 36	1,000	136	55	65 dB within 100 feet of roadway
147	Junction SR 89 to Lassen County	940	93	30	65 dB within 100 feet of roadway
284	Junction SR 70 to Frenchman	260	0	0	65 dB within 100 feet of roadway

Notes: (1) Represents Annual Average Daily Traffic.
SOURCE: Plumas County Transportation Commission, 2010.

Railroad Noise

Plumas County has two active rail lines used by the Union Pacific Railroad (UPRR) and the Burlington Northern/Santa Fe Railroad (BNSF) (see Figure 4.5-8). While both lines are primarily used for freight and local shipping and receiving, a portion of the UPRR line through the Feather River Canyon is recognized as a scenic route, with occasional chartered passenger trains. Daily traffic on the UPRR and BNSF lines in the County consists of a limited number of trains per day. This volume creates minimal noise impacts in term of frequency.

Typically, noise associated with railroad operations is caused by diesel engines, switching operations and whistles. Generally, trains operate at low speeds through populated areas as a safety precaution, and noise levels are correspondingly lower at lower speeds. Switching operations usually occur at stations or depots.

Whistles are blown in advance of grade crossings. Generalized noise contours are provided below in **Table 4.5-9**.

TABLE 4.5-9
EXISTING RAILROAD NOISE CONTOURS

Contour	Mainline UPRR(1)	Spur Line BNSF(1)
60 dB Ldn	600 feet	300 feet
65 dB Ldn	350 feet	180 feet
70 dB Ldn	200 feet	80 feet

Notes: (1) Distances from rail line.
SOURCE: Plumas County Transportation Commission, 2010.

Airport Noise

Three public-use airports are located in the County: Nervino Airport in Beckwourth, Rogers Field Airport in Chester and Gansner Field Airport in Quincy (see **Figure 4.5-9** and **4.5-10**). Airport noise caused by aircraft depends primarily on the type of aircraft and the frequency and direction of flights, with specific noise events caused by aircraft flyovers, takeoffs and landings. Noise from aircraft warming up early in the morning can also be a significant source of noise from airports. The existing noise contours (including 60 dB, 65 dB, and 70 dB) for these airports are presented in these figures.

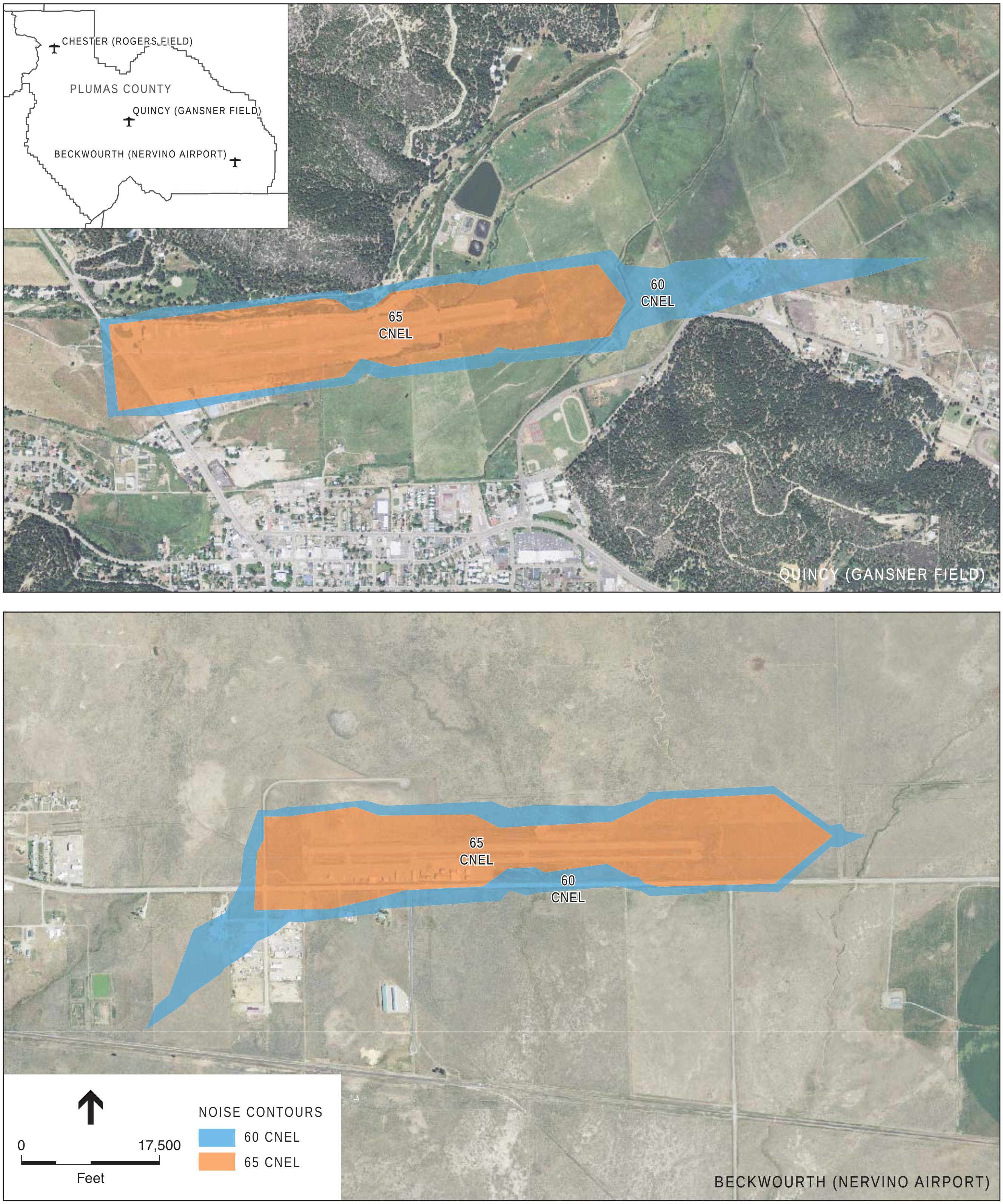
Helicopter and related noise is also common during certain seasonal periods (in particular during wildfire season), with helipads located at both the Rogers Field Airport, Gansner Field Airport, and in Greenville. The Plumas District Hospital also operates a helipad for emergency and medical related uses.

Stationary Noise Sources

Stationary or non-transportation noise sources in Plumas County are those caused by a variety of industrial or resource extraction-related activities, including manufacturing operations, power plants, lumber mills, aggregate mining and processing plants, race tracks, shooting ranges and car washes, to name a few. Additionally, noise from temporary wood and gravel processing operations varies significantly from site to site and is the result of factors including noise source location and surrounding natural conditions. For example, tree cover near the Collins Pine Lumber Mill in Chester reduces off-site noise whereas the Sierra Pacific Industries facility in Quincy, which is located in the middle of the American Valley, doesn’t have tree cover to help reduce noise. Table 4.5-7 (above) identifies the primary stationary noise sources for the various community areas that comprise Plumas County.

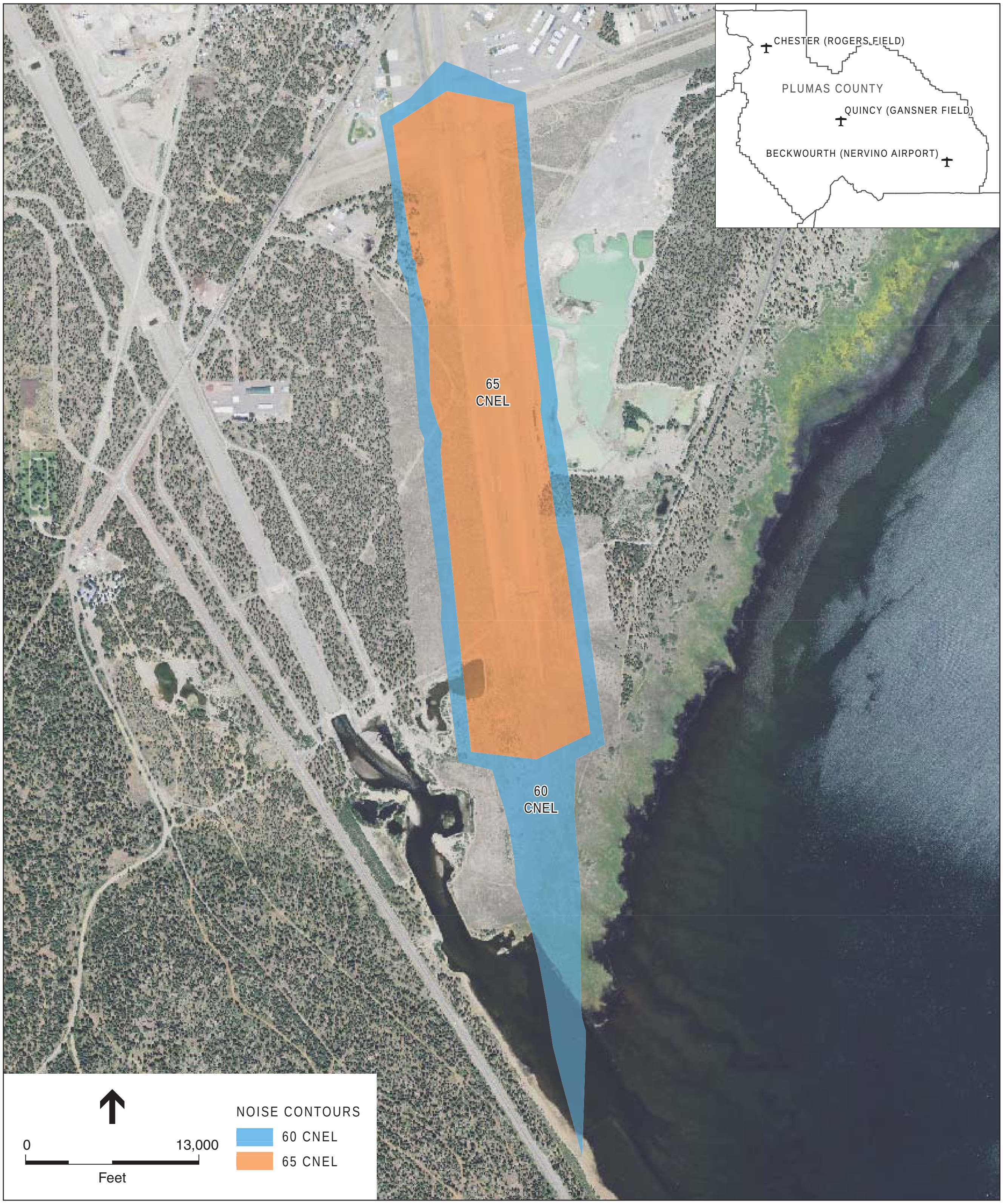
Recreation or entertainment-related noise sources include motorized watercraft noise (near larger water bodies), the Quincy Fairgrounds (High Sierra Music Festival and races), and smaller music festivals such as those held in the community of Beldon. Most of these noise sources are seasonal, occurring predominately during the summer months.

Construction-related activities can also be a source of stationary (temporary) noise. Two types of short-term noise are emitted during construction. First, construction crew commutes and the



SOURCE: Plumas County, 2008; and ESA, 2010

Figure 4.5-9
Quincy (Gansner Field) and Beckwourth (Nervino Airport)
Noise Contours



SOURCE: Plumas County, 2008; and ESA, 2010

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Figure 4.5-10
Chester (Rogers Field) Noise Contours

transport of construction equipment and materials to construction sites would incrementally increase noise levels on access roads leading to the sites. Although there would be a relatively high single-event noise exposure potentially causing intermittent noise nuisance; for example, passing trucks at 50 feet would generate up to a maximum of 86 dBA Lmax, the effect on longer term (hourly or daily) ambient noise levels would be minimal. Second, noise would be generated during excavation, grading and erection of buildings.

Construction typically occurs in discrete steps, each of which has a distinctive mix of equipment and, consequently, distinctive noise characteristics. These various sequential phases would change the character of the noise generated on each site and, therefore, the noise levels surrounding these sites as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. **Table 4.5-10** lists typical construction equipment noise levels recommended for noise-impact assessments, based on a distance of 50 feet between the equipment and a noise receptor. Chainsaw operation is also a common source of noise within Plumas County. An operating chainsaw can generate noise levels of 110 dBA.

TABLE 4.5-10
TYPICAL CONSTRUCTION EQUIPMENT MAXIMUM NOISE LEVELS

Type of Equipment	Range of Maximum Sound Levels (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers	81 to 96	93
Rock Drills	83 to 99	96
Jackhammers	75 to 85	82
Pneumatic Tools	78 to 88	85
Pumps	68 to 80	77
Scrapers	83 to 91	87
Haul Trucks	83 to 94	88
Electric Saws	66 to 72	70
Portable Generators	71 to 87	80
Rollers	75 to 82	80
Dozers	85 to 90	88
Tractors	77 to 82	80
Front-End Loaders	86 to 90	88
Hydraulic Backhoe	81 to 90	86
Hydraulic Excavators	81 to 90	86
Graders	79 to 89	85
Air Compressors	76 to 89	85
Trucks	81 to 87	85

SOURCE: U.S. Environmental Protection Agency, Bolt, Beranek, and Newman, 1971.

Impacts and Mitigation Measures

Methodology

This DEIR qualitatively considers the impacts associated with adoption of the proposed project including new noise policies. Noise impacts are identified for new noise-sensitive developments located within areas affected by existing or future traffic, rail, aircraft, industrial, or other significant noise sources.

Significance Criteria

The significance criteria for this analysis were developed from criteria presented in Appendix G, Environmental Checklist Form", of the CEQA Guidelines and based on the professional judgment of the County of Plumas and its consultants. The proposed project would result in a significant impact if it would:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- Exposure of persons living or working the project area to excessive noise levels (for a project located within an airport land use plan, or where such a plan has not been adopted, within 2 miles of a public airport);
- Exposure of persons living or working in the project area to excessive noise levels for a project within the vicinity of a private airstrip; or
- A project-related increase in noise are considered significant if project-related increase in noise greater than 3 dB where the with-project noise level is in excess of a "normally acceptable" land use compatibility noise standards in Figure 4.5-7 (see the Regulatory Setting section provided above).

Impact 4.5-1: Mobile Noise Sources

SU	**The proposed project could result in exposure of noise sensitive land uses (persons) to traffic noise in excess of County noise standards, or substantial increases in traffic noise.**
	Level of Significance Before Mitigation: *Potentially Significant*
	Required Additional Mitigating Policies and Implementation Measures*: No Additional Mitigation Available*
	Resultant Level of Significance: *Significant and Unavoidable*

Implementation of the proposed project could result in additional on-road mobile sources (vehicles) traveling along local roadways. The increased traffic associated with this new development would increase traffic noise along roadways with adjacent noise-sensitive land uses, with the actual level of impact depending on the presence and location of any existing or proposed land uses or barriers in relation to the noise source. Vehicle trips generated by the proposed project could more than double traffic trips within some Planning Areas and traffic noise would likely increase noticeably (greater than 3 dBA increase) with implementation of the proposed project. While an increase of 3 to 5 dBA is considered potentially significant, it is only significant if it affects sensitive land uses. It is expected that subsequent CEQA documentation prepared for individual projects would have project-specific data and will be required to address, and if possible, mitigate any potential operations-related noise impacts to a less-than-significant level. Examples of mitigation that may be proposed include various types of shielding (e.g., berms, vegetation, etc.) or sound walls. However, it should be noted, the ability to mitigate this potential impact is contingent on a variety of factors including the severity of the noise impact, existing land use conditions and the technical feasibility of being able to implement any proposed mitigation measures.

TABLE 4.5-11
MITIGATING POLICIES AND IMPLEMENTATION MEASURES

Noise (N), Land Use (LU), and Economics (E) Elements			
Policies intended to provide a quiet environment for the residents of Plumas County by addressing the effects of construction-related noise include the following:			
N-3.1.4	Construction Noise	N-3.1.11	Noise Study Requirements
N-3.1.9	Environmental Review Process	Implementation Measure #2 Noise Ordinance (g)	
Policies designed to provide guidance on the analysis, mitigation and monitoring of a variety of noise-related impacts that could occur within the County include the following:			
N-3.1.1	Primary Noise Sources	N-3.1.8	Noise Source Exemptions
N-3.1.2	Sensitive Land Uses	N-3.1.10	Noise Buffering
N-3.1.6	Noise-Generating Land Uses	N-3.1.12	Agency Coordination and Information Sharing
N-3.1.7	Noise Standard Exceptions	Implementation Measure #2 Noise Ordinance	
Policies designed to promote compatible development within areas that minimize impacts (including noise) to surrounding land uses include the following:			
LU-1.2.2	Land Use Compatibility	N- 3.1.3	Noise / Land Use Compatibility Standards
E-5.1.4	Discouragement of Non-Compatible Land Uses		

Noise-related concerns are a primary issue addressed under the proposed project, with the dedication of a specific element to these resources. The Noise Element provides a number of policies that have been developed to address noise and land use compatibility issues associated with the proposed project (see **Table 4.5-11** above). For example, policies have been developed to provide guidance on the analysis and mitigation of future project-related noise issues. These policies include identifying appropriate noise levels for sensitive receptors (policies N-3.1.1, N-3.1.2, and N-3.1.3), noise buffering for new residential land uses (Policy N-3.1.10), and requirements for project specific noise study and analysis as part of further environmental compliance review (policies N-3.1.9 and N-3.1.10). Additional policies from the Noise, Land Use, and Economics Elements (see policies N-3.1.3,LU-1.2.2, and E-5.1.4) prevent the placement of incompatible noise generating land uses (i.e., industrial, railroads, airports, etc.) within residential areas. Finally, Implementation Measure #2 from the Noise Element requires the County to prepare and adopt a Noise Ordinance that addressed the following items:

- Establishment of noise sensitive protection areas around existing noise sensitive uses. Within these protection areas establish “limited” combining or overlay zones for all industrially zoned lands which would require mitigation of noise impacts which exceed 60 dB at the noise sensitive site or cause the interior noise level to exceed 45 dB or existing levels, whichever is greater, except where specifically altered based upon field measurements, environmental, social, economic or physical factors.
- Prohibition of new noise sensitive uses within the noise contour established around industrial noise generation sources in order to protect existing industrial areas.
- Requirements for new subdivisions to utilize normal residential design and construction techniques to achieve interior noise levels of 45 dB by site location.
- Requirements that new established uses do not increase off-site noise to a level which exceeds the ambient noise level for the specific land-use area.
- Requirement for the preparation of a noise analysis/acoustical study, by a project applicant, including recommendations for attenuation, for all proposed projects which may result in potentially significant noise impacts to nearby sensitive land uses.
- Requirement for a noise analysis/acoustical study, by a project applicant, with recommendations for attenuation, for all proposed development within noise-impacted areas that may reasonably be expected to be exposed to levels that exceed the appropriate Land Use / Noise Compatibility Standards.
- Establishment of construction noise standards as a method of limiting the potential noise impacts of construction activities on surrounding land uses.

Significance Determination

Implementation of the proposed project would result in the generation of additional vehicle trips within the various Planning Areas of the County, which could result in the exposure of persons to traffic noise in excess of County noise standards. As identified in the policies described above, the County will continue to discourage the siting of sensitive land uses near mobile and stationary noise sources. In addition, the County will ensure that future CEQA documentation be prepared for individual projects (with project-specific data) that will (if technically possible) mitigate any potential noise impacts to a less-than-significant level. However, it should be noted, the ability to mitigate this potential impact is contingent upon a variety of factors including the severity of the noise impact, existing land use conditions and the technical feasibility of being able to implement any proposed mitigation measures. Given the uncertainty as to whether future noise impacts could be adequately mitigated for all the individual projects that will be implemented as part (i.e., establishment of setbacks near at-grade railroad crossings, etc.) of the proposed project, this impact remains significant. Therefore, no mitigation is available to reduce the significance of this impact to a less than significant level. Therefore, this is a ***significant and unavoidable*** impact.

Significance Conclusion

Overall, policies included as part of the proposed project have been developed to avoid and minimize adverse mobile noise impacts on sensitive receptors. However, no feasible mitigation is available to reduce the significance of this impact to a level of less than significant. Therefore, this remains a ***significant and unavoidable*** impact.

Impact 4.5-2: Short-Term Construction Noise

LTS	**The proposed project could result in temporary, short-term noise impacts during associated construction activities.**
	Level of Significance Before Mitigation: *Less than Significant*
	Required Additional Mitigating Policies and Implementation Measures*: None*
	Resultant Level of Significance: *Less than Significant*

Implementation of the proposed project would result in new development and construction in undeveloped areas of the county. This construction would generate new sources of short-term construction noise.

Table 4.5-10 (provided above) shows typically maximum noise levels for various types of construction equipment that are typically used during construction. For example, the highest construction noise levels could be generated during grading and excavation, with lower noise levels occurring during actual building construction. Large pieces of earth-moving equipment, such as pile drivers, graders, scrapers, and bulldozers, generate maximum noise levels of 85 to 90 dBA at a distance of 50 feet. Using the information provided in the table, an estimate of composite construction noise for commercial and industrial development can be characterized as 89 dBA Leq when measured at a distance of 50 feet from the construction area. Residential development is slightly lower with a composite noise level of 88 dBA Leq. These values take into account the number, pieces, and spacing of the types of equipment used for each type of activity. Finally, using the 89 dBA Leq value and assuming that construction would occur for approximately 8 hours per day, the CNEL is estimated at 84 dBA at 50 feet (83 dBA CNEL for residential construction).

Construction-related noise concerns are also addressed under the proposed project. The Noise Element provides a number of policies that have been developed to address construction-related noise (see Table 4.5-11 above).

Significance Determination

Development resulting from implementation of the proposed project could result in adverse impacts from construction noise. However, the policies contained in the Noise Element establish comprehensive measures to avoid and minimize adverse construction noise impacts (including the identification of construction timeframes and standards). Therefore, construction noise resulting from implementation of the proposed project would have a less-than-significant impact on existing and planned noise-sensitive receptors.

This impact is considered ***less than significant***. No additional mitigation measures are required.

Significance Conclusion

Implementation of the proposed project would not result in significant construction-related noise issues and therefore associated impacts would be ***less than significant***.

Impact 4.5-3: Ground-borne Vibration

LTS	**The proposed project could result in the exposure of persons to excessive ground-borne vibration.**
	Level of Significance Before Mitigation: *Less than Significant*
	Required Additional Mitigating Policies and Implementation Measures*: None*
	Resultant Level of Significance: *Less than Significant*

Implementation of the proposed project would result in new development with the various Planning Areas of the County. New development would result in additional construction activities in some areas of the County. Operation of heavy equipment during construction would result in minor amounts of ground-borne vibration.

As more fully described above under Impact 4.10-3, construction-related noise concerns are also addressed under the proposed project. The Noise Element provides a number of policies that have been developed to address construction-related noise (see Table 4.5-11 above).

Significance Determination

Development resulting from implementation of the proposed project could result in adverse impacts from construction noise creating ground-borne vibration. However, the policies contained in the Noise Element establish comprehensive measures to avoid and minimize adverse ground-borne vibration impacts from new development and construction to acceptable levels. Therefore, ground-borne vibration effects resulting from implementation of the proposed project would have a less-than-significant impact on existing and planned noise-sensitive receptors.

This impact is considered ***less than significant***. No additional mitigation measures are required.

Significance Conclusion

Implementation of the proposed project would not result in significant ground-borne vibration effects and therefore associated impacts would be ***less than significant***.

Impact 4.5-4: Aviation Noise Sources

LTS	**The proposed project could involve the potential exposure of people residing or working near an airport to excessive noise levels.**
	Level of Significance Before Mitigation: *Less than Significant*
	Required Additional Mitigating Policies and Implementation Measures*: None*
	Resultant Level of Significance: *Less than Significant*

Implementation of the proposed project could result in new urban development in some areas of the County, including new development in the vicinity of airports, private airstrips, and helipads. New development near aviation facilities could expose residents and workers to noise from aviation facilities that exceed County noise standards. This is of most concern in certain areas near the Nervino Airport (Beckwourth Planning Area), Rogers Field Airport (Chester Planning Area) and Gansner Field Airport (Quincy Planning Area).

Overall, the intent of the proposed project is to ensure that existing and future land uses function without imposing a nuisance, hazard, or unhealthy condition upon adjacent uses. Policies included as part of the proposed project that would minimize conflicts with public use airports are summarized below. The Public Health and Safety, Noise and Circulation elements provides a number of policies (as shown in **Table 4.5-12**) that establish requirements for compatible development; including buffering; screening, noise controls and performance standards, and the siting of compatible land uses (see Policies PHS-6.6.1, N-3.1.5, N-3.1.10, CIR-4.5.1). Policy PHS-6.6.2 requires the County to ensure that new development within the airport approach and departure zones are in compliance with Part 77 of the FAA Regulations. Policy LU-1.6.4 from the Land Use Element requires the County to utilize the Rogers Field Airport in Chester, Gansner Field Airport in Quincy and Nervino Airport in Beckwourth Land Use Compatibility Plans to guide planning efforts near these facilities.

TABLE 4.5-12
MITIGATING POLICIES AND IMPLEMENTATION MEASURES

Land Use (LU), Noise (N), and Economics (E), Circulation (C), and Public Health and Safety (PHS) Elements			
Policies designed to promote compatible land use development and minimize aviation-related noise impacts and hazards include the following:			
LU-1.2.2	Land Use Compatibility	N-3.1.5	Development Surrounding Airports
PHS-6.6.1	Consistency with the Airport Land Use Compatibility Plan	N-3.1.10	Noise Buffering
PHS-6.6.2	Compliance with Federal Aviation Administration (FAA) Regulations	CIR-4.5.1	Compatibility of Airports with Adjacent Land Uses
N- 3.1.3	Noise / Land Use Compatibility Standards	E-5.1.4	Discouragement of Non-Compatible Land Uses
Policies designed to provide guidance on the analysis, mitigation and monitoring of a variety of noise-related impacts that could occur within the County include the following:			
N-3.1.1	Primary Noise Sources	N-3.1.8	Noise Source Exemptions
N-3.1.2	Sensitive Land Uses	N-3.1.12	Agency Coordination and Information Sharing
N-3.1.6	Noise-Generating Land Uses		
N-3.1.7	Noise Standard Exceptions	Implementation Measure #2 Noise Ordinance	

Significance Determination

Development resulting from implementation of the proposed project could result in adverse impacts from aviation noise. However, aviation noise policies in the proposed project and state and federal aviation regulations, listed above, establish comprehensive measures to avoid and minimize adverse impacts from aviation noise. Therefore, aviation noise resulting from implementation of the proposed project would have a less-than-significant impact on existing and planned noise-sensitive receptors.

This impact is considered ***less than significant***. No additional mitigation measures are required.

Significance Conclusion

Implementation of the proposed project would not result in significant aviation noise effects and therefore associated impacts would be ***less than significant***.

Impact 4.5-5: Stationary Noise Sources

LTS	**The proposed project could expose people residing or working near industrial/agricultural land uses and recreational venues to excessive noise levels.**
	Level of Significance Before Mitigation: *Less than Significant*
	Required Additional Mitigating Policies and Implementation Measures*: None*
	Resultant Level of Significance: *Less than Significant*

Implementation of the proposed project could result in new urban development in the vicinity of existing industrial/agricultural land uses and recreation venues in the County. Potential areas of land use noise conflict could occur at the borders of these industrial areas with other sensitive land uses (i.e., residential, schools, etc.) or along roadways leading to these industrial areas within each of the County's individual planning areas. It is expected that subsequent CEQA documentation prepared for individual projects would have project-specific data and will be required to address, and if possible, mitigate any potential operations-related noise impacts to a less-than-significant level. Examples of mitigation that may be proposed include various types of shielding (e.g., vegetation, etc.), sound walls, or noise-reducing building treatments. However, it should be noted, the ability to mitigate this potential impact is contingent upon a variety of factors including the severity of the noise impact, existing land use conditions and the technical feasibility of being able to implement any proposed mitigation measures.

The Noise Element provides a number of policies that have been developed to address noise and land use compatibility issues associated with the proposed project (see **Table 4.5-11** above). For example, policies have been developed to provide guidance on the analysis and mitigation of future project-related noise issues. These policies include identifying appropriate noise levels for sensitive receptors (policies N-3.1.1, N-3.1.2, and N-3.1.3), noise buffering for new residential land uses (Policy N-3.1.10), and requirements for project specific noise study and analysis as part of further environmental compliance review (policies N-3.1.9 and N-3.1.10). Additional policies from the Noise, Land Use, and Economics Elements (see policies N-3.1.3,LU-1.2.2, and E-5.1.4) prevent the placement of incompatible noise generating land uses (i.e., industrial, railroads, airports, etc.) within residential areas. Finally, Implementation Measure #2 from the Noise Element requires the County to prepare and adopt a Noise Ordinance that addressed the following items:

- Establishment of noise sensitive protection areas around existing noise sensitive uses. Within these protection areas establish "limited" combining or overlay zones for all industrially zoned lands which would require mitigation of noise impacts which exceed 60 dB at the noise sensitive site or cause the interior noise level to exceed 45 dB or existing levels, whichever is greater, except where specifically altered based upon field measurements, environmental, social, economic or physical factors.
- Prohibition of new noise sensitive uses within the noise contour established around industrial noise generation sources in order to protect existing industrial areas.
- Requirements for new subdivisions to utilize normal residential design and construction techniques to achieve interior noise levels of 45 dB by site location.
- Requirements that new established uses do not increase off-site noise to a level which exceeds the ambient noise level for the specific land-use area.
- Requirement for the preparation of a noise analysis/acoustical study, by a project applicant, including recommendations for attenuation, for all proposed projects which may result in potentially significant noise impacts to nearby sensitive land uses.
- Requirement for a noise analysis/acoustical study, by a project applicant, with recommendations for attenuation, for all proposed development within noise-impacted areas that may reasonably be expected to be exposed to levels that exceed the appropriate Land Use / Noise Compatibility Standards.

- Establishment of construction noise standards as a method of limiting the potential noise impacts of construction activities on surrounding land uses.

Significance Determination

Development resulting from implementation of the proposed project could result in adverse impacts from stationary sources. As identified in the policies described above, the County will continue to discourage the siting of sensitive land uses near mobile and stationary noise sources. In addition, the County will ensure that future CEQA documentation be prepared for individual projects (with project-specific data) that will (if technically possible) mitigate any potential noise impacts to a less-than-significant level. Therefore, noise from stationary sources resulting from implementation of the proposed project would have a less-than-significant impact on existing and planned noise-sensitive land uses.

This impact is considered ***less than significant***. No additional mitigation measures are required.

Significance Conclusion

Implementation of the proposed project would not result in significant stationary noise effects and therefore associated impacts would be ***less than significant***.