5.12 NOISE

This section discusses the fundamentals of sound; examines federal, state, and local noise guidelines, policies, and standards; reviews noise levels at existing receptor locations; evaluates potential noise impacts associated with the Countywide Plan (proposed Project); and provides mitigation to reduce noise impacts at sensitive locations. This section of the draft program environmental impact report (PEIR) evaluates the potential for implementation of the Countywide Plan to result in noise and vibration impacts in the County of San Bernardino (County).

5.12.1 Environmental Setting

5.12.1.1 SOUND FUNDAMENTALS

Sound is a pressure wave transmitted through the air. It is described in terms of loudness or amplitude (measured in decibels), frequency or pitch (measured in Hertz [Hz] or cycles per second), and duration (measured in seconds or minutes). The standard unit of measurement of the loudness of sound is the decibel (dB). Changes of 1 to 3 dB are detectable under quiet, controlled conditions and changes of less than 1 dBA are usually indiscernible. A 3 dB change in noise levels is considered the minimum change that is detectable with human hearing in outside environments. A change of 5 dB is readily discernable to most people in an exterior environment whereas a 10 dBA change is perceived as a doubling (or halving) of the sound.

The human ear is not equally sensitive to all frequencies. Sound waves below 16 Hz are not heard at all and are "felt" more as a vibration. Similarly, while people with extremely sensitive hearing can hear sounds as high as 20,000 Hz, most people cannot hear above 15,000 Hz. In all cases, hearing acuity falls off rapidly above about 10,000 Hz and below about 200 Hz. Since the human ear is not equally sensitive to sound at all frequencies, a special frequency dependent rating scale is usually used to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by weighting frequencies in a manner approximating the sensitivity of the human ear.

Noise is defined as unwanted sound, and is known to have several adverse effects on people, including hearing loss, speech and sleep interference, physiological responses, and annoyance. Based on these known adverse effects of noise, the federal government, the State of California, and many local governments have established criteria to protect public health and safety and to prevent disruption of certain human activities.

Sound Measurement

Sound pressure is measured through the A-weighted measure to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies.

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale, representing points on a sharply rising curve. On a logarithmic scale, an increase of 10 dB is 10 times more intense than 1 dB, while 20 dB is 100 times more intense, and 30 dB is 1,000 times more intense. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between

the physical intensity of sound and its perceived loudness to the human ear. Ambient sounds generally range from 30 dBA (very quiet, e.g. soft whisper) to 100 dBA (very loud, e.g. garbage truck).

Sound levels are generated from a source and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. This phenomenon is known as "spreading loss." For a single point source, sound levels decrease by approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by on-site operations from stationary equipment or activity at a project site. If noise is produced by a line source, such as highway traffic, the sound decreases by 3 dB for each doubling of distance in a hard site environment. Line source noise in a relatively flat environment with absorptive vegetation decreases by 4.5 dB for each doubling of distance.

Time variation in noise exposure is typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called L_{eq}), or alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. For example, the L_{50} noise level represents the noise level that is exceeded 50 percent of the time. Half the time the noise level exceeds this level and half the time the noise level is less than this level. This level is also representative of the level that is exceeded 30 minutes in an hour. Similarly, the L_2, L_8 and L_{25} values represent the noise levels that are exceeded 2, 8, and 25 percent of the time, or 1, 5, and 15 minutes per hour. These "Ln" values are typically used to demonstrate compliance for stationary noise sources with a city's noise ordinance, as discussed below. Other values typically noted during a noise survey are the L_{min} and L_{max}. These values represent the minimum and maximum root-mean-square noise levels obtained over the measurement period.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law and the County require that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL) or Day-Night Noise Level (L_{dn}). The CNEL descriptor requires that an artificial increment of 5 dBA be added to the actual noise level for the hours from 7:00 p.m. to 10:00 p.m. and 10 dBA for the hours from 10:00 p.m. to 7:00 a.m. The L_{dn} descriptor uses the same methodology except that there is no artificial increment added to the hours between 7:00 p.m. and 10:00 p.m. Both descriptors give roughly the same 24-hour level with the CNEL being only slightly more restrictive (i.e., higher).

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, and thereby affecting blood pressure, functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA could result in permanent hearing damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. Table 5.12-1 shows typical noise levels from familiar noise sources.

Table 5.12-1 Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Onset of physical discomfort	120+	
	110	Rock Band (near amplification system)
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at three feet		
	90	
Diesel Truck at 50 feet, at 50 mph		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime		
	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans 2013.

5.12.1.2 VIBRATION FUNDAMENTALS

Vibration is an oscillating motion in the earth. Like noise, vibration is transmitted in waves, but in this case through the earth or solid objects. Unlike noise, vibration is typically of a frequency that is felt rather than heard.

Vibration can be either natural as in the form of earthquakes, volcanic eruptions, landslides, or man-made as from explosions, heavy machinery or trains. Both natural and man-made vibration may be continuous such as from operating machinery, or impulsive as from an explosion.

As with noise, vibration can be described by both its amplitude and frequency. Amplitude may be characterized in three ways including displacement, velocity, and acceleration. Particle displacement is a measure of the distance that a vibrated particle travels from its original position and for the purposes of soil displacement is

typically measured in inches or millimeters. Particle velocity is the rate of speed at which soil particles move in inches per second or millimeters per second. Particle acceleration is the rate of change in velocity with respect to time and is measured in inches per second or millimeters per second. Typically, particle velocity (measured in inches or millimeters per second) and/or acceleration (measured in gravities) are used to describe vibration. Table 5.12-2 presents the human reaction to various levels of peak particle velocity.

Table 5.12-2 Human Reaction to Typical Vibration Levels

Vibration Level Peak Particle Velocity (in/sec)	Human Reaction	Effect on Buildings
0.006–0.019	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage

Source: Caltrans 2013.

Vibrations also vary in frequency and this affects perception. Typical construction vibrations fall in the 10 to 30 Hz range and usually occur around 15 Hz. Traffic vibrations exhibit a similar range of frequencies; however, due to their suspension systems, buses often generate frequencies around 3 Hz at high vehicle speeds. It is less common, but possible, to measure traffic frequencies above 30 Hz.

The way in which vibration is transmitted through the earth is called propagation. As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level striking a given point is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced with distance as a result of material damping in the form of internal friction, soil layering, and void spaces. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

5.12.1.3 REGULATORY BACKGROUND

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, and local governments have established standards and ordinances to control noise.

Federal Regulations

Federal Highway Administration

Proposed federal or federal-aid highway construction projects at a new location, or the physical alteration of an existing highway that significantly changes either the horizontal or vertical alignment, or increases the number of through-traffic lanes, requires an assessment of noise and consideration of noise abatement per 23 CFR Part 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise." The Federal Highway Administration (FHWA) has adopted noise abatement criteria (NAC) for sensitive receivers such as picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals when "worst-hour" noise levels approach or exceed 67 dBA Leq. Caltrans has further defined approaching the NAC to be 1 dBA below the NAC for noise-sensitive receivers identified as Category B activity areas (e.g., 66 dBA Leq is considered approaching the NAC) (Caltrans 2011a).

US Environmental Protection Agency

In addition to FHWA standards, the United States Environmental Protection Agency (EPA) has identified the relationship between noise levels and human response. The EPA has determined that over a 24-hour period, an L_{eq} of 70 dBA will result in some hearing loss. Interference with activity and annoyance will not occur if exterior levels are maintained at an L_{eq} of 55 dBA and interior levels at or below 45 dBA. While these levels are relevant for planning and design and useful for informational purposes, they are not land use planning criteria because they do not consider economic cost, technical feasibility, or the needs of the community.

The EPA also set 55 dBA L_{dn} as the basic goal for exterior residential noise intrusion. However, other federal agencies, in consideration of their own program requirements and goals, as well as difficulty of actually achieving a goal of 55 dBA L_{dn}, have settled on the 65 dBA L_{dn} level as their standard. At 65 dBA L_{dn}, activity interference is kept to a minimum, and annoyance levels are still low. It is also a level that can realistically be achieved.

Occupational Health and Safety Administration

The federal government regulates occupational noise exposure common in the workplace through the Occupational Health and Safety Administration (OSHA) under the EPA. Such limitations would apply to the operation of construction equipment and could also apply to any proposed industrial land uses. Noise exposure of this type is dependent on work conditions and is addressed through a facility's Health and Safety Plan, as required under OSHA, and is therefore not addressed further in this analysis.

US Department of Housing and Urban Development

The US Department of Housing and Urban Development (HUD) has set a goal of 65 dBA L_{dn} as a desirable maximum exterior standard for residential units developed under HUD funding. (This level is also generally accepted within the State of California.) While HUD does not specify acceptable interior noise levels, standard construction of residential dwellings typically provides in excess of 20 dBA of attenuation with the windows closed. Based on this premise, the interior L_{dn} should not exceed 45 dBA.

Aircraft Noise Standards

The Federal Aviation Administration (FAA) Advisory Circular Number 150 5020 2, "Noise Assessment Guidelines for New Helicopters," recommends the use of a cumulative noise measure, the 24-hour equivalent sound level [$L_{eq(24)}$], so that the relative contributions of the heliport and other sound sources within the community may be compared. The $L_{eq(24)}$ is similar to the L_{dn} used in assessing the impacts of fixed-wing aircraft. The helicopter $L_{eq(24)}$ values are obtained by logarithmically adding the single-event sound exposure level values over a 24-hour period.

Public Law 96 193 also directs the FAA to identify land uses that are "normally compatible" with various levels of noise from aircraft operations. Because of the size and complexity of many major hub airports and their operations, FAR Part 150 identifies a large number of land uses and their attendant noise levels. However, since the operations of most heliports and helistops tend to be much simpler and the impacts more restricted in area, Part 150 does not apply to heliports/helistops not located on airport property. Instead, the FAA recommends exterior noise criteria for individual heliports based on the types of surrounding land uses. These recommended noise levels are included in Table 5.12-1.

The maximum recommended cumulative sound level [$L_{eq(24)}$] from the operations of helicopters at any new site should not exceed the ambient noise already present in the community at the site of the proposed heliport or the sound levels in Table 5.12-3, whichever is lower.

Table 5.12-3 Normally Compatible Community Sound Levels

Type of Area	$L_{eq(24)}$
Residential	
Suburban	57
Urban	67
City	72
Commercial	72
Industrial	77

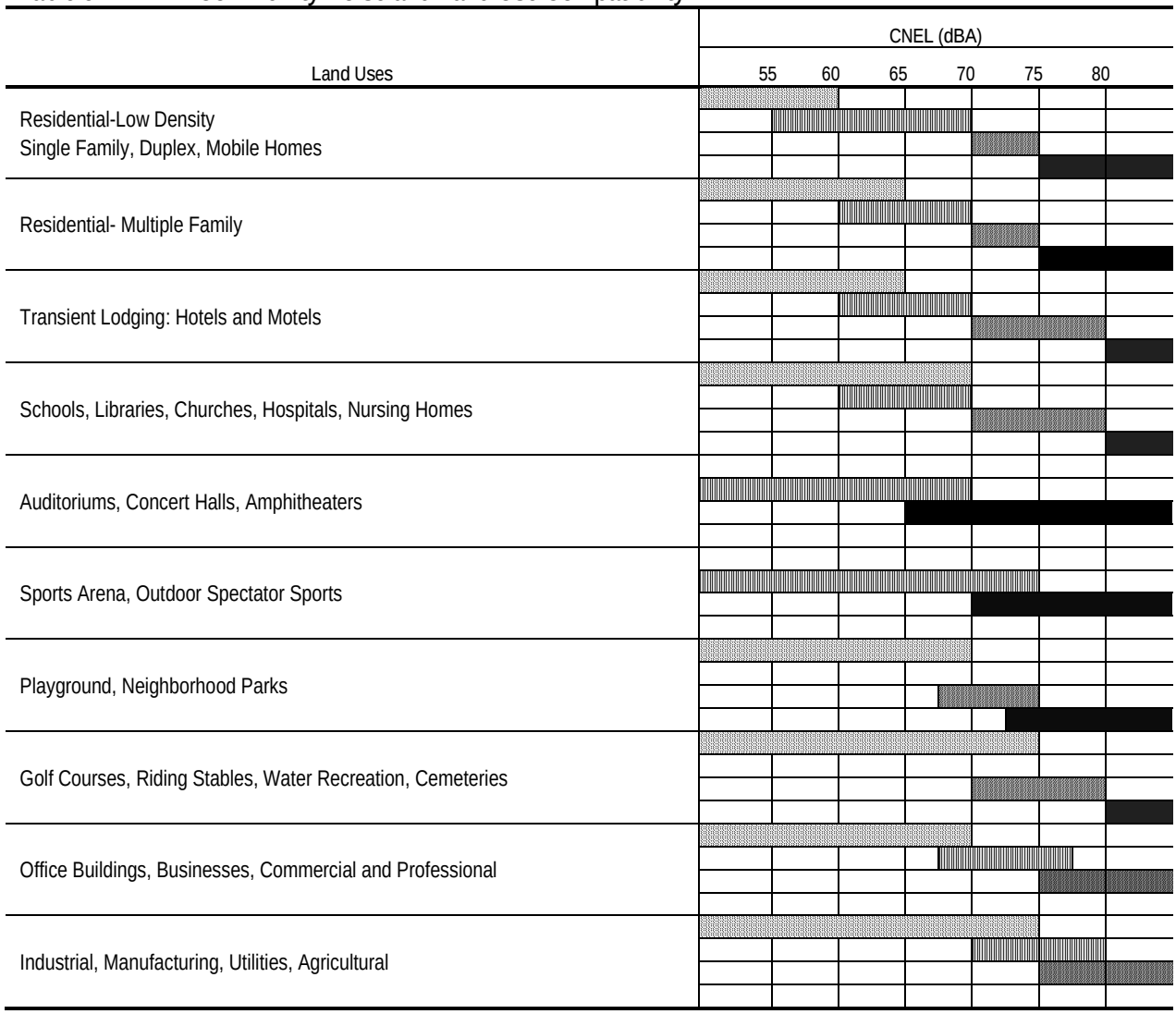
Source: FAA Advisory Circular Number 150-5020-2, 1983.

California Regulations

General Plan Guidelines

The State of California, through its General Plan Guidelines, discusses how ambient noise should influence land use and development decisions and includes a table of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable uses at different noise levels expressed in CNEL. These land use compatibility guidelines are shown in Table 5.12-4. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design. By comparison, a normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements. This table provides urban planners with a tool to gauge the compatibility of land uses relative to existing and future noise levels.

Table 5.12-4 Community Noise and Land Use Compatibility



Explanatory Notes

Normally Acceptable: With no special noise reduction requirements assuming standard construction.		Normally Unacceptable: New construction is discouraged. If new construction does not proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.	
Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design.		Clearly Unacceptable: New construction or development should generally not be undertaken.	

Source: California Office of Noise Control. *Guidelines for the Preparation and Content of Noise Elements of the General Plan.* February 1976. Adapted from the US EPA Office of Noise Abatement Control, Washington D.C. Community Noise. Prepared by Wyle Laboratories. December 1971.

California Building Code

The California Building Code (CBC), Title 24, Part 2, Volume 1, Chapter 12, Interior Environment, Section 1207.11.2, *Allowable Interior Noise Levels*, requires that interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room. The noise metric is evaluated as either the day-night average sound level (Ldn) or the community noise equivalent level (CNEL), consistent with the noise element of the local general plan.

The California Green Building Standards Code (CALGreen), Chapter 5, Division, 5.5 has additional requirements for insulation that affect exterior-interior noise transmission for nonresidential structures. Pursuant to Section 5.507.4.1, Exterior Noise Transmission, Prescriptive Method, wall and roof-ceiling assemblies making up the building or addition envelope or altered envelope and exposed to the noise source shall meet a composite sound transmission class (STC) rating of at least 50 or a composite outdoor-indoor transmission class (OITC) rating of no less than 40—with exterior windows of a minimum STC of 40 or OITC of 30 within a 65 dBA CNEL noise contour of an airport, or within a 65 dBA CNEL or Ldn noise contour of a freeway, expressway, railroad, industrial source, or fixed-guideway source, as determined by the noise element of the general plan. Where noise contours are not readily available, buildings exposed to a noise level of 65 dBA Leq for one hour during any hour of operation shall have building, addition, or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meet a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum of STC 40 (or OITC 30).

Airport Noise Standards

California Code of Regulations Title 21, Subchapter 6, Airport Noise Standards, establishes 65 dBA CNEL as the acceptable level of aircraft noise for persons living in the vicinity of airports. Noise-sensitive land uses in locations where the aircraft exterior noise level exceeds 65 dBA CNEL are generally incompatible unless an aviation easement for aircraft noise has been acquired by the airport proprietor or the residence is a high-rise apartment or condominium that has an interior CNEL of 45 dBA or less in all habitable rooms despite aircraft noise and an air circulation or air conditioning system, as appropriate. Assembly Bill (AB) 2776 requires any person who intends to sell or lease residential properties within an airport influence area to disclose that fact to the person buying the property.

County of San Bernardino Noise Standards

Stationary Source Noise

The County Development Code (Development Code) Section 83.01.080, Noise, establishes standards concerning acceptable noise levels for both noise-sensitive land uses and noise-generating land uses. Noise limits based on the receiving land use are shown in Table 5.12-5, *Noise Standards for Stationary Noise Sources*. Areas are designated "noise impacted" if exposed to existing or projected future exterior noise levels exceeding these standards.

Table 5.12-5 Noise Standards for Stationary Noise Sources

Affected Land Uses (Receiving Noise)	7:00 AM–10:00 PM L_{eq}	10:00 PM–7:00 AM L_{eq}
Residential	55 dBA	45 dBA
Professional Services	55 dBA	55 dBA
Other Commercial	60 dBA	60 dBA
Industrial	70 dBA	70 dBA

Source: Development Code, Section 83.01.080 (Noise).
L_{eq} = Equivalent-energy sound level (see 5.9.1.1, *Noise Descriptors*, above).
dBA = A-weighted sound pressure level.

The following adjustments are applicable to the standards in Table 5.12-3:

Noise levels at receiving properties may not exceed the standards:

1. For a cumulative period of more than 30 minutes in any hour (equivalent to the L_{50} statistical sound level).
2. Plus 5 dBA for a cumulative period of more than 15 minutes in any hour (equivalent to the L_{25} statistical sound level).
3. Plus 10 dBA for a cumulative period of more than 5 minutes in any hour (equivalent to the L_8 statistical sound level).
4. Plus 15 dBA for a cumulative period of more than 1 minute in any hour (equivalent to the L_2 statistical sound level).
5. Plus 20 dBA for any period of time (equivalent to the L_{max} statistical sound level).

If the measured ambient level exceeds any of the first four noise limit categories, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

If the noise consists entirely of impact noise or simple tone noise, each of the noise levels in Table 5.12-3, *Noise Standards for Stationary Noise Sources,* shall be reduced by 5 dBA.

Mobile Source Noise

Table 5.12-6 shows the noise standards by receiving-land-use type for exposure to mobile noise sources. Areas are designated "noise impacted" if exposed to existing or projected future exterior noise levels exceeding these standards.

Table 5.12-6 Noise Standards for Adjacent Mobile Noise Sources

Land Use		L_{dn} (or CNEL) dBA	
Categories	Uses	Interior[1]	Exterior[2]
Residential	Single and multi-family, duplex, mobile homes	45	60[3]
Commercial	Hotel, motel, transient housing	45	60[3]
	Commercial retail, bank, restaurant	50	N/A
	Office Building, research and development, professional offices	45	65
	Amphitheater, concert hall, auditorium, movie theater	45	N/A
Institutional / Public	Hospital, nursing home, school classroom, religious institution, library	45	65
Open Space	Park	N/A	65

Source: Development Code, Section 8.01.080 (Noise).
Notes: CNEL = Community Noise Equivalent Level
[1] The indoor environment shall exclude bathrooms, kitchens, toilets, closets and corridors.
[2] The outdoor environment shall be limited to:
Hospital/office building patios
Hotel and motel recreation areas
Mobile home parks
Multi-family private patios or balconies
Park picnic areas
Private yard of single-family dwellings
School playgrounds
[3] An exterior noise level of up to 65 dBA Ldn (or CNEL) shall be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed 45 dB(A) Ldn (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level shall necessitate the use of air conditioning or mechanical ventilation.

The Development Code also has noise level standards for other structures, as summarized in Table 5.12-7. In addition, the average of the maximum levels of the loudest intrusive sounds during a 24-hour period shall not exceed an interior sound level of 65 dBA.

Table 5.12-7 Noise Standards for Other Structures

Typical Uses	12-Hour Equivalent Interior Sound Level (dBA Ldn)[1]
Educational, Institutions, Libraries, Meeting Facilities, etc.	45 dBA
General Office, Reception, etc.	50 dBA
Retail Stores, Restaurants, etc.	55 dBA
Other Areas for Manufacturing, Assembly, Testing, Warehousing, etc.	65 dBA

Source: Development Code, Section 83.01.080 (Noise).
[1] Note that there is an inherent mismatch between the specified 12-hour sound level and the L_{dn} level, which is, by definition, a 24-hour noise metric.

Exemptions

Under Development Code Section 83.01.080, the County exempts construction activities from 7AM to 7PM, except on Sundays and federal holidays; motor vehicles not under the control of the commercial or industrial use; and emergency equipment, vehicles, and devices.

Vibration

Development Code Section 83.01.090 prohibits vibration that can be felt without the aid of instruments or produces a particle velocity greater than or equal to two-tenths inches per second peak particle velocity (i.e., 0.20 in/sec PPV) at or beyond the lot line of the source. Exceptions are made for temporary construction, maintenance, repair, or demolition activities between 7:00 AM and 7:00 PM, except Sundays and federal holidays, and motor vehicles not under control of the commercial or industrial use.

5.12.1.4 EXISTING NOISE ENVIRONMENT

Sensitive Receptors

Certain land uses, such as residences, schools, and hospitals are particularly sensitive to noise and vibration. Sensitive receptors in the County include residences, senior housing, schools, places of worship, and recreational areas. These uses are regarded as sensitive because they are where citizens most frequently engage in activities that are likely to be disturbed by noise, such as reading, studying, sleeping, resting, or engaging in quiet or passive recreation. Commercial and industrial uses are not particularly sensitive to noise or vibration.

Ambient Noise Measurements

To determine a baseline noise level at different environments in the planning area, ambient noise monitoring was conducted throughout the County by PlaceWorks in June 2018. Measurements were made during weekdays, which are expected to be the most active. Long-term (48-hour) measurements were conducted at 5 locations in the plan area, and short-term (10-minute) measurements were conducted at 22 locations in the plan area. All measurements were conducted in 2018 from Tuesday, June 12, through Thursday, June 14.

The primary noise sources around the measurement locations were traffic, aircraft overflights, and rail noise. Commercial, industrial and government operations and urban and rural activity noise (such as dogs barking and birds chirping) also contributed to the overall noise environment at various locations. Meteorological conditions during the measurement periods were favorable for outdoor sound measurements and were noted to be representative of the typical conditions for the season. Generally, conditions included clear skies, daytime temperatures from 79 to 102 degrees Fahrenheit (°F), and average wind speeds between one to five miles per hour (mph). Where excessive wind speeds (i.e., above sustained speeds of 10 mph) were noted, noise measurements were retaken later during lighter wind. All sound level meters were equipped with a windscreen during measurements.

All sound level meters used for noise monitoring satisfy the American National Standards Institute (ANSI) standard for Type 1 instrumentation.[1] The sound level meters were set to "slow" response and "A" weighting (dBA). The meters were calibrated prior to and after the monitoring period. All measurements were at least five feet above the ground and away from reflective surfaces. Noise measurement locations are described below and shown on Figure 5.12-1, *Noise Monitoring Locations, Countywide*. Figures 5.12-2 through 5.12-4 show the approximate noise monitoring locations by region.

[1] Monitoring of ambient noise was performed using Larson-Davis Model LxT and 820 sound level meters.

Noise Monitoring Locations

- **Long-Term Location 1 (LT-1)** was in a residential area near commercial and industrial uses at the intersection of Cherry Avenue and Rosemary Drive in the City of Fontana. The measurement location was approximately 20 feet east of the Cherry Avenue northbound edge of travel lane and 15 feet south of the Rosemary Drive eastbound centerline. A 48-hour noise measurement was conducted, beginning at the 11 AM hour on Tuesday, June 12, 2018. The noise environment of this site is characterized primarily by local traffic on Cherry Avenue. A high truck traffic volume (20 percent) on Cherry Avenue was observed at the noise measurement site.

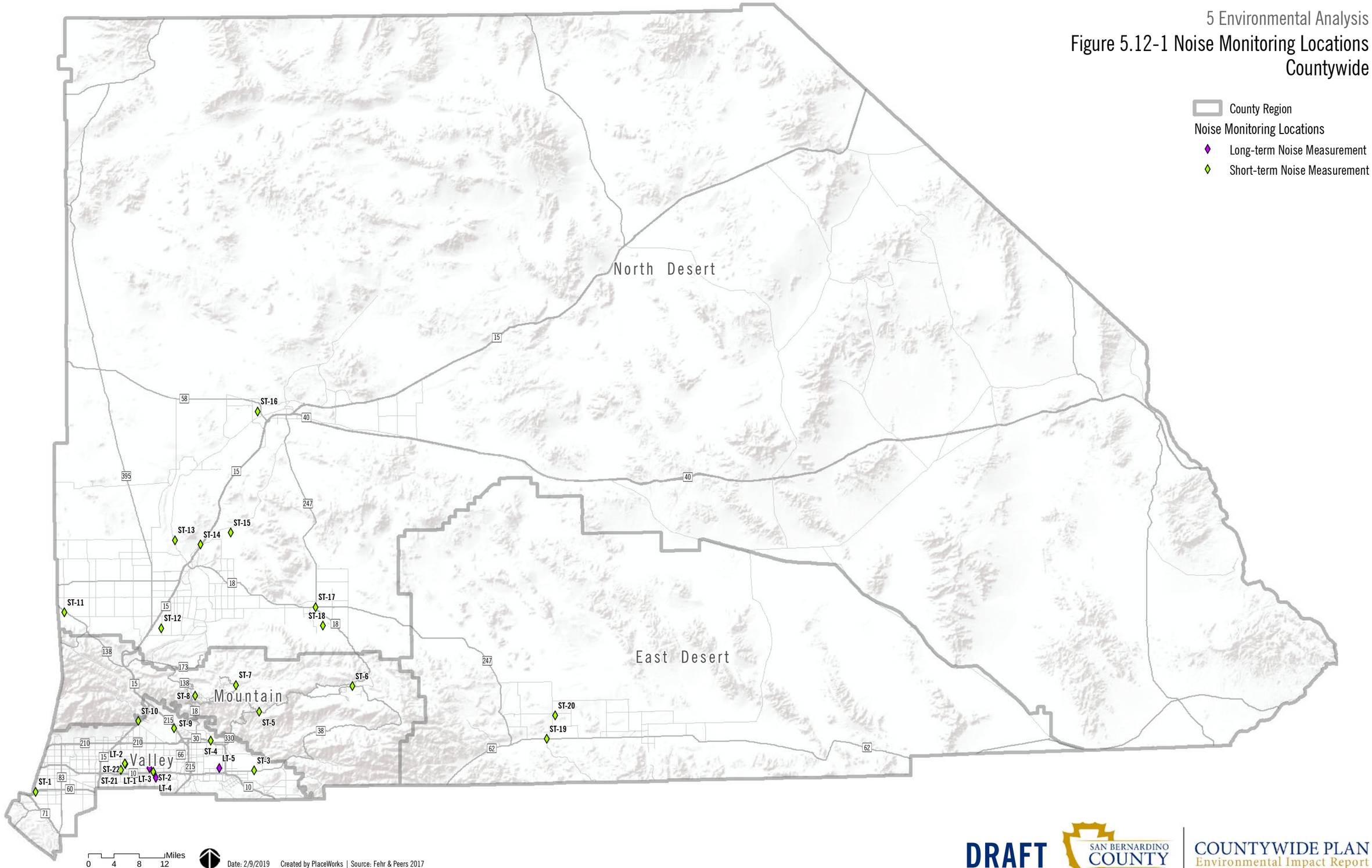
- **Long-Term Location 2 (LT-2)** was in a residential community at the intersection of Hemlock Avenue and Quail Lane in the City of Fontana. The measurement location was representative of 15111 Quail Lane and was approximately 30 feet east of the Hemlock Avenue southbound centerline and 20 feet south of the Quail Lane eastbound centerline. A 48-hour noise measurement was conducted, beginning at the 11 AM hour on Tuesday, June 12, 2018. The noise environment of this site is characterized primarily by local traffic and distant I-10 highway noise. Occasional aircraft overflights also contributed to the noise environment at this measurement location.

- **Long-Term Location 3 (LT-3)** was in a residential area near Mary B. Lewis Elementary School at the intersection of San Bernardino Avenue and Locust Avenue in unincorporated Bloomington. The measurement location was approximately 45 feet south of the San Bernardino eastbound centerline and 25 feet west of the Locust Avenue southbound centerline. A 48-hour noise measurement was conducted, beginning at the 9 AM hour on Tuesday, June 12, 2018. The noise environment of this site is characterized primarily by local traffic and distant I-10 highway noise. Localized residential noise, such as barking dogs, as well as school activity was noted at this measurement location.

- **Long-Term Location 4 (LT-4)** was in a residential area at the intersection of Santa Ana Avenue and Larch Avenue in unincorporated Bloomington. The measurement location was approximately 45 feet south of the Santa Ana Avenue eastbound centerline and 50 feet west of the Larch Avenue southbound centerline. A 48-hour noise measurement was conducted, beginning at the 10 AM hour on Tuesday June 12, 2018. The noise environment of this site is characterized primarily by local traffic and distant I-10 highway noise. A substantial amount of truck traffic was observed at the noise measurement site.

- **Long-Term Location 5 (LT-5)** was in a commercial office area on Nevada Street south of San Bernardino Avenue in the City of Redlands. The measurement location was approximately 12 feet east of the Nevada Street northbound centerline. A 48-hour noise measurement was conducted, beginning at the 8 AM hour on Tuesday June 12, 2018. The noise environment of this site is characterized primarily by local traffic and distant I-10 highway noise. A nearby baseball field and aircraft overflights to and from the San Bernardino International Airport are also sources of noise at this location.

Figure 5.12-1 Noise Monitoring Locations Countywide



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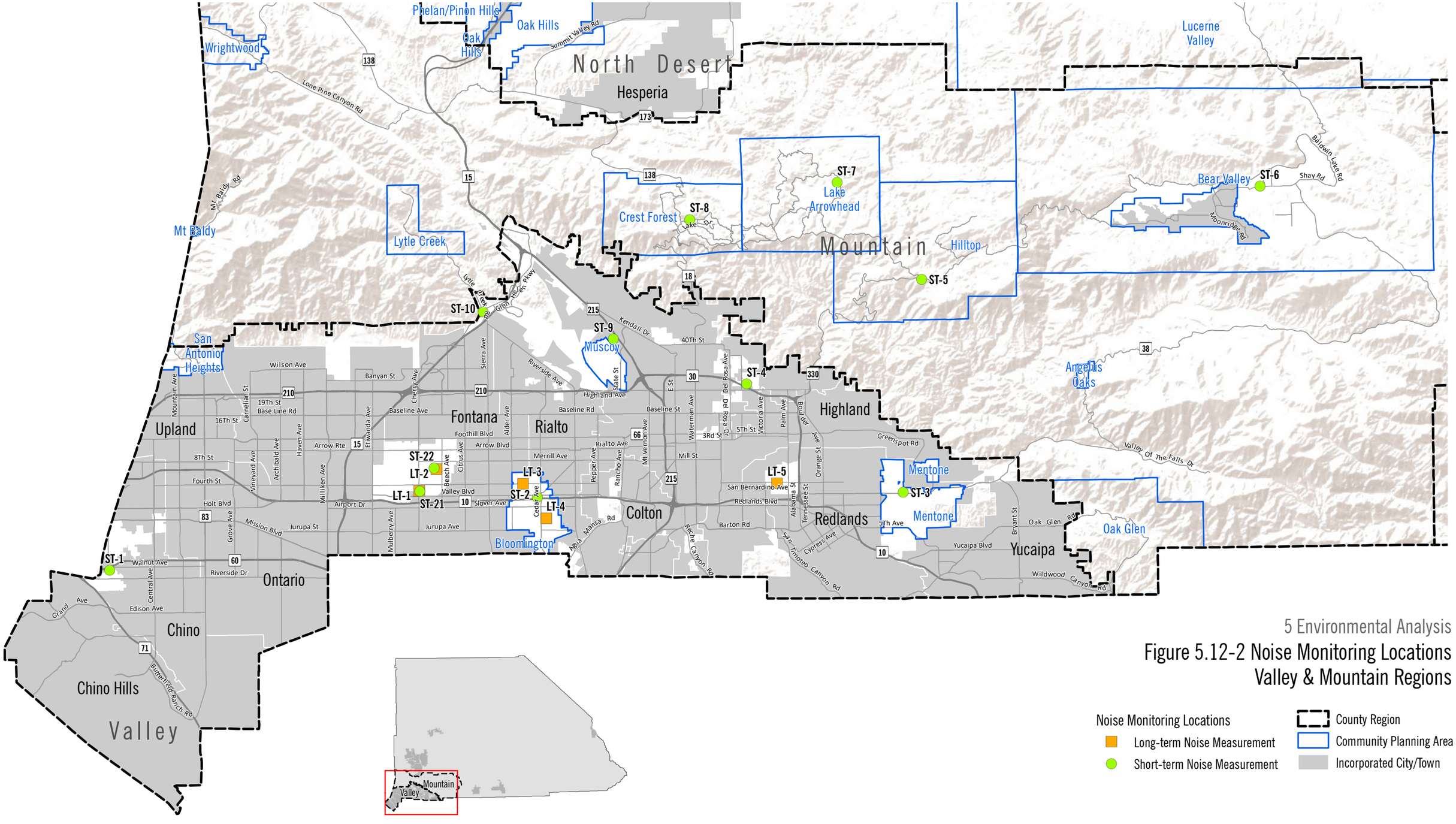

5 Environmental Analysis

Figure 5.12-2 Noise Monitoring Locations Valley & Mountain Regions

Noise Monitoring Locations
- Long-term Noise Measurement
- Short-term Noise Measurement

County Region
Community Planning Area
Incorporated City/Town

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Figure 5.12-3 Noise Monitoring Locations North Desert Region, Victor Valley

Noise Monitoring Locations
- Long-term Noise Measurement
- Short-term Noise Measurement
- County Region
- Community Planning Area
- County Boundary
- Incorporated City/Town

North Desert

ST-11 ST-12 ST-13 ST-14 ST-15 ST-16 ST-17 ST-18

Barstow Yermo Daggett Newberry Springs Helendale Oro Grande Adelanto El Mirage Apple Valley Victorville Phelan/Pinon Hills Oak Hills Wrightwood Hesperia Lake Arrowhead Bear Valley Lucerne Valley Homestead Valley

Santa Fe Ave, Old State 58 Hwy, Community Blvd, Hinkley Rd, Main St, H St, Rimrock Rd, Irwin Rd, Fort Irwin Rd, Yermo Rd, Calico Rd, Valley Center Rd, Minneola Rd, Dune Rd, Harvard Rd, Newberry Rd, National Trails Hwy, Lenwood Rd, Helendale Rd, Wild Rd, Bonanza Trl, Shadow Mountain Rd, Stoddard Wells Rd, El Mirage Rd, St Anthony Ave, Rancho Rd, Koala Rd, Air Expy, Adelanto Rd, Holly Rd, Caughlin Rd, Oasis Rd, Sheep Creek Rd, Johnson Rd, Mojave Dr, Amethyst Rd, D St, Seventh St, Apple Valley Rd, Corwin Rd, Waalew Rd, Central Rd, Yucca Loma Rd, Nisqualli Rd, Bear Valley Rd, Duncan Rd, Baldy Mesa Rd, Phelan Rd, Balsam Ave, Hesperia Rd, I Ave, Seventh Ave, Maple Ave, Main St, Ranchero Rd, Danbury Ave, Deep Creek Rd, Kiowa Rd, Navajo Rd, Tussing Ranch Rd, Roundup Way, Desert View Rd, Rabbit Springs Rd, High Rd, Mesa Rd, Midway Ave, Camp Rock Rd, North Side Rd, Granite Rd, Lone Pine Canyon Rd, Summit Valley Rd, Arrowhead Lake Rd

15 18 40 58 138 173 247 395

0 2 4 6 8 10 Miles

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Figure 5.12-4 Noise Monitoring Location East Desert Region

Noise Monitoring Locations
- Long-term Noise Measurement
- Short-term Noise Measurement
- County Region
- Community Plannning Area
- County Boundary
- Incorporated City/Town

North Desert
East Desert
Mountain
Lucerne Valley
Bear Valley
Homestead Valley
Pioneertown
Joshua Tree
Yucca Valley
Twentynine Palms
Morongo Valley
ST-19
ST-20
247
62
Reche Rd
Landers Ln
Avalon Ave
Border Ave
Sonora Rd
Pole Line Rd
Aberdeen Dr
Sunfair Rd
Valle Vista Rd
Lear Ave
Morongo Rd
Amboy Rd
Buena Vista Dr
Broadway
Sunburst Ave
Cascade Rd
Two Mile Rd
Larrea Ave
Adobe Rd
Godwin Rd
Utah Trl
Baseline Rd
Wilshire Ave
Pioneertown Rd
Quail Springs Rd
Park Blvd

East Desert

0 2 4 6 8 Miles

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- **Short-Term Location 1 (ST-1)** represented the front yard of a residence on Placentia Court, east of East End Street in the City of Chino. A 10-minute noise measurement was conducted, beginning at 12:21 PM on Tuesday, June 12, 2018. The noise environment of this site is characterized primarily by SR-60 highway noise. Secondary noises such as birds chirping also contribute to the existing noise environment at this location. A very low traffic volume was noted on Placentia Court.

- **Short-Term Location 2 (ST-2)** was in a commercial area on Commercial Street west of Orchard Street in unincorporated Bloomington. A 10-minute noise measurement was conducted, beginning at 12:14 PM on Tuesday, June 12, 2018. The measurement location was approximately 20 feet north of the Commercial Street westbound centerline. The noise environment of this site is characterized primarily by local I-10 highway noise and railroad activity including train horns. Occasional aircraft overflights also contribute to the existing noise environment at this location.

- **Short-Term Location 3 (ST-3)** was in a residential area near Mentone Elementary School on Crafton Avenue, north of Mentone Boulevard (SR-38) in unincorporated Mentone. A 10-minute noise measurement was conducted, beginning at 4:33 PM on Tuesday, June 12, 2018. The measurement location was approximately 20 feet west of the Crafton Avenue southbound centerline. The noise environment of this site is characterized primarily by local traffic noise and school activity.

- **Short-Term Location 4 (ST-4)** was in a residential area near Barton Elementary School at the intersection of Guthrie Street and 26th Street in the City of San Bernardino. A 10-minute noise measurement was conducted, beginning at 3:51 PM on Tuesday, June 12, 2018. The measurement location was approximately 20 feet west of the Guthrie Street southbound centerline and 20 feet north of the 26th Street nearest travel lane. The noise environment of this site is characterized primarily by local traffic noise and SR-210.

- **Short-Term Location 5 (ST-5)** was in the downtown commercial area of unincorporated Running Springs at the intersection of Hilltop Boulevard (SR-18/Rim of the World Highway) and Palo Alto Way. A 10-minute noise measurement was conducted, beginning at 3:31 PM on Tuesday, June 12, 2018. The measurement location was approximately 25 feet south of the SR-18 eastbound centerline. The noise environment of this site is characterized primarily by local traffic noise.

- **Short-Term Location 6 (ST-6)** was in a commercial area near residential at the intersection of Big Bear Boulevard (SR-18) and Saw Mill Drive in the City of Big Bear. A 10-minute noise measurement was conducted, beginning at 4:49 PM on Tuesday, June 12, 2018. The measurement location was approximately 25 feet south of the SR-18 eastbound centerline. The noise environment of this site is characterized primarily by local traffic noise and aircraft overflights to and from the Big Bear City Airport. One helicopter overflight was noted during the noise measurement period.

- **Short-Term Location 7 (ST-7)** was in a rural residential area near the Mountains Community Hospital at the intersection of North Shore Road and SR-173 in unincorporated Lake Arrowhead. A 10-minute noise measurement was conducted, beginning at 2:41 PM on Tuesday, June 12, 2018. The measurement location was approximately 25 feet west of the SR-173 southbound centerline. The noise environment of this site

is characterized primarily by local traffic noise and activity at the Mountains Community Hospital. One small plane overflight was noted during the noise measurement period.

- **Short-Term Location 8 (ST-8)** was in a commercial area near rural residential at the intersection of Lake Drive and South Thousand Pines Road in unincorporated Crestline. A 10-minute noise measurement was conducted, beginning at 1:41 PM on Tuesday, June 12, 2018. The measurement location was approximately 25 feet north of the Lake Drive westbound centerline and 12 feet east of the S. Thousand Pines Road northbound centerline. The noise environment of this site is characterized primarily by local traffic noise.

- **Short-Term Location 9 (ST-9)** was in an industrial area near residential at 4370 Hallmark Parkway, south of Saratoga Way in the City of San Bernardino. A 10-minute noise measurement was conducted, beginning at 3:06 PM on Tuesday, June 12, 2018. The measurement location was approximately 20 feet west of the Hallmark Parkway southbound centerline. The noise environment of this site is characterized primarily by local traffic noise and I-215 and railroad activity.

- **Short-Term Location 10 (ST-10)** was in a commercial and residential area on Sierra Avenue, south of Glen Helen Parkway in the City of Fontana. A 10-minute noise measurement was conducted, beginning at 1:46 PM on Tuesday, June 12, 2018. The measurement location was approximately 20 feet west of the Sierra Avenue southbound centerline. The noise environment of this site is characterized primarily by local traffic noise and I-15.

- **Short-Term Location 11 (ST-11)** was in a rural residential area at the intersection of Oasis Road and Juniper Road in unincorporated Pinon Hills. A 10-minute noise measurement was conducted, beginning at 1:15 PM on Wednesday, June 13, 2018. The measurement location was representative of the residence at 924 Oasis Road. The noise environment of this site is characterized primarily by distant SR-138 traffic noise and birds chirping. There was no local traffic noted during the noise measurement period.

- **Short-Term Location 12 (ST-12)** was in a rural residential area at the intersection of Mesquite Street and Jargon Street in unincorporated Oak Hills. A 10-minute noise measurement was conducted, beginning at 8:11 AM on Thursday, June 14, 2018. The noise environment of this site is characterized primarily by distant traffic, distant railroad activity, and localized neighborhood noises such as dogs barking. There was very low local traffic noted during the noise measurement period; a distant train horn was also noted.

- **Short-Term Location 13 (ST-13)** was in the center of a park in unincorporated Oro Grande near the intersection of 1st Street and Olive Street. A 10-minute noise measurement was conducted, beginning at 10:55 AM on Wednesday, June 13, 2018. The noise environment of this site is characterized primarily by local railroad and switchyard activity, and industrial noise from a nearby cement plant. There was very low local traffic on 1st Street noted during the noise measurement period. A train was noted idling across 1st Street on the nearby tracks and then blowing its horn once south of the measurement site.

- **Short-Term Location 14 (ST-14)** was just northeast of the Victorville city limits in unincorporated San Bernardino County on Stoddard Wells Road. A 10-minute noise measurement was conducted, beginning at 10:06 AM on Wednesday, June 13, 2018. The measurement location was approximately 25 feet west of

the Stoddard Wells southbound centerline. The noise environment of this site is characterized primarily by local traffic, distant traffic on I-15, operations at the County dump site, and occasional aircraft overflights to and from the Osborne Airport (a small private airstrip south of the measurement site). A loader was noted as operating at the County dump site north of the measurement site.

- **Short-Term Location 15 (ST-15)** was in a rural residential area on Quarry Road in the town of Apple Valley. A 10-minute noise measurement was conducted, beginning at 9:31 AM on Wednesday, June 13, 2018. The measurement location was approximately 25 feet south of the Quarry Road eastbound centerline, at the approximate property line of 20025 and 20085 Quarry Road. The noise environment of this site is characterized primarily by local haul truck traffic and railroad activity.

- **Short-Term Location 16 (ST-16)** was in a rural residential area at the intersection of Cedar Road and Agate Road in the City of Barstow. A 10-minute noise measurement was conducted, beginning at 8:39 AM on Wednesday, June 13, 2018. The noise environment of this site is characterized primarily by a low level of local traffic noise, distant SR-58 traffic, distant train horns, and localized neighborhood noises such as dogs barking and birds chirping.

- **Short-Term Location 17 (ST-17)** was in a commercial area near rural residential on Oracle Road, south of Old Woman Springs Road (SR-247) in unincorporated Lucerne Valley. A 10-minute noise measurement was conducted, beginning at 6:17 PM on Tuesday, June 12, 2018. The noise environment of this site is characterized primarily by distant traffic noise and birds chirping.

- **Short-Term Location 18 (ST-18)** was in a very low density rural residential area near industrial processing uses on Meridian Avenue in unincorporated Lucerne Valley. A 10-minute noise measurement was conducted, beginning at 5:52 PM on Tuesday, June 12, 2018. The measurement location was approximately 25 feet west of the Meridian Avenue southbound centerline. The noise environment of this site is characterized primarily by local haul truck traffic noise and distant industrial processing noise. One small airplane overflight was noted during the measurement period.

- **Short-Term Location 19 (ST-19)** was in a commercial area at the intersection of Park Boulevard and Twentynine Palms Highway (SR-62) in unincorporated Joshua Tree. A 10-minute noise measurement was conducted, beginning at 10:11 AM on Wednesday, June 13, 2018. The measurement location was approximately 65 feet south of the SR-62 eastbound centerline and 50 feet east of the Park Boulevard northbound centerline. The noise environment of this site is characterized primarily by local traffic noise.

- **Short-Term Location 20 (ST-20)** was on a vacant rural parcel at the intersection of Center Avenue and Belmont Street in unincorporated Joshua Tree. A 10-minute noise measurement was conducted, beginning at 11:06 AM on Wednesday, June 13, 2018. The noise environment of this site is characterized primarily by rural noises such as birds chirping. Traffic was very low, with one vehicle pass-by during the measurement period.

- **Short-Term Location 21 (ST-21)** was just east of LT-1 and was representative of the front yard of 14531 Rosemary Drive in the City of Fontana. A 10-minute noise measurement was conducted, beginning at

11:06 AM on Tuesday, June 12, 2018. The noise environment of this site is characterized primarily by local traffic, birds chirping, and distant train horns.

- **Short-Term Location 22 (ST-22)** was in the vicinity of LT-2 and was representative of the front yard of 15037 Athol Street in the City of Fontana. A 10-minute noise measurement was conducted, beginning at 10:45 AM on Thursday, June 14, 2018. The noise environment of this site is characterized primarily by neighborhood noises such as dogs barking and birds, including a rooster. A low traffic volume on Athol Street was noted during the measurement period.

Ambient Noise Results, Long-Term Monitoring

During the ambient noise survey, the Ldn noise levels at monitoring locations ranged from 66 to 80 dBA L_{dn}. The long-term noise measurement results are summarized in Table 5.12-8, *Long-Term Noise Measurements Summary in A-weighted Sound Levels*. A summary of the daily trend during long-term noise measurements is provided in Appendix J.

Table 5.12-8 Long-Term Noise Measurements Summary in A-weighted Sound Levels

Monitoring Location	Description	Ldn	Lowest $L_{eq, 1\text{-}hr}$	Highest $L_{eq, 1\text{-}hr}$
LT-1	Cherry Avenue and Rosemary Drive Fontana	80	45.8	100.0
LT-2	Hemlock Avenue and Quail Lane Fontana	66	39.1	100.8
LT-3	San Bernardino Avenue and Locust Avenue Bloomington	71	39.1	103.0
LT-4	Santa Ana Avenue and Larch Avenue	69	39.1	96.7
LT-5	Nevada Street south of San Bernardino Avenue Redlands	68	33.8	100.4

Short-Term Noise Monitoring Results

The short-term noise measurement results are summarized in Table 5.12-9, *Short-Term Noise Measurements Summary in A-Weighted Sound Levels*.

Table 5.12-9 Short-Term Noise Measurements Summary in A-Weighted Sound Levels

Monitoring Location	Description	10-minute Noise Level, dBA		
		Lmin	Leq	Lmax
ST-1	Placentia Court, east of East End Street Chino, 12:21 PM, 6/12/2018	57.6	60.3	64.1
ST-2	Commercial Street west of Orchard Street Bloomington, 12:14 PM, 6/12/2018	64.2	69.0	81.1
ST-3	Crafton Avenue, north of Mentone Boulevard (SR-38) Mentone, 4:33 PM, 6/12/2018	47.7	62.0	73.3
ST-4	Guthrie Street and 26th Street City of San Bernardino, 3:51 PM, 6/12/2018	52.9	58.3	71.4
ST-5	Hilltop Boulevard (SR-18) and Palo Alto Way Running Springs, 3:31 PM, 6/12/2018	48.1	65.0	81.0
ST-6	Big Bear Boulevard (SR-18) and Saw Mill Drive Big Bear, 4:49 PM, 6/12/2018	53.1	71.7	86.1
ST-7	North Shore Road and SR-173 Lake Arrowhead, 2:41 PM, 6/12/2018	49.7	66.7	86.0
ST-8	Lake Drive and South Thousand Pines Road Crestline, 1:41 PM, 6/12/2018	51.0	65.3	79.3
ST-9	4370 Hallmark Parkway City of San Bernardino, 3:06 PM, 6/12/2018	50.2	69.7	82.0
ST-10	Sierra Avenue, south of Glen Helen Parkway Fontana, 1:46 PM, 6/12/2018	55.6	72.8	90.0
ST-11	Oasis Road and Juniper Road Pinon Hills, 1:15 PM, 6/13/2018	34.8	41.9	58.5
ST-12	Mesquite Street and Jargon Street Oak Hills, 8:11 AM, 6/14/2018	35.0	44.7	61.4
ST-13	Park at 1st Street and Olive Street Oro Grande, 10:55 AM, 6/13/2018	48.5	55.4	66.8
ST-14	Stoddard Wells Road north of Victorville city limits Unincorporated San Bernardino County, 10:06 AM, 6/13/2018	39.6	60.1	81.2
ST-15	20025 and 20085 Quarry Road Apple Valley, 9:31 AM, 6/13/2018	32.1	69.0	85.5
ST-16	Cedar Road and Agate Road Barstow, 8:39 AM, 6/13/2018	37.2	51.1	71.1
ST-17	Oracle Road, south of Old Woman Springs Road (SR-247) Lucerne Valley, 6:17 PM, 6/12/2018	37.5	50.8	67.1
ST-18	Meridian Avenue Lucerne Valley, 5:52 PM, 6/12/2018	31.8	60.3	82.6
ST-19	Park Boulevard and Twentynine Palms Highway (SR-62) Joshua Tree, 10:11 AM, 6/13/2018	50.3	69.1	88.5
ST-20	Center Avenue and Belmont Street Joshua Tree, 11:06 AM, 6/13/2018	29.0	42.1	62.1
ST-21	14531 Rosemary Drive Fontana, 11:06 AM, 6/12/2018	47.3	56.2	68.0
ST-22	15037 Athol Street Fontana, 10:45 AM, 6/14/2018	42.6	64.8	77.7

Summary of Ambient Noise Measurements

The noise environment within the planning area is highly variable, depending on location. However, freeway, rail, and local traffic noise tends to control the noise environment at most locations. Average sound levels ranged from 42 to 73 dBA L_{eq} during short-term measurements. Rural locations in Joshua Tree, Oak Hills, Pinon Hills, Barstow, and Lucerne Valley had the lowest measured noise levels—in the 40s to low 50s dBA Leq—and more urban and suburban locations such as Bloomington, City of San Bernardino, and Fontana had higher measured noise levels, in the high 60s to low 70s dBA Leq. Rural locations near major roadways such as downtown Joshua Tree, Running Springs and Big Bear adjacent to SR-18, Lake Arrowhead adjacent to SR-173, and downtown Crestline also had higher noise levels, in the mid 60s to low 70s dBA Leq.

Existing Traffic Noise

On-road vehicles represent the most prominent source of noise in the plan area. Existing traffic noise conditions were modeled using the Federal Highway Administration's (FHWA) Traffic Noise Prediction computer model (FHWA 1978) using average daily traffic volumes, fleet mix by time of day, speeds, and number of lanes data provided by Fehr and Peers for highway and roadway segments in the plan area. Appendix J lists the calculated existing noise levels on roadways in the plan area at a distance of 50 feet from the roadway centerline. Figures 5.12-5 through 5.12-7 illustrate the modeled roadways and existing noise contours for 60 dBA CNEL, 65 dBA CNEL, and 70 dBA CNEL.

Aircraft Noise

Aircraft noise in the County is typically characterized as occasional but can be intrusive to nearby sensitive receptors. There are 16 airports, airstrips, and heliports in the County, for which noise contours are shown in Appendix J, including Big Bear City Airport, Chino Airport, Ontario International Airport, Redlands Municipal Airport, Southern California Logistics Airport, and San Bernardino International Airport (San Bernardino 2005). Both the Roy Williams Airport and the Rialto Airport recently closed.

Railroad Noise

Rail operations in the County are also substantial sources of noise in some areas. Day-night average noise levels vary throughout the County depending on the number of trains operating along a given rail line per day, the timing and duration of train pass-by events, and whether or not trains must sound their warning whistles near "at-grade" crossings. Day-night average noise levels commonly range from 65 to 75 dBA L_{dn} at land uses adjoining a railroad right-of-way. When railroad trains approach a passenger station or "at-grade" crossing, they are required to sound their warning whistle within ¼ mile. Trains are required to sound a long signal followed by a short signal when approaching stations, curves, or other points where views may be obscured and when approaching passenger or freight trains. When passing a standing train, the moving train is required to sound two long signals followed by a short signal followed by a long signal, the same requirement when signaling for at-grade crossings. Train warning whistles typically generate maximum noise levels of approximately 105 dBA at 100 feet. The day-night average noise level at locations immediately adjacent to "at-grade" crossings and exposed to multiple train pass-by events during a day can exceed 85 dBA L_{dn}/CNEL.

Existing railroad noise levels were projected using the Federal Transit Administration (FTA) CREATE rail noise model and the Federal Rail Administration Grade Crossing Horn Model, the average number of pass-bys, time of day, number of locomotives and type, number of rail cars and type, and speed. The calculated distances to the 65 dBA Ldn/CNEL contours from existing railroad noise are summarized in Table 5.12-10.

Table 5.12-10 Existing Railroad Noise Level Screening Distances

Train	Subdivision	Distance (feet) to 65 dBA Ldn/CNEL Contour (main line)	Distance (feet) to 65 dBA Ldn/CNEL Contour (within ¼ mile of grade crossing)
Trona		45	306
ARZC	Cadiz	50	410
BNSF	Mojave	700	995
BNSF	Needles	1,400	1,400
BNSF	Cajon	1,400	1,434
BNSF	Lucerne Valley	45	300
BNSF	San Bernardino Sub	450	1,028
BNSF	San Jacinto Industrial Lead	20	264
UP	Cima	500	750
UP	Mojave	250	652
UP	Yuma	500	500*
UP	Alhambra	500	894
UP	Los Angeles	300	866
UP	Chino Industrial Lead	15	266
SCAX	San Bernardino Line	100	924
SCAX	Redlands Sub	17	349

* Quiet Zone (warning whistle prohibited).

Stationary Source Noise

Stationary sources of noises may occur from all types of land uses. Residential uses would generate noise from landscaping, maintenance activities, and air conditioning systems. Commercial uses would generate noise from heating, ventilation, air conditioning (HVAC) systems, loading docks, and other sources. Industrial uses may generate noise from HVAC systems, loading docks, and possibly machinery. Noise generated by residential or commercial uses is generally short and intermittent. Industrial uses may generate noise on a more continual basis. Nightclubs, outdoor dining areas, gas stations, car washes, fire stations, drive-throughs, swimming pool pumps, school playgrounds, athletic and music events, and public parks are other common noise sources.

5.12.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would result in:

N-1 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.

N-2 Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

N-3 A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

N-4 A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

N-5 For a project located within an airport land use plan or where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

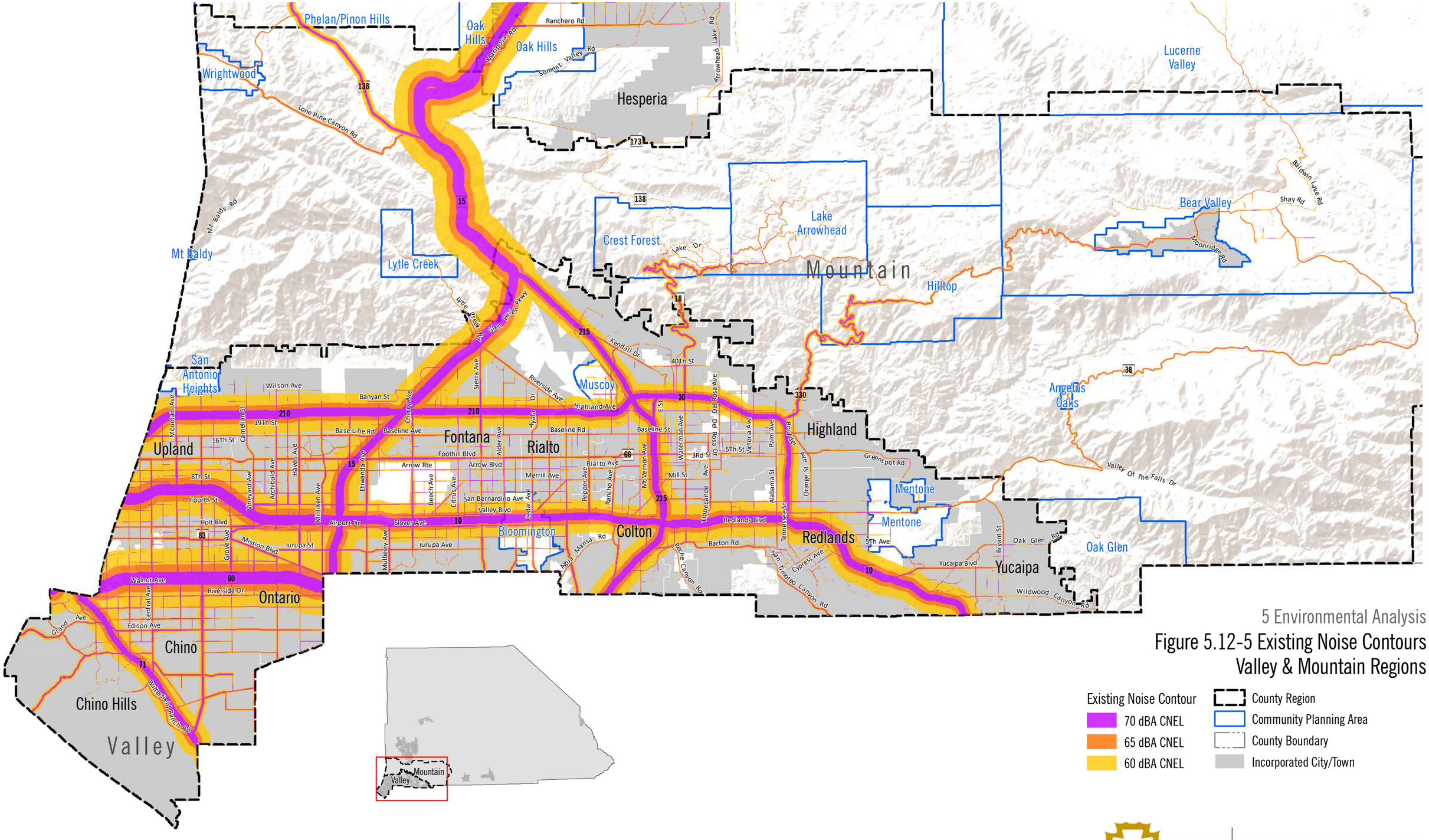
N-6 For a project within the vicinity of a private airstrip, expose people residing or working the project area to excessive noise levels.

5.12.3 Regulatory Requirements and General Plan Policies

5.12.3.1 REGULATORY REQUIREMENTS

RR-NOI-1 **California Building Code.** The California Building Code (CBC), Title 24, Part 2, Volume 1, Chapter 12, Interior Environment, Section 1207.11.2, Allowable Interior Noise Levels, requires that interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room. The noise metric is evaluated as either the day-night average sound level (Ldn) or the community noise equivalent level (CNEL), consistent with the noise element of the local general plan.

The California Green Building Standards Code (CALGreen), Chapter 5, Division 5.5, has additional requirements for insulation that affect exterior-interior noise transmission for nonresidential structures: Pursuant to Section 5.507.4.1, Exterior Noise Transmission, Prescriptive Method, wall and roof-ceiling assemblies making up the building or addition envelope or altered envelope and exposed to the noise source shall meet a composite sound transmission class (STC) rating of at least 50 or a composite outdoor-indoor transmission class (OITC) rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 within a 65 dBA CNEL noise contour of an airport, or within a 65 dBA CNEL or Ldn noise contour of a freeway, expressway, railroad, industrial source, or fixed-guideway source, as determined by the noise element. Where noise contours are not readily available, buildings exposed to a noise level of 65 dBA Leq for one hour during any hour of operation shall have building, addition, or alteration exterior wall and roof-ceiling assemblies that are exposed to the noise source meet a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum of STC 40 (or OITC 30).



5 Environmental Analysis

Figure 5.12-5 Existing Noise Contours Valley & Mountain Regions

Existing Noise Contour
- 70 dBA CNEL
- 65 dBA CNEL
- 60 dBA CNEL

- County Region
- Community Planning Area
- County Boundary
- Incorporated City/Town

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Figure 5.12-6 Existing Noise Contours North Desert Region, Victor Valley

Existing Noise Contour
- 70 dBA CNEL
- 65 dBA CNEL
- 60 dBA CNEL
- County Region
- Community Planning Area
- County Boundary
- Incorporated City/Town

North Desert

Miles
0 2 4 6 8 10

Date: 2/9/2019 Created by PlaceWorks | Source: Fehr & Peers, 2018 (traffic volumes); PlaceWorks, 2018 (noise contours based on traffic volumes)

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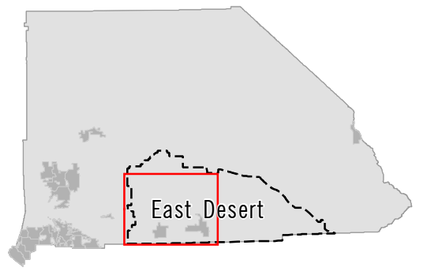
Figure 5.12-7 Existing Noise Contours East Desert Region

East Desert

Existing Noise Contour
- 70 dBA CNEL
- 65 dBA CNEL
- 60 dBA CNEL
- County Region
- Community Plannning Area
- County Boundary
- Incorporated City/Town

Lucerne Valley
Bear Valley
Homestead Valley
Pioneertown
Joshua Tree
Yucca Valley
Twentynine Palms
Morongo Valley
Reche Rd
Landers Ln
Avalon Ave
Aberdeen Dr
Buena Vista Dr
Pioneertown Rd
Border Ave
Sonora Rd
Sunfair Rd
Broadway
Sunburst Ave
Cascade Rd
Pole Line Rd
Lear Ave
Morongo Rd
Valle Vista Rd
Amboy Rd
Two Mile Rd
Larrea Ave
Adobe Rd
Utah Trl
Baseline Rd
Wilshire Ave
Godwin Rd
Quail Springs Rd
Park Blvd
247
62



0 2 4 6 8 Miles

Date: 2/9/2019 Created by PlaceWorks | Source: Fehr & Peers, 2018 (traffic volumes); PlaceWorks, 2018 (noise contours based on traffic volumes)

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Prior to issuance of building permits for projects that include sensitive receptors and are located in ambient noise environments exceeding the "Normally Acceptable" noise and land use compatibility standards shown in Table 5.12-2, the project applicant shall submit an acoustical study to the County of San Bernardino that demonstrates that the proposed residential building design would provide an interior noise level of 45 dBA CNEL or less for residential uses, as required by the California Building Code, or acceptable levels for nonresidential uses per CALGreen standards. Acceptable methods for reducing noise exposure may include, but are not limited to:

- Noise barriers, berms, or other noise reduction techniques could be constructed to reduce noise transmission where reasonable and feasible. Final design of such barriers should be completed during project level review.
- Alternative noise reduction techniques could be implemented, such as repaving streets with "quiet" pavement types, including open-grade rubberized asphaltic concrete. The use of quiet pavement can reduce noise levels by up to 7 dBA, depending on the existing pavement type, traffic speed, traffic volumes, and other factors.
- Traffic-calming measures to slow traffic, such as speed bumps.
- Adequate building sound insulation, such as sound-rated windows and doors, on a case-by-case basis as a method of reducing noise levels in interior spaces.

RR-NOI-2 **San Bernardino County Development Code, Construction Noise Sources.** Section 83.01.080 establishes standards concerning acceptable noise levels for both noise-sensitive land uses and noise-generating land uses. It prohibits construction activities between 7:00 PM and 7:00 AM on weekdays, or at any time on Sunday or a federal holiday.

RR-NOI-3 **San Bernardino County Development Code, Stationary Noise Sources.** Section 83.01.080 establishes standards for stationary noise sources in Table 83-2.

RR-NOI-4 **San Bernardino County Development Code Mobile Noise Sources.** Section 83.01.080 establishes standards for mobile noise sources in Table 83-3 including:

- Limiting construction to the daytime hours between 7 AM to 7 PM on Monday through Friday and 9 AM to 6PM on Saturday,. Construction is prohibited on Sundays.

RR-NOI-5 **San Bernardino County Development Code Vibration.** Section 83.01.090 prohibits vibration that can be felt without the aid of instruments or produces a particle velocity greater than or equal to two-tenths inch per second peak particle velocity (i.e., 0.20 in/sec PPV) at or beyond the lot line of the source. Exceptions are made for temporary construction, maintenance, repair, or demolition activities between 7:00 AM and 7:00 PM, except Sundays and federal holidays; and motor vehicles not under control of the industrial or commercial use.

5.12.3.2 POLICY PLAN

The Countywide Plan Hazards (HZ) Element includes goals, policies, and programs intended to avoid or reduce noise-related impacts. In most cases, no single goal, policy, or implementation program is expected to completely avoid or reduce an identified potential environmental impact. However, the collective, cumulative mitigating benefits of the policies listed below are intended to reduce noise-related impacts. Specific goals and policies are discussed in Section 5.12.4, *Environmental Impacts*, to demonstrate how the policy would avoid or reduce the impact.

Goal HZ-2 **Human-Generated Hazards**: People and the natural environment protected from exposure to hazardous materials, excessive noise, and other human-generated hazards.

Policy HZ-2.6 **Coordination with Transportation Authorities:** We collaborate with airport owners, FAA, Caltrans, SBCTA, SCAG, neighboring jurisdictions, and other transportation providers in the preparation and maintenance of, and updates to transportation-related plans and projects to minimize noise impacts and provide appropriate mitigation measures.

Policy HZ-2.7 **Truck Delivery Areas:** We encourage truck delivery areas to be located away from residential properties and require associated noise impacts to be mitigated.

Policy HZ-2.8 **Proximity to Noise Generating Uses:** We limit or restrict new noise sensitive land uses in proximity to existing conforming noise generating uses and planned industrial areas.

Policy HZ-2.9 **Control Sound at the Source:** We prioritize noise mitigation measures that control sound at the source before buffers, soundwalls, and other perimeter measures.

Policy HZ-2.10 **Agricultural Operations:** We require new development adjacent to existing conforming agricultural operations to provide adequate buffers to reduce the exposure of new development to operational noise, odor, and the storage or application of pesticides or other hazardous materials.

5.12.4 Environmental Impacts

The following impact analysis addresses thresholds of significance and applicable thresholds are identified in brackets after the impact statement.

Impact 5.12-1: Construction activities would result in temporary noise increases. [Threshold N-3]

The Countywide Plan would implement the Project objectives described in Chapter 3 and result in buildout of the County with a horizon year of 2040. As part of that implementation, various individual land use development and other projects would be constructed. Two types of temporary noise impacts could occur during construction. First, the transport of workers and movement of materials to and from the site could incrementally increase noise levels along local access roads. The second type of temporary noise impact is related to demolition, site preparation, grading, and/or physical construction. Construction is performed in

distinct steps, each of which has its own mix of equipment, and, consequently, its own noise characteristics. Table 5.12-11 lists typical construction equipment noise levels recommended for noise-impact assessments, based on a distance of 50 feet between the equipment and noise receptor.

Table 5.12-11 Construction Equipment Noise Emission Levels

Construction Equipment	Typical Max Noise Level (dBA L_{max})[1]	Construction Equipment	Typical Max Noise Level (dBA L_{max})[1]
Air Compressor	81	Pile-Driver (Impact)	101
Backhoe	80	Pile-Driver (Sonic)	96
Ballast Equalizer	82	Pneumatic Tool	85
Ballast Tamper	83	Pump	76
Compactor	82	Rail Saw	90
Concrete Mixer	85	Rock Drill	98
Concrete Pump	71	Roller	74
Concrete Vibrator	76	Saw	76
Crane, Derrick	88	Scarifier	83
Crane, Mobile	83	Scraper	89
Dozer	85	Shovel	82
Generator	81	Spike Driver	77
Grader	85	Tie Cutter	84
Impact Wrench	85	Tie Handler	80
Jack Hammer	88	Tie Inserter	85
Loader	85	Truck	88
Paver	89		

Source: FTA 2018.
[1] Measured 50 feet from the source.

As shown, construction equipment generates high levels of noise, with maximums ranging from 71 dBA to 101 dBA. Construction of individual developments associated with implementation of the plan would temporarily increase the ambient noise environment and would have the potential to affect noise-sensitive land uses in the vicinity of an individual project. According to the Development Code Section 83.01.080, construction activities are exempt from the noise standards between 7:00 AM and 7:00 PM, except on Sundays and federal holidays.

Implementation of the plan anticipates an increase in development intensity to accommodate populations and employment growth. Construction noise levels are highly variable and dependent upon the specific locations, site plans, and construction details of individual projects. Significant noise impacts may occur from operation of heavy earthmoving equipment and truck haul operations associated with construction of individual development projects, particularly if construction techniques such as impact or vibratory pile driving are proposed. The time of day that construction activity is conducted would also determine the significance of each project, particularly during the more sensitive nighttime hours. However, construction would be localized and would occur intermittently for varying periods of time.

Because specific, project-level information is not available at this time, it is not possible nor appropriate to quantify the construction noise impacts at specific sensitive receptors. In most cases, construction of individual developments associated with implementation of the plan would temporarily increase the ambient noise environment in the vicinity of each individual project, potentially affecting existing and future nearby sensitive uses. Because construction activities associated with any individual development may occur near noise-sensitive receptors and because, depending on the project type, equipment list, time of day, phasing and overall construction durations, noise disturbances may occur for prolonged periods of time or during the more sensitive nighttime hours, construction noise impacts associated with implementation of the plan are considered potentially significant.

Level of Significance before Mitigation: Potentially significant.

Impact 5.12-2 Buildout of the Countywide Plan would cause a substantial noise increase related to traffic on highways and local roadways and could locate sensitive receptors in areas that exceed established noise standards. [Thresholds N-1 and N-3]

Future development in accordance with the Countywide Plan would cause increases in traffic along local roadways. Traffic noise levels were estimated using the FHWA Highway Traffic Noise Prediction Model. Traffic volumes for existing and 2040 conditions, obtained from the traffic impact analysis prepared for the Project (Fehr and Peers 2018). The FHWA model predicts noise levels through a series of adjustments to a reference sound level. These adjustments account for distances from the roadway, traffic volumes, vehicle speeds, car/truck mix, number of lanes, and road width. The complete distances to the 70, 65, and 60 dBA CNEL noise contours for roadway segments in the plan area are included in Appendix J. Figures 5.12-8 through 5.12-10 illustrate the modeled roadways and future noise contours for 60 dBA CNEL, 65 dBA CNEL, and 70 dBA CNEL. As shown on Figures 5.12-8 through 5.12-10, future development of noise-sensitive land uses could be located in areas that exceed the "Normally Acceptable" noise and land use compatibility standards in Table 5.12-4.

In addition, future noise-sensitive land uses could be in areas that exceed the "Normally Acceptable" noise standards due to airport operations (see Appendix J for airport noise contours) and railroad activity. Table 5.12-12 contains the calculated distances to the 65 dBA Ldn/CNEL contours from future railroad noise. The same methodology that was used to estimate existing railroad noise contours was used for future railroad activity. Though implementation of the proposed Countywide Plan would not directly cause an increase in rail activity, future residential development could be placed in areas that would expose sensitive receptors to noise levels in excess of established standards. Stationary source noise, such as from HVAC units and commercial loading docks, is controlled by the County's Municipal Code. Policy HZ-2.7, Truck Delivery Areas, would encourage truck delivery areas to be located away from residential properties and require associated noise impacts to be mitigated.

Table 5.12-12 Future 2040 Railroad Noise Level Screening Distances

Train	Subdivision	Distance (feet) to 65 dBA Ldn/CNEL Contour (main line)	Distance (feet) to 65 dBA Ldn/CNEL Contour (within ¼ mile of grade crossing)
Trona		55	365
ARZC	Cadiz	70	485
BNSF	Mojave	850	1,134
BNSF	Needles	1,800	1,800
BNSF	Cajon	1,700	1,700
BNSF	Lucerne Valley	55	362
BNSF	San Bernardino Sub	800	1,350
BNSF	San Jacinto Industrial Lead	30	312
UP	Cima	650	873
UP	Mojave	350	761
UP	Yuma	1,000	1,000*
UP	Alhambra	600	1,034
UP	Los Angeles	400	1,029
UP	Chino Industrial Lead	20	318
SCAX	San Bernardino Line	110	1,001
SCAX	Redlands Sub	20	408

* Quiet Zone (warning whistle prohibited).

Following industry standard practice, a significant traffic noise impact could occur if the Project would result in an increase of 3 dB or more, which is considered a barely perceptible change in outdoor environments. As shown on Figures 5.12-11 through 5.12-15, significant traffic noise increases of 3 dBA CNEL or greater would occur along multiple roadway segments throughout unincorporated areas of the County. Incorporated areas would fall under the jurisdiction of their respective cities. Policy HZ-2.6, Coordination with Transportation Authorities, would reduce this impact through coordination with Caltrans, San Bernardino County Transportation Authority, SCAG, neighboring jurisdictions, and other transportation providers in the preparation and maintenance of, and updates to transportation-related plans and projects to minimize noise impacts.

Furthermore, prior to issuance of building permits for projects that include sensitive receptors and are located in ambient noise environments exceeding the "Normally Acceptable" noise and land use compatibility standards shown in Table 5.12-2, the project applicant shall submit an acoustical study to the County that demonstrates that the proposed residential building design would provide an interior noise level of 45 dBA CNEL or less for residential uses, as required by the California Building Code, or acceptable levels for nonresidential uses per CALGreen standards. Acceptable methods for reducing noise exposure are detailed under RR NOI-1.

Level of Significance before Mitigation: Although implementation of RR NOI-1 and Countywide Plan policies would mitigate interior noise levels to an acceptable level, exterior noise levels due to traffic-related noise would be potentially significant; therefore Impact 5.12-2 would be potentially significant.

Impact 5.12-3: Buildout of the individual land uses and projects for implementation of the Countywide Plan may expose sensitive uses to strong levels of groundborne vibration. [Threshold N-2]

Construction Vibration Impacts

Construction activity would generate varying degrees of ground vibration, depending on the construction procedures and equipment. Operation of construction equipment generates vibrations that spread through the ground and diminish with distance from the source. The effect on buildings in the vicinity of the construction site varies depending on soil type, ground strata, and receptor-building construction. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels. Vibration from construction activities rarely reaches levels that can damage structures, but can achieve the audible and perceptible ranges in buildings close to the construction site. Table 5.12-13 lists reference vibration levels for construction equipment.

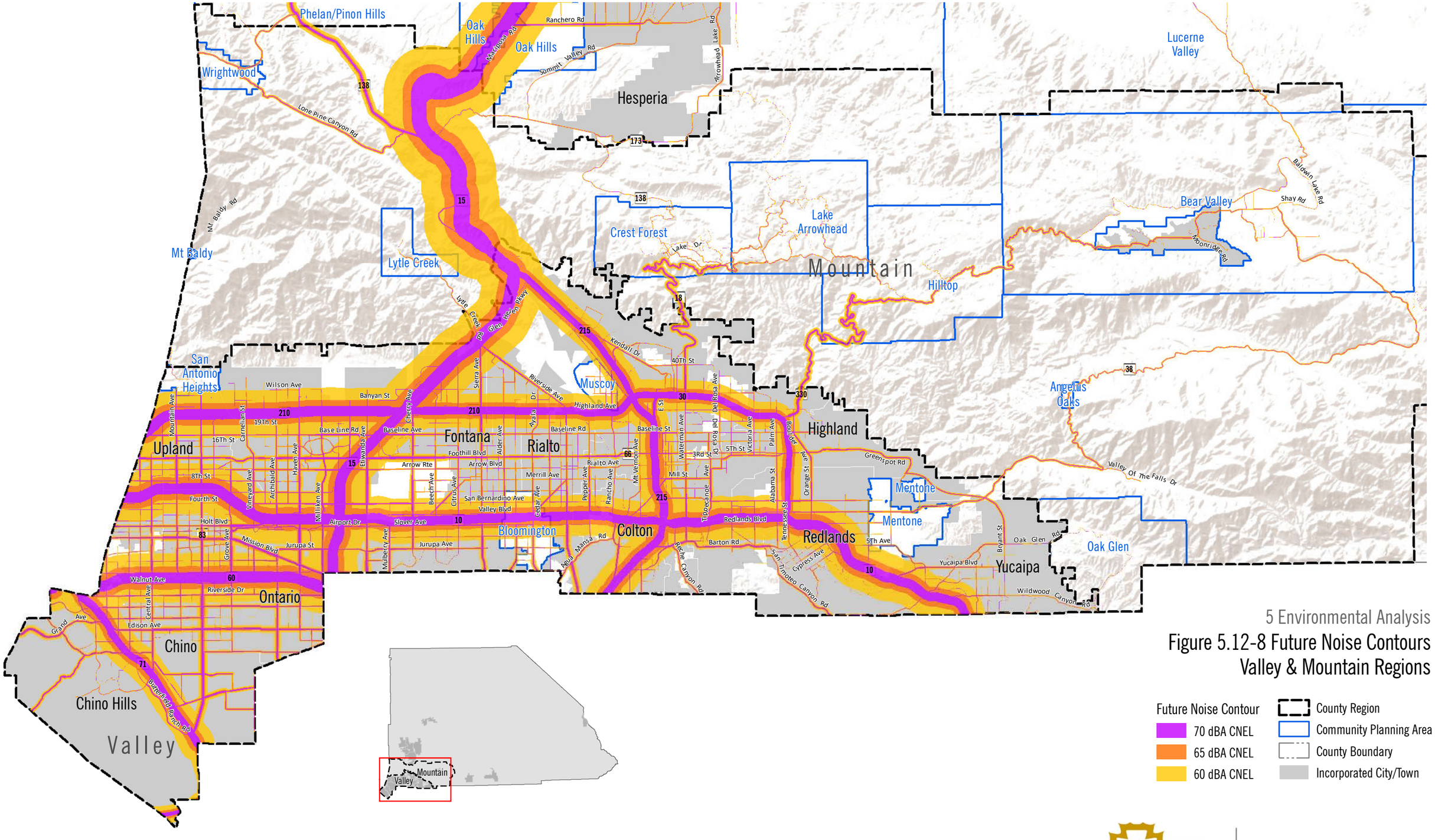
Table 5.12-13 Vibration Levels for Construction Equipment

Equipment	Approximate RMS Vibration Level at 25 Feet (VdB)	Approximate PPV Vibration Level at 25 Feet (in/sec)
Pile Driver, Impact (Upper Range)	112	1.518
Pile Driver, Impact (Typical)	104	0.644
Pile Driver, Sonic (Upper Range)	105	0.734
Pile Driver, Sonic (Typical)	93	0.170
Vibratory Roller	94	0.210
Large Bulldozer	87	0.089
Caisson Drilling	87	0.089
Loaded Trucks	86	0.076
Jackhammer	79	0.035
Small Bulldozer	58	0.003

Source: FTA 2018.
Notes: RMS = root-mean-square, PPV = peak particle velocity.

As shown in Table 5.12-13, vibration generated by construction equipment has the potential to be substantial, since it has the potential to exceed the FTA criteria for human annoyance of 78 VdB and architectural damage of 0.2 in/sec. However, groundborne vibration is almost never annoying to people who are outdoors, so it is usually evaluated in terms of indoor receivers (FTA 2018).

Construction details and equipment for future project-level developments under the Countywide Plan are not known at this time, but may cause vibration impacts. Therefore, this would be a potentially significant impact.



5 Environmental Analysis

Figure 5.12-8 Future Noise Contours Valley & Mountain Regions

Date: 2/9/2019

Created by PlaceWorks | Source: Fehr & Peers, 2018 (traffic volumes); PlaceWorks, 2018 (noise contours based on traffic volumes)

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Figure 5.12-9 Future Noise Contours North Desert Region, Victor Valley

Future Noise Contour
- 70 dBA CNEL
- 65 dBA CNEL
- 60 dBA CNEL
- County Region
- Community Planning Area
- County Boundary
- Incorporated City/Town

North Desert
East Desert
Mountain
Barstow
Yermo
Daggett
Newberry Springs
Helendale
Oro Grande
Adelanto
El Mirage
Apple Valley
Victorville
Phelan/Pinon Hills
Oak Hills
Hesperia
Lucerne Valley
Bear Valley
Lake Arrowhead
Wrightwood
Homestead Valley

Miles
0 2 4 6 8 10

Date: 2/9/2019 Created by PlaceWorks | Source: Fehr & Peers, 2018 (traffic volumes); PlaceWorks, 2018 (noise contours based on traffic volumes)

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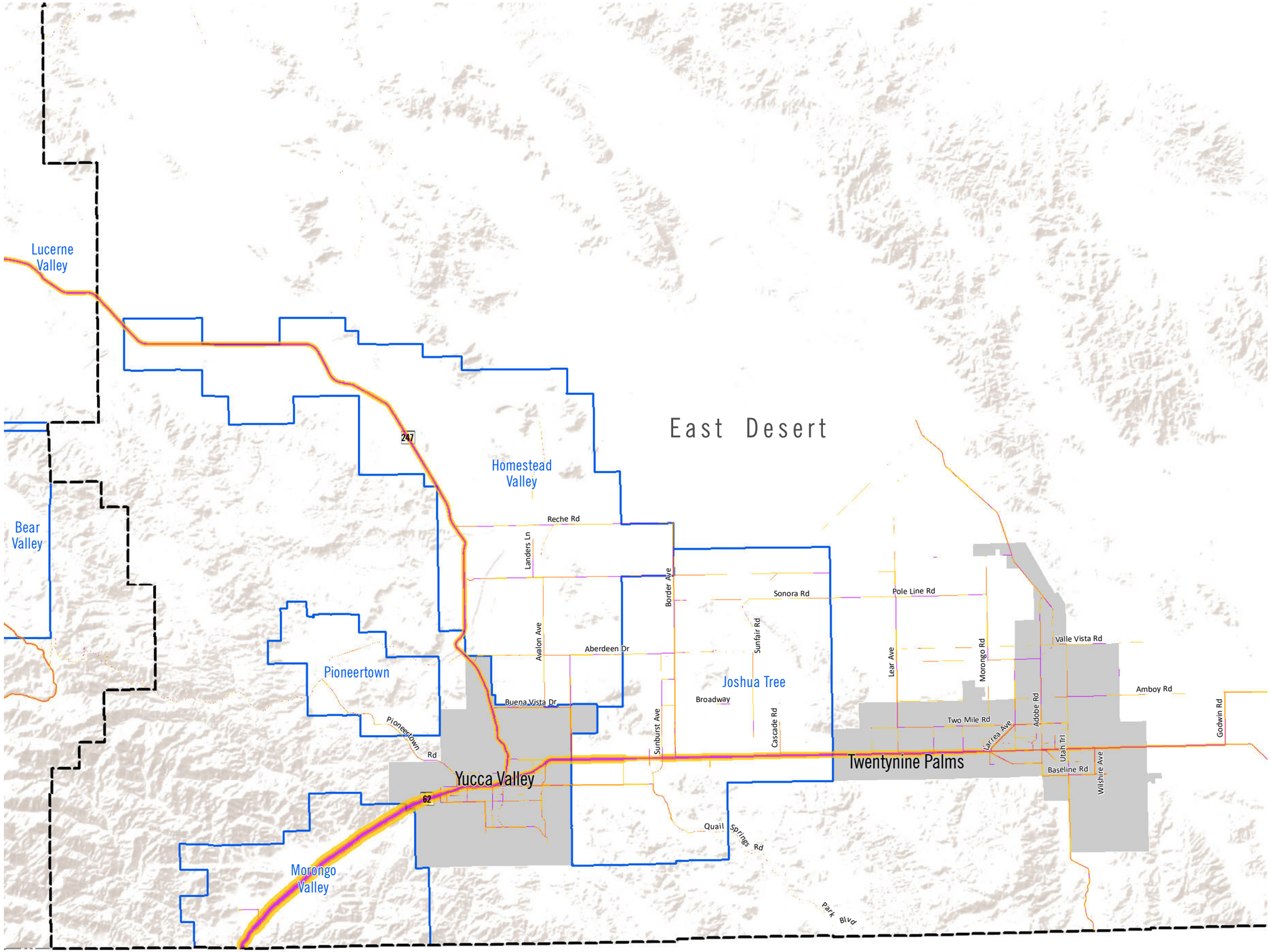
Figure 5.12-10 Future Noise Contours
East Desert Region



Date: 2/9/2019 Created by PlaceWorks | Source: Fehr & Peers, 2018 (traffic volumes); PlaceWorks, 2018 (noise contours based on traffic volumes)

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Figure 5.12-11 Significant Unincorporated County Roadway Noise Increases, Countywide

Noise Level Change
- <3 CNEL Change
- 3 + CNEL Change
- County Boundary
- County Region
- Incorporated City/Town Limits

North Desert

East Desert

Mountain

Valley

State Highway 127
Nipton Rd
Ivanpah Rd
Lanfair Rd
Mountain Springs Rd
Goffs Rd
River Rd
Unknown
Turtle Mountain Rd
Us Highway 95
Cadiz Rd
Rainbow Canyon Rd
Valle Vista Rd
Amboy Rd
Aronage Rd
State Highway 62
Winters Rd
Landers Ln
Sunny Vista Rd
Cascade Rd
Pioneertown Rd
Pipes Rd
Pioneer Dr
Mill Creek Rd
Hinkley Rd
Community Blvd
Powerline Rd
Manix Rd
Unknown
Needles Fwy
Newberry Rd
National Trails Highway
Sorrel Trl
Stoddard Wells Rd
Blanco Rd
Shadow Mountain Rd
Helendale Rd
El Mirage Rd
Caughlin Rd
Azalea Rd
Pearblossom Highway
Goss Rd
Duncan Rd
Smoke Tree Rd
Nielson Rd
Spring Valley Pkwy
Cahuilla Rd
Japatul Rd
Desert View Rd
Harrod Rd
Northside
Camp Rock Rd Rd
Calico Blvd
Glen Helen Pky
N Euclid Ave
Beech Ave
Alder Ave
Locust Ave
N Duffy St
5Th Ave
Grafton Ave
Phillips Blvd
Riverside Dr

Miles
0 4 8 12

Date: 6/13/2019 Created by PlaceWorks | Source: Fehr & Peers, 2018 (traffic volumes); PlaceWorks, 2018 (noise level change based on traffic volumes)

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Figure 5.12-12 Significant Unincorporated County Roadway Noise Increases, Valley Region

Noise Level Change
- <3 CNEL Change
- 3 + CNEL Change

- County Region
- Community Planning Area
- County Boundary
- Incorporated City/Town

Miles
0 2 4 6

Date: 6/13/2019 Created by PlaceWorks | Source: Fehr & Peers, 2018 (traffic volumes); PlaceWorks, 2018 (noise level change based on traffic volumes)

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Figure 5.12-13 Significant Unincorporated County Roadway Noise Increases, Mountain Region

Noise Level Change
- <3 CNEL Change
- 3 + CNEL Change

- County Region
- Community Planning Area
- County Boundary
- Incorporated City/Town

Miles
0 2 4 6

Date: 6/13/2019 Created by PlaceWorks | Source: Fehr & Peers, 2018 (traffic volumes); PlaceWorks, 2018 (noise level change based on traffic volumes)

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Figure 5.12-14 Significant Unincorporated County Roadway Noise Increases, North Desert Region, Victor Valley and Barstow

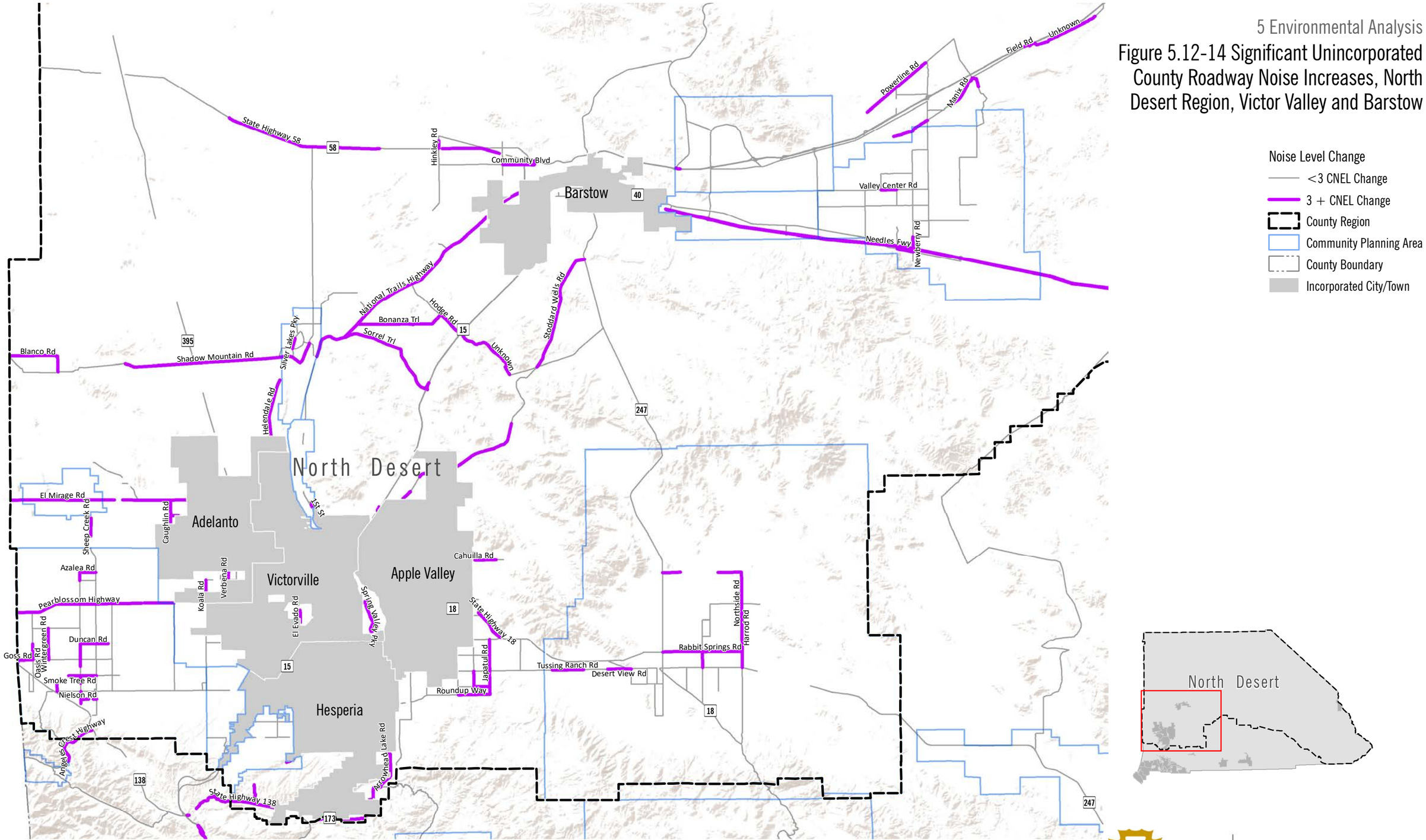

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Figure 5.12-15 Significant Unincorporated County Roadway Noise Increases, East Desert Region

Needles Fwy
40
National Trails Highway
Cadiz Rd
247
Rainbow Canyon Rd
Landers Ln
Winters Rd
Valle Vista Rd
Amboy Rd
Ironage Rd
Twentynine Palms Highway
State Highway 62
Pipes Rd
Pipes Canyon Rd
Pioneertown Rd
Yucca Valley
62
Sunny Vista Rd
Cascade Rd
Twentynine Palms
Pioneer Dr
East Desert

Noise Level Change
- <3 CNEL Change
- 3 + CNEL Change
- County Region
- Community Planning Area
- County Boundary
- Incorporated City/Town

Miles
0 2 4 6 8 10

Date: 6/13/2019 Created by PlaceWorks | Source: Fehr & Peers, 2018 (traffic volumes); PlaceWorks, 2018 (noise level change based on traffic volumes)

5. Environmental Analysis
NOISE

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Operational Vibration Impacts

Commercial and industrial operations would generate varying degrees of ground vibration, depending on the operational procedures and equipment. The effect on buildings in the vicinity of the vibration source varies depending on soil type, ground strata, and receptor-building construction. In addition, future sensitive receptors could be placed within close proximity to existing railroad lines through buildout of the Countywide Plan.

Development Code Section 83.01.090 prohibits vibration that can be felt without the aid of instruments or produces a particle velocity greater than or equal to two-tenths inch per second (i.e., 0.20 in/sec PPV) at or beyond the lot line of the source. Because specific project-level information is not available at this time, it is not possible to quantify future vibration levels at vibration-sensitive receptors that may be in close proximity to existing and future vibration sources. Therefore, with the potential for sensitive uses to be exposed to annoying and/or interfering levels of vibration from commercial or industrial operations and existing railroad lines, operations-related vibration impacts associated with implementation of the Countywide Plan are considered potentially significant.

Level of Significance before Mitigation: Potentially significant.

Impact 5.12-4: The proximity of the project area to an airport or airstrip would not result in exposure of future residents and/or workers to new airport-related noise. [Thresholds N-5 and N-6]

As discussed above, there are 16 airports, airstrips, and heliports in the County, for which noise contours are shown in Appendix J, including Big Bear City Airport, Chino Airport, Ontario International Airport, Redlands Municipal Airport, Southern California Logistics Airport, and San Bernardino International Airport, (San Bernardino 2005). Both the Roy Williams Airport and the Rialto Airport recently closed. Aircraft noise in the County is typically characterized as occasional but can be intrusive to nearby sensitive receptors. Future development of noise-sensitive land uses could be in areas that exceed the "Normally Acceptable" noise and land use compatibility standards shown in Table 5.12-4. However, Policy HZ-2.10, Airport Land Use and Noise Compatibility, would require new development in unincorporated areas to be consistent with applicable airport master plans and airport safety review areas, and the County would support new development in the influence area of County airports only when it is consistent with applicable airport master plans.

Level of Significance before Mitigation: Less than significant with Policy HZ-2.10.

5.12.5 Cumulative Impacts

The above analysis of the proposed Countywide Plan addresses cumulative impacts with regard to operational and construction noise as well as groundborne noise and vibration in the project area. The Countywide Plan proposes the long-term buildout and operation of many different uses. Although multiple simultaneous nearby noise sources may, in combination, result in higher overall noise levels, this effect is captured and accounted for by the community noise level metrics that form the basis of the standards of significance for noise analysis. To specifically estimate the Countywide Plan's contribution to traffic noise, existing noise levels were compared to those projected with completion of the plan. As demonstrated above, the Countywide Plan's contribution to increases in ambient noise levels results in a significant impact.

Additionally, construction activities may occur simultaneously and in close proximity to noise-sensitive receptors, resulting in significant impacts. Since details of individual development projects in the Project area are currently unknown, it cannot be determined whether Mitigation Measure N-1, listed below, would reduce potentially significant impacts to less than significant. The Countywide Plan would therefore contribute to cumulatively considerable construction-related noise, and the cumulative impact would be significant and unavoidable.

5.12.6 Level of Significance Before Mitigation

With the implementation of RR NOI-1 and Policy HZ-2.6 and HZ-2.7, Impact 5.12-2 would be less than significant.

With implementation of Policy HZ-2.10, Impact 5.12-4 would be less than significant.

Without mitigation, these impacts would be **potentially significant**:

- **Impact 5.12-1:** Construction activities would result in temporary noise.
- **Impact 5.12-2:** Buildout of the Countywide Plan would cause a substantial noise increase related to traffic on highways and local roadways and could locate sensitive receptors in areas that exceed established noise standards.
- **Impact 5.12-3:** Buildout of the individual land uses and projects for implementation of the Countywide Plan may expose sensitive uses to strong levels of groundborne vibration.

5.12.7 Mitigation Measures

Impact 5.12-1

N-1 Prior to issuance of demolition, grading and/or building permits on sites adjacent to sensitive receptors, a note shall be provided on construction plans indicating that during grading, demolition, and construction, the project applicant shall be responsible for requiring contractors to implement the following measures to limit construction-related noise:

- During the entire permitted activity, equipment and trucks used for the project shall utilize the best available noise control techniques (e.g., improved mufflers, intake silencers, ducts, engine enclosures, and acoustical attenuation), wherever feasible.
- Require impact tools (e.g., jack hammers and hoe rams) that are hydraulically or electrically powered whenever feasible. Where the use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used along with external noise jackets on the tools.

- Stationary equipment such as generators and air compressors shall be located as far as feasible from nearby noise-sensitive uses.
- Stockpiling shall be located as far as feasible from nearby noise-sensitive receptors.
- Prior to the start of construction activities, a sign shall be posted at the job site, clearly visible to the public, that includes permitted construction days and hours, as well as contact information for the County Building Inspection Supervisor and contractor's authorized representative. If the authorized contractor's representative receives a noise or vibration complaint, he/she shall investigate, take appropriate corrective action, and report the action to the County.
- Signs shall be posted at the job site entrance(s), within the on-site construction zones, and along queueing lanes (if any) to reinforce the prohibition of unnecessary engine idling. All other equipment shall be turned off if not in use for more than 5 minutes.
- During the entire active construction period, the use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only. The construction manager shall be responsible for adjusting alarms based on the background noise level, or to utilize human spotters when feasible and in compliance with all safety requirements and laws.
- Erect temporary noise barriers, where feasible, when construction noise is predicted to exceed the County noise standards and when the anticipated construction duration is greater than is typical (e.g., two years or greater).

Impact 5.12-3

N-2 Individual projects that use vibration-intensive construction activities, such as pile drivers, jack hammers, and vibratory rollers, near sensitive receptors shall be evaluated for potential vibration impacts. If construction-related vibration is determined to exceed the maximum level of 0.2 in/sec PPV at residential structures per Development Code Section 83.01.090 additional requirements, such as use of less-vibration-intensive equipment or construction techniques, shall be implemented during construction (e.g., drilled piles to eliminate use of vibration-intensive pile driver).

N-3 During the project-level CEQA process for individual discretionary development projects likely to generate noise or vibration exceeding limits established under the Countywide Plan or County Development Code at the site of a nearby sensitive receptor, a noise and vibration analysis shall be conducted to assess and mitigate potential noise and vibration impacts related to the operations of that development. This analysis shall be conducted by a qualified, experienced acoustical consultant or engineer and shall follow the latest CEQA guidelines, practices, and precedents.

N-4 Require that new discretionary residential projects (or other sensitive uses) within 200 feet of existing railroad lines conduct a groundborne vibration and noise evaluation consistent with FTA-approved methodologies.

Other Mitigation Measures Considered for Impact 5.12-2

Without other mitigation measures, existing noise-sensitive uses would be exposed to elevated traffic noise levels that would result in substantial impacts at some time in the Countywide Plan buildout. In compliance with CEQA, "each public agency shall mitigate or avoid the significant effects on the environment of project it carries out or approves whenever it is feasible to do so" (Public Resources Code § 21002.1(b)). The term "feasible" is defined in CEQA to mean "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors" (Public Resources Code § 21061.1). A number of measures were considered for mitigating or avoiding the traffic noise impacts.

Special Roadway Paving

Notable reductions in tire noise have been achieved via the implementation of special paving materials, such as rubberized asphalt or open-grade asphalt concrete overlays. For example, Caltrans conducted a study of pavement noise along Interstate 80 in Davis (Caltrans 2011b) and found an average improvement of 6 dBA to 7 dBA compared to conventional asphalt overlay.

Although this amount of noise reduction from rubberized/special asphalt materials would be sufficient in some cases to avoid the predicted noise increase due to traffic, the potential up-front and ongoing maintenance costs are such that the cost versus benefits ratio[2] may not be feasible and reasonable and would not mitigate noise to a level of less than significant in all cases. In addition, the study found that noise levels increased over time due to pavement raveling, with the chance of noise level increases higher after 10 years.

Sound Barriers

A cursory review of aerial depictions of the impacted roadway segments shows that the majority (if not all) of residences around the plan area have direct access (via driveways) to the associated roadway. Therefore, barrier walls would prevent access to individual properties and would be infeasible. Further, these impacted homes are on private property outside of the control of future project developers, so there may be limited admittance onto these properties to construct such walls. Lastly, the costs versus benefits ratio in relation to the number of benefitted households may not be feasible and reasonable in all cases.

Sound Insulation of Existing Residences and Sensitive Receptors

Exterior-to-interior noise reductions depend on the materials used, the design of the homes, and their conditions. To determine what upgrades would be needed, a noise study would be required for each house to measure exterior-to-interior noise reduction. Sound insulation may require upgraded windows, upgraded doors,

[2] Cost versus benefit considerations are in terms of the number of households benefited, per the general methodology employed by Caltrans in the evaluation of highway sound walls.

and a means of mechanical ventilation to allow a "windows closed" condition. There are no funding mechanisms and procedures that would guarantee that the implementation of sound insulation features at each affected home would offset the increase in traffic noise to interior areas and ensure that the State 45 dBA CNEL standard for multifamily residences would be achieved.

5.12.8 Level of Significance After Mitigation

Impact 5.12-1

Mitigation Measure N-1 would reduce potential noise impacts during construction to the extent feasible. However, due to the potential for proximity of construction activities to sensitive uses, the number of construction projects occurring simultaneously, and the potential longevity of construction activities, Impact 5.12-1 (construction noise) could result in a temporary substantial increase in noise levels above ambient conditions. Therefore, this impact would remain **significant and unavoidable**. It should be noted that the identification of this program-level impact does not preclude the finding of less than significant impacts for subsequent projects analyzed at the project level.

Impact 5.12-2

Mitigation Measure N-2 would reduce potential interior noise impacts to future noise-sensitive receptors below the thresholds. However, as demonstrated under "Other Mitigation Measures Considered for Impact 5.12-2," there are no feasible or practical mitigation measures available to reduce project-generated traffic noise to less than significant levels for existing residences along the affected roadway. No individual measure and no set of feasible or practical mitigation measures are available to reduce project-generated traffic noise to less than significant levels in all cases. Thus, Impact 5.12-2 would remain **significant and unavoidable**. It should be noted that the identification of this program-level impact does not preclude the finding of less than significant impacts for subsequent projects analyzed at the project level.

Impact 5.12-3

With Mitigation Measures N-3, N-4, and N-5, coupled with adherence to associated performance standards, Impact 5.12-3 would be reduced to **less than significant levels**. Specifically, Mitigation Measure N-3 would reduce potential vibration impacts during construction below the pertinent thresholds, and Mitigation Measures N-4 and N-5 (operations-related vibration) would reduce potential vibration impacts from commercial/industrial uses and proposed uses near existing railroads and facilities to **less than significant levels**. No significant vibration impacts would remain.

5.12.9 References

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