Fundamentals of Noise

NOISE

Noise is most often defined as unwanted sound; whether it is loud, unpleasant, unexpected, or otherwise undesirable. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness."

Noise Descriptors

The following are brief definitions of terminology used in this chapter:

- **Sound.** A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.

- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

- **Decibel (dB).** A unitless measure of sound, expressed on a logarithmic scale and with respect to a defined reference sound pressure. The standard reference pressure is 20 micropascals (20 μPa).

- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.

- **Equivalent Continuous Noise Level (L_{eq}); also called the Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.

- **Statistical Sound Level (L_n).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."

- **Day-Night Sound Level (L_{dn} or DNL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.

- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added from 7:00 PM to 10:00 PM and 10 dB from 10:00 PM to 7:00 AM. NOTE: For general community/environmental noise, CNEL and L_{dn} values rarely differ by more than 1 dB (with the CNEL being only slightly more restrictive – that is, higher than the L_{dn} value). As a matter of practice, L_{dn} and CNEL values are interchangeable and are treated as equivalent in this assessment.

- **Peak Particle Velocity (PPV).** The peak rate of speed at which soil particles move (e.g., inches per second) due to ground vibration.

- **Sensitive Receptor.** Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

Characteristics of Sound

When an object vibrates, it radiates part of its energy in the form of a pressure wave. Sound is that pressure wave transmitted through the air. Technically, airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure that creates sound waves.

Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). Loudness or amplitude is measured in dB, frequency or pitch is measured in Hertz [Hz] or cycles per second, and duration or time variations is measured in seconds or minutes.

Amplitude

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale. Because of the physical characteristics of noise transmission and perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Table 1 presents the subjective effect of changes in sound pressure levels. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud). Changes of 1 to 3 dB are detectable under quiet, controlled conditions, and changes of less than 1 dB are usually not discernible (even under ideal conditions). 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 discernible to most people in an exterior environment, and a 10 dB change is perceived as a doubling (or halving) of the sound.

Table 1 Noise Perceptibility

Change in dB	Noise Level
± 3 dB	Threshold of human perceptibility
± 5 dB	Clearly noticeable change in noise level
± 10 dB	Half or twice as loud
± 20 dB	Much quieter or louder

Source: Bies, David A. and Colin H. Hansen. 2009. *Engineering Noise Control: Theory and Practice*. 4th ed. New York: Spon Press.

Frequency

The human ear is not equally sensitive to all frequencies. Sound waves below 16 Hz are not heard at all, but are "felt" more as a vibration. Similarly, though 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.

When describing sound and its effect on a human population, A-weighted (dBA) sound levels are typically used to approximate the response of the human ear. The A-weighted noise level has been found to correlate well with people's judgments of the "noisiness" of different sounds and has been used for many years as a measure of community and industrial noise. Although the A-weighted scale and the energy-equivalent metric are commonly used to quantify the range of human response to individual events or general community sound levels, the degree of annoyance or other response also depends on several other perceptibility factors, including:

- Ambient (background) sound level
- General nature of the existing conditions (e.g., quiet rural or busy urban)
- Difference between the magnitude of the sound event level and the ambient condition
- Duration of the sound event
- Number of event occurrences and their repetitiveness
- Time of day that the event occurs

Duration

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, respectively. These "n" values are typically used to demonstrate compliance for stationary noise sources with many cities' noise ordinances. 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, respectively.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law and many local jurisdictions use an adjusted 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 (or "penalty") of 5 dBA be added to the actual noise level for the hours from 7:00 PM to 10:00 PM and 10 dBA for the hours from 10:00 PM to 7:00 AM. The L_{dn} descriptor uses the same methodology except that there is no artificial increment added to the hours between 7:00 PM and 10:00 PM. Both descriptors give roughly the same 24-hour level, with the CNEL being only slightly more restrictive (i.e., higher). The CNEL or L_{dn} metrics are commonly applied to the assessment of roadway and airport-related noise sources.

Sound Propagation

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 (conservatively neglecting ground attenuation effects, air absorption factors, and barrier shielding). For example, if a backhoe at 50 feet generates 84 dBA, at 100 feet the noise level would be 79 dBA, and at 200 feet it would be 73 dBA. 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 over a reflective ("hard site") surface such as concrete or asphalt. Line source noise in a relatively flat environment with ground-level absorptive vegetation decreases by an additional 1.5 dB for each doubling of distance.

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 the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. Extended periods of noise exposure above 90 dBA results in permanent cell damage, which is the main driver for employee hearing protection regulations in the workplace. For community environments, the ambient or background noise problem is widespread, through generally worse in urban areas than in outlying, less-developed areas. Elevated ambient noise levels can result in noise interference (e.g., speech interruption/masking, sleep disturbance, disturbance of concentration) and cause annoyance. Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level number means. To help relate noise level values to common experience, Table 2 shows typical noise levels from familiar sources.

Table 2 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: California Department of Transportation (Caltrans). 2013, September. Technical Noise Supplement ("TeNS").

Vibration Fundamentals

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities stemming from operations of railroads or vibration-intensive stationary sources, but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. As with noise, vibration can be described by both its amplitude and frequency. Vibration displacement is the distance that a point on a surface moves away from its original static position; velocity is the instantaneous speed that a point on a surface moves; and acceleration is the rate of change of the speed. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During construction, the operation of construction equipment can cause groundborne vibration. During the operational phase of a project, receptors may be subject to levels of vibration that can cause annoyance due to noise generated from vibration of a structure or items within a structure.

Vibration amplitudes are usually described in terms of either the peak particle velocity (PPV) or the root mean square (RMS) velocity. PPV is the maximum instantaneous peak of the vibration signal and RMS is the

square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage and RMS is typically more suitable for evaluating human response.

As with airborne sound, annoyance with vibrational energy is a subjective measure, depending on the level of activity and the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Persons accustomed to elevated ambient vibration levels, such as in an urban environment, may tolerate higher vibration levels. Table 3 displays the human response and the effects on buildings resulting from continuous vibration (in terms of various levels of PPV).

Table 3 Human Reaction to Typical Vibration Levels

Vibration Level, PPV (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: California Department of Transportation (Caltrans). 2004, June. Transportation- and Construction-Induced Vibration Guidance Manual. Prepared by ICF International.

LOCAL REGULATIONS AND STANDARDS

Noise Element

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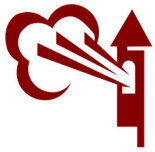
Noise Element



PURPOSE

The Noise Element is intended to limit exposure of the community to excessive noise levels. Noise is generally defined as unwanted or unpleasant sound. Excessive noise is associated with an interference with speech and other communication, a distraction at home and at work, the disturbance of rest and sleep, and the disruption of various recreational pursuits.

To ensure that noise does not affect the health and serenity of Victorville residents, this element provides a systematic approach to identifying and appraising excessive noise in the Planning Area, quantifying noise levels, and addressing excessive noise exposure, and community planning for the regulation of noise. This element includes policies, standards, criteria, programs, diagrams, a reference to action items, and maps related to protecting public health and welfare from noise.

Section 65302(f) of the Government Code requires that a General Plan include a Noise Element to guide decisions concerning land use and the location of excessive noise sources. Issues to be addressed in the Noise Element include:

- Major noise sources, both mobile and stationary
- Existing and projected levels of noise and noise contours for major noise sources
- Existing and projected land uses and locational relationship to existing and projected noise sources
- Existing and proposed sensitive receptors, including:
    - Hospitals
    - Convalescent homes
    - Schools
    - Churches
    - Sensitive wildlife habitat, including the habitat of rare, threatened, or endangered species.

Major noise sources in a community include the following:

- Highways and freeways
- Primary arterials and major local streets
- Passenger and freight on-line railroad operations and ground rapid transit systems
- Commercial, general aviation, heliport, helistop and military airport operations, aircraft over-flights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation
- Local industrial plants, including, but not limited to railroad classification yards
- Other ground stationary sources identified by local agencies as contributing to the community noise environment.

RELATIONSHIP TO OTHER ELEMENTS

The Noise Element has a direct relationship with other General Plan elements, most notably the Land Use Element. Through the Land Use Map and Land Use Element policies, land uses that will be occupied by sensitive receptors are located away from excessive noise sources. These policies that focus on placing residential uses away from major noise sources also are reflected in the Housing Element. The Noise Element also relates to the Circulation Element, because the location and design of new roads and transit could impact existing and planned land uses. Finally, the Noise Element also relates to the Resource Ele-

ment because excessive noise may have a detrimental effect on sensitive habitats and the community's enjoyment of open spaces.

VISION – NOISE

The Noise Element of the City of Victorville's General Plan lays the foundation for balancing the placement of noise sensitive land uses with the need for infrastructure and activities that generate excessive noise. The goals, objectives, policies, and implementation measures of this element envision a Victorville that minimizes noise-land use incompatibilities and supports the health and serenity of its citizens.

EXISTING CONDITIONS

Definition of Noise

Noise is usually defined as unwanted or excessive sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a wave, resulting in the tone's range from high to low. Loudness is the strength of a sound and describes a noisy or quiet environment; it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves, combined with the reception characteristics of the human ear. In an urban environment, sound that becomes noise is typically a byproduct of transportation systems, certain land uses and on-going human activity.

Definitions of acoustical terms are provided in Table N-1.

Noise Measurement

The common unit for measuring sound (or noise) to the faintest level detectable by a person with good hearing is called a decibel (dB).

Because sound or noise can vary in intensity by over one million times within the range of human hearing, a logarithmic loudness scale is used to keep sound intensity numbers at a convenient level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, noise levels at maximum human sensitivity are factored more heavily into sound descriptions in a process called A-weighting, written as dBA. References to noise levels in this Section are in dBA. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud).

Because community receptors (e.g. residents, the infirm, convalescents, children) are more sensitive to unwanted noise during the evening and night, state law requires that nighttime noise be more heavily weighted than noise occurring during the day. To measure this noise variation during different times of the day, an artificial dB increment is added to quiet time noise levels for planning purposes in a 24-hour noise descriptor called the Community Noise Equivalency Level (CNEL). The CNEL takes average sound levels at an observation point and adds a weighting penalty to those sounds that occur during the evening and night hours. A penalty of 5 dBA is added between 7 PM and 10 PM, and a 10 dBA penalty is added between 10 PM and 7 AM. CNEL noise levels are often reported as 65 dB CNEL or 65 CNEL.

When evaluating changes in 24-hour community noise levels, a 3 dBA increase is

barely perceptible to most people. While a 5 dBA increase is readily noticeable, a 10 dBA increase would be perceived as a doubling of loudness (US DOT 1980).

Effects of Noise

Noise measurements are meaningless without an understanding of the relationship to human sensitivity. The human response to noise is varied and extremely complex. Noise effects have been divided and described in terms of physiological effects, behavioral effects, and subjective effects. Physiological effects include both temporary effects such as startle reactions and temporary hearing threshold shifts, along with enduring effects such as those from prolonged sleep loss or permanent hearing damage. Behavioral effects involve interference with ongoing activities such as speech, learning, listening, or distraction from the performance of various tasks. Subjective effects are a combined result of behavioral and physiological effects and are described in such terms as "annoyance," "nuisance," "disturbance," or "dissatisfaction."

Table N-2, Common Noise Sources and Sound Levels, provides examples of some common sound levels and their noise sources.

Demolition of a portion of City Hall

Table N-1

Definitions of Acoustical Terms

Term	Definition
Decibel (dB)	A unit of level that denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency (Hz)	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level (dBA)	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{02}, L_{08}, L_{50}, L_{90}	The fast A-weighted noise levels that are equaled or exceeded by a fluctuating sound level 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period, respectively.
Equivalent Continuous Noise Level (L_{eq})	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level (CNEL)	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 decibels to sound levels occurring in the evening from 7:00 PM to 10:00 PM and after the addition of 10 decibels to sound levels occurring in the night between 10:00 PM and 7:00 AM
Day/Night Noise Level (L_{dn})	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 decibels to sound levels occurring in the night between 10:00 PM and 7:00 AM
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Source: *Handbook of Acoustical Measurement and Noise Control, 1991*.	

Table N-2 Common Noise Sources and Sound Levels		
Noise Source	**A-Weighted Sound Level (dB)**	**Noise Effect**
Near jet engine	140	Deafening
Civil defense siren	130	Threshold of pain
Hard rock band	120	Threshold of feeling
Accelerating motorcycle at a few feet away	110	Very loud
Pile driver; noisy urban street/ heavy city traffic	100	Very loud
Ambulance siren; food blender	95	Very loud
Garbage disposal	90	Very loud
Freight cars; living room music	85	Loud
Pneumatic drill; vacuum cleaner	80	Loud
Busy restaurant	75	Moderately loud
Near freeway auto traffic	70	Moderately loud
Average office	60	Quiet
Suburban street	55	Quiet
Light traffic; soft radio music in apartment	50	Quiet
Large transformer	45	Quiet
Average residence without stereo playing	40	Faint
Soft whisper	30	Faint
Rustling leaves	20	Very faint
Human breathing	10	Very faint

Standards for Land Use Compatibility

Activity, or land use, also is a factor in sensitivity to noise. Excessive noise could prevent sleep. As sleep is a primary activity in residences and hospitals, these land uses are also sensitive to noise. Noise can distract from activities that require quiet and human concentration, such as reading, studying, and listening, making schools and libraries vulnerable to noise intrusion. Noise is tolerated to a much greater extent in commercial and industrial areas, where it does not interfere with quiet human activities as much. Table N-3 illustrates acceptable and unacceptable noise levels for various land uses as established by the U.S. Department of Housing and Urban Development and State of California Guidelines.

Table N-3
Victorville Land Use Compatibility Standards

	Community Noise Exposure Ldn or CNEL, dB						
Land Use Categories	55	60	65	70	75	80 +	
Residential - Low Density, Single Family, Duplex, Multi-family, Mobile Home	1	1	2	2	3	4	4
Transient Lodging - Motels, Hotels	1	1	2	2	3	3	4
Schools, Libraries, Churches, Hospitals, Nursing Homes	1	1	2	3	3	4	4
Auditoriums, Concert Halls, Amphitheaters	2	2	3	3	4	4	4
Sports Arena, Outdoor Spectator Sports	2	2	2	2	3	3	3
Playgrounds, Neighborhood Parks	1	1	1	2	3	3	3
Golf Courses, Riding Stables, Water Recreation, Cemeteries	1	1	1	2	2	4	4
Office Buildings, Business Commercial, Retail Commercial and Professional	1	1	1	2	2	3	3
Industrial, Manufacturing, Utilities	1	1	1	1	2	2	2
Agriculture	1	1	1	1	1	1	1

Legend:

1. NORMALLY ACCEPTABLE: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
2. CONDITIONALLY ACCEPTABLE: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and Schools, Libraries, Churches, Hospitals, Nursing Homes 1 needed noise insulation features included in the design. Conventional construction, with closed windows and fresh air supply systems or air conditioning will normally suffice.
3. NORMALLY UNACCEPTABLE: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
4. CLEARLY UNACCEPTABLE: New construction or development should generally not be undertaken.

Noise exposure is "normally acceptable" if the level of exposure does not require any special noise insulation or special construction techniques to reduce interior noise levels. The maximum exterior noise level considered to be normally acceptable for residential development is 65 dBA.

The State also provides additional standards through the implementation of the State Noise Insulation Standards. These standards apply to new multiple-family residential development located in areas exposed to ambient noise levels that exceed 65 dB (CNEL or Ldn). New multiple-family development in these areas must reduce exterior to interior noise levels through insulation, construction, or design.

Noise Environment

The primary sources of noise in the Victorville Planning Area are freeways and roadways, railroad traffic, SCLA aircraft operations, and stationary sources, as described below.

Freeways and Roadways: The dominant sources of noise throughout the Planning Area are transportation-related. Motor vehicle noise commonly causes sustained noise levels, often in close proximity to sensitive land uses. The major sources of traffic noise in the Planning Area are the I-15, US-395, SR-18, Route 66, Bear Valley Road, Palmdale Road, Mojave Drive, 7th Street, Amethyst Road, El Evado Road, Green Tree Boulevard, Hesperia Road, and La Mesa Road.

Vehicular noise along these routes comes from both cars and trucks. The following roadways are designated truck routes, and are expected to have notably higher levels of truck related Noise: Air Expressway; National Trails Highway / D Street; Hesperia Road from Bear Valley Road to D Street; Green Tree Boulevard from 7th Street to Hesperia Road; Mariposa Road from Bear Valley Road to Green Tree Boulevard; Bear Valley Road within the City limits; Amargosa Road from Bear Valley Road to Dos Palmas Road; Nisqualli Road from Hesperia Road to I-15.

Railroad Traffic: The Burlington Northern Santa Fe Company (BNSF) operates freight rail services through the City of Victorville, with a double main line and lead tracks for industrial uses. Union Pacific Railroad also operates on the double main line and Victorville is within its service area. The rail lines bisect the eastern portion of the City. In the future, with the expansion of the SCLA, Victorville plans to function as a major hub for cargo transfer and distribution. The City has begun construction of the first phase of rail lines leading to a new inter-modal/multi-modal rail yard. This facility will be located in the northwestern portion of the City, allowing transfer of freight from rail-to-truck and rail-to-rail.

SCLA Airport Noise: The SCLA site encompasses approximately 2,762 acres in the northwestern part of Victorville. It is bordered by the Mojave River to the east, a federal correctional facility to the south, and the City of Adelanto to the west. Aircraft noise is an important component of determining land use compatibility with airport operations. Aircraft activity noise contours have been calculated based upon long range SCLA utilization projections.

The existing aircraft noise contours presented in the “Comprehensive Land Use Plan for Southern California Logistics Airport” (Draft December 2007) are depicted in Figure N-1 . Future Noise Contours are presented in Figure N-2. For existing activity levels, the 70 and 75 CNEL contours remain entirely on airport property. The 65 CNEL noise contour extends off airport property to the south. This area is presently

undeveloped. The 60 CNEL noise contour extends off airport property to the north, south, and southwest. The 55 CNEL noise contour extends off airport property to the north, south, northeast, and southwest.[1]

SCLA is proposing to update its master plan and increase aircraft flight operations. As proposed, SCLA's long-term forecast activity, expected in year 2025, would extend its noise contours (75, 70, 65, 60, 55 CNEL) beyond airport property. As shown in Figure N-2, the contours that are considered to have a significant noise effect are the 75, 70, and 65 CNEL contours. The 75 CNEL noise contour extends a short distance beyond the airport property line to the north and south. To the east and west this contour does not go beyond the airport property line. The 70 CNEL noise contour extends north and south of airport property approximately one mile. This contour does not extend beyond the property line to the east or west. The 65 CNEL noise contour extends south of the airport property line approximately three miles to Mojave Drive. It extends north of airport property approximately 2.5 miles. Additionally, this contour extends beyond airport property west of Adelanto Road.

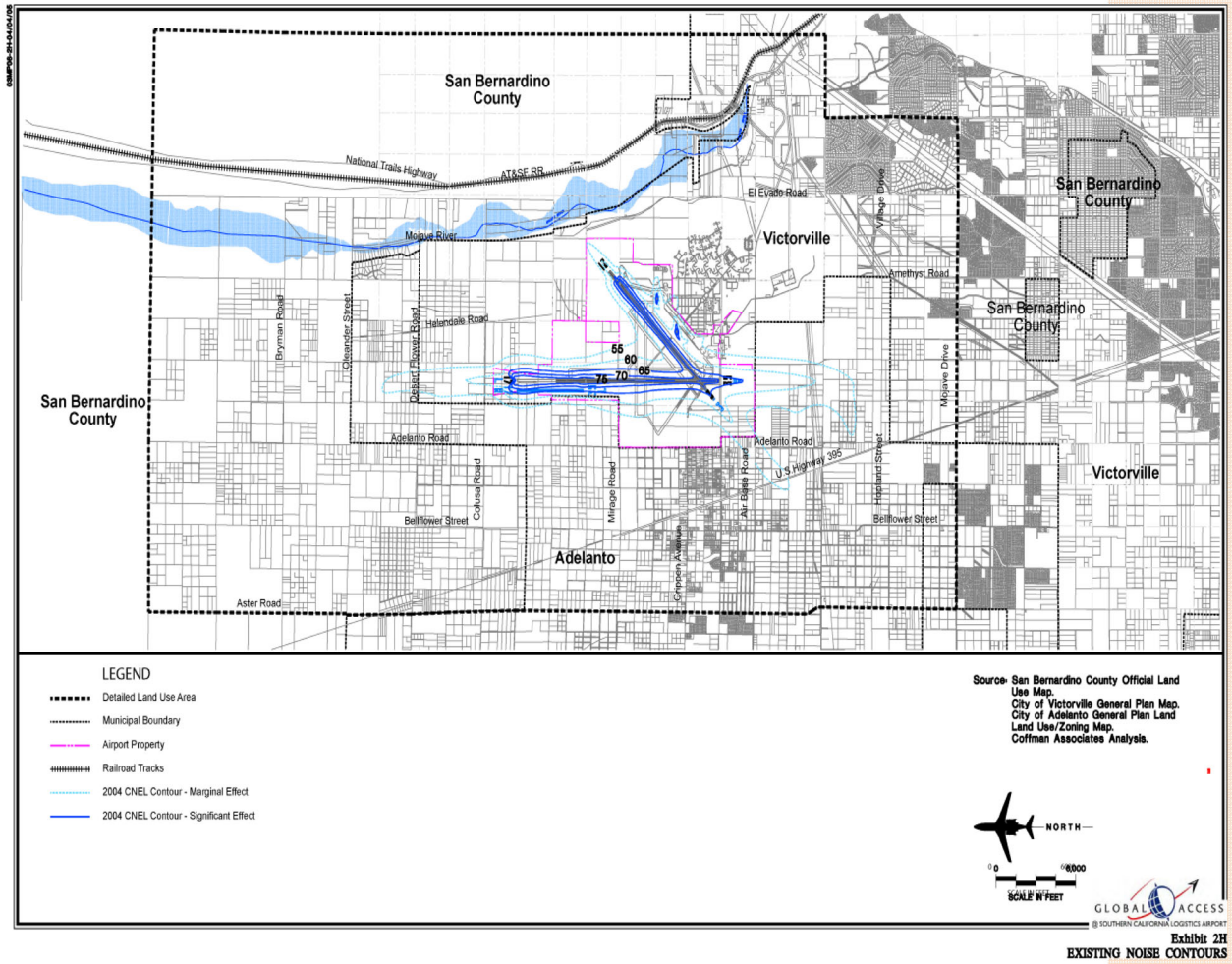


Figure N-1. SCLA Existing Airport Noise Contours

[1]Comprehensive Land Use Plan for Southern California Logistics Airport, Draft December 2007, Coffman Associates.

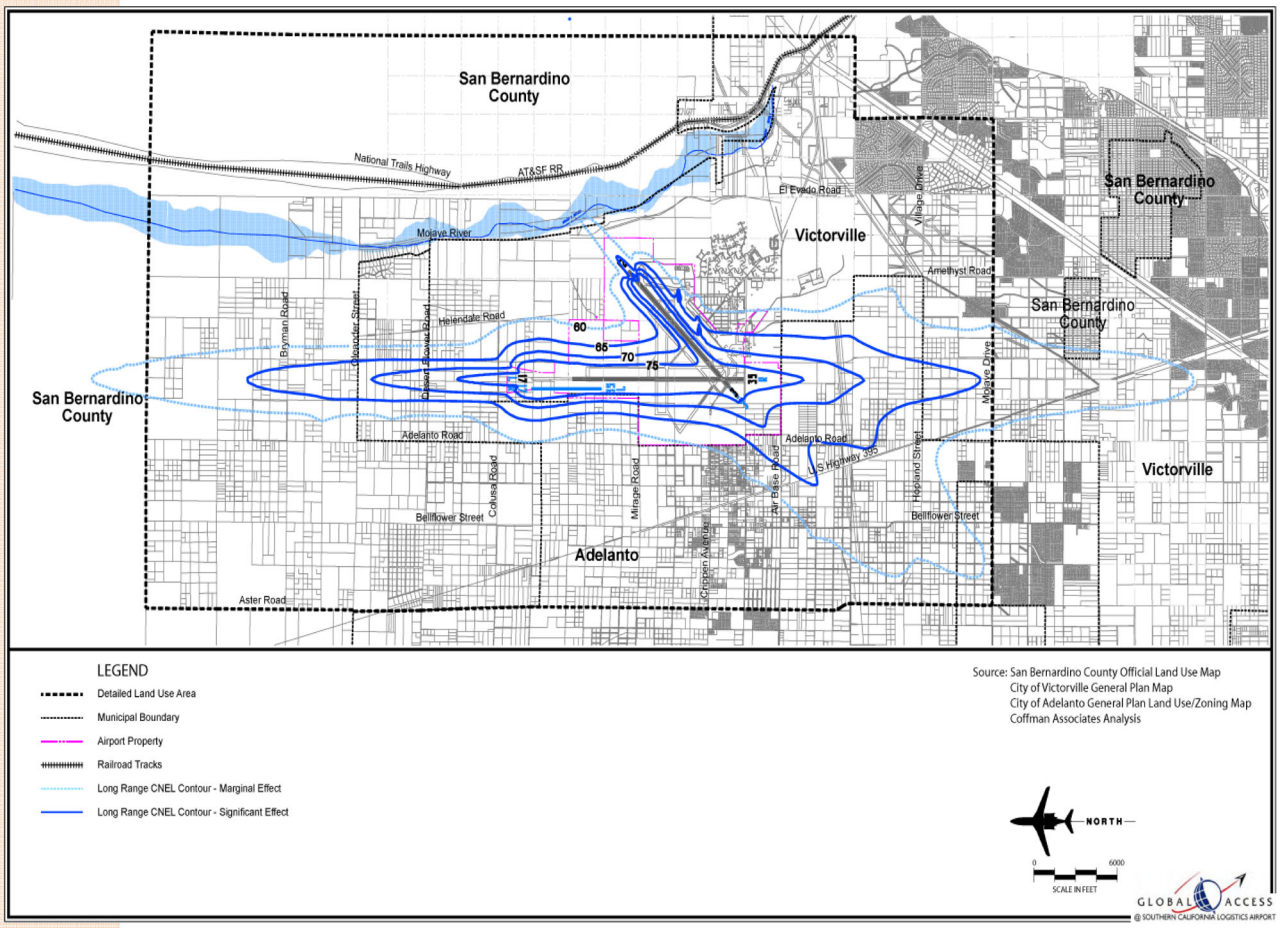


Figure N-2 (5.11-2. SCLA Proposed Future (2025) Airport Noise Contours)

Stationary Noise Sources: Manufacturing operations are the major stationary noise sources in the Planning Area. Of the existing manufacturing operations in the Planning Area, cement manufacturers are expected to generate the most noise. There are currently two cement manufacturers in the Planning Area, both which have outdoor rock crushing operations. Both are located within Heavy Industrial land use designated areas where 75 decibels is "conditionally acceptable" for permitted uses.

GOALS, OBJECTIVES, POLICIES AND IMPLEMENTATION

The following goals, objectives, policies and implementation measures are intended to achieve the Vision of this Noise Element and to guide the City's efforts to minimize noise-land use incompatibilities and support the health and serenity of its citizens.

GOAL #1: Noise Sensitivity – Identify significant noise sources that could adversely affect community.

GOAL #2: Noise Control – Manage the affects of noise emissions to help ensure reduction of adverse affects on the community.

GOAL #1: NOISE SENSITIVITY
IDENTIFY SIGNIFICANT NOISE SOURCES THAT COULD ADVERSELY AFFECT COMMUNITY.

Objective 1.1: Locate noise sensitive land uses away from existing excessive noise sources, and locate new excessive noise generators away from existing sensitive land uses

Policy 1.1.1: *Implement Table N-3 regarding placement of new land uses.*

Implementation Measure 1.1.1.1: Continue to assess projects through the subdivision, site plan, conditional use permit, and other development review processes and incorporate conditions of approval which ensure noise compatibility where appropriate.

Implementation Measure 1.1.1.2: Prohibit new single family residential land uses in areas with a CNEL of 65 dB or greater.

Implementation Measure 1.1.1.3: Require a noise study to be performed and appropriate noise attenuation to be incorporated prior to approving any multifamily or mixed-use residential development in an area with a CNEL of 65 dB or greater.

Policy 1.1.2: *Continue to ensure that there is no conflict or inconsistency between the operation of the Southern California Logistics Airport and future land uses within the Planning Area.*

Implementation Measure 1.1.2.1: Continue to monitor Southern California Logistics Airport operations to ensure there is no conflict or inconsistency between the operation of the Southern California Logistics Airport and future land uses within the Planning Area.

Implementation Measure 1.1.2.2: Work closely with Southern California Logistics Airport planners to ensure that future master plan expansions do not impact sensitive Victorville land uses.

Implementation Measure 1.1.2.3: Require Southern California Logistics Airport to update its Specific Plan as directed by the City to accommodate changes in its master plan.

Objective 1.2: Design new transportation facilities to minimize noise impacts on nearby sensitive sources

Policy 1.2.1: *Include noise mitigation measures in the design and use of new roadway projects.*

Implementation Measure 1.2.1.1: Continue to use special paving materials that will buffer roadway noise.

Implementation Measure 1.2.1.2: Incorporate adequate setbacks in roadway design to maximize the distance from sensitive land uses.

Implementation Measure 1.2.1.3: Restrict new truck routes to roadways that are located away from sensitive land uses.

Policy 1.2.2*: Promote noise mitigation measures in the design and use of new rail projects.*

Implementation Measure 1.2.2.1: Continue to coordinate with regional agencies and rail providers to incorporate adequate setbacks in rail line to maximize the distance from sensitive land uses.

GOAL #2 NOISE CONTROL
MANAGE THE AFFECTS OF NOISE EMISSIONS TO HELP ENSURE REDUCTION OF ADVERSE AFFECTS ON THE COMMUNITY

Objective 2.1: Ensure existing and future noise sources are properly attenuated

Policy 2.1.1: *Continue to implement acceptable standards for noise for various land uses throughout the City.*

Implementation Measure 2.1.1.1: Require a noise study to be performed and appropriate noise attenuation to be incorporated prior to approving any multifamily or mixed-use residential development in an area with a CNEL of 65 dB or greater.

Implementation Measure 2.1.1.2: Monitor noise complaints and enforce provisions of the City noise ordinance.

Implementation Measure 2.1.1.3: Discourage location of new educational facilities in areas with noise levels greater than 65 dB CNEL.

Implementation Measure 2.1.1.5: Continue to restrict noise and require mitigation measures for any noise-emitting construction equipment or activity.

Implementation Measure 2.1.1.6: Reduce speed limits on arterial streets if necessary to lower sound to appropriate levels for adjacent and surrounding land uses.

Objective 2.2: Ensure the community is properly informed regarding potential noise from SCLA operations

Policy 2.2.1: *Incorporate current information regarding SCLA operations into the land use planning process.*

Implementation Measure 2.2.1.1: Place the following condition on all new residential projects within the Planning Area: *The applicant/developer shall record an Airport Location Notice, which discloses the direction and distance from Southern California Logistics Airport. This notice shall record with the final map, including legal descriptions for all lots, and shall be subject to staff review and approval.*

Implementation Measure 2.2.1.2: Place the following condition on all development within the airport influence area, roughly north of Mojave Drive and west of Amargosa Road: *The applicant/developer shall record an Avigation Easement, which allows for the continued operation of overhead flights from Southern California Logistics Airport. The Avigation Easement shall be recorded prior to the issuance of any building permits, and shall be subject to staff review and approval.*

Chapter 13.01 - NOISE CONTROL

Sections:

13.01.010 - Purpose and intent.

(a) The purpose of this chapter is to establish criteria and standards for the regulation of noise levels within the city of Victorville.

(b) The city council declares and finds that excessive noise levels are detrimental to the public health, welfare and safety and contrary to the public interest. It is the intent of this chapter to protect persons from excessive levels of noise from sources including, but not limited to; persons, animals, or fowl; automobiles, motorcycles, engines, machines, or other mechanical devices; loudspeakers, musical instruments, radios, televisions, phonographs, or other amplifying devices.

(c) This chapter includes standards for the measurement of noise levels to ensure that noise levels do not disturb and interfere with the peace, comfort or repose of the residents of the neighborhood from which the noise is emitted.

(Ord. 1962 § 2 (part), 2002)

13.01.020 - Definitions.

The following words, phrases, and terms as used in this chapter shall have the following meanings:

(1) "A-weighted sound level" means the sound pressure level in decibels as measured on a sound level meter using A-weighting network. The level to read is designated db(A) or dB(A).

(2) "Ambient noise level" means the all-encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding any intrusive noise.

(3) "Cumulative period" means an additive period of time composed of individual time segments which may be continuous or interrupted.

(4) "Decibel" means a unit of measure of sound level noise.

(5) "Noise level" means the same as "sound level" and the terms may be used interchangeably herein.

(6) "Sound level" (noise level) in decibels is the quantity measured using the frequency weighting of A of a sound level meter as defined herein.

(7) "Sound level meter" means an instrument meeting American National Standard Institute's Standard S1.4-1971 for type 1 or type 2 sound level meters or an instrument

and the associated recording and analyzing equipment which will provide equivalent data.

(Ord. 1962 § 2 (part), 2002)

13.01.030 - Noise measurement criteria.

Any noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter as defined in this chapter. The location selected for measuring exterior noise levels shall be at any point on the property line of the offender or anywhere on the affected property.

(Ord. 1962 § 2 (part), 2002)

13.01.040 - Base ambient noise levels.

All ambient noise measurements shall commence in decibels within the respective zones and times as follows:

Zone	Time	Sound Level Decibels
All residential zones	10:00pm to 7:00am	55 dB(A)
	7:00am to 10:00pm	65 dB(A)
All commercial zones	Anytime	70 dB(A)
All industrial zones	Anytime	75 dB(A)

If the ambient noise level exceeds the applicable limit as noted in the above table, the ambient noise level shall be the standard.

(Ord. 1962 § 2 (part), 2002)

13.01.050 - Noise levels prohibited.

Noise levels shall not exceed the ambient noise levels in Section 13.01.040 by the following dB(A) levels for the cumulative period of time specified:

(1) Less than 5dB(A) for a cumulative period of more than thirty minutes in any hour;

(2) Less than 10 dB(A) for a cumulative period of more than fifteen minutes in any hour;

(3) Less than 15 dB(A) for a cumulative period of more than five minutes in any hour;

(4) Less than 20 dB(A) for a cumulative period of more than one minute in any hour;

(5) 20 dB(A) or more for any period of time.

(Ord. 1962 § 2 (part), 2002)

13.01.060 - Noise source exemptions.

The following activities shall be exempted from the provisions of this chapter:

(1) All mechanical devices, apparatus or equipment used, related to or connected with emergency machinery, vehicle or work.

(2) The provisions of this regulation shall not preclude the construction, operation, maintenance and repairs of equipment, apparatus or facilities of park and recreation projects, public works projects or essential public works services and facilities, including those utilities subject to the regulatory jurisdiction of the California Public Utilities Commission.

(3) Activities conducted on the grounds of any elementary, intermediate or secondary school or college.

(4) Outdoor gatherings, public dances and shows, provided said events are conducted pursuant to a permit as required by this code.

(5) Activities conducted in public parks and public playgrounds, provided said events are conducted pursuant to a permit as required by this code.

(6) Any activity to the extent regulation thereof has been preempted by state or federal law.

(7) Traffic on any roadway or railroad right-of-way.

(8) The operation of the Southern California Logistics Airport.

(9) Construction activity on private properties that are determined by the director of building and safety to be essential to the completion of a project.

(Ord. 1962 § 2 (part), 2002)

13.01.070 - Notice and penalties.

Any person violating any of the provisions, or failing to comply with the requirements of this chapter, is guilty of a civil penalty, punishable in accordance with Chapter 1.05. In addition, in the discretion of the city attorney and based upon the specific facts and circumstances presented to him or her, any such violation may be charged as an infraction subject to the penalties contained in Section 1.04.010.

(Ord. 1962 § 2 (part), 2002)

13.01.080 - Severability.

If any provision of the ordinance codified in this chapter or the application thereof to any person or circumstance is held invalid, the remainder of the ordinance, and the application of such provision to other persons or circumstances, shall not be affected thereby.

(Ord. 1962 § 2 (part), 2002)

CONSTRUCTION NOISE MODELING

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 08/06/2019
Case Description: DTPA-01

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Site Prep	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Scraper	No	40		83.6	175.0	0.0
Dozer	No	40		81.7	175.0	0.0
Front End Loader	No	40		79.1	175.0	0.0
Grader	No	40	85.0		175.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Scraper	72.7	68.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	70.8	66.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	68.2	64.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	74.1	70.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	74.1	74.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 08/06/2019
Case Description: DTPA-01

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Rough Grading	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85.0		175.0	0.0
Scraper	No	40		83.6	175.0	0.0
Dozer	No	40		81.7	175.0	0.0
Front End Loader	No	40		79.1	175.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Grader	74.1	70.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	72.7	68.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	70.8	66.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	68.2	64.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	74.1	74.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 08/06/2019
Case Description: DTPA-01

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Building Construction	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	175.0	0.0
Backhoe	No	40		77.6	175.0	0.0
Crane	No	16		80.6	175.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Front End Loader	68.2	64.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	66.7	62.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	69.7	61.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	69.7	67.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 08/06/2019
Case Description: DTPA-01

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Utility Trenching	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Scraper	No	40	83.6	175.0	0.0	
Front End Loader	No	40	79.1	175.0	0.0	
Grader	No	40	85.0	175.0	0.0	

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Noise Limits (dBA) Day Leq	Noise Limits (dBA) Evening Lmax	Noise Limits (dBA) Evening Leq	Noise Limits (dBA) Night Lmax	Noise Limits (dBA) Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Noise Limit Exceedance (dBA) Day Leq	Noise Limit Exceedance (dBA) Evening Lmax	Noise Limit Exceedance (dBA) Evening Leq	Noise Limit Exceedance (dBA) Night Lmax	Noise Limit Exceedance (dBA) Night Leq
Scraper	72.7	68.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	68.2	64.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	74.1	70.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	74.1	73.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 08/06/2019
Case Description: DTPA-01

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Architectural Coating	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	175.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Compressor (air)	66.8	62.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	66.8	62.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 08/06/2019
Case Description: DTPA-01

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Fine Grading	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Scraper	No	40		83.6	175.0	0.0
Front End Loader	No	40		79.1	175.0	0.0
Grader	No	40	85.0		175.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Scraper	72.7	68.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	68.2	64.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	74.1	70.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	74.1	73.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 08/06/2019
Case Description: DTPA-01

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Foundation	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85.0		175.0	0.0
Front End Loader	No	40		79.1	175.0	0.0
Scraper	No	40		83.6	175.0	0.0
Paver	No	50		77.2	175.0	0.0
Roller	No	20		80.0	175.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Day Noise Limits (dBA) Lmax	Day Noise Limits (dBA) Leq	Evening Noise Limits (dBA) Lmax	Evening Noise Limits (dBA) Leq	Night Noise Limits (dBA) Lmax	Night Noise Limits (dBA) Leq	Day Noise Limit Exceedance (dBA) Lmax	Day Noise Limit Exceedance (dBA) Leq	Evening Noise Limit Exceedance (dBA) Lmax	Evening Noise Limit Exceedance (dBA) Leq	Night Noise Limit Exceedance (dBA) Lmax	Night Noise Limit Exceedance (dBA) Leq
Grader	74.1	70.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	68.2	64.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	72.7	68.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	66.3	63.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	69.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	74.1	73.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 08/06/2019
Case Description: DTPA-01

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Asphalt Paving	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Paver	No	50	77.2	175.0		0.0
Roller	No	20	80.0	175.0		0.0
Front End Loader	No	40	79.1	175.0		0.0

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Paver	66.3	63.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	69.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	68.2	64.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	69.1	68.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 08/06/2019
Case Description: DTPA-01

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Finish/Landscape	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Excavator	No	40	80.7	175.0	0.0	
Front End Loader	No	40	79.1	175.0	0.0	

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	69.8	65.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	68.2	64.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	69.8	68.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TRAFFIC NOISE INCREASE CALCULATIONS

Traffic Noise Calculator: FHWA 77-108 **Project Title: DTPA-01**

	Output						Inputs													Auto Inputs	
	dBA at 50 feet			Distance to CNEL Contour																	
ID	$L_{eq\text{-}24hr}$	L_{dn}	CNEL	70 dBA	65 dBA	60 dBA	Roadway	Segment	ADT	Posted Speed Limit	Grade	% Autos	% Med Trucks	% Heavy Trucks	% Daytime	% Evening	% Night	Number of Lanes	Site Condition	Distance to Reciever	Ground Absorption	Lane Distance
1	50.3	53.1	53.8	1	4	12	Mesa View	South of Project	1,834	25	0.0%	97.3%	2.7%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
2	52.5	55.3	55.9	2	6	20	Mesa View	North of Project	3,010	25	0.0%	97.3%	2.7%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
3	55.1	57.9	58.6	4	11	36	Luna Road	East of Mesa View	1,946	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
4	59.3	62.1	62.8	10	30	95	Luna Road	East of Vista Verde Street	5,152	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
5	60.1	62.9	63.6	11	36	115	Luna Road	East of Bella Pine Street	6,216	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
6	78.3	81.1	81.8	748	2366	7482	US-395	North of Dos Palmas Road	38,584	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	4	Hard	50	0	44
7	76.9	79.7	80.3	541	1711	5411	US-395	North of Luna Road	27,902	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	4	Hard	50	0	44
8	76.0	78.8	79.5	446	1412	4464	US-395	South of Luna Road	23,478	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	2	Hard	50	0	20

Traffic Noise Calculator: FHWA 77-108 **Project Title: DTPA-01.0**

	Output						Inputs													Auto Inputs	
	dBA at 50 feet			Distance to CNEL Contour																	
ID	$L_{eq\text{-}24hr}$	L_{dn}	CNEL	70 dBA	65 dBA	60 dBA	Roadway	Segment	ADT	Posted Speed Limit	Grade	% Autos	% Med Trucks	% Heavy Trucks	% Daytime	% Evening	% Night	Number of Lanes	Site Condition	Distance to Reciever	Ground Absorption	Lane Distance
1	53.8	56.6	57.2	3	8	26	Mesa View	South of Project	4,060	25	0.0%	97.3%	2.7%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
2	56.7	59.5	60.2	5	17	52	Mesa View	North of Project	8,008	25	0.0%	97.3%	2.7%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
3	59.0	61.8	62.5	9	28	89	Luna Road	East of Mesa View	4,802	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
4	60.7	63.5	64.2	13	42	132	Luna Road	East of Vista Verde Street	7,140	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
5	61.2	64.0	64.7	15	47	148	Luna Road	East of Bella Pine Street	8,008	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
6	78.4	81.2	81.9	770	2435	7699	US-395	North of Dos Palmas Road	39,704	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	4	Hard	50	0	44
7	77.0	79.8	80.4	554	1752	5541	US-395	North of Luna Road	28,574	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	4	Hard	50	0	44
8	76.0	78.8	79.5	446	1412	4464	US-395	South of Luna Road	23,478	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	2	Hard	50	0	20

Traffic Noise Calculator: FHWA 77-108 **Project Title: DTPA-01.0**

	Output						Inputs												Auto Inputs	
	dBA at 50 feet			Distance to CNEL Contour																
ID	$L_{eq\text{-}24hr}$	L_{dn}	CNEL	70 dBA	65 dBA	60 dBA	Roadway	Segment	ADT	Posted Speed Limit	Grade	% Autos	% Med Trucks	% Heavy Trucks	% Daytime	% Evening	% Night	Number of Lanes	Site Condition	Distance to Reciever	Ground Absorption	Lane Distance
1	54.3	57.1	57.8	3	9	30	Mesa View	South of Project	4,578	25	0.0%	97.3%	2.7%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
2	54.3	57.1	57.8	3	10	30	Mesa View	North of Project	4,620	25	0.0%	97.3%	2.7%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
3	59.5	62.3	63.0	10	31	99	Luna Road	East of Mesa View	5,348	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
4	61.8	64.6	65.3	17	53	169	Luna Road	East of Vista Verde Street	9,156	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
5	62.4	65.2	65.9	19	61	192	Luna Road	East of Bella Pine Street	10,430	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
6	80.2	83.0	83.7	1163	3679	11633	US-395	North of Dos Palmas Road	59,990	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	4	Hard	50	0	44
7	79.1	81.8	82.5	894	2827	8940	US-395	North of Luna Road	46,102	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	4	Hard	50	0	44
8	78.1	80.9	81.6	721	2280	7211	US-395	South of Luna Road	37,926	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	2	Hard	50	0	20

Traffic Noise Calculator: FHWA 77-108 **Project Title: DTPA-01.0**

	Output						Inputs												Auto Inputs	
	dBA at 50 feet			Distance to CNEL Contour																
ID	$L_{eq\text{-}24hr}$	L_{dn}	CNEL	70 dBA	65 dBA	60 dBA	Roadway	Segment	ADT	Posted Speed Limit	Grade	% Autos	% Med Trucks	% Heavy Trucks	% Daytime	% Evening	% Night	Number of Lanes	Site Condition	Distance to Reciever	Ground Absorption	Lane Distance
1	55.6	58.4	59.0	4	13	40	Mesa View	South of Project	6,146	25	0.0%	97.3%	2.7%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
2	57.5	60.3	61.0	6	20	63	Mesa View	North of Project	9,618	25	0.0%	97.3%	2.7%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
3	61.3	64.1	64.8	15	48	150	Luna Road	East of Mesa View	8,148	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
4	62.7	65.5	66.1	21	65	206	Luna Road	East of Vista Verde Street	11,144	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
5	63.1	65.9	66.5	23	71	225	Luna Road	East of Bella Pine Street	12,222	40	0.0%	100.0%	0.0%	0.0%	75.0%	15.0%	10.0%	2	Hard	50	0	20
6	80.3	83.1	83.7	1185	3747	11850	US-395	North of Dos Palmas Road	61,110	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	4	Hard	50	0	44
7	79.1	81.9	82.6	907	2868	9070	US-395	North of Luna Road	46,774	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	4	Hard	50	0	44
8	78.1	80.9	81.6	721	2280	7211	US-395	South of Luna Road	37,926	70	0.0%	77.3%	12.4%	10.3%	75.0%	15.0%	10.0%	2	Hard	50	0	20

	Existing	Existing + Proj	Cumulative	Cumulative + Proj	Project Noise Increase	Cumulative Project Noise increase	Cumulative Increase due to Project
Mesa View s/o Project	53.8	57.2	57.8	59.0	3.5	0.5	1.3
Mesa View n/o Project	55.9	60.2	57.8	61.0	4.2	5.0	3.2
Luna e/o Mesa View	58.6	62.5	63.0	64.8	3.9	6.2	1.8
Lune e/o Vista Verde	62.8	64.2	65.3	66.1	1.4	3.4	0.9
Luna e/o Bella Pine	63.6	64.7	65.9	66.5	1.1	2.9	0.7
US-395 n/o Dos Palmas	81.8	81.9	83.7	83.7	0.1	2.0	0.1
US 395 n/o Luna	80.3	80.4	82.5	82.6	0.1	2.2	0.1
US 395 s/o Luna	79.5	79.5	81.6	81.6	0.0	2.1	0.0