

## **Appendix L**

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### Noise Technical Report

**SINGLE-FAMILY RESIDENTIAL HAULED WATER INITIATIVE  
FOR NEW DEVELOPMENT**

**NOISE TECHNICAL REPORT**

**PREPARED FOR:**

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## **SECTION ES**

### **EXECUTIVE SUMMARY**

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This Noise Technical Report was undertaken by Sapphos Environmental, Inc. for the County of Los Angeles (County) to evaluate the proposed Single-Family Residential Hauled Water Initiative for New Development (proposed initiative), in the unincorporated territory of Los Angeles County. The proposed initiative would allow hauled water as the primary source of potable water for new development of single-family residences on existing vacant legal lots, or lots that are eligible for a certificate of compliance, where the property owner has demonstrated that there is no other feasible source of private or municipal potable water, or capability of developing an on-site well to provide potable water to the property, and only if the property lies outside of the boundaries of the local private and municipal water districts, and is not eligible for service by the nearest public-community water purveyor.

The report's findings are as follows:

- The proposed initiative would potentially result in 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 whenever construction takes place within 251 feet of a sensitive receptor.
- The proposed initiative would not result in exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.
- The proposed initiative would not result in a substantial permanent increase in ambient noise levels in the proposed initiative vicinity above levels existing without the proposed initiative.
- The proposed initiative would result in a substantial temporary or periodic increase in ambient noise levels in the proposed initiative vicinity above levels existing without the proposed initiative.
- For a proposed initiative parcel located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, the proposed initiative would not expose people residing or working in the proposed initiative area to excessive noise levels.
- For a proposed initiative parcel within the vicinity of a private airstrip, the proposed initiative would not expose people residing or working in the proposed initiative area to excessive noise levels.

## **SECTION 1.0 INTRODUCTION**

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### **1.1 PURPOSE AND SCOPE**

This Noise Technical Report was undertaken by Sapphos Environmental, Inc. for the County of Los Angeles (County), for the Single-Family Residential Hauled Water Initiative for New Development (proposed initiative). This technical report identifies relevant regulatory framework, baseline conditions in the proposed initiative study area as they relate to ambient noise, the potential for the proposed initiative to result in substantial adverse direct, indirect, and cumulative impacts on ambient noise levels from construction and occupancy of single-family residences facilitated by the approval of building permits relying on the use of hauled water as the primary source of potable water and the associated transport of hauled water, and measures or alternatives that would avoid or reduce significant impacts on ambient noise levels.

### **1.2 PROJECT LOCATION**

The area that would be subject to the proposed initiative consists of 42,867 parcels in the unincorporated territory of Los Angeles County (see Figure 1.2-1, *Proposed Initiative Study Area*, at the end of this section).<sup>1</sup> The combined proposed initiative study area consists of approximately 340,461 acres or approximately 532 square miles.

Although this is a Countywide initiative, the parcels that would potentially be affected by the proposed initiative are located entirely within the 5th Supervisorial District in the northern one-third of the County, including areas located in the San Gabriel Mountains, in the Antelope Valley; areas located northeast of the City of Santa Clarita, north and south of California State Route 14; and areas that are southwest of the City of Palmdale in the communities of Agua Dulce and Acton. The subject parcels have been categorized into seven subareas:

1. **Lake Hughes/Gorman/West of Lancaster:** The Lake Hughes/Gorman/West of Lancaster subarea is located in an area generally located west of State Highway 14 and north of the Angeles National Forest. This subarea consists of 15,166 parcels and encompasses approximately 195.4 square miles (125,041.4 acres). State Highway 138 bisects the subarea in an east-west direction, and State Highway 14 forms the eastern boundary of this subarea. This subarea is adjacent to the northwestern edge of the incorporated City of Lancaster.
2. **Lancaster Northeast:** The Lancaster Northeast subarea is located in an area generally east of State Highway 14 and north of East Avenue J. This subarea consists of 6,794 parcels and encompasses approximately 55.2 square miles (35,324.90 acres). State Highway 14 forms the western boundary, and East Avenue J forms the southern boundary of this subarea. Edwards Air Force Base is located north of the study area. This subarea is adjacent to the northeastern edge of the incorporated City of Lancaster.

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<sup>1</sup> Assessor's Parcels Numbers for the referenced parcels are on file at the Los Angeles County Department of Regional Planning.

3. **Antelope Valley Northeast:** The Antelope Valley Northeast subarea is located in an area generally north of East Avenue E and east of 165th Street East in the far northeastern portion of Los Angeles County. This subarea consists of 1,938 parcels and encompasses approximately 22.7 square miles (14,528.23 acres). This subarea is relatively isolated and is located in the northeastern area of Los Angeles County. This subarea is located approximately 10.9 miles northeast of the incorporated City of Palmdale and approximately 11.3 miles northeast of the incorporated City of Lancaster.
4. **Lake Los Angeles/Llano/Valyermo/Littlerock:** The Lake Los Angeles/Llano/Valyermo/Littlerock subarea is located in an area generally south of East Avenue J, east of 47th Street East. This subarea consists of 14,822 parcels and encompasses approximately 168.8 square miles (108,067.33 acres). Avenue J forms the northern boundary, the Cities of Palmdale and Lancaster form the western boundary, and the San Bernardino County line forms the eastern boundary of this subarea. This subarea is adjacent to the eastern edge of the incorporated City of Palmdale.
5. **Acton:** The Acton subarea is located in an area generally east of Hubbard Road and West of 47th Street East. This subarea consists of 1,246 parcels and encompasses approximately 28.2 square miles (18,067.22 acres). The Angeles National Forest is located to the north and south of the subarea. This subarea is adjacent to the southwestern edge of the incorporated City of Palmdale.
6. **Castaic/Santa Clarita/Agua Dulce:** The Castaic/Santa Clarita/Agua Dulce subarea is located generally west of Hubbard Road and north of the 210 Freeway excluding Kagel Canyon. This subarea consists of 2,243 parcels and encompasses approximately 55.2 square miles (35,340.2 acres). This subarea is adjacent to the northern, western, and southern edges of the incorporated City of Santa Clarita and the northern edge of the incorporated City of Los Angeles.
7. **East San Gabriel Mountains:** The East San Gabriel Mountains subarea consists of parcels generally located within the Angeles National Forest east of State Highway 14, north of the 210 freeway, south of the Pearblossom Highway, and west of the San Bernardino County line. This subarea consists of 658 parcels and encompasses approximately 6.4 square miles (4,092.26 acres). This subarea is adjacent to the northern edges of the San Gabriel and San Fernando Valleys.

The proposed initiative study area is located within 53 U.S. Geological Survey (USGS) 7.5-minute quadrangle maps (see Figure 1.2-2, *USGS 7.5-Minute Quadrangle Index*, at the end of this section):

- Acton
- Adobe Mountain
- Agua Dulce
- Alpine Butte
- Azusa
- Black Mountain
- Burnt Peak
- Chilao Flat
- Condor Peak
- Crystal Lake
- Del Sur
- El Mirage
- Fairmont Butte
- Frazier Mountain
- Glendora
- Green Valley
- Hi Vista
- Jackrabbit Hill
- Juniper Hills
- La Liebre Ranch
- Lake Hughes
- Lancaster East
- Lancaster West
- Lebec
- Liebre Mountain
- Little Buttes
- Littlerock
- Lovejoy Buttes
- Mescal Creek
- Mint Canyon
- Mount Baldy
- Mount San Antonio
- Mount Wilson
- Neenach School
- Newhall
- Oat Mountain
- Pacifico Mountain
- Palmdale
- Pasadena
- Redman
- Ritter Ridge
- Rogers Lake South
- Rosamond
- Rosamond Lake
- San Fernando
- Simi Valley East
- Sleepy Valley
- Sunland
- Val Verde
- Valyermo
- Warm Springs Mountain
- Waterman Mountain
- Whitaker Peak

### 1.3 PROJECT DESCRIPTION

The purpose of the proposed initiative is to allow the use of hauled water as a primary and sustainable source of potable water on lots with an average slope of less than 50 percent, where it has been demonstrated that potable water for domestic requirements cannot be provided by an on-site groundwater well, and where the lot meets all of the following criteria at the time of the hauled water permit application and as of the effective date of an ordinance authorizing the use of hauled water: (a) the lot is an existing legal lot or entitled to a certificate of compliance; (b) is vacant and has never been developed; (c) is greater than 2,000 square feet in size; (d) is outside the boundaries of a public or private water district; and (e) has a land use designation and is within a zone allowing for the development of a single-family residence.

In order to determine which areas would be subject to the proposed initiative, the Los Angeles County Department of Regional Planning developed a geographic information system (GIS) suitability model in 2012 based on five criteria defined by the Hauled Water Task Force:

- Parcels located in the unincorporated territory of Los Angeles County
- Vacant parcels
- Parcels located in areas where there is no designated water purveyor
- Zoning and General Plan designation that allow for development of a single-family residence
- Parcel size > 2,000 square feet with slopes under 50 percent (26.6°)

The model was re-run in 2015 to incorporate the recently adopted Antelope Valley Town and Country Plan and General Plan amendment.<sup>2</sup>

### 1.3.1 Construction Scenario

The evaluation of the proposed initiative is based on an anticipated reasonable worst-case scenario of anticipated development of approximately 3,680 parcels, over the 20-year 2015 to 2035 planning horizon, in the unincorporated territory of Los Angeles County to use hauled water as a source for potable water. Using annual growth rates, the worst-case scenario projects that approximately 184 building permits per year would be issued. The impacts related to noise for the construction associated with the proposed initiative would be indirect and temporary noise generation. The evaluation of construction impacts on ambient noise levels is based on an average single-family residence for the Los Angeles County.

Site preparation and construction of the proposed project would be undertaken in accordance with all federal, state, and county building codes. Construction would be scheduled in compliance with county regulations. The county allows construction noise from Monday through Saturday, between the hours of 7:00 a.m. and 7:00 p.m.<sup>3</sup> However, the County Noise Ordinance prohibits construction on Sundays and holidays.

The number of workers required on site during construction hours would be site specific, and construction on the specific parcels would be at the parcel owner's discretion, resulting in variability in the construction scenario for the proposed initiative. For the purpose of this analysis, it was assumed that approximately up to 20 workers would be expected to be on-site during peak construction activity periods, all of whom would drive to the site in an on-road vehicle.

It is assumed that the time required to complete construction of a single family home would be approximately 14 months. For the construction of a home permitted to be built following the proposed initiative, it is anticipated there would be six phases of construction:

1. Ground Clearing
2. Excavation, Grading
3. Foundations
4. Structural, Paving
5. Finishing
6. Landscaping

<sup>2</sup> Los Angeles County Department of Regional Planning. Adopted 6 October 2015. *Los Angeles County 2035 General Plan*: Chapter 6: Land Use Element. Available online at: [planning.lacounty.gov/assets/upl/project/gp\\_final-general-plan-ch6.pdf](http://planning.lacounty.gov/assets/upl/project/gp_final-general-plan-ch6.pdf)

<sup>3</sup> County of Los Angeles. County of Los Angeles Code of Ordinances, Section 12.08.440: "Construction Noise."

Site ingress and egress locations for construction, delivery vehicles, haul routes, and emergency response and evacuation would be site specific.

It is assumed that construction would be in compliance with Los Angeles County regulations and standard practices for construction and development. Construction equipment would be turned off when not in use. The construction contractor would be required to ensure that all construction, demolition, and grading equipment are properly maintained. All vehicles and compressors would utilize exhaust mufflers and engine enclosure covers (as designed by the manufacturer) at all times. All grading and earthwork would be performed under the observation of a geotechnical engineer to ensure proper subgrade preparation, selection of satisfactory materials, and placement and compaction of structural fills. Any unanticipated adverse conditions encountered would be evaluated by the project engineering geologist and the soils engineer, and the appropriate recommendation made and implemented.

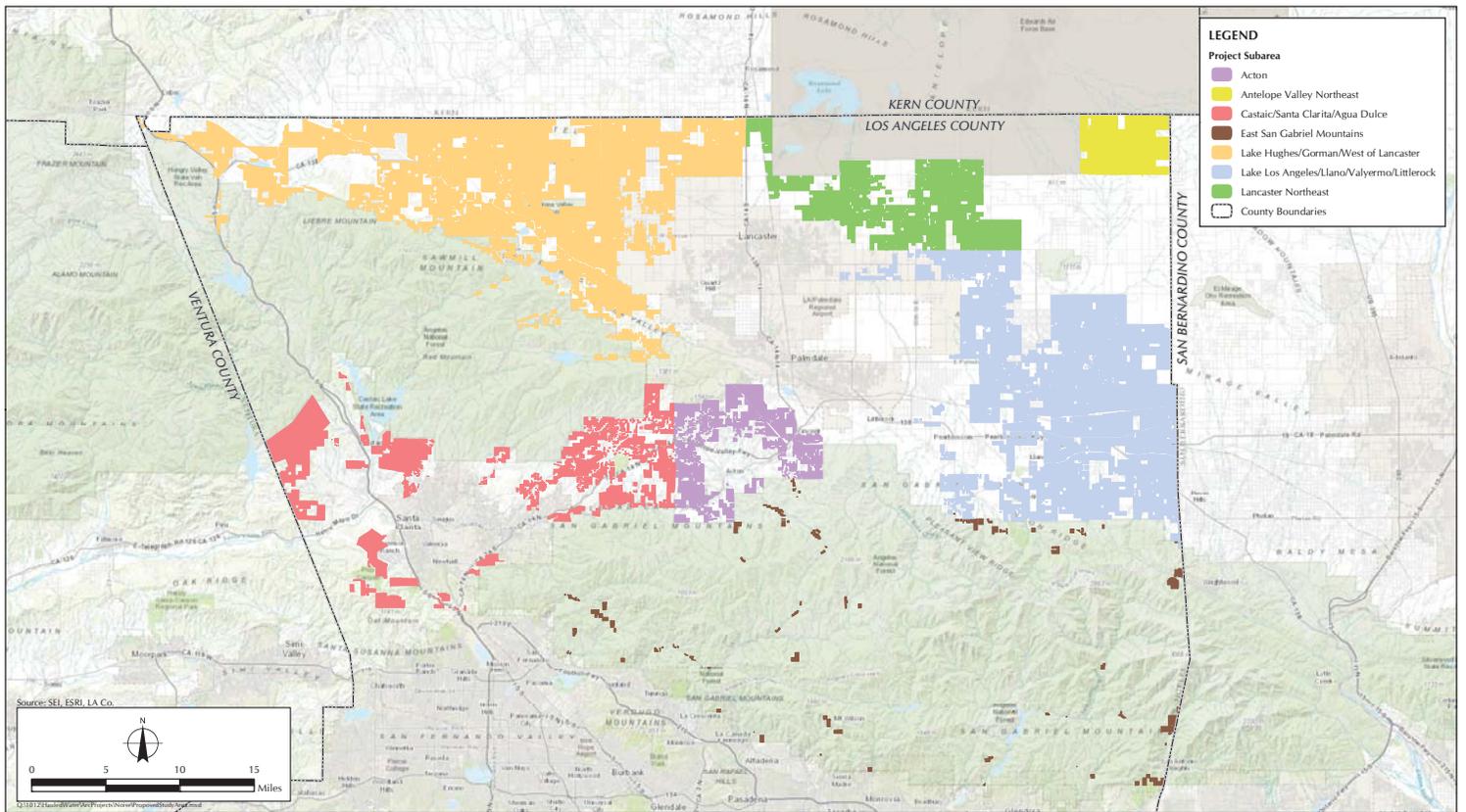
### **1.3.2 Operations**

According to the Traffic Impact Study conducted by Fehr & Peers Transportation Consultants, it is estimated that the proposed initiative in the operational phase will generate approximately 588,000 net passenger car vehicle miles traveled (VMT) and approximately 4,300 net hauled water truck VMT per average day at full build-out of 3,680 parcels.<sup>4</sup> These estimates are likely to be a worst-case scenario, operating under the assumption of 5,000 gallons of water per residence per week for domestic use and 5,000 gallons of water per residence per year for fire supply.<sup>5</sup> At full build-out, the proposed initiative would result in 4,300 water truck VMT per day with 134 trucks traveling on average 31.8 miles round trip. It is assumed one truck could visit up to four parcels in a day, which equates to 134 trucks in operation daily to serve all 3,680 parcels. The residents on each parcel are estimated to take on average 10 daily trips of approximately 16 miles roundtrip in length for an additional 588,000 passenger car VMT daily.

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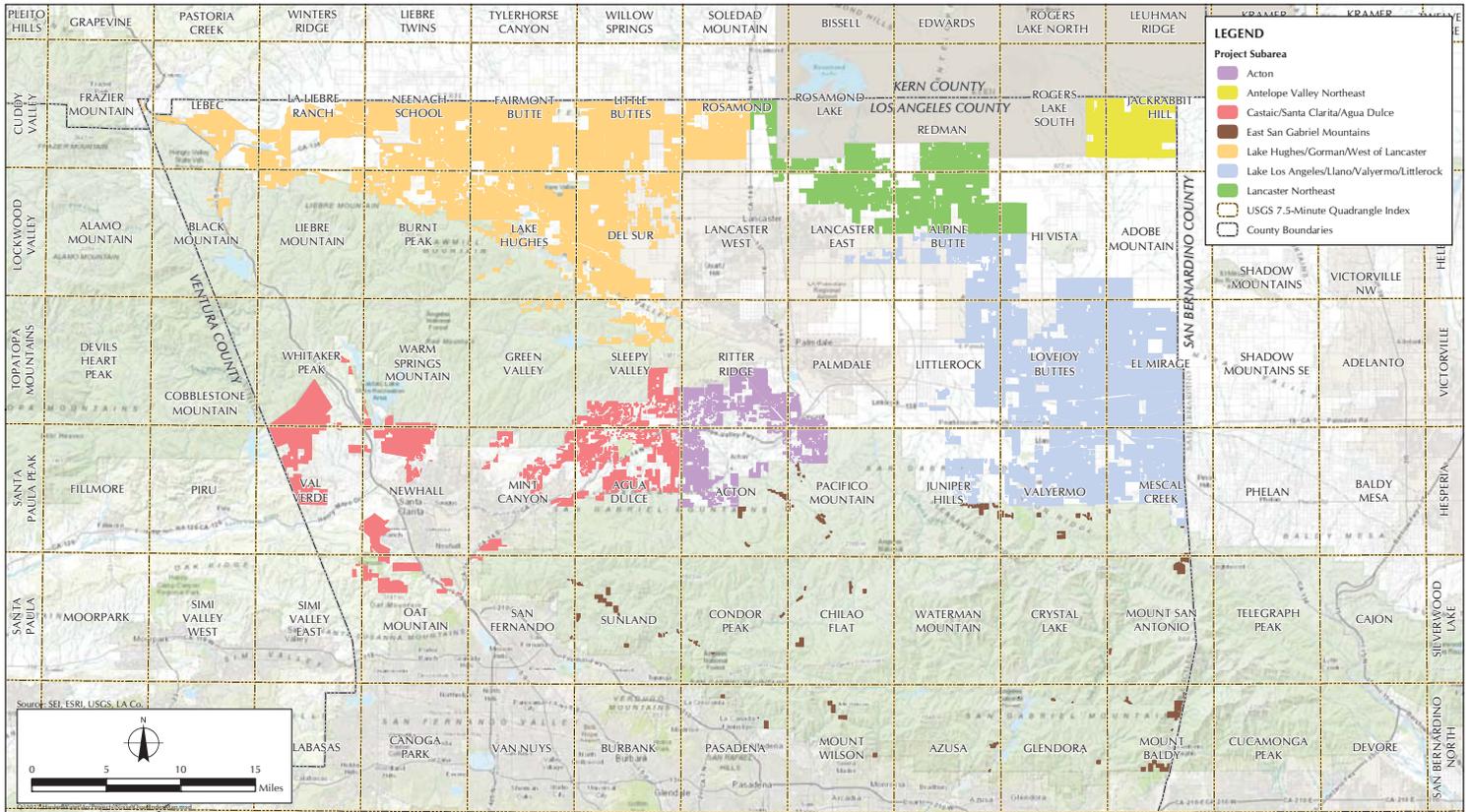
<sup>4</sup> Fehr & Peers. June 2015. *Single-Family Residential Hauled Water Initiative for New Development: Traffic Analysis*. Prepared for: Los Angeles County Hauled Water Task Force.

<sup>5</sup> Fehr & Peers. June 2015. *Single-Family Residential Hauled Water Initiative for New Development: Traffic Analysis*. Prepared for: Los Angeles County Hauled Water Task Force.



**FIGURE 1.2-1**  
Proposed Initiative Study Area





**FIGURE 1.2-2**  
USGS 7.5-Minute Quadrangle Index



## 2.1 NOISE AND VIBRATION TERMINOLOGY

A list of noise terminology is included to facilitate the discussion of noise and its impacts.

- *A-weighting*. This is the method commonly used to quantify environmental noise that involves evaluation of all frequencies of sound, with an adjustment to reflect the constraints of human hearing. Because the human ear is less sensitive to low and high frequencies than to midrange frequencies, noise measurements are weighted more heavily within those frequencies of maximum human sensitivity in a process called A-weighting (dBA).
- *Ambient*. Ambient is the total noise in the environment, excluding noise from the source of interest.
- *Community noise equivalent level (CNEL)*. CNEL represents the average daytime noise level during a 24-hour day, adjusted to an equivalent level to account for people's lower tolerance of noise during the evening and nighttime hours. Because community receptors are more sensitive to unwanted noise intrusion during the evening and night, an artificial decibel increment is added to quiet-time noise levels. Sound levels are increased by 5 dBA during the evening, from 7:00 p.m. to 10:00 p.m. and by 10 dBA during the nighttime, from 10:00 p.m. to 7:00 a.m. during this quiet time period.
- *Day-night equivalent level ( $L_{dn}$ )*.  $L_{dn}$  is a measure of the 24-hour average noise level at a given location. It is based on a measure of the  $L_{eq}$  noise level over a given time period. The  $L_{dn}$  is calculated by averaging the  $L_{eq}$  for each hour of the day at a given location after penalizing the "sleeping hours" (defined as 10:00 p.m. to 7:00 a.m.), by 10 dBA to account for the increased sensitivity of people to noises that occur at night.
- *Decibel (dB)*. dB is a unitless measure of sound on a logarithmic scale that indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
- *Equivalent sound level ( $L_{eq}$ )*:  $L_{eq}$  is a term typically used to express time averages. It is a steady-state energy level that is equivalent to the energy content of a varying sound level over a stated period of time, which means that the  $L_{eq}$  represents the noise level experienced over a stated period of time averaged as a single noise level.
- *Frequency*. Frequency is the number of cycles per unit of time (seconds), expressed in hertz (Hz).
- *Noise*. Noise is any sound that annoys or disturbs humans or that causes or tends to cause an adverse psychological or physiological effect on humans. Any unwanted sound.

- *Noise level ( $L_N$ )*. Another measure used to characterize noise exposure,  $L_N$  is the variation in sound levels over time, measured by the percentage exceedance level.  $L_{10}$  is the A-weighted sound level that is exceeded for 10 percent of the measurement period, and  $L_{90}$  is the level that is exceeded for 90 percent of the measurement period.  $L_{50}$  is the median sound level. Additional statistical measures include  $L_{min}$  and  $L_{max}$ , the minimum and maximum sound levels, respectively, measured during a stated measurement period.
- *Peak Particle Velocity (PPV)*. Defined as the maximum instantaneous positive or negative peak of the vibration signal, usually measured in inches per second (in/sec).
- *Sound*. It is a vibratory disturbance created by vibrating objects, 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.
- *Vibration*. Vibration is the mechanical motion of earth or ground, building, or other type of structure, induced by the operation of any mechanical device or equipment located upon or affixed thereto. For purposes of this report, the magnitude of the vibration shall be stated as the acceleration in “g” units (1 g is equal to 32.2 feet/second<sup>2</sup>, or 9.81 meters/second<sup>2</sup>).

## 2.2 NOISE MEASUREMENT

Noise is defined as unwanted sound. The human response to environmental noise is subjective and varies considerably from individual to individual. Sensitive receptors, such as residential areas, convalescent homes, schools, auditoriums, and other similar land uses, may be affected to a greater degree by increased noise levels than industrial, manufacturing, or commercial facilities. The effects of noise can range from interference with sleep, concentration, and communication, to the causation of physiological and psychological stress, and at the highest intensity levels, hearing loss.<sup>1</sup>

The method commonly used to quantify environmental noise involves evaluation of all frequencies of sound, with an adjustment to reflect the constraints of human hearing. Since the human ear is less sensitive to low and high frequencies than to midrange frequencies, noise measurements are weighted more heavily within those frequencies of maximum human sensitivity in a process called “A-weighting,” written as dBA. In practice, environmental noise is measured using a sound level meter that includes an electronic filter corresponding to the A-weighted frequency spectrum. Table 2.2-1, *Common Noise Levels and Loudness*, provides examples of noise sources that correlate to measured A-weighted sound levels and the subjective loudness to a person.

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<sup>1</sup> U.S. Environmental Protection Agency, Office of Noise Abatement and Control. August 1978. *Noise: A Health Problem*. Washington, DC.

**TABLE 2.2-1  
COMMON NOISE LEVELS AND LOUDNESS**

<b>Noise Source</b>	<b>A-weighted Sound Level (dBA)</b>	<b>Subjective Loudness</b>
Near jet engine	130	Threshold of pain
	120	
Rock-n-roll band	110	Deafening
Jet flyover at 1,000 feet	100	
Loud auto horn at 10 feet	90	
Power Mower		
Motorcycle at 25 feet	80	Very loud
Food blender		
Garbage disposal	70	
Living room music	60	Loud
Human voice at 3 feet		
Residential air conditioner at 50 feet	50	Moderate
	40	
Bird calls	30	
Quiet living room	20	Faint
Average whisper	10	
Rustling leaves	0	Very faint
		Threshold of human audibility

**SOURCE:** Cowan, James P. 1993. *Handbook of Environmental Acoustics*. Hoboken, NJ: John Wiley and Sons.

There are several statistical tools used to evaluate and compare noise level measurements. To account for the fluctuation in noise levels over time, noise impacts are commonly evaluated using time-averaged noise levels.  $L_{eq}$  is used to represent the noise level experienced over a stated period of time averaged as a single noise level. Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, an artificial decibel increment is added to quiet-time noise levels to create a 24-hour noise descriptor, or a 24-hour  $L_{eq}$ , which is the CNEL.<sup>2</sup>  $L_{dn}$  also adds an artificial decibel increment to the sound level during nighttime hours, but does not adjust the sound level during the evening hours.

Another measure used to characterize noise exposure is the variation in sound levels over time, measured by percentage exceedance level.  $L_{10}$  is the A-weighted sound level that is exceeded 10 percent of the measurement period, and  $L_{90}$  is the level exceeded 90 percent of the measurement period.  $L_{50}$  is the median sound level. Additional statistical measures include  $L_{min}$  and  $L_{max}$ , the minimum and maximum sound levels, respectively, measured during a stated measurement period.

These descriptions of noise are based on the sound level at the point of measurement. When determining potential impacts to the environment, the noise level at the receptor is considered. Noise is attenuated as it propagates from the source to the receiver. Attenuation is the reduction in the level of sound resulting from the absorption by the topography of an area (i.e., paved or vegetated surface), atmosphere, distance, barriers, and other factors. Attenuation is also logarithmic rather than linear, so that for stationary point sources such as construction equipment, noise levels decrease approximately 6 dBA for every doubling of distance. For linear sources, such as streets, noise levels decrease by 3 to 5 dBA for every doubling of distance.

To estimate a receiver's subjective reaction to a new noise is to compare the new noise with the existing noise environment, the "ambient" noise level, to which the receiver has become adapted. An increase of 1 dBA over the ambient noise level cannot be perceived unless it occurs in carefully controlled laboratory experiments; a 3-dBA increase is considered as a just-perceivable difference; an increase of at least 5 dBA is a noticeable change, thereby causing community response and often being considered as a significant impact; and a 10-dBA increase is subjectively heard as approximately a doubling in loudness, thereby almost always causing an adverse community response.

The assessment of the noise impact depends on the environment, the nature and level of noise-generating activities, the pathway through which the noise travels, the sensitivity of the receptor, the period of exposure, and the exceedance of the noise level over the ambient level.

### **2.2.1 Construction Noise**

Due to the large area of effect for the proposed initiative, calculating the exact noise impacts associated with the construction of each home for each potentially affected neighboring sensitive receptor is not practical. Construction noise associated with the proposed initiative was analyzed using an estimated average list of construction equipment, and typical scheduling and phasing for construction activities. The construction noise analysis for the proposed initiative is based on

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<sup>2</sup> City of Los Angeles. 2006 L.A. CEQA Thresholds Guide. "I. Noise." Available at: [http://www.ci.la.ca.us/ead/programs/table\\_of\\_contents.htm](http://www.ci.la.ca.us/ead/programs/table_of_contents.htm)

construction equipment noise levels as published in the *FHWA Roadway Construction Noise Model User's Guide*.<sup>3</sup>

### 2.2.2 Operational Noise

Operational noise impacts associated with the proposed initiative were evaluated by identifying the noise levels generated by the water hauling activities, and comparing such noise levels to ambient noise levels to determine significance. Result of the Traffic Impact Study are used to calculate potential noise impacts from water hauling truck trips.<sup>4</sup>

## 2.3 VIBRATION MEASUREMENT

Vibration is an oscillatory motion in terms of displacement, velocity, or acceleration. Vibration is typically measured as peak particle velocity (PPV) in inches per second. In this context, vibration refers to the minimum ground- or structure-borne motion that causes a normal person to be aware of the vibration by means such as, but not limited to, sensation by touch or visual observation of moving objects. The effects of ground-borne vibration include movements of the building floors that can be felt, rattling of windows, and shaking of items on shelves or hangings on the walls. In extreme cases, vibration can cause damage to buildings. The noise radiated from the motion of the room surfaces is called ground-borne noise. Typical levels of ground-borne vibration are listed in Table 2.3-1, *Typical Levels of Ground-borne Vibration*. The vibration motion normally does not provoke the same adverse human reactions as the noise unless there is an effect associated with the shaking of the building. In addition, the vibration noise can only occur inside buildings. Similar to the propagation of noise, vibration propagated from the source to the receptor depends on the receiving building (i.e., the weight of the building), soil conditions, layering of the soils, the depth of groundwater table, etc.

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<sup>3</sup> U.S. Department of Transportation, Federal Highway Administration. January 2006. FHWA Roadway Construction Noise Model User's Guide. Prepared by: U.S. Department of Transportation, Research and Innovative Technology Administration, John A. Volpe National Transportation Systems Center Acoustics Facility, Cambridge, MA.

<sup>4</sup> Fehr & Peers. July 2015. Single-Family Residential Hauled Water Initiative for New Development: Traffic Analysis.

**TABLE 2.3-1  
TYPICAL LEVELS OF GROUND-BORNE VIBRATION**

<b>Response</b>	<b>Velocity Level<sup>a</sup></b>	<b>Typical Sources (At 50 feet)</b>
Minor cosmetic damage of fragile buildings	100	Blasting from construction projects
Difficulty with tasks such as reading a video display terminal (VDT) screen	90	Bulldozers and other heavy tracked construction equipment
Residential annoyance, infrequent events	80	Rapid transit, upper range
Residential annoyance, frequent events	70	High speed rail, typical
Approximate threshold for human perception	60	Bus or truck, typical
	50	Typical background vibration

**NOTE:**

a. Root mean square (RMS) Vibration Velocity Level in VdB relative to 10<sup>-6</sup> inches/second.

**SOURCE:** Nelson, J.T. and H.J. Saurenman. December 1983. "State-of-the-Art Review: Prediction and Control of Ground-Borne Noise and Vibration from Rail Transit Trains." U.S. Department of Transportation, Urban Mass Transportation Administration, Report Number UMTA-MA-06-0049-83-4, DOT-TSC-UMTA-83-3.

**2.3.1 Ground-Borne Vibration**

Ground-borne vibration impacts due to construction and operation activities were evaluated by identifying potential vibration sources (i.e., construction equipment for the construction phase, and water hauling trucks for the operation phase), estimating the vibration levels at various distances of potential sensitive receptors, and comparing these levels with the significance thresholds. The vibration source levels for various types of equipment were based on data from the FTA.<sup>5</sup>

<sup>5</sup> U.S. Department of Transportation, Federal Transit Administration. May 2006. Transit Noise and Vibration Impact Assessment. Washington, DC.

## **SECTION 3.0**

### **REGULATORY FRAMEWORK**

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#### **3.1 FEDERAL**

##### **Noise Control Act**

The adverse impacts of noise were officially recognized by the federal government in the Noise Control Act of 1972,<sup>1</sup> which serves three purposes:

- Promulgating noise emission standards for interstate commerce;
- Assisting state and local abatement efforts; and
- Promoting noise education and research.

The Office of Noise Abatement and Control (ONAC) was initially tasked with implementing the Noise Control Act. However, the ONAC has since been eliminated, leaving the development of federal noise policies and programs to other federal agencies and interagency committees. For example, the Occupational Safety and Health Administration agency prohibits exposure of workers to excessive sound levels. The U.S. Department of Transportation assumed a significant role in noise control through its various operating agencies. Surface transportation system noise is regulated by a host of agencies, including the Federal Transit Administration (FTA). Transit noise is regulated by the FTA, while freeways that are part of the interstate highway system are regulated by the Federal Highway Administration (FHWA). The federal government encourages local jurisdictions to use their land use regulatory authority to site new development to minimize potential noise impacts.

#### **3.2 STATE**

##### **Senate Bill 860**

In the State of California, State Senate Bill 860, which became effective January 1, 1976, directed the California Office of Noise Control within the State Department of Health Services to prepare the *Guidelines for the Preparation and Content of Noise Elements of the General Plan*.<sup>2</sup> One purpose of these guidelines was to provide sufficient information concerning the noise environment in the community so that noise could be considered in the land-use planning process. As part of this publication, Land Use Compatibility Standards were developed in four categories: Normally Acceptable, Conditionally Acceptable, Normally Unacceptable, and Clearly Unacceptable. These categories were based on earlier work done by the U.S. Department of Housing and Urban Development. The interpretation of these four categories is as follows:

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<sup>1</sup> 42 U.S.C., *Noise Control Act of 1972*, § 4901-4918.

<sup>2</sup> California Department of Health Services, Office of Noise Control. February 1976. *Guidelines for the Preparation and Content of Noise Elements of the General Plan*. Contact: P.O. Box 942732 Sacramento, CA 94234-7320.

<b>Normally Acceptable:</b>	Specified land use is satisfactory without special insulation.
<b>Conditionally Acceptable:</b>	New development requires detailed analysis of noise insulation requirements.
<b>Normally Unacceptable:</b>	New development is discouraged and requires a detailed analysis of insulation features.
<b>Clearly Unacceptable:</b>	New development should not be undertaken.

The state has developed a land-use compatibility matrix for community noise environments that further defines four categories of acceptance and assigns CNEL values to them. In addition, the State Building Code (Part 2, Title 24, California Code of Regulations) establishes uniform minimum noise insulation performance standards to protect persons within new hotels, motels, dormitories, long-term care facilities, apartment houses, and residential units other than detached single-family residences from the effects of excessive noise, including, but not limited to, hearing loss or impairment and interference with speech and sleep. Residential structures to be located where the CNEL or  $L_{dn}$  is 60 dBA or greater are required to provide sound insulation to limit the interior CNEL to a maximum of 45 dBA. An acoustic, or noise, analysis report prepared by an experienced acoustic engineer is required for the issuance of a building permit for these structures. Conversely, land use changes that result in increased noise levels at residences of 60 dBA or greater must be considered in the evaluation of impacts to ambient noise levels. Table 3.2-1, *Land Use Compatibility for Community Noise Environments*, graphically depicts the acceptability of noise levels for a variety of uses.

**TABLE 3.2-1  
LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS**

Land Use Category	Community Noise Exposure L <sub>dn</sub> or CNEL (dBA)					
	55	60	65	70	75	80
Residential—low-density single-family, duplex, mobile homes	Normally acceptable		Normally acceptable		Normally unacceptable	Clearly unacceptable
Residential—multiple family	Normally acceptable		Normally acceptable		Normally unacceptable	Clearly unacceptable
Transient lodging—motels, hotels	Normally acceptable		Normally acceptable		Normally unacceptable	Clearly unacceptable
Schools, libraries, churches, hospitals, nursing homes	Normally acceptable		Normally acceptable		Normally unacceptable	Clearly unacceptable
Auditoriums, concert halls, amphitheaters	Normally acceptable		Normally acceptable		Clearly unacceptable	Clearly unacceptable
Sports area, outdoor spectator sports	Normally acceptable		Normally acceptable		Clearly unacceptable	Clearly unacceptable
Playgrounds, neighborhood parks	Normally acceptable		Normally acceptable		Normally unacceptable	Clearly unacceptable
Golf courses, riding stables, water recreation, cemeteries	Normally acceptable		Normally acceptable		Normally unacceptable	Clearly unacceptable
Office buildings, business commercial and professional	Normally acceptable		Normally acceptable		Normally unacceptable	Clearly unacceptable
Industrial, manufacturing, utilities, agriculture	Normally acceptable		Normally acceptable		Normally unacceptable	Clearly unacceptable
<b>INTERPRETATION:</b>						
 <b>Normally acceptable</b> Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.		 <b>Normally unacceptable</b> 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.				
 <b>Conditionally acceptable</b> New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction with closed windows and fresh air supply systems or air conditioning will normally suffice.		 <b>Clearly unacceptable</b> New construction or development should not be undertaken.				

**NOTES:**

L<sub>dn</sub> = Day-Night Level

CNEL = Community Noise Equivalent Level

dBA = decibels in A-weighted sound levels

**SOURCE:**

California Department of Health Services, Office of Noise Control. February 1976. *Guidelines for the Preparation and Content of Noise Elements of the General Plan*. Sacramento, CA.

### 3.3 REGIONAL

#### County of Los Angeles Municipal Codes

##### Noise

The County maintains the health and welfare of its residents with respect to noise through nuisance abatement ordinances and land use planning. The County Noise Control Ordinance, Title 12 of the County Code, was adopted by the Los Angeles County Board of Supervisors in 1977 “to control unnecessary, excessive, and annoying noise and vibration.” It declares that the purpose of the County policy is to “maintain quiet in those areas which exhibit low noise levels and to implement programs aimed at reducing noise in those areas within the county where noise levels are above acceptable values.”<sup>3</sup>

On August 14, 2001, the Los Angeles County Board of Supervisors approved an ordinance amending Title 12 of the County Code to prohibit loud, unnecessary, and unusual noise that disturbs the peace and/or quiet of any neighborhood or that causes discomfort or annoyance to any reasonable person of normal sensitivity residing in the area. Regulations can include requirements for sound barriers, mitigation measures to reduce excessive noise, or the placement and orientation of buildings, and can specify the compatibility of different uses with varying noise levels, as shown in Table 3.3-1, *County of Los Angeles Community Noise Criteria*.

**TABLE 3.3-1  
COUNTY OF LOS ANGELES COMMUNITY NOISE CRITERIA**

Noise Zone	Land Use of Receptor Property	Time	Noise Levels (dBA)				
			Std 1 L50 30 min/hr	Std 2 L25 15 min/hr	Std 3 L8.3 5 min/hr	Std 4 L1.7 1 min/hr	Std 5 L0 at No Time
I	Noise Sensitive	Anytime	45	50	55	60	65
II	Residential	10 p.m. – 7 a.m.	45	50	55	60	65
		7 a.m. – 10 p.m.	50	55	60	65	70
III	Commercial	10 p.m. – 7 a.m.	55	60	65	70	75
		7 a.m. – 10 p.m.	60	65	70	75	80
IV	Industrial	Anytime	70	75	80	85	90

**SOURCE:** County of Los Angeles. *Municipal Codes*. Title 12, Chapter 8, *Noise Control*.

In addition to the community noise criteria, the municipal codes establish interior noise standards for residential dwellings. According to Section 12.08.400 of the municipal codes, no person shall operate or cause to be operated within a dwelling unit, any source of sound, or allow the creation of any noise, which causes the noise level when measured inside a neighboring receiving dwelling to exceed the following standards:<sup>4</sup>

<sup>3</sup> County of Los Angeles. *Municipal Codes*. Title 12, Chapter 8, *Noise Control*.

<sup>4</sup> County of Los Angeles. *Municipal Codes*. Title 12, Chapter 8, *Noise Control*.

- Standard No. 1: The applicable interior noise level for cumulative period of more than 5 minutes in any hour; or
- Standard No. 2: The applicable interior noise level plus 5 dB for a cumulative period or more than one minute in any hour; or
- Standard No. 3: The applicable interior noise level plus 10 dB or the maximum measured ambient noise level for any period of time.

Section 12.08.440 of the municipal codes states that operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of 7:00 p.m. and 7:00 a.m., or at any time on Sundays or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work of public service utilities or by variance issued by the health office, is prohibited. If noise disturbance crosses a residential or commercial property line, the County has established maximum noise levels for both mobile and stationary equipment (Table 3.3-2, *County of Los Angeles Construction Noise Restrictions*).

**TABLE 3.3-2  
COUNTY OF LOS ANGELES CONSTRUCTION NOISE RESTRICTIONS**

Time Frame	Single-Family Residential	Multifamily Residential	Semi-residential/ Commercial
<b>Mobile equipment*</b>			
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m. (daytime)	75 dBA	80 dBA	85 dBA
Daily, 8:00 p.m. to 7:00 a.m. (nighttime) and all day Sunday and legal holidays	60 dBA	64 dBA	70 dBA
<b>Stationary equipment**</b>			
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m. (daytime)	60 dBA	65 dBA	70 dBA
Daily, 8:00 p.m. to 7:00 a.m. (nighttime) and all day Sunday and legal holidays	50 dBA	55 dBA	60 dBA

**SOURCE:** County of Los Angeles. *Municipal Codes*. Title 12, Chapter 8, *Noise Control*.

**NOTES:**

- \* = Maximum noise levels for nonscheduled, intermittent, short-term operation (less than 10 days) of mobile equipment
- \*\* = Maximum noise levels for repetitively scheduled and relatively long-term operation (periods of 10 days or more) of stationary equipment

**Vibration**

Title 12, Section 12.08.560, of the county municipal code provides criteria for construction-generated ground-borne vibration:<sup>5</sup>

- Operating or permitting the operation of any device that creates vibration which is above the vibration perception threshold of any individual at or beyond the property boundary of the source if on private property, or at 150 feet (46 meters) from the source if on a public space or public right-of-way is prohibited. The perception threshold shall be a motion velocity of 0.01 in/sec over the range of 1 to 100 Hertz.

<sup>5</sup> County of Los Angeles. *Municipal Codes*. Title 12, Chapter 8, *Noise Control*.

## Adopted County of Los Angeles General Plan 2035, Noise Element

Of the 12 policies outlined in the Los Angeles County General Plan 2035 Update related to noise, 7 are applicable to the proposed initiative:<sup>6</sup>

**Goal N-1:** The reduction of excessive noise impacts.

- **Policy N 1.1:** Utilize land uses to buffer noise-sensitive uses from adverse noise impacts.
- **Policy N 1.2:** Reduce exposure to noise impacts by promoting land use compatibility.
- **Policy N 1.3:** Minimize impacts to noise-sensitive land uses by ensuring adequate site design, acoustical construction, and use of barriers, berms, or additional engineering controls through Best Available Technologies (BAT).
- **Policy N 1.4:** Enhance and promote noise abatement programs in an effort to maintain acceptable levels of noise as defined by the Los Angeles County Exterior Noise Standards and other applicable noise standards.
- **Policy N 1.6:** Ensure cumulative impacts related to noise do not exceed health-based safety margins.
- **Policy N 1.7:** Utilize traffic management and noise suppression techniques to minimize noise from traffic and transportation systems.
- **Policy N 1.9:** Require construction of suitable noise attenuation barriers on noise sensitive uses that would be exposed to exterior noise levels of 65 dBA CNEL and above, when unavoidable impacts are identified.

There are no General Plan policies related to ground-borne vibration.

### 2015 Antelope Valley Area Plan – Town & Country

The planning area of the Antelope Valley Area Plan – Town & Country, a component of the adopted County of Los Angeles General Plan, provides planning policies for 1,200 square miles of elevated desert terrain bounded by the San Gabriel Mountains on the south, Kern County to the north, and extending from Gorman on the west to San Bernardino County on the east, including approximately 95 percent of the area that would be potentially affected by the proposed initiative.

Chapter V, *Policy Statements*, establishes the following relevant policy relevant to noise in consideration of the proposed initiative:<sup>7</sup>

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<sup>6</sup> Los Angeles County Department of Regional Planning. Adopted 6 October 2015. *Los Angeles County 2035 General Plan*: Chapter 11: Noise Element. Available online at: [planning.lacounty.gov/assets/upl/project/gp\\_final-general-plan-ch6.pdf](http://planning.lacounty.gov/assets/upl/project/gp_final-general-plan-ch6.pdf)

<sup>7</sup> County of Los Angeles Department of Regional Planning. 4 December 1986. *Antelope Valley Areawide General Plan: A Component of the Los Angeles County General Plan*.

**Goal:** Land Use and Development Controls

- **Policy 174:** Use “worst case,” or highest potential noise exposure levels within the planning period as the basis of land use and development controls to prevent future noise-use incompatibilities.

**Goal:** Coordination, Support and Monitoring Activities

- **Policy 176:** Encourage the reduction of the present and future impact of excessive noise from all major sources by the judicious use of technology, planning, and regulatory measures.

There are no Antelope Valley Area Plan policies related to ground-borne vibration.

**2012 Santa Clarita Valley Area Plan**

The Castaic / Santa Clarita / Agua Dulce Subarea is located within the planning area of the Santa Clarita Valley Area Plan, which includes 5 percent of the area potentially affected by the proposed initiative. The Noise Element of the Santa Clarita Valley Area Plan is a comprehensive program for including noise management in the planning process, providing a tool for planners to use in achieving and maintaining land uses that are compatible with existing and future environmental noise levels. The Noise Element identifies current noise conditions within the planning area, and projects future noise impacts resulting from continued growth allowed by the Land Use Element. The following goals and policies are relevant to noise in consideration of the proposed initiative:<sup>8</sup>

**Goal N-1:** Noise Environment

- **Policy N-1.1.1:** Use the Noise and Land Use Compatibility Guidelines contained in Figure N-8, which are consistent with State guidelines, as a policy basis for decisions on land use and development proposals related to noise.
- **Policy N-1.1.2:** Continue to implement the adopted Noise Ordinance and other applicable code provisions, consistent with state and federal standards, which establish noise impact thresholds for noise abatement and attenuation, in order to reduce potential health hazards associated with high noise levels.
- **Policy N-1.1.3:** Include consideration of potential noise impacts in land use planning and development review decisions.
- **Policy N-1.1.4:** Control noise sources adjacent to residential, recreational, and community facilities, and those land uses classified as noise sensitive.

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<sup>8</sup> County of Los Angeles Department of Regional Planning. 27 November 2012. *Santa Clarita Valley Area Plan*. Chapter 6: Noise Element.

### Goal N-3: Residential Neighborhoods

- **Policy N-3.1.1:** Require that developers of new single-family and multi-family residential neighborhoods in areas where the ambient noise levels exceed 60 CNEL provide mitigation measures for new residences to reduce interior noise levels to 45 CNEL, based on future traffic and railroad noise levels.
- **Policy N-3.1.2:** Require that developers of new single-family and multi-family residential neighborhoods in areas where the projected noise levels exceed 65 CNEL provide mitigation measures for new residences to reduce outdoor noise levels to 65 CNEL. This requirement would apply to rear yard areas for single-family developments, and to private open space and common recreational and open space areas for multi-family developments.
- **Policy N.3.1.4:** Require that those responsible for construction activities develop techniques to mitigate or minimize the noise impacts on residences, and adopt standards that regulate noise from construction activities that occur in or near residential neighborhoods.
- **Policy N.3.1.6:** Ensure that new residential buildings shall not be located within 150 feet of the centerline for Interstate 5.

There are no Santa Clarita Valley Area Plan policies related to ground-borne vibration.

## SECTION 4.0 ANALYSIS

The analysis provided in this section evaluates the noise impact level of significance associated with the construction and operation of the proposed initiative. Relevant regulatory framework is used to determine the consistency of the proposed initiative with federal, state, and local laws that govern the regulation of noise to determine the level of significance of the proposed initiative impacts to existing ambient noise levels and sensitive receptors. The information used in this analysis is based on a review of relevant literature and technical reports (see Section 5.0, *References*, for a list of reference materials consulted).

### 4.1 AFFECTED ENVIRONMENT

#### 4.1.1 Ambient Noise Levels

Presumed ambient noise levels for the proposed initiative subareas are referenced from the *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, prepared by the U.S. Environmental Protection Agency (U.S. EPA) Office of Noise Abatement and Control in March 1974.<sup>1</sup> According to the published document, the range of outdoor day-night noise levels ( $L_{dn}$ ) in the United States is very large, extending from 44 dB at a farm to over 87 dB at an apartment located adjacent to a freeway. Since the proposed initiative subareas are located in undeveloped, rural areas, it is assumed that the majority of the proposed initiative subareas will experience  $L_{dn}$  noise levels of 44–53 dB, consistent with the findings of the U.S. EPA. The potential range of outdoor  $L_{dn}$  noise levels mapped in Figure 4.1.1-1, *Outdoor Day-Night  $L_{dn}$  Noise Levels* (see figure at the end of this section), was determined by the findings of the U.S. EPA and by distance to major noise sources such as highways, major arterials, trains, airports, and industrial zones. Pursuant to SB 860, and California Government Code Section 65302(f), Tables 4.1.1-1 through 4.1.1-5 indicate the number of proposed initiative parcels that are located within 0.25 mile of an existing source of noise that may be incompatible for residential development.

**TABLE 4.1.1-1  
PROPOSED INITIATIVE PARCELS WITHIN 0.25 MILE OF  
A HIGHWAY OR FREEWAY**

Subarea	Number of Parcels within 0.25 Mile
Acton	101
Castaic/Santa Clarita/Agua Dulce	136
Lake Los Angeles/Llano/Valyermo/Littlerock	689
Lake Hughes/Gorman/West of Lancaster	1,346
Lancaster Northeast	46
East San Gabriel Mountains	0
Antelope Valley Northeast	0
<b>Total</b>	<b>2,318</b>

<sup>1</sup> United States Environmental Protection Agency. March 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health with an Adequate Margin of Safety*. Prepared by the U.S. Environmental Protection Agency Office of Noise Abatement and Control. Available at: [http://www.fican.org/pdf/EPA\\_Noise\\_Levels\\_Safety\\_1974.pdf](http://www.fican.org/pdf/EPA_Noise_Levels_Safety_1974.pdf)

**TABLE 4.1.1-2  
PROPOSED INITIATIVE PARCELS WITHIN 0.25 MILE OF  
A PRIMARY ARTERIAL OR MAJOR STREET**

Subarea	Number of Parcels within 0.25 Mile
Acton	1,063
Castaic/Santa Clarita/Agua Dulce	1,930
Lake Los Angeles/Llano/Valyermo/Littlerock	11,306
Lake Hughes/Gorman/West of Lancaster	11,871
Lancaster Northeast	5,086
East San Gabriel Mountains	523
Antelope Valley Northeast	1,081
<b>Total</b>	<b>32,860</b>

**TABLE 4.1.1-3  
PROPOSED INITIATIVE PARCELS WITHIN 0.25 MILE OF A  
PASSENGER/FREIGHT RAILROAD OR GROUND RAPID TRANSIT SYSTEM**

Subarea	Number of Parcels within 0.25 Mile
Acton	79
Castaic/Santa Clarita/Agua Dulce	82
Lake Los Angeles/Llano/Valyermo/Littlerock	456
Lake Hughes/Gorman/West of Lancaster	0
Lancaster Northeast	162
East San Gabriel Mountains	0
Antelope Valley Northeast	0
<b>Total</b>	<b>779</b>

**TABLE 4.1.1-4  
PROPOSED INITIATIVE PARCELS WITHIN 0.25 MILE OF  
AN AIRPORT/HELIPORT**

Subarea	Number of Parcels within 0.25 Mile
Acton	1
Castaic/Santa Clarita/Agua Dulce	13
Lake Los Angeles/Llano/Valyermo/Littlerock	35
Lake Hughes/Gorman/West of Lancaster	65
Lancaster Northeast	5
East San Gabriel Mountains	0
Antelope Valley Northeast	0
<b>Total</b>	<b>114</b>

**TABLE 4.1.1-5  
PROPOSED INITIATIVE PARCELS WITHIN 0.25 MILE OF  
AN INDUSTRIAL ZONE**

Subarea	Number of Parcels within 0.25 Mile
Acton	57
Castaic/Santa Clarita/Agua Dulce	272
Lake Los Angeles/Llano/Valyermo/Littlerock	246
Lake Hughes/Gorman/West of Lancaster	2,114
Lancaster Northeast	1,634
East San Gabriel Mountains	0
Antelope Valley Northeast	0
<b>Total</b>	<b>4,323</b>

#### **4.1.2 Ground-Borne Vibration Levels**

Due to the fact that the proposed initiative subareas are located in largely undeveloped, rural, or agricultural areas, it is assumed that the primary source of existing ground-borne vibration in the vicinity of the proposed initiative subareas is vehicular travel (e.g., standard cars, refuse trucks, and commercial trucks) on local roadways and freeways. According to the U.S. Department of Transportation, Federal Transit Administration (FTA) technical study, *Transit Noise and Vibration Impact Assessments*, typical road traffic-induced vibration levels are unlikely to be perceptible by people. In part, the FTA study states that “it is unusual for vibration from traffic including buses and trucks to be perceptible, even in locations close to major highways.”<sup>2</sup> Additionally, there are no active mines in the vicinity of the proposed initiative subareas; therefore, there are no ground-borne vibration conditions in the area related to blasting or other activities associated with active mines.

#### **4.1.3 Sensitive Receptors**

##### **4.1.3.1 Residential Parcels**

The area that would be subject to the proposed initiative consists of 42,867 parcels in the unincorporated area of Los Angeles County, all of which could potentially be developed into single-family residences. As these parcels are undeveloped, all 42,867 parcels shall be considered sensitive receptors.

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<sup>2</sup> U.S. Department of Transportation, Federal Transit Administration. May 2006. *Transit Noise and Vibration Impact Assessment*. Washington, DC.

#### 4.1.3.2 Schools

There are 20 elementary schools, middle schools, and high schools located in the vicinity of the parcels within the proposed initiative subareas, with the exception of the Acton subarea and Antelope Valley Northeast subarea, which do not contain any elementary, middle, or high schools (see Figure 4.1.3.2-1, *Schools within 0.25 Mile of Proposed Initiative Subareas*, at the end of this section). Table 4.1.3.2-1, *Schools within 0.25 Mile of Proposed Initiative Subareas*, indicates which schools are located in the vicinity of the proposed initiative subareas.

**TABLE 4.1.3.2-1  
SCHOOLS WITHIN 0.25 MILE OF PROPOSED INITIATIVE SUBAREAS**

Subarea	School	Public/Private
Acton	None	Not applicable
Castaic/Santa Clarita/Agua Dulce	Agua Dulce Elementary School	Public
	Desert Canyon Academy	Private
	Mint Canyon Elementary School	Public
	Castaic Elementary School	Public
	Castaic Middle School	Public
Lake Los Angeles/Llano/ Valyermo/Littlerock	Almondale Middle School	Public
	Lake Los Angeles Elementary School	Public
	Vista San Gabriel Elementary School	Public
Lake Hughes/Gorman/ West of Lancaster	Del Sur Elementary School	Public
	Del Sur Middle School	Public
	Gorman Elementary School	Public
	Gorman Middle School	Public
	Neenach Elementary School	Public
	Sommer Haven Church School	Private
	Hughes- Elizabeth Lakes Elementary School	Public
	Hughes- Elizabeth Lakes Middle School	Public
Shema Christian	Private	
Lancaster Northeast	Eastside Elementary School	Public
East San Gabriel Mountains	Hathaway- Sycamores NPS	Private
	Mount Baldy Elementary School	Public
Antelope Valley Northeast	None	Not applicable

#### 4.1.3.3 Medical Centers

There are no medical centers or hospitals located within 0.25 mile of the proposed initiative subareas.

#### 4.1.3.4 Parks

In addition to residential parcels, schools, and hospitals, parks are also considered sensitive receptors. There are 30 parks located within a 0.25-mile radius of the proposed initiative subareas (see Figure 4.1.3.4-1, *Parks within 0.25 Mile of Proposed Initiative Subareas*, at the end of this section). Of these, 27 are regional parks and three are local parks. Table 4.1.3.4-1, *Local Parks within 0.25 Mile of Proposed Initiative Subareas*, and Table 4.1.3.4-2, *Regional Parks within 0.25 Mile of Proposed Initiative Subareas*, indicate which parks are located adjoining or in the vicinity of the proposed initiative subareas.

**TABLE 4.1.3.4-1  
LOCAL PARKS WITHIN 0.25 MILE OF PROPOSED INITIATIVE SUBAREAS**

<b>Subarea</b>	<b>Park</b>	<b>Acreage within 0.25 Mile</b>
Castaic/Santa Clarita/ Agua Dulce	Oak Spring Canyon Park	1
	West Creek Park	18
Lake Los Angeles/Llano/Valyermo/ Littlerock	Everett Martin Park	6
<b>Total</b>		<b>25</b>

**TABLE 3.8.2-8  
REGIONAL PARKS WITHIN 0.25 MILE OF PROPOSED INITIATIVE SUBAREAS**

<b>Subarea</b>	<b>Park</b>	<b>Acreage within 0.25 Mile</b>
Acton	Angeles National Forest	34,116
Antelope Valley Northeast	Phacelia Wildflower Sanctuary	160
Castaic/Santa Clarita/Agua Dulce	Castaic Lake State Recreation Area	956
	Castaic Regional Sports Complex	24
	Los Padres National Forest	132
	Michael D Antonovich Open Space	6
	Michael D. Antonovich Regional Park at Joughin Ranch	1
	Placerita Canyon Natural Area and Nature Center	30
	Santa Clarita Woodlands Park	1,502
	Tesoro Adobe Historic Park	18
	Vasquez Rocks Natural Area and Nature Center	507
East San Gabriel Mountains	Arcadia Wilderness Park	3
	Claremont Hills Wilderness Park	211
	Dexter Park	38
	River Wilderness Park	11
	Winery Canyon Open Space	94
Lake Hughes/Gorman/ West of Lancaster	Arthur B. Ripley Desert Woodland State Park	434
	George R Bones Wildlife Sanctuary	99
	Hungry Valley State Vehicular Recreation Area	1,125
	Neenach Habitat Preserve	40
Lake Los Angeles/Llano/Valyermo/ Littlerock	Alpine Butte Wildlife Sanctuary	315
	Big Rock Wash Wildlife Sanctuary	80
	Blalock Wildlife Sanctuary	110
	Devil's Punchbowl Natural Area and Nature Center	235
	Jackrabbit Flats Wildlife Sanctuary	39
	Mescal Wildlife Sanctuary	99
	Theodore Payne Wildlife Sanctuary	157
<b>Total</b>		<b>40,542</b>

#### 4.1.3.5 Public and Private Airports

There are three public use airports and eight private use airports located within a 2-mile radius of the proposed initiative subareas (see Figure 4.1.4-1, *Airports within 2 Miles of Proposed Initiative Subareas*, at the end of this section). Table 4.1.4-1, *Airports within 2 Miles of Proposed Initiative Subareas*, indicates that there are a total of 5,549 parcels located within 2 miles of a public and/or private use airport.

**TABLE 4.1.4-1  
AIRPORTS WITHIN 2 MILES OF PROPOSED INITIATIVE SUBAREAS**

Subarea	Airport	Private/Public	Number of Parcels within 2 miles
Acton	None	Not applicable	0
Castaic/Santa Clarita/Agua Dulce	Agua Dulce Airport	Public	390
Lake Los Angeles/Llano/Valyermo/Littlerock	Palmdale Regional Airport	Public	19
	Brian Ranch Airport	Private	779
	Crystal Airport	Private	602
	Gray Butte Field	Private	369
	Nichols Farms Airport	Private	644
Lake Hughes/Gorman/West of Lancaster	General Williams J. Fox Airfield	Public	105
	Bohunk's Airport	Private	925
	Quail Lake Sky Park	Private	74
	Skyotee Ranch	Private	180
	Little Buttes Antique Airfield	Private	1,462
Lancaster Northeast	None	Not applicable	0
East San Gabriel Mountains	None	Not applicable	0
Antelope Valley Northeast	None	Not applicable	0

## 4.2 SIGNIFICANCE CRITERIA

### 4.2.1 CEQA Thresholds

The noise impacts associated with the proposed initiative can be separated into construction-related short-term impacts and operation-related long-term, permanent impacts. According to Appendix G of the California of the State CEQA Guidelines,<sup>3</sup> there are six questions that should be addressed to determine the potential impacts of the proposed initiative:

- Would the proposed initiative result in 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?
- Would the proposed initiative result in exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels?

<sup>3</sup> California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000–15387, Appendix G.

- Would the proposed initiative result in a substantial permanent increase in ambient noise levels in the proposed initiative vicinity above levels existing without the proposed initiative?
- Would the proposed initiative result in a substantial temporary or periodic increase in ambient noise levels in the proposed initiative vicinity above levels existing without the proposed initiative?
- For a proposed initiative parcel located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the proposed initiative expose people residing or working in the proposed initiative area to excessive noise levels?
- For a proposed initiative parcel within the vicinity of a private airstrip, would the proposed initiative expose people residing or working in the proposed initiative area to excessive noise levels?

#### 4.2.2 FTA Vibration Thresholds

The FTA guidelines set forth in its technical manual, *Transit Noise and Vibration Impact Assessment*, will be utilized in determining the vibration impacts associated with the proposed initiative.<sup>4</sup> The FTA measures building vibration damage in peak particle velocity (PPV), which is measured in inches per second. Table 4.2.2-1, *FTA Construction Vibration Impact Criteria for Building Damage*, provides the FTA vibration criteria applicable to construction activities. According to the FTA guidelines, a vibration criterion of 0.2 inch per second should be considered as the significant impact level for non-engineered timber and masonry buildings. Furthermore, pursuant to the FTA guidelines, a vibration damage criteria of 0.50 inch per second has been designated for structures or buildings constructed of reinforced-concrete, steel, or timber.

**TABLE 4.2.2-1  
FTA CONSTRUCTION VIBRATION  
IMPACT CRITERIA FOR BUILDING DAMAGE**

Building Category	PPV (inches per second)
I. Reinforced-concrete, steel or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

**SOURCE:** U.S. Department of Transportation, Federal Transit Administration. May 2006. *Transit Noise and Vibration Impact Assessment*. Washington, DC.

#### 4.3 IMPACT ANALYSIS

The County's Noise Regulation states that the baseline ambient noise shall be the actual measured ambient noise level or the County's presumed ambient noise level, whichever is greater. As presented in Section 4.1.1, the ambient noise level is assumed to be 44–53 dB for the purposes of determining the proposed initiative's noise impacts on the surrounding communities.

<sup>4</sup> U.S. Department of Transportation, Federal Transit Administration. May 2006. *Transit Noise and Vibration Impact Assessment*. Washington, DC.

### 4.3.1 Construction Noise

Noise impacts from construction of the proposed initiative occurring within or adjacent to the proposed initiative area would be a function of the noise generated by construction equipment, the location of the equipment, the timing and duration of the noise-generating construction activities, and the relative distance to noise sensitive receptors. Construction activities would generally include ground clearing, site grading, and building construction. Each phase of construction would involve the use of various types of construction equipment and would, therefore, have its own distinct noise characteristics. For example, site grading typically requires the use of earth-moving equipment, such as excavators, front-end loaders, and heavy-duty trucks. Noise from construction equipment generate both steady-state and periodic noise that could be heard within and adjacent to the proposed initiative area.

Individual pieces of construction equipment that would be used during construction of homes resulting from the issuance of building permits from the proposed initiative could potentially generate maximum noise levels ranging from 71 dBA to 90 dBA at a reference distance of 50 feet from the noise source, as shown in Table 4.3.1-1, *Noise Levels for Typical Construction Equipment*. These maximum noise levels would occur when equipment is operating under full power conditions (i.e., with the equipment engine at maximum speed). However, equipment on construction sites often operates under less than full power conditions.

**TABLE 4.3.1-1  
NOISE LEVELS FOR TYPICAL CONSTRUCTION EQUIPMENT**

Equipment	Estimated Usage Factor* (%)	Typical Noise Level at 50 feet from Source (dBA)
Air compressor	40	78
Cement and mortar mixer	50	80
Concrete mixer truck	40	79
Concrete saw	20	90
Crane	16	81
Drill rig	20	84
Forklift	10	75
Generator	50	81
Grader	40	85
Dump / haul truck	40	76
Excavator	40	81
Paver	50	77
Pump	50	71
Roller	20	80
Rubber tired loader	40	79
Tractor / loader / backhoe	40	80
Water truck	10	82
Welders	40	74

**NOTE:** \* Usage factor represents the percentage of time the equipment would be operating at full speed.

**SOURCE:** Federal Highway Administration. January 2006. *FHWA Roadway Construction Noise Model User's Guide*. Prepared by: U.S. Department of Transportation, Research and Innovative Technology Administration, John A. Volpe National Transportation Systems Center Acoustics Facility. Cambridge, MA.

To more accurately characterize construction-phase noise levels, the average noise level associated with each phase of construction is calculated based on the quantity, type, and usage factors for

each type of equipment that would be used during each construction phase. These noise levels are typically associated with multiple pieces of equipment operating simultaneously.

During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary based on the amount of equipment in operation and the location of the activity. The USEPA has compiled data regarding the noise-generating characteristics of specific types of construction equipment during typical construction phases. These data are presented in Table 4.3.1-2, *Typical Outdoor Construction Noise Levels*, for a reference distance of 50 feet. These activities are generally point sources, which would attenuate with distance from the construction site at a rate of approximately 6.0 dB for every doubling of distance.

**TABLE 4.3.1-2  
TYPICAL OUTDOOR CONSTRUCTION NOISE LEVELS**

Construction Phase	Noise Level (dBA Leq)	
	50 Feet	50 Feet with Mufflers
Ground clearing	84	82
Excavation/grading	89	86
Foundations	78	77
Structural/paving	85	83
Finishing	89	86

**SOURCE:** U.S. Environmental Protection Agency. 1971. *Noise from Construction Equipment and Operation, Building Equipment and Home Appliances*. PB 206717. Washington, DC.

As shown in Table 4.3.1-2, the excavation/grading phase and finishing phase of construction would generate the highest levels of noise (at 89 dBA). This is due in large part to the operation of heavy equipment, but it should be noted that only a limited amount of equipment will be operating near a given location at a particular time because not all affected parcels would initiate construction at the same time. Based on the information in Table 4.3.1-2, construction noise levels could periodically reach approximately 77 to 89 dBA at a distance of 50 feet from the proposed initiative area, depending on the use of muffler on construction equipment.

Based on these noise levels, and that noise from a point source attenuate by 6.0 dBA per doubling of distance from the source, the noise impacts on sensitive receptors can be determined by Equation 1:

$$(1) \quad L_2 = L_1 - 20 \log_{10} \left( \frac{d_1}{d_2} \right)$$

Where

$L_1$  = known sound level at  $d_1$

$L_2$  = desired sound level at  $d_2$

$d_1$  = distance of known sound level from the noise source

$d_2$  = distance of the sensitive receptor from the noise source

By assigning the highest potential noise level during construction at 89 dBA ( $L_1$ ) at a reference distance of 50 feet ( $d_1$ ), the distance at which construction activities would reach a maximum of 75 dBA ( $L_2$ ) and be below the maximum allowable noise level for construction activities near a single-

family residence,<sup>5</sup> is approximately 251 feet ( $d_2$ ). Similarly, Equation 1 was used to calculate the distance at which the noise impacts from each construction phase would be below 75 dBA (Table 4.3.1-3, *Predicted Distance at which Noise Impact Would Be below 75 dBA*).

**TABLE 4.3.1-3  
PREDICTED DISTANCE AT WHICH  
NOISE IMPACT WOULD BE BELOW 75 dBA**

Construction Phase	Distance* (feet)
Ground clearing	141
Excavation/grading	251
Foundations	71
Structural/paving	158
Finishing	251

**NOTE:** \* According to Section 12.08.440 of the Los Angeles County Municipal Code, construction activities may not exceed 75 dBA at a distance of 50 feet between the hours of 7:00 a.m. and 8:00 p.m. in any residential zone of the County or within 500 feet thereof.

The distance at which construction noise impacts will be below the threshold of significance for a residential zone for the different phases of construction ranges from 71 to 251 feet. As Table 4.3.1-3 indicates, construction of the proposed initiative would potentially have a significant impact on sensitive receptors during all phases of construction, depending on the distance to the sensitive receptor. Therefore, construction noise related to the development of single-family residences associated with the proposed initiative has the potential to exceed the 75-dBA limit imposed by Section 12.08.440 of the Los Angeles County Municipal Code, and will require the implementation of mitigation measures.

#### **4.3.2 Construction Vibration**

Construction activities can generate varying degrees of ground-borne vibration, depending on the construction procedures and the type of construction equipment used. The operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. Propagation of vibration from source to the receiver is dependent on soil type and on the receiving building. Vibration propagates more efficiently in stiff soils than in loose soils. The vibration levels inside a building depend on how the building foundation is coupled to the soil and the construction of the building. In general, heavier buildings have a lower response to vibration than smaller, lighter buildings.

Ground-borne vibration from construction rarely results in a negative response from people who are outdoors. Negative responses are typically associated with the shaking of the building where the person is located. Since construction vibration is transient, the Caltrans guidance manual can be used to categorize the potential human response to construction-induced vibration (Table 4.3.2-1, *Human Response to Transient Vibration*).<sup>6</sup>

<sup>5</sup> County of Los Angeles. *Municipal Codes*. Title 12, Chapter 8, *Noise Control*.

<sup>6</sup> California Department of Transportation. June 2004. *Transportation- and Construction-Induced Vibration Guidance Manual*. Sacramento, CA.

**TABLE 4.3.2-1  
HUMAN RESPONSE TO TRANSIENT VIBRATION**

Average Human Response	ppv (in/sec)
Severe	2.000
Strongly perceptible	0.900
Distinctly perceptible	0.240
Barely perceptible	0.035

The proposed initiative would generate ground-borne construction vibration during excavation and grading activities where heavy construction equipment, such as large bulldozers, would be used. The FTA has published standard vibration velocities for various construction equipment operations. The typical vibration levels (in terms of inches per second PPV) at a reference distance of 25 feet, 50 feet, and 100 feet for construction equipment used during construction activities are listed in Table 4.3.2-2, *Vibration Source Levels for Construction Equipment*.

**TABLE 4.3.2-2  
VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT**

Equipment	PPV at 25 feet (inches per second)	PPV at 50 feet (inches per second)	PPV at 100 feet (inches per second)
Vibratory roller	0.210	0.074	0.026
Large bulldozer	0.089	0.031	0.011
Loaded trucks (haul truck)	0.076	0.027	0.010
Jackhammer	0.035	0.012	0.004
Small bulldozer	0.003	0.001	0.000

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

Construction of the homes associated with the issuance of building permits as a result of the proposed initiative would not include demolition or pile driving methods, and as such, impacts from these activities are not included in this construction vibration analysis. As indicated in Table 4.3.2-1, vibration velocities from most heavy construction operations that would be used during construction of homes associated with the proposed initiative would range from 0.000 to 0.026 inch per second PPV at a reference distance of 100 feet from the equipment. This estimated range of vibration velocity levels at a distance of 100 feet is well below the category of “barely perceptible,” which is defined as 0.035 inch per second PPV, as indicated in Table 4.3.2-1. This estimated range is also below the vibration criterion that would be considered as the significant impact level for non-engineered timber and masonry buildings, which is defined as 0.2 inch per second PPV, as indicated in Table 4.2.2-1. Therefore, construction vibration related to the development of single-family residences associated with the proposed initiative would not likely expose people to excessive ground-borne vibration or ground-borne noise levels.

### 4.3.3 Operational Noise

The proposed initiative is expected to generate traffic noise associated with water trucks traveling to and from the proposed initiative area. According to the Traffic Impact Study prepared by Fehr & Peers, the proposed initiative is expected to result in approximately 134 total water hauling truck trips per day. As indicated in Table 4.3.1-1, the typical noise level of a water truck at 50 feet is 82 dBA. The noise level at other distances can be estimated using Equation 1 (Table 4.3.3-1, *Noise Level of Water Truck at Various Distances*).

**TABLE 4.3.3-1  
NOISE LEVEL OF WATER TRUCK AT VARIOUS DISTANCES**

Distance (feet)	Noise Level (dBA)
50	82
100	76
150	72
200	70
250	68
300	66
350	65
400	64
450	63
500	62
550	61
600	60
650	60
700	59
750	58
800	58

Per the U.S. EPA, the proposed initiative area and immediate vicinity have a range of ambient noise levels, with small town and quiet suburban areas ranging from 46 to 53 dBA, suburban areas ranging from 53 to 58 dBA, and urban areas ranging from 58 to 63 dBA.<sup>7</sup>

As discussed in Section 2.2, one way of estimating a person’s subjective reaction to a permanent increase in ambient noise levels is to examine the difference between the new noise level and the existing ambient noise level:

- Typically, a change of 1 dBA cannot be perceived outside of controlled laboratory conditions.
- A change of 3 dBA is considered a just-perceivable difference.
- A change of at least 5 dBA is required before any noticeable change in community response would be expected. A 5-dBA increase is often considered a significant impact.
- A change of 10 dBA is subjectively heard as an approximate doubling of loudness and causes an adverse community response.

The ambient noise levels in the proposed initiative area are low relative to those generated by water trucks. At a reference distance of 100 feet, a water truck would result in a noise level of 76 dBA, which is more than 10 dBA greater than the ambient noise levels of the loudest areas (urban: 58–63 dBA). Even in the loudest areas, the water truck would have to be driving on roads located at a minimum of 450 feet away from the receptor to not result in a significant impact. In the quietest areas (small town and quiet suburban: 46–53 dBA), the water truck would have to be driving on roads located at a minimum of 1,774 feet away from the receptor to not result in a significant impact.

<sup>7</sup> United States Environmental Protection Agency. March 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health with an Adequate Margin of Safety*. Prepared by the U.S. Environmental Protection Agency Office of Noise Abatement and Control. Available at: [http://www.ficam.org/pdf/EPA\\_Noise\\_Levels\\_Safety\\_1974.pdf](http://www.ficam.org/pdf/EPA_Noise_Levels_Safety_1974.pdf)

Due to the generally quiet and rural nature of the area within and surrounding the proposed initiative parcels, the regular operation of the water trucks would result in substantial periodic increases, but not a permanent steady state increase, in ambient noise levels above levels existing without the proposed initiative. Mitigation measures would have to be implemented to reduce impacts to below the level of significance.

#### **4.3.4 Operational Vibration**

Water trucks would also generate ground-borne vibration as they travel to and from the proposed initiative area. Thus, an analysis of potential vibration impacts associated with building damage from ground-borne vibration along the local access routes to the proposed initiative area was conducted. As indicated in Table 4.3.2-2, a loaded truck would generate a ground-borne vibration level of 0.010 inch per second PPV at a reference distance of 100 feet from the truck. This is well below the “barely perceptible” category, which is defined as 0.035 inch per second PPV in Table 4.3.2-1. Therefore, potential impacts from vibration during operation would be less than significant.

#### **4.3.5 Airport Land Use Plan and Public Airports**

The proposed initiative is not anticipated to result in significant impacts from airport land use plans or public airports because there are no proposed initiative parcels located within the 60 CNEL noise contour of the three public airports that are within a 2-mile radius of the proposed initiative area. Therefore, the proposed initiative would not result in impacts from exposing people residing or working in the proposed initiative area to excessive noise levels.

#### **4.3.6 Private Airstrips**

The proposed initiative is not anticipated to result in significant impacts from private airports because there are no proposed initiative parcels located within the 60 CNEL noise contour of the eight private airstrips that are within a 2-mile radius of the proposed initiative area. Therefore, the proposed initiative would not result in impacts from exposing people residing or working in the proposed initiative area to excessive noise levels.

### **4.4 CUMULATIVE IMPACTS**

The proposed initiative together with related projects and future growth could potentially contribute to cumulative noise impacts. The potential for cumulative noise impacts to occur is specific to the distance between each related initiative parcel and their stationary noise sources, including the cumulative traffic that these initiatives would add to the surrounding roadway network.

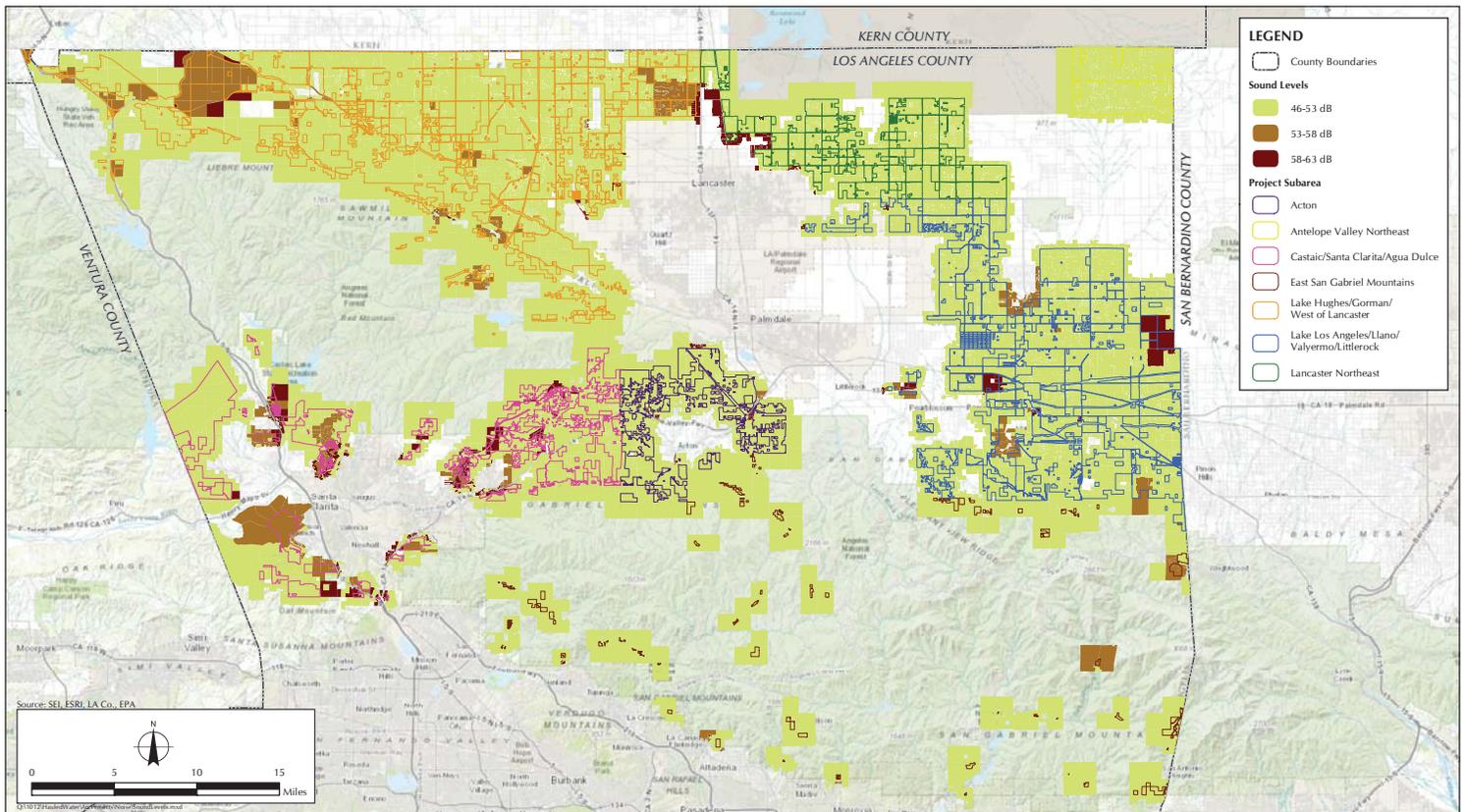
There are four related projects in the vicinity of the proposed initiative area (Table 4.4.1-1, *Related Projects*).

**TABLE 4.4.1-1  
RELATED PROJECTS**

Name	Project Type
Centennial Project	Residential
High Desert Corridor Project	Transportation
Newhall Ranch Specific Plan	Specific Plan
Northlake Specific Plan	Specific Plan

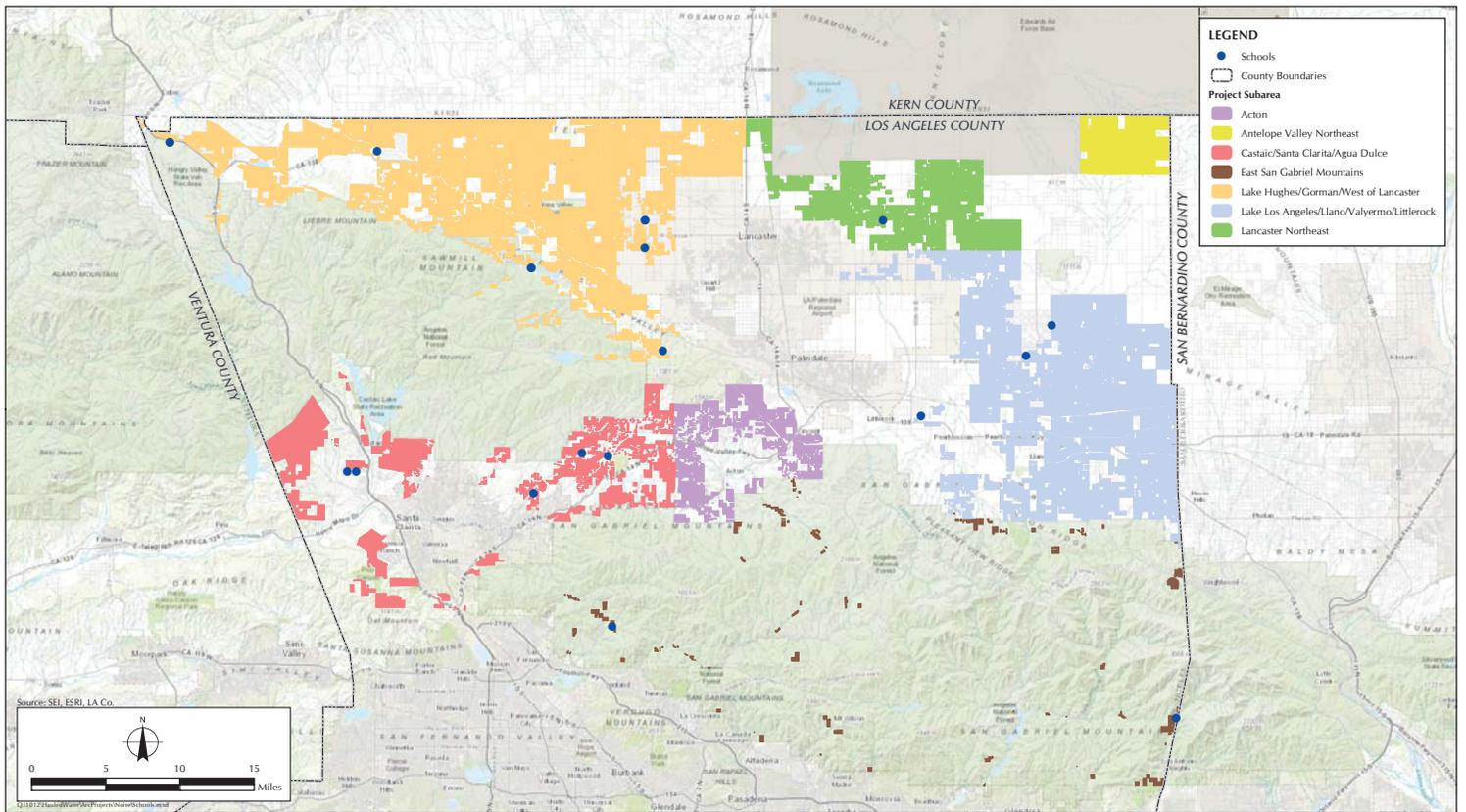
Noise from construction as a result of the proposed initiative is typically localized and has the potential to affect areas in the immediate vicinity of the construction site. Were it to occur at the same time, construction noise from the proposed initiative would combine with the construction noise from the Centennial Project, which is located in the Lake Hughes/Gorman/West of Lancaster subarea, to result in cumulative construction noise impacts.

Noise from the water trucks as a result of the proposed initiative would combine with traffic noise from the Centennial Project, which is located in the Lake Hughes/Gorman/West of Lancaster subarea, and the High Desert Corridor Project, which is located in the Lake Los Angeles/Llano/Valyermo/Littlerock subarea, to result in cumulative operational noise impacts.

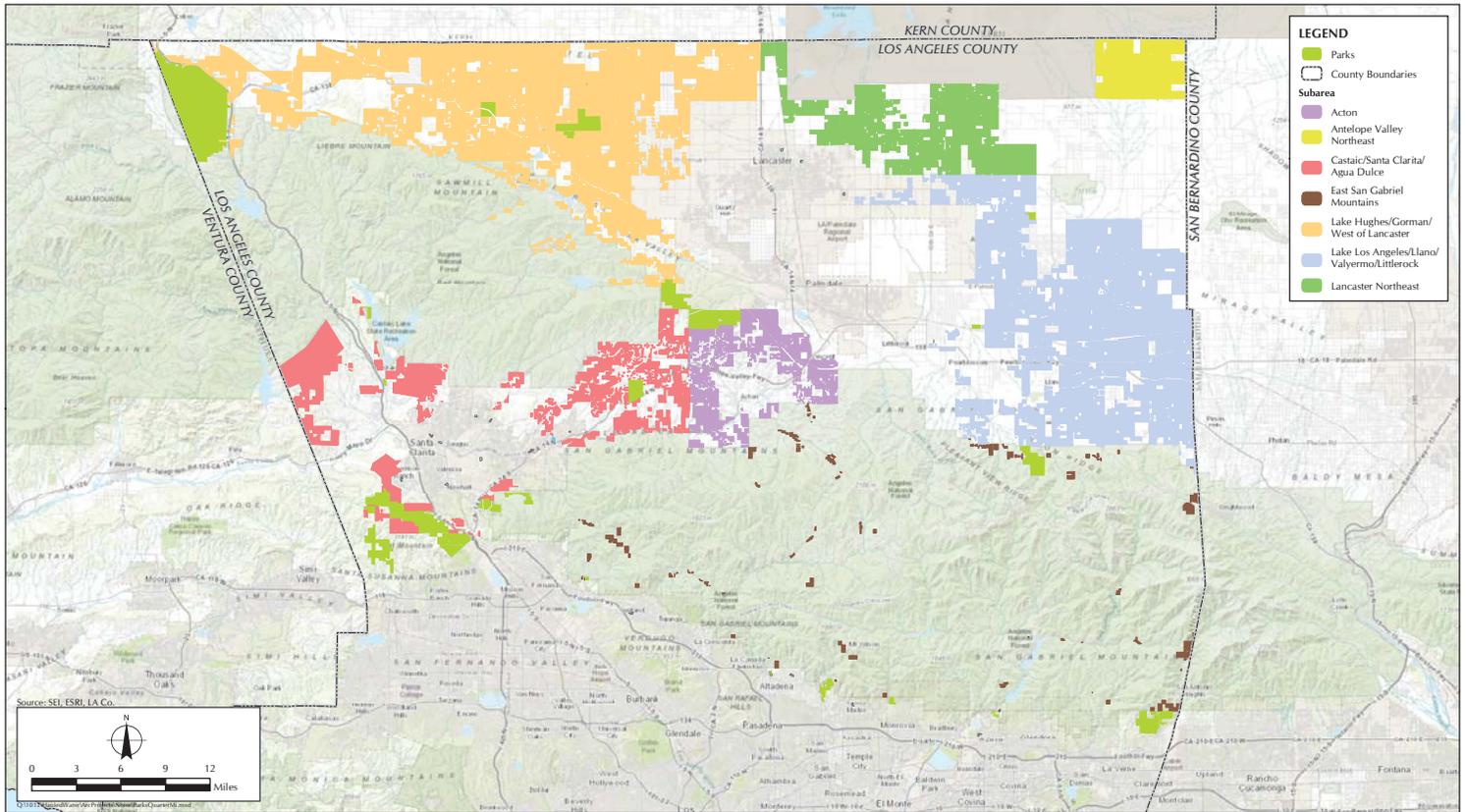


**FIGURE 4.1.1-1**  
Outdoor Day-Night Ldn Noise Levels

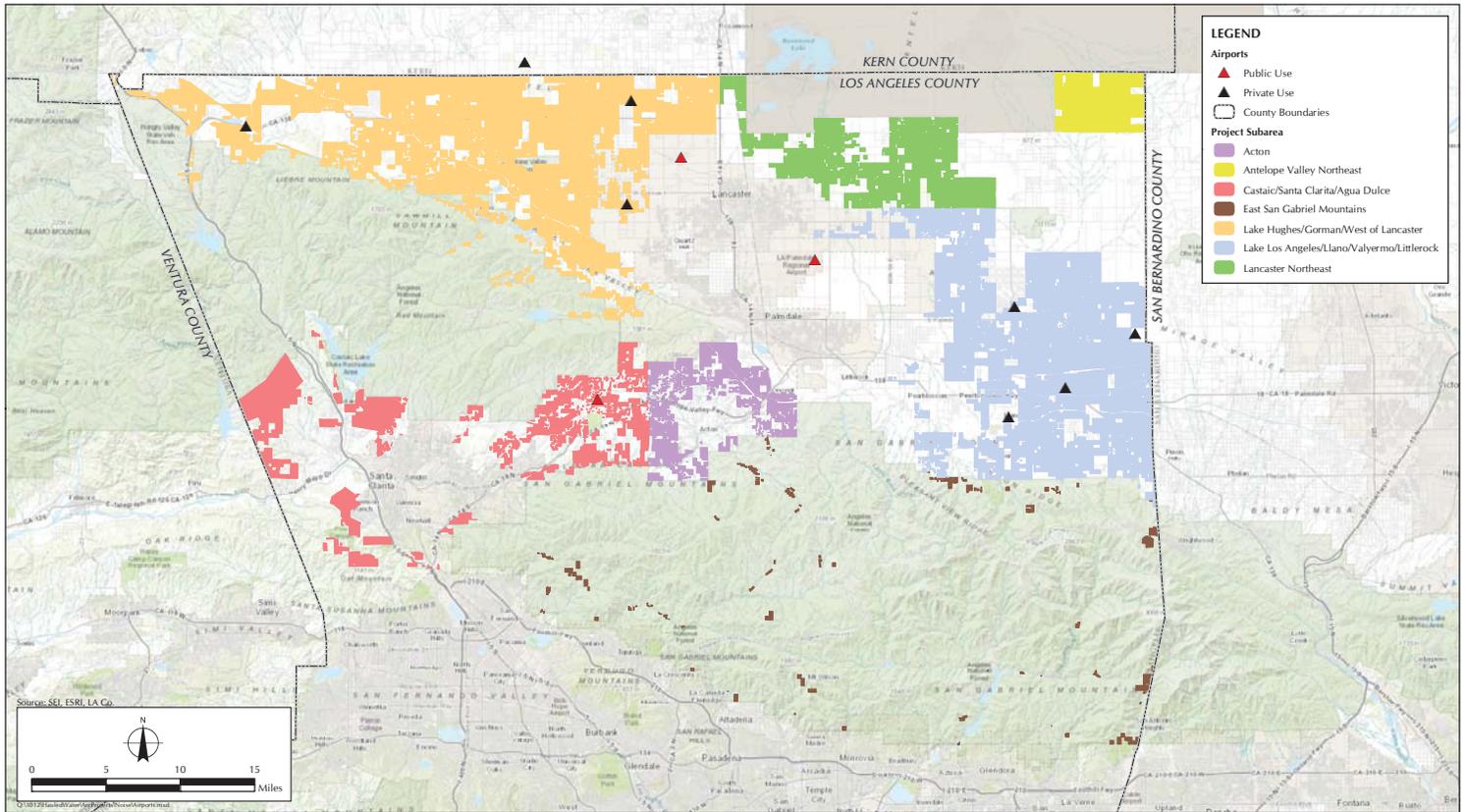




**FIGURE 4.1.3.2-1**  
Schools Within 0.25 Mile of Proposed Initiative Subareas



**FIGURE 4.1.3.4-1**  
Parks Within 0.25 Mile of Proposed Initiative Subareas



**FIGURE 4.1.4-1**  
Airports Within 2 Miles of Proposed Initiative Subareas



## SECTION 5.0 REFERENCES

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