5.8 NOISE

This section of the DEIR discusses the fundamentals of sound; examines federal, state, and local noise guidelines, policies, and standards; reviews noise levels at existing receptor locations; evaluates potential noise impacts associated with the Sierra Madre General Plan Update (General Plan Update); and provides mitigation to reduce noise impacts at noise-sensitive locations. This section also evaluates the potential for implementation of the City of Sierra Madre General Plan Update to result in noise impacts in the city. Noise calculations on which this analysis is based are included in Appendix C of this DEIR.

5.8.1 Environmental Setting

Noise Descriptors

Noise is most often defined as unwanted sound. 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."

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

- **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 on a logarithmic scale.

- **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}).** The mean of the noise level, energy averaged over the measurement period.

- **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 to the levels occurring during the period from 7:00 PM to 10:00 PM and 10 dB added to the sound levels occurring during the period 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 considered to be equivalent/interchangeable and are treated as such in this assessment.

Characteristics of Sound

When an object vibrates, it radiates part of its energy as acoustical pressure in the form of a sound wave. Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). The human hearing system is not equally sensitive to sound at all frequencies. Therefore, to approximate the human, frequency-dependent response, the A-weighted filter system is used to adjust measured sound levels. The normal range of human hearing extends from approximately 0 dBA (the threshold of detection) to 140 dBA (the threshold of pain).

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale to better account for the large variations in pressure amplitude (the above range of human hearing, 0 to 140 dBA, represents a ratio in pressures of one hundred trillion to one). All noise levels utilized for the noise analysis presented herein are relative to the industry-standard pressure reference value of 20 micropascals. 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 5.8-1 presents the subjective effect of changes in sound pressure levels.

Table 5.8-1 Change in Apparent Loudness

± 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 and Hansen 2009.

Sound is generated from a source and the decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. This phenomenon is known as spreading loss or distance attenuation.

When sound is measured for distinct time intervals, the statistical distribution of the overall sound level during that period can be obtained. For example, L_{50} is the noise level that is exceeded 50 percent of the time. Similarly, the L_{02}, L_{08}, and L_{25} values are exceeded 2, 8, and 25 percent of the time or 1, 5, and 15 minutes per hour. The energy-equivalent sound level (L_{eq}) is the most common parameter associated with community noise measurements. The L_{eq} metric is a single-number noise descriptor of the energy-average sound level over a given period of time. Other values typically noted during a noise survey are the L_{min} and L_{max}. These values are the minimum and maximum root-mean-square (RMS) noise levels obtained over the stated measurement period.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and nighttime hours, state law requires that, for planning purposes and to account for this increased receptiveness of noise, an artificial decibel increment is to be added to quiet-time noise levels to calculate the 24-hour CNEL noise metric.

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 and generally more concentrated 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 (SPL) number means. To help relate noise level values to common experience, Table 5.8-2 shows typical noise levels from noise sources.

Table 5.8-2 Typical Noise Levels

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

Source: Caltrans 2009.

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 such as railroads or vibration-intensive stationary sources, but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. Vibration displacement is the distance that a point on a surface moves away from its original static position. The instantaneous speed that a point on a surface moves is the velocity, and the rate of change of the speed is the acceleration. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During project 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. These types of vibration are best measured and described in terms of velocity and acceleration.

The three main types of waves associated with groundborne vibrations are surface or Rayleigh waves, compression or P-waves, and shear or S-waves.

- **Surface or Rayleigh waves** travel along the ground surface. They carry most of their energy along an expanding *cylindrical* wave front, similar to the ripples produced by throwing a rock into a lake. The particle motion is more or less perpendicular to the direction of propagation.

- **Compression or P-waves** are body waves that carry their energy along an expanding *spherical* wave front. The particle motion in these waves is longitudinal, in a push-pull motion. P-waves are analogous to airborne sound waves.

- **Shear or S-waves** are also body waves, carrying their energy along an expanding *spherical* wave front. Unlike P-waves, however, the particle motion is transverse, or perpendicular to the direction of propagation.

Vibration amplitudes are usually described in terms of either the peak particle velocity (PPV) or the 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, whereas RMS is typically more suitable for evaluating human response.

The units for PPV and RMS velocity are normally inches per second (in/sec). Often, vibration is presented and discussed in dB units in order to compress the range of numbers required to describe the vibration. In this study, all PPV and RMS velocity levels are in in/sec and all vibration levels are in dB relative to one microinch per second (abbreviated as VdB). Typically, groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration. Even the more persistent Rayleigh waves decrease relatively quickly as they move away from the source of the vibration. Man-made vibration problems are, therefore, usually confined to relatively short distances (500 to 600 feet or less) from the source (FTA 2006).

Construction operations generally include a wide range of activities that can generate groundborne vibration. In general, blasting and demolition of structures generate the highest vibrations. Vibratory compactors or rollers, pile drivers, and pavement breakers can generate perceptible amounts of vibration at up to 200 feet. Heavy trucks can also generate groundborne vibrations, which can vary, depending on vehicle type, weight, and pavement conditions. Potholes, pavement joints, discontinuities, differential settlement of pavement, etc., all increase the vibration levels from vehicles passing over a road surface. Construction vibration is normally of greater concern than vibration from normal traffic flows on streets and freeways with smooth pavement conditions. Trains generate substantial quantities of vibration due to their engines, steel wheels, heavy loads, and wheel-rail interactions.

Noise- and Vibration-Sensitive Receptors

Certain land uses are particularly sensitive to noise and vibration. These uses include residential, schools, libraries, churches, nursing homes, hospitals, and open space/recreation areas where quiet environments are necessary for enjoyment, public health, and safety. Commercial and industrial uses are generally not considered noise- and vibration-sensitive uses, unless noise and vibration would interfere with their normal operations and business

activities. Sensitive land uses in the City of Sierra Madre include residences, schools, libraries, churches, and recreational areas.

5.10.1.1 REGULATORY SETTING

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

State

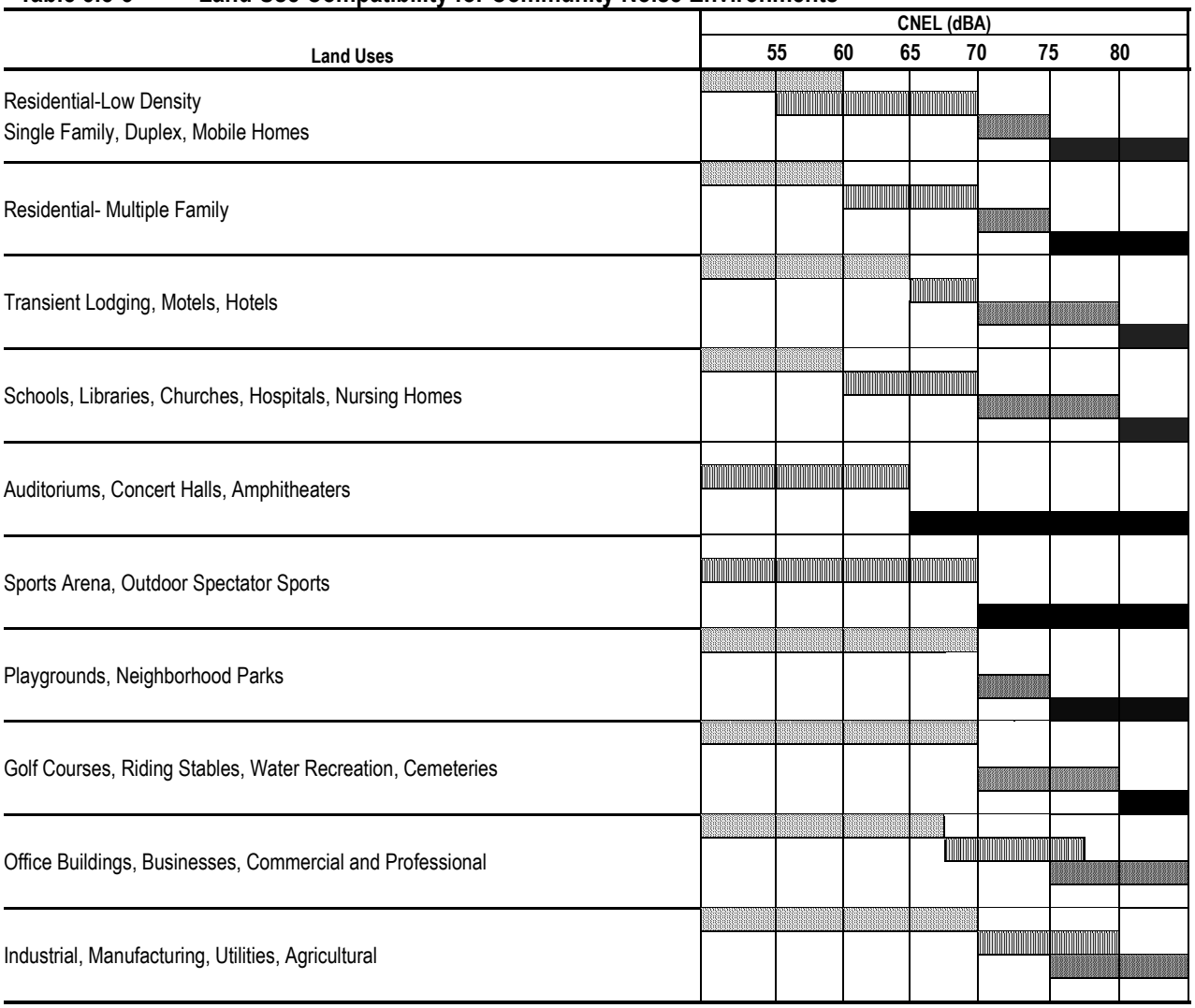
State of California Building Code

The state of California's noise insulation standards are codified in the California Code of Regulations, Title 24, *Building Standards Administrative Code*, Part 2, *California Building Code*. These noise standards are applied to new construction in California for the purpose of interior noise compatibility from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential buildings, schools, or hospitals, are located near major transportation noise sources, and where such noise sources create an exterior noise level of 65 dBA CNEL or higher. Acoustical studies that accompany building plans must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL.

Noise/Land Use Compatibility Matrix

Table 5.8-3 presents the land use compatibility chart for community noise adopted by the State of California as part of its General Plan Guidelines. This table provides urban planners with a tool to gauge the compatibility of new land uses relative to existing and future noise levels. This table identifies normally acceptable, conditionally acceptable, and clearly unacceptable noise levels for various land uses. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design. By comparison, a normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements.

Table 5.8-3 Land Use Compatibility for Community Noise Environments



Normally Acceptable:
Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable:
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and the needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally Unacceptable:
New construction or development should generally be discouraged. If new construction does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable:
New construction or development generally should not be undertaken.

Source: Office of Noise Control, Guidelines for the Preparation and Content of Noise Elements of the General Plan, February 1976. Included in the Governor's Office of Planning and Research, California, *General Plan Guidelines*, Appendix C, October 2003.

City of Sierra Madre

General Plan

The currently adopted (1996) Sierra Madre General Plan Hazard Prevention Element (Section 4, Noise) includes goals, objectives, and policies to evaluate existing and future noise condition and minimize the impacts of noise on the city. The policies stated in this section contain a direct relationship to the desired goals of the community and are the legislative tools with which Sierra Madre can realize its vision for the future. The policies of Section 4 address:

- Maintaining the quiet residential character of the city, free from excessive noise from transportation or fixed source generators.
- Minimizing the noise impacts associated with the development of residential units above ground floor commercial uses in designated "Mixed-Use" areas.
- Minimizing the impacts of construction noise on adjacent uses

Municipal Code

Section 9.32 (Noise) of the City's Municipal Code includes the City's noise standards to regulate noise sources within the city. Per Section 9.32, the limit for noise sources affecting residential properties is 6 dB above the local ambient noise level, 8 dB above the local ambient noise level for sources on commercial or industrial property, and 15 dB above the local ambient noise level for sources on public property. Additionally, it is unlawful for any person to create any noise that causes a disturbance to any school, institution of learning, church, or hospital, or to create noise which unreasonably disturbs the peace and quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person. However, any noise source that produces a noise level below 80 dBA at a distance of 25 feet is exempt between the hours of 7:00 AM and 9:00 PM on Monday through Saturday, and between 10:00 AM and 6:00 PM on Sundays and holidays. These standards do not gauge the compatibility of developments in the noise environment, but provide restrictions on the amount of noise generated at a property, as measured at the property line of the noise receptor. This Chapter also regulates the hours of construction noise.

Neither Section 4 (Noise) of the currently adopted (1996) Sierra Madre General Plan Hazard Prevention Element nor the City's Municipal Code include land use compatibility standards; therefore, for the purpose of the analysis provided herein, it was assumed that the city follow the State's standards presented above in Table 5.8-3, *Land Use Compatibility for Community Noise Environments*.

Construction Noise Hours

Noise sources associated with construction activity are exempt from the noise standards presented in Table 5.8-3, provided said activities take place only between the hours of 7:00 AM and 7:00 PM on Monday through Saturday, between the hours of 10:00 AM and 6:00 PM on a Sunday or holiday, and provided noise levels outside the property do not exceed 85 dBA. Per Section 9.32.090 (Exception Permits) of the City's Municipal Code, if a project applicant can demonstrate to the City Manager that a diligent investigation of available noise abatement

techniques indicates that immediate compliance with the regulations would be impractical or unreasonable, a permit to allow exception may be issued, with appropriate conditions to minimize the public detriment caused by such exceptions. Any such permit shall be of as short duration as possible up to three months, but renewable upon a showing of good cause.

Vibration Criteria

The City of Sierra Madre has not adopted criteria to address vibration; therefore, the Federal Transit Administration (FTA) is used for the noise analysis provided herein. The FTA provides criteria for acceptable levels of groundborne vibration for various types of land uses that are sensitive to vibration. These criteria can be separated into annoyance effects and architectural damage effects due to vibration (as discussed below).

Vibration Annoyance

Table 5.8-4 shows the FTA and Caltrans vibration criteria to evaluate vibration-related annoyance due to resonances of the structural components of a building. These criteria are based on the work of many researchers that suggested that humans are sensitive to vibration velocities in the range of 8 to 80 Hz.

Table 5.8-4 Groundborne Vibration Criteria – Human Annoyance

Land Use Category	Vibration Velocity, in/sec (RMS amplitude)[1]	Description
Workshop	0.032	Distinctly felt vibration. Appropriate to workshops and non-sensitive areas
Office	0.016	Felt vibration. Appropriate to offices and non-sensitive areas.
Residential – Daytime	0.008	Barely felt vibration. Adequate for computer equipment.
Residential – Nighttime	0.004	Vibration not felt, but groundborne noise may be audible inside quiet rooms.

Source: FTA 2006 and Caltrans 2004.
[1] As measured in 1/3-octave bands of frequency over the frequency ranges of 8 to 80 Hz.

Vibration-Related Structural Damage

Structures amplify groundborne vibration and wood-frame buildings, such as typical residential structures, are more affected by ground vibration than heavier buildings. The level at which groundborne vibration is strong enough to cause architectural damage has not been determined conclusively. The most conservative estimates are reflected in the FTA standards, shown in Table 5.8-5.

Table 5.8-5 Groundborne Vibration Impact Criteria – Architectural Damage

Building Category	PPV (in/sec)
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: FTA 2006.

5.8.1.1 EXISTING SETTING

Existing Noise Environment

The City of Sierra Madre is impacted by a multitude of noise sources. Mobile sources of noise, especially cars, and trucks, are the most common and significant sources of noise in most communities and are the predominant source of noise in the city. There are no major highways, freeways, or other transportation corridor traversing Sierra Madre. The most significant sources of transportation noise include Baldwin Avenue, Michillinda Avenue, Sierra Madre Boulevard, and Orange Grove Avenue. Additionally, given that it lies between 0.6 and 1.25 miles south of the city limits and given that there are multiple intervening structures that act as sound barriers for freeway noise, Interstate 210 (I-210) would generally not be considered a significant source of noise for the city. However, many residents of the city consider the freeway to be a significant noise source because they can hear freeway traffic noise due to localized topographical particulars or specific weather conditions, which may bend sound back towards the earth (as with temperature inversions during episodes of heavy cloud cover). It should be noted however, that audibility, in and of itself, does not create a significant noise source, nor an impact per CEQA.

Commercial uses, primarily located on Sierra Madre Boulevard between Lima Street and Mountain Trail Avenue, generate stationary-source noise. There are no public or public-use airports within, or in the general vicinity of Sierra Madre.

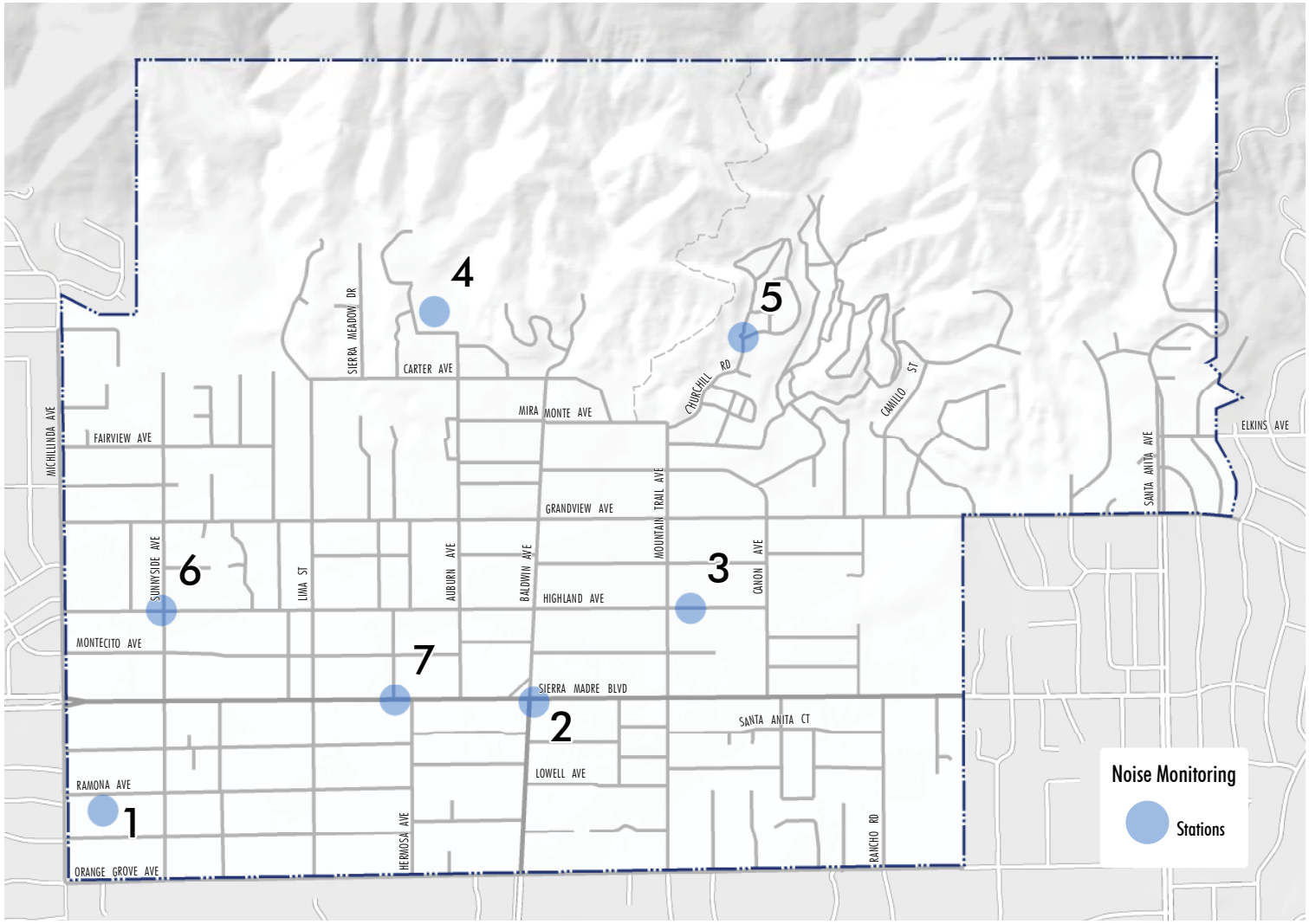
Local Noise Monitoring Data

PlaceWorks conducted noise measurements at several locations on Tuesday, November 1, 2011, and Wednesday, November 2, 2011. Locations ST-1 to ST-33 were each taken for a period of 24 hours, and locations ST-4 to ST-7 were each taken for a period of 15 minutes. Considerable guidance and coordination with the city volunteers went into selecting both the general areas to be surveyed during the noise study as well as the individual measurement locations, as shown in Figure 5.8-1, *Noise Monitoring Locations*.[1]

[1] For example, noise sources such as dogs, aircraft, helicopters, landscaping activities, children playing, etc. are an integral part of the urban soundscape. As such, they are "threads" in a city's noise fabric and are intended to be accounted for in a general plan. One goal of coordination with city volunteers was to prevent the removal or discounting of such "normal" sources—by choosing atypical measurement locations or inducing an artificial and unintended bias to the measured data—thereby skewing the true assessment of the normal sound environment.

Figure 5.8-1 - Noise Monitoring Locations

5. Environmental Analysis



Source: ESRI, 2014

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The noise monitoring locations are described below:

- **Site 1 (Long-term).** At the building facade of The British Home, at 647 Manzanita Avenue, approximately 50 feet from the street curb. Noise levels were primarily influenced by local traffic on Manzanita Avenue during the daytime. This location was near the southern border of the city and along a relatively untraveled and quiet roadway. The aim was to capture influences, if any, from I-210 traffic, which is farther to the south.

- **Site 2 (Long-term).** In the downtown commercial district, located at the building facade at 33 E. Sierra Madre Boulevard. Noise levels were primarily influenced by traffic during the morning and afternoon traffic peak hour. This location was near the intersection of the two major roadways in the City, Sierra Madre Boulevard and Baldwin Avenue, to focus on local roadway traffic noise patterns as well as the downtown commercial and retail districts. The selected location had excellent line-of-sight 'contact' to the intersection.

- **Site 3 (Long-term).** At 273 Highland Avenue. Noise levels were primarily influenced by traffic on Highland Avenue. This location was a typical residential location, representative of the overall city and without undue influences from freeway traffic, major local roadway traffic, and/or special uses such as schools, parks, or commercial/ retail land uses.

- **Site 4 (Short-term).** At the front yard of 618 North Auburn Avenue, approximately 20 feet from the road. The highest levels occurred due to local vehicular traffic, landscaping activities and helicopter fly-overs. This location assessed the noise environment in the western up-slope and foothill areas of the city.

- **Site 5 (Short-term).** At the front yard of 450 Churchill Road, approximately 20 feet from the road. The highest levels occurred due to vehicular traffic, landscaping activities, and dogs barking. This location was east of Mountain Trail Avenue, and was another up-slope/foothill measurement site. While farthest from I-210, up-slope locations such as this one may experience freeway noise contributions in the distance since they are elevated above the rest of the cityscape.[2]

- **Site 6 (Short-term).** At the corner of Sunnyside Avenue and Highland Avenue, approximately 20 feet from the road. The highest levels occurred due to vehicular traffic and helicopter fly-overs. This location was a typical residential location, representative of the western portion of the city and near a school facility.

- **Site 7 (Short-term).** At Sierra Vista Park near the playground area, approximately 100 feet from the road. The highest levels occurred due to local vehicular traffic and activities at the playground area. This was a typical location along a primary local roadway, as well as indicative of a park use.

The results of the short-term noise measurement taken and their respective noise monitoring locations are presented in Table 5.8-6.

[2] Note that some up-slope locations east of Mountain Trail Avenue tend to have hilly, obstructed, and/or "pocketed" exposures to noise from lower elevation sources, even though they are overlooking the city below and the freeway in the distance.

Table 5.8-6 Short-Term Noise Level Measurements

Noise Monitoring Location[1]	Time	L_{eq}	L_{min}	L_{max}
4	12:08-12:24 PM	42.6	32.3	62.7
5	12:33-12:50 PM	44.3	34.4	59.0
6	2:31-2:47 PM	62.7	40.6	81.3
7	3:00-3:16 PM	59.1	44.9	73.9

Note: Calculations and detailed outputs are included in Appendix C.
[1] See Figure 5.8-1, *Noise Monitoring Locations*.

As shown in Table 5.8-6, the average noise levels during the daytime at the monitoring locations where the short-term measurements were taken ranged from 42.6 to 62.7dBA L_{eq}. During the noise monitoring and field reconnaissance, it was observed that the existing noise levels in the city are dominated mostly by traffic noise. Secondary noise sources included dogs, aircraft, helicopters, landscaping activities, and children playing. As mentioned previously, such sources are common in urban areas and inherent to a typical community noise environment. The highest noise levels were observed in areas near Sunnyside Avenue, Highland Avenue, and Sierra Vista Park.

Long-term locations were monitored for a period of 24-hours. As shown in Table 5.8-7, the 24-hour noise levels ranged from 51.1 to 62.1dBA CNEL. At all locations, noise was dominated by traffic. The noise pattern observed is typical of street traffic with the highest levels close to the AM and PM peak traffic hours. The detailed noise measurement outputs are presented in tabular and graphical format in Appendix C.

Table 5.8-7 Long-Term Noise Level Measurements

Noise Monitoring Location[1]	CNEL	Highest 1-hour L_{eq}	Hour	Lowest 1-hour L_{eq}	Hour
1	58.6	55.8	2 PM	46.4	2 AM
2	62.1	63.8	4 PM	46.6	2 AM
3	51.1	52.5	8 AM	39.9	2 AM

Note: Calculations and detailed outputs are included in Appendix C.
[1] See Figure 5.8-1, *Noise Monitoring Locations*.

On-Road Vehicles

Mobile sources of noise, especially cars, and trucks, are the most common and significant sources of noise in most communities and are the predominant source of noise in the city. There are no major highways, freeways, or other transportation traversing Sierra Madre. All roads within the city have two lanes and speed limits of 35 miles per hour or less. The major thoroughfares are Baldwin Avenue, Michillinda Avenue, Sierra Madre Boulevard, and Orange Grove Avenue. I-210 is approximately 0.6 to 1.25 miles south of the southern City boundary; however, as noted above in in the *Existing Conditions* section, many residents of the City consider the freeway to be a significant noise source because of being able to hear freeway traffic noise due to localized topographical features or during specific weather conditions.

Rail Noise

There are no rail lines that run through the city or are near the city limits. Rail noise is not considered to be a significant factor for the community noise environment of the city.

Aircraft Noise

There are no public or public-use airports within or in the general vicinity of Sierra Madre. The closest airport is El Monte Airport, located approximately five miles to the south. Occasional overflights may be heard, but are not considered to be a significant factor for the community noise environment of the City.

Stationary Sources of Noise

Whereas mobile-source noise affects many receptors along an entire length of roadway, stationary noise sources affect only their immediate areas. Many processes and activities in cities produce stationary noise, most notably, the operation of commercial, warehousing, industrial uses, schools, and at-grade railroad crossings. Noise exposure within industrial facilities is controlled by federal and state employee health and safety regulations. Noise levels outside of industrial and other facilities are subject to local standards.

There are some light manufacturing uses within the city; these occur mostly along East Montecito Avenue, west of Baldwin Avenue. Most of the city's commercial uses are located on Sierra Madre Boulevard between Lima Street and Mountain Trail Avenue, with some along Montecito Avenue, east of Baldwin Avenue (see Figure 3-3, *Existing Land Uses*). Schools are considered noise-sensitive because of the necessity for quiet in the classroom to provide an adequate environment for learning. However, outdoor activities that occur on school campuses throughout the city can generate noticeable levels of noise. While it is preferable to have schools in residential areas to support the neighborhood, noise generated on both the weekdays (by physical education classes and sports programs) and weekends (by use of the fields by youth organizations) can elevate noise levels at adjacent receptor areas.

Vibration

The primary existing source of vibration in the city is truck traffic along the city's roadways. Perceptible vibration levels may be caused by heavy trucks hitting discontinuities in the pavement from gaps and potholes. Under normal conditions with well-maintained asphalt, vibration levels are usually not perceptible beyond the road right-of-way. There are no known major sources of vibration such as heavy industrial equipment that would cause substantial levels of vibration to nearby sensitive uses.

5.8.2 Thresholds of Significance

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

N-1 Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies.

- For noise compatibility, noise levels at noise-sensitive exterior areas exceed 65 dBA CNEL.
- For noise compatibility, interior noise levels in habitable noise-sensitive areas exceed 45 dBA CNEL.

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

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

- Project-related traffic noise increase the ambient noise level at noise-sensitive locations by 3 dB or more and the ambient noise levels under with-project conditions fall within the "Normally Unacceptable" or "Clearly Unacceptable" categories; OR
- Project-related traffic noise increases the ambient noise level at noise-sensitive locations by 5 dB or more.

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

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

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

5.8.3 Relevant General Plan Policies and Implementation Program Measures

The following are relevant policies and measures of the Sierra Madre General Plan Update and Implementation Program, respectively, which are designed to reduce potential impacts related to noise from implementation of the General Plan Update.

General Plan Update Policies

Land Use Element

- **Policy L3. 1:** Maintain an area in the City for commercial development through the review and update of appropriate standards and regulations for new construction.
- **Policy L38.2:** Adopt an Artisan Mixed Use Zoning Ordinance to regulate commercial, light-manufacturing and residential uses.
- **Policy L38.3:** Require the issuance of a conditional use permit for new uses to adequately protect adjacent uses.

Hazard Prevention Element

- **Policy Hz14.1:** Formulate measures to mitigate noise impacts from mobile and stationary noise sources through compatible land use planning and the discretionary review of development projects.
- **Policy Hz14.2:** Identify and control the noise levels associated with transportation and general circulation patterns in the City to ensure the residential quality of the community.
- **Policy Hz14.3:** Enact noise regulations to prohibit unnecessary excessive and annoying noise sources. These controls currently relate to the general category of disturbing- the-peace nuisances.
- **Policy Hz14.4:** Ensure that the noise level of the commercial districts does not interfere with the normal business, commercial or residential activities.
- **Policy Hz14.5:** To the extent possible, protect schools, hospitals, libraries, churches, parks, and recreational areas from excessive sound levels so as not to adversely affect their normal activities.
- **Policy Hz14.6:** Review current guidelines regarding the use of gas powered lawn equipment and consider restricting the type of equipment, hours and duration of operation.
- **Policy Hz15.1:** Require that commercial uses developed as part of a residential mixed-use project are not noise intensive.
- **Policy Hz15.2:** Design mixed-use structures to prevent the transfer of noise from the commercial use to the residential use.
- **Policy Hz15.3:** Require that common walls and floors between commercial and residential uses be constructed to minimize the transmission of noise and vibration.
- **Policy Hz16.1:** Limit construction activities to reasonable weekday and weekend/holiday hours in order to reduce noise impacts on adjacent residences.
- **Policy Hz16.2:** Require that construction activities incorporate feasible and practical techniques to minimize the noise impacts on adjacent uses.

Implementation Program Measures

Noise Implementation Program

- **Measure IM-1:** The City shall review its zoning ordinances and amend as necessary to include measures to mitigate noise impacts from mobile and stationary noise sources.
- **Measure IM-2:** The City shall identify opportunities to control noise levels associated with vehicular traffic throughout the City.

- **Measure IM-3:** The City shall amend its Noise Ordinance as needed to prohibit unnecessary excessive and annoying noise sources.

- **Measure IM-4:** The City shall continue to enforce its Noise Ordinance to ensure that noise levels in the commercial areas do not interfere with the normal business, commercial and residential activities.

- **Measure IM-5:** The City shall continue to enforce its Noise Ordinance to protect schools, hospitals, libraries, churches, parks and recreational areas from excessive sound levels.

- **Measure IM-6:** The City shall consider amending its Noise Ordinance to further restrict the use of gas powered lawn equipment.

- **Measure IM-7:** The City shall amend the Commercial Zone Ordinance to exclude noise-intensive uses that may be allowed in mixed-use projects.

- **Measure IM-8:** The City shall amend the Commercial Zone Ordinance to require that mixed-use projects be designed to prevent the transfer of noise between the commercial and residential uses.

- **Measure IM-9:** The City shall continue to limit construction activities to reasonable weekday and weekend/holiday hours to reduce noise impacts to residential uses, and enforce noise regulations addressing construction activities.

5.8.4 Environmental Impacts

The following impact analysis addresses thresholds of significance for which the Notice of Preparation (see Appendix A) disclosed potentially significant impacts. The applicable thresholds are identified in brackets after the impact statement.

For the impact analysis of all thresholds below, it should be noted that the large infill opportunity site shown in Figure 3-5, *Infill Opportunity Sites*, just north of Carter Avenue, which is associated with the residential subdivision known as Stonegate, is an approved development project and was analyzed under separate environmental documentation in accordance with CEQA. The noise-related impacts resulting from Stonegate were addressed and mitigated for in that environmental documentation. Also, all residential lots within Stonegate are subject to the provisions of Title 17 (Zoning) of the City's Municipal Code and the Hillside Management zone regulations (Chapter 17.52 of the City's Municipal Code),, which requires that each residential development within Stonegate obtain approval of a hillside development permit.

For the purpose of the following analysis, it is also important to note that, based on the requirements of CEQA, this analysis is based on a comparison to existing land uses and does not address the differences that would result from a comparison with the existing General Plan land use map, from which there is little variation when compared to the proposed General Plan land use map.

Furthermore, it is important to note that while the General Plan Update establishes City-wide policy level guidance, it includes a revision to the current land use map (see Figures 3-4, *Current Land Use Map*, and 3-6, *Proposed Land Use Map*) and modifies the development potential of certain parcels in the City (see Figure 3-5, *Infill Opportunity Sites*); it does not contain specific development project proposals. The General Plan Update is a regulatory document that sets forth the framework for future growth and development (e.g., infill development, redevelopment, and revitalization/restoration) in the City and does not directly result in development in and of itself. Before any development can occur in the City, all such development is required to be analyzed for conformance with the City's General Plan, zoning requirements, and other applicable local and state requirements; comply with the requirements of CEQA (e.g., preparation of site-specific environmental documentation in accordance with CEQA); and obtain all necessary approvals, clearances, and permits.

Impact 5.8-1: Buildout under the General Plan Update would result in an increase in traffic on local roadways in Sierra Madre in a manner that would not substantially increase the existing noise environment. [Thresholds N-1 and N-3]

Impact Analysis: Future development in accordance with General Plan would cause increases in traffic along local roadways. For the purpose of assessing the compatibility of new development with the anticipated ambient noise, the city utilizes the state's Community Noise and Land Use Compatibility standards, summarized in Table 5.8-3, *Land Use Compatibility for Community Noise Environments*. A significant impact could occur if the proposed Land Use Map (see Figure 3-6, *Proposed Land Use Map*) designates noise-sensitive land uses in areas where the ambient noise level clearly exceeds levels that are compatible for the designated land use, or if the future ambient noise would be incompatible with existing noise-sensitive land uses. Noise sensitive land uses include residential, schools, libraries, churches, nursing homes, hospitals, and open space/recreation areas. Commercial and industrial areas are not considered noise-sensitive and have higher tolerances for exterior noise levels.

The traffic noise levels for build out of the General Plan Update were estimated using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (RD-77-108). The FHWA model predicts noise levels through a series of adjustments to a reference sound level. These adjustments account for distances from the roadway, traffic flows, vehicle speeds, car/truck mix, length of exposed roadway, and road width. The distances to the 70, 65, and 60 CNEL contours for selected roadway segments in the vicinity of the city are included in Appendix C.

Noise level increases on roadways over existing conditions were calculated for two long range (2035) scenarios obtained from the Traffic Impact Study prepared by Fehr & Peers for the General Plan Update (see Appendix E). The modeled scenarios evaluated below were chosen for their greatest potential to cause traffic noise impacts based on a review of the intersection analysis summary and on the daily traffic volumes provided in the Traffic Impact Study. Long range traffic noise was modeled for the following scenarios:

- **2035 Without Project Conditions:** Consists of Year 2035 forecasted traffic volumes without the implementation of the General Plan Update.

- **2035 With Project Conditions:** Consists of Year 2035 forecasted traffic volumes with implementation of the preferred General Plan Update. The preferred General Plan Update refers to the proposed policies and goals being presented through the General Plan Update effort to be adopted as the new plan for future growth in the city.

2035 Without Project Conditions

Table 5.8-8 presents the noise level increases on roadways over existing conditions at 50 feet from the centerline of each roadway segment for the 2035 Without Project conditions. Table 5.8-8 shows that traffic noise increases along roadways would be up to 0.7 dBA CNEL; the increases in traffic noise would occur due to regional growth only. As shown in the table, there are no segments that would experience substantial noise increases greater than 5 dB over existing conditions, resulting at noise levels greater than 65 dBA CNEL that include nose-sensitive receptors along those segments.

Traffic noise increases would occur over a period of many years and would not be readily discernible on an annual basis because traffic and noise would increase gradually over a long time period. Additionally, the future ambient noise would not be substantially higher when compared to existing conditions. Therefore, traffic-related noise impacts would not be significant.

Table 5.8-8 Traffic Noise Increases – 2035 Without Project (dBA CNEL)

Roadway	Segment	Existing	Future[1]	Increase	Potentially Significant?
Michillinda Avenue	Edgeview Drive to Grandview Avenue	60.8	61.4	0.6	No
Michillinda Avenue	Grandview Avenue to Highland Avenue	63.6	64.2	0.6	No
Michillinda Avenue	Highland Avenue to Mariposa Avenue	65.9	66.4	0.5	No
Michillinda Avenue	Mariposa Avenue to Orange Grove Avenue	66.5	66.9	0.4	No
Baldwin Avenue	Grandview Avenue to Victoria Lane	59.6	59.9	0.2	No
Baldwin Avenue	Victoria Lane to Sierra Madre Boulevard	60.6	61.1	0.5	No
Baldwin Avenue	Sierra Madre Boulevard to Lowell Avenue	64.5	65.0	0.5	No
Baldwin Avenue	Lowell Avenue to Orange Grove Avenue	65.6	66.2	0.6	No
Grandview Avenue	Michillinda Avenue to Sunnyside Avenue	58.6	59.3	0.7	No
Grandview Avenue	Sunnyside Avenue to Lima Street	60.4	60.8	0.5	No
Grandview Avenue	Lima Street to Baldwin Avenue	60.5	60.8	0.4	No
Grandview Avenue	Baldwin Avenue to Mountain Trail Avenue	59.8	60.4	0.6	No
Grandview Avenue	Mountain Trail Avenue to Coburn Avenue	59.0	59.3	0.3	No
Grandview Avenue	Coburn Avenue to Olivera Lane	58.2	58.6	0.5	No
Grandview Avenue	Olivera Lane to Santa Anita Avenue	57.3	57.8	0.6	No

Table 5.8-8 Traffic Noise Increases – 2035 Without Project (dBA CNEL)

Roadway	Segment	Existing	Future[1]	Increase	Potentially Significant?
Sierra Madre Blvd.	Michillinda Avenue to Sunnyside Avenue	63.2	63.6	0.4	No
Sierra Madre Blvd.	Sunnyside Avenue to Lima Street	64.0	64.5	0.5	No
Sierra Madre Blvd.	Lima Street to Baldwin Avenue	63.7	64.3	0.5	No
Sierra Madre Blvd.	Baldwin Avenue to Mountain Trail Avenue	62.2	62.6	0.4	No
Sierra Madre Blvd.	Mountain Trail Avenue to Coburn Avenue	61.8	62.3	0.5	No
Sierra Madre Blvd.	Coburn Avenue to Olivera Lane	59.4	59.9	0.5	No
Orange Grove Ave.	Michillinda Avenue to Sunnyside Avenue	63.3	63.9	0.6	No
Orange Grove Ave.	Sunnyside Avenue to Baldwin Avenue	63.8	64.2	0.4	No
Orange Grove Ave.	Baldwin Avenue to S. Canon Avenue	63.2	63.5	0.3	No
Orange Grove Ave.	S. Canon Avenue to Olivera Lane	62.0	62.4	0.4	No

Note: Traffic Noise Model Calculations included in Appendix C.
[1] Future noise level corresponds to 2035 Without Project conditions.

2035 With Project Conditions

Table 5.8-9 presents the noise level increases on roadways over existing conditions at 50 feet from the centerline of each roadway segment for the 2035 With Project conditions. Table 5.8-9 shows that traffic noise increases along roadways would be up to 1.6 dBA CNEL. The traffic noise increases would occur due to implementation of the proposed Land Use Map, implementation of the circulation plan, and in particular, regional growth. However, the affected roadway segments would not experience substantial noise increases greater than 5 dB over existing conditions. Likewise, there are no segments with adjacent sensitive receptors that would experience substantial noise increases greater than 3 dB that would also fall into the "Normally Unacceptable" or "Clearly Unacceptable" land use categories.

Therefore, the future ambient noise under the 2035 With Project conditions would not be substantially higher when compared to existing conditions at noise-sensitive receptors along the roadway segments identified in Table 5.8-9. Traffic-related noise impacts would not be significant

Table 5.8-9 Traffic Noise Increases – 2035 With Project (dBA CNEL)

Roadway	Segment	Existing	Future[1]	Increase	Potentially Significant?
Michillinda Avenue	Edgeview Drive to Grandview Avenue	60.8	61.4	0.6	No
Michillinda Avenue	Grandview Avenue to Highland Avenue	63.6	64.2	0.6	No
Michillinda Avenue	Highland Avenue to Mariposa Avenue	65.9	66.5	0.7	No
Michillinda Avenue	Mariposa Avenue to Orange Grove Avenue	66.5	67.2	0.7	No
Baldwin Avenue	Grandview Avenue to Victoria Lane	59.6	61.2	1.6	No
Baldwin Avenue	Victoria Lane to Sierra Madre Boulevard	60.6	62.1	1.5	No
Baldwin Avenue	Sierra Madre Boulevard to Lowell Avenue	64.5	65.6	1.1	No
Baldwin Avenue	Lowell Avenue to Orange Grove Avenue	65.6	66.5	0.9	No
Grandview Avenue	Michillinda Avenue to Sunnyside Avenue	58.6	59.3	0.7	No
Grandview Avenue	Sunnyside Avenue to Lima Street	60.4	60.8	0.5	No
Grandview Avenue	Lima Street to Baldwin Avenue	60.5	60.8	0.4	No
Grandview Avenue	Baldwin Avenue to Mountain Trail Avenue	59.8	60.4	0.6	No
Grandview Avenue	Mountain Trail Avenue to Coburn Avenue	59.0	59.9	0.8	No
Grandview Avenue	Coburn Avenue to Olivera Lane	58.2	58.6	0.5	No
Grandview Avenue	Olivera Lane to Santa Anita Avenue	57.3	57.8	0.6	No
Sierra Madre Boulevard	Michillinda Avenue to Sunnyside Avenue	63.2	63.8	0.7	No
Sierra Madre Boulevard	Sunnyside Avenue to Lima Street	64.0	64.8	0.8	No
Sierra Madre Boulevard	Lima Street to Baldwin Avenue	63.7	64.6	0.9	No
Sierra Madre Boulevard	Baldwin Avenue to Mountain Trail Avenue	62.2	63.1	1.0	No
Sierra Madre Boulevard	Mountain Trail Avenue to Coburn Avenue	61.8	62.6	0.8	No
Sierra Madre Boulevard	Coburn Avenue to Olivera Lane	59.4	60.4	1.0	No
Orange Grove Avenue	Michillinda Avenue to Sunnyside Avenue	63.3	63.9	0.6	No
Orange Grove Avenue	Sunnyside Avenue to Baldwin Avenue	63.8	64.4	0.6	No
Orange Grove Avenue	Baldwin Avenue to S Canon Avenue	63.2	63.9	0.7	No
Orange Grove Avenue	S. Canon Avenue to Olivera Lane	62.0	62.8	0.8	No

Note: Traffic Noise Model Calculations included in Appendix C.
[1] Future noise level corresponds to 2035 with Project conditions.

Conclusion

As demonstrated above, traffic-related noise impacts would not be significant due to buildout of the General Plan Update. Additionally, the General Plan Update and Implementation Program include policies and implementation measures, respectively, designed to minimize traffic-related noise impacts. Following are the applicable policies and implementation measures:

- **Hazard Prevention Element Policy Hz14.1:** Formulate measures to mitigate noise impacts from mobile and stationary noise sources through compatible land use planning and the discretionary review of development projects.

- **Hazard Prevention Element Policy Hz14.2:** Identify and control the noise levels associated with transportation and general circulation patterns in the City to ensure the residential quality of the community.

- **Hazard Prevention Element Policy Measure IM-2:** The City shall identify opportunities to control noise levels associated with vehicular traffic throughout the City.

- **Noise Implementation Program Measure IM-1:** The City shall review its zoning ordinances and amend as necessary to include measures to mitigate noise impacts from mobile and stationary noise sources.

Impact 5.8-2: Noise-sensitive land uses would not be exposed to substantial levels of rail or aircraft noise. [Thresholds, N-1, N-4, and N-6]

Impact Analysis:

Rail Noise

There are no rail lines through or immediately adjacent to the city. Therefore, future development that would be accommodated by the General Plan Update would not be subject to rail noise. No impacts due to rail noise would occur.

Aircraft Noise

Aircraft overflights, takeoffs, and landings at airports and heliports in the region contribute modestly to the ambient noise environment. The closest airport to the project site is El Monte Airport, approximately five miles south of city limits. There are no public or public use airports in, or in the general vicinity of Sierra Madre. Aircraft overflights from El Monte and other airports and heliports in the region may be sporadically heard; however, no portions of Sierra Madre are located within an airport influence area or the 65 dBA CNEL noise contours of an airport. Therefore, development in accordance with the General Plan Update would not expose people to excessive noise levels, and aircraft-related noise impacts would not be significant.

Impact 5.8-3: Noise-sensitive uses could be exposed to elevated noise levels from transportation sources. [Thresholds N-1 and N-3]

Impact Analysis: An impact could be significant if the proposed Land Use Map (see Figure 3-6, *Proposed Land Use Map*) designates noise-sensitive land uses in areas that would exceed the pertinent noise compatibility criteria. In lieu of city-specific standards, this assessment uses the state's Community Noise and Land Use Compatibility standards, summarized in Table 5.8-3, *Land Use Compatibility for Community Noise Environments*, for the purpose of

assessing the compatibility of new development with ambient noise. Noise-sensitive land uses would be exposed to transportation sources including vehicular traffic and aircraft overflights.

Traffic Noise

As discussed above in Impact 5.8-1, traffic noise contours were calculated for 2035 conditions for the 2035 Without Project and 2035 With Project conditions. As shown in Tables 5.8-8, *Traffic Noise Increases – 2035 Without Project (dBA CNEL)*, and 5.8-9, *Traffic Noise Increases – 2035 With Project (dBA CNEL)*, land uses along several roadway segments in the city would be exposed to noise levels above 65 dBA CNEL.

However, individual development projects that would be accommodated by the General Plan Update would be subject to a project-specific environmental review by the city. As a part of the city's development review process, new noise-sensitive land uses would also have to demonstrate that they are compatible with the ambient noise levels. Additionally, the General Plan Update and Implementation Program include policies and implementation measures, respectively, designed to minimize traffic-related noise impacts. Following are the applicable policies and implementation measures:

- **Hazard Prevention Element Policy Hz14.1:** Formulate measures to mitigate noise impacts from mobile and stationary noise sources through compatible land use planning and the discretionary review of development projects.

- **Hazard Prevention Element Policy Hz14.2:** Identify and control the noise levels associated with transportation and general circulation patterns in the City to ensure the residential quality of the community.

- **Hazard Prevention Element Policy Measure IM-2:** The City shall identify opportunities to control noise levels associated with vehicular traffic throughout the City.

- **Noise Implementation Program Measure IM-1:** The City shall review its zoning ordinances and amend as necessary to include measures to mitigate noise impacts from mobile and stationary noise sources.

Refer to the *Land Use Compatibility* discussion below for a discussion of the significant impact that could occur if the proposed Land Use Map designates noise-sensitive land uses in areas where the ambient noise level clearly exceeds levels that are compatible for the designated land use.

Land Use Compatibility

The noise contour distances for future noise conditions from transportation sources are presented in Table 5.8-9, *Traffic Noise Increases – 2035 With Project (dBA CNEL)*. Any siting of new noise-sensitive land uses within a noise environment that exceeds the normally acceptable land use compatibility criterion represents a potentially significant impact and would require a separate, project-specific noise study through the city's development review process to determine the level of impacts and required mitigation. Additionally, the General Plan Update and Implementation Program includes policies and implementation measures, respectively, designed to reduce noise in city, including:

- **Policy Hz14.5:** To the extent possible, protect schools, hospitals, libraries, churches, parks, and recreational areas from excessive sound levels so as not to adversely affect their normal activities.

- **Policy Hazard Prevention Element Policy Hz14.1:** Formulate measures to mitigate noise impacts from mobile and stationary noise sources through compatible land use planning and the discretionary review of development projects.

- **Policy Hz14.2:** Identify and control the noise levels associated with transportation and general circulation patterns in the City to ensure the residential quality of the community.

- **Policy L1.1:** Maintain areas of the City for single-family residences on varying lot sizes through the review and update of appropriate development standards.

- **Policy L1.2:** Maintain areas of the City for the development of two units per lot through the review and update of appropriate development standards.

- **Policy L1.3:** Maintain areas of the City for the development of multiple-unit apartment, condominium, and townhouse development through the review and update of appropriate development standards.

- **Noise Implementation Program Measure IM-4:** The City shall continue to enforce its Noise Ordinance to ensure that noise levels in the commercial areas do not interfere with the normal business, commercial and residential activities.

- **Measure IM-8:** The City shall amend the Commercial Zone Ordinance to require that mixed-use projects be designed to prevent the transfer of noise between the commercial and residential uses.

Therefore, impacts from transportation noise sources due to buildout of the General Plan Update would not be significant.

Aircraft Overflights

As discussed above in Impact 5.8-3, no portions of the city are located with the 65 dBA CNEL noise contours of an airport. Therefore, implementation of the General Plan Update would not expose noise-sensitive land uses to noise levels that are incompatible with aircraft noise.

Impact 5.8-4: Noise-sensitive uses could be exposed to elevated noise levels from stationary sources. [Thresholds N-1 and N-3]

Impact Analysis: Noise is regulated by numerous codes and ordinances across federal, state, and local agencies. In addition, the City of Sierra Madre regulates stationary-source noise through the City's Municipal Code. Buildout of the General Plan Update would result in an increase in residential, commercial, and light-manufacturing development within the city. The primary noise sources from these land uses are landscaping and maintenance activities, and air conditioning systems. In addition, future commercial uses may include loading

docks. Noise generated by residential or commercial uses is generally short and intermittent, and these uses are not considered a substantial source of noise.

The City of Sierra Madre requires that noise from new stationary sources in the city comply with the City's Noise Ordinance (Section 9.32 [Noise] of the City's Municipal Code), which limits the acceptable noise at the property line of the property producing the noise, to reduce nuisances to sensitive land uses. Sierra Madre's Police and Code Enforcement Officer enforce the noise limitation of the City's Municipal Code. Per the City's Noise Ordinance, noise that exceeds the limitations of the City's Municipal Code is considered a noise nuisance by the city and violations are punishable by a fine or imprisonment for each day a violation occurs and may be subject to abatement by restraining order or injunction. Consequently, stationary-source noise from these types of land uses would be adequately regulated and not result in a substantial increase in the noise environment.

The siting of new commercial or light-manufacturing developments may increase noise levels to nearby residential uses. This can be due to the continual presence of medium to heavy trucks used for the pick-up and delivery of goods and supplies. While vehicle noise on public roadways is exempt from local regulation, for the purposes of the planning process, it may be regulated as a stationary-source noise while operating on private property. Process equipment and the use of noisy pneumatic or electric tools could also generate elevated noise levels; however, this equipment is typically housed within the facilities.

For all such activities on private property, individual commercial or light-manufacturing development projects that would be accommodated by the General Plan Update would be subject to a project-specific environmental review by the city. Additionally, all such stationary sources would be subject to the provisions of the City's Noise Ordinance. Furthermore, the General Plan Update and Implementation Program include policies and implementation measures, respectively, designed to minimize noise impacts. Following are the applicable policies and implementation measures:

- **Hazard Prevention Element Policy Hz14.1:** Formulate measures to mitigate noise impacts from mobile and stationary noise sources through compatible land use planning and the discretionary review of development projects.

- **Hazard Prevention Element Policy Hz14.3:** Enact noise regulations to prohibit unnecessary excessive and annoying noise sources. These controls currently relate to the general category of disturbing- the-peace nuisances.

- **Hazard Prevention Element Policy Hz14.4:** Ensure that the noise level of the commercial districts does not interfere with the normal business, commercial or residential activities.

- **Hazard Prevention Element Policy Hz15.1:** Require that commercial uses developed as part of a residential mixed-use project are not noise intensive.

- **Hazard Prevention Element Policy Hz15.2:** Design mixed-use structures to prevent the transfer of noise from the commercial use to the residential use.

- **Hazard Prevention Element Policy Hz15.3:** Require that common walls and floors between commercial and residential uses be constructed to minimize the transmission of noise and vibration.

- **Noise Implementation Program Measure IM-1:** The City shall review its zoning ordinances and amend as necessary to include measures to mitigate noise impacts from mobile and stationary noise sources.

- **Noise Implementation Program Measure IM-3:** The City shall amend its Noise Ordinance as needed to prohibit unnecessary excessive and annoying noise sources.

- **Noise Implementation Program Measure IM-4:** The City shall continue to enforce its Noise Ordinance to ensure that noise levels in the commercial areas do not interfere with the normal business, commercial and residential activities.

- **Measure IM-8:** The City shall amend the Commercial Zone Ordinance to require that mixed-use projects be designed to prevent the transfer of noise between the commercial and residential uses.

Therefore, impacts from stationary noise sources due to buildout of the General Plan Update would not be significant.

Impact 5.8-5: Construction activities associated future development that would be accommodated by the General Plan would substantially elevate noise levels in the vicinity of noise-sensitive land uses. [Threshold N-4]

Impact Analysis: Implementation of the General Plan Update would accommodate the development of new residential, commercial, and light-manufacturing uses on the identified infill opportunity sites (see Figure 3-5, *Infill Opportunity Sites*). Two types of short-term noise impacts could occur during construction. First, the transport of workers and movement of materials to and from a construction site could incrementally increase noise levels along local roads. The second type of short-term noise impact is related to demolition, site preparation, grading, and/or physical construction. Construction is performed in distinct steps, each of which has its own mix of construction equipment, and, consequently, its own noise characteristics. Table 5.8-10 lists typical construction equipment noise levels recommended for noise-impact assessments, based on a distance of 50 feet between the equipment and noise receptor.

As shown in the table, construction equipment generates high levels of noise ranging from a maximum of 71 dBA to 101 dBA. Construction of individual developments associated with buildout of the General Plan Update would temporally increase the ambient noise environment, and would have the potential to affect noise sensitive land uses in the vicinity of each individual project site. Section 9.32.060 (Special Exception Provisions) of the City's Municipal Code allows for construction, alteration, or repair activities between the hours of 7:00 AM to 7:00 PM, Monday through Saturday, and between 10:00 AM and 6:00 PM on Sundays and holidays. The activities must be authorized by a city permit and must not exceed 85 dBA. As stated in Section 9.32.060, a permit for exceptions to all or part of the noise regulations may be acquired through the City manager for up to three months, and renewable upon good cause.

Table 5.8-10 Construction Equipment Noise Levels

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

Source: FTA 2006.
Note: Noise levels measured 50 feet from the source.

Significant noise impacts during construction may occur from operation of heavy earthmoving equipment and truck haul that would occur with construction of individual development projects that would be accommodated by the General Plan Update. Implementation of the General Plan Update anticipates maintaining the existing low-density village character of Sierra Madre in the same urban development pattern that exists today (see Figures 3-4, *Current Land Use Map*, and 3-5, *Proposed Land Use Map*). Additionally, the General Plan Update and Implementation Program include policies and implementation measures, respectively, designed to minimize construction-related noise impacts. Following are the applicable policies and implementation measures:

- **Hazard Prevention Element Policy Hz16.1:** Limit construction activities to reasonable weekday and weekend/holiday hours in order to reduce noise impacts on adjacent residences.

- **Hazard Prevention Element Policy Hz16.2:** Require that construction activities incorporate feasible and practical techniques to minimize the noise impacts on adjacent uses.

- **Noise Implementation Program Measure IM-9:** The City shall continue to limit construction activities to reasonable weekday and weekend/holiday hours to reduce noise impacts to residential uses, and enforce noise regulations addressing construction activities.

However, specific locations, site plans, and construction details have not been developed and are not known for future development projects that would be accommodated by the General Plan Update. Construction would be localized and would occur intermittently for varying periods of time. Because specific project-level information is not available at this time, it is not possible to quantify the construction noise impacts at specific sensitive receptors. Construction of individual development project under the General Plan would temporally increase the ambient noise environment in the vicinity of each individual development site. Because construction activities associated with any individual development may occur near noise-sensitive receptors and noise disturbances may occur for prolonged periods of time, construction noise impacts associated with implementation of the General Plan are considered significant.

Impact 5.8-6: Construction activities associated future development that would be accommodated by the General Plan would expose sensitive uses to strong levels of groundborne vibration. [Threshold N-2]

Impact Analysis:

Transportation-Related Vibration Impacts

Caltrans has studied the effects of propagation of vehicle vibration on sensitive land uses and notes that "heavy trucks, and quite frequently buses, generate the highest earthborn vibrations of normal traffic." Caltrans further notes that the highest traffic-generated vibrations are along freeways and state routes. Their study finds that "vibrations measured on freeway shoulders (five meters from the centerline of the nearest lane) have never exceeded 0.08 inches per second, with the worst combinations of heavy trucks and poor roadway conditions. This level coincides with the maximum recommended safe level for ruins and ancient monuments (and historic buildings)." Typically, trucks do not generate high levels of vibration because they travel on rubber wheels and do not have notable vertical movement, which generates ground vibration. Therefore, transportation-related sources associated with future development that would be accommodated by the General Plan Update would not generate excessive groundborne vibrations and no vehicle-generated vibration impacts would occur.

Railroad-Related Vibration Impacts

As there are no railroad lines within the city, there would be no vibration due to trains. Implementation of the General Plan Update would not add new sensitive land uses to areas adjacent to a railroad line, and as a result no new vibration-sensitive land uses would be exposed to excessive groundborne vibration from train operations. Therefore, no railroad vibration impacts would occur.

Industrial-Related Vibration Impacts

The use of heavy equipment associated with industrial operations can create elevated vibration levels in their immediate proximity. Soil conditions have a strong influence on the levels of groundborne vibration. There are currently no light-manufacturing operations within the city that would create notable groundborne vibration. As the proposed Land Use Plan would not add new sensitive receptors in proximity to the city's light-manufacturing areas and as no new heavy industrial sources would be added in the future, no vibration impacts would occur.

Construction-Related Vibration Impacts

Construction operations can generate varying degrees of ground vibration, depending on the construction procedures and equipment. Operation of construction equipment generates vibrations that spread through the ground and diminish with distance from the source. The effect on buildings in the vicinity of the construction site varies depending on soil type, ground strata, and receptor-building construction. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, and slight structural damage at the highest levels. Vibration from construction activities rarely reaches the levels that can damage structures, but can achieve the audible and perceptible ranges in buildings close to the construction site. Table 5.8-11 lists vibration levels for various construction equipment.

Table 5.8-11 Vibration Levels for Construction Equipment

Equipment	Approximate Velocity Level at 25 Feet (VdB)	Approximate RMS[1] Velocity at 25 Feet (in/sec)
Pile Driver (impact) Upper Range	112	1.518
Pile Driver (impact) Lower Range	104	0.644
Pile Driver (sonic) Upper Range	105	0.734
Pile Driver (sonic) Lower Range	93	0.170
Large Bulldozer	87	0.089
Caisson Drilling	87	0.089
Jackhammer	79	0.035
Small Bulldozer	58	0.003
Loaded Trucks	86	0.076
FTA Criteria – Human Annoyance (Daytime)	78	—
FTA Criteria – Structural Damage	—	0.200

Source: FTA 2006.
[1] RMS velocity calculated from vibration level (VdB) using the reference of 1 microinch/second.

As shown in Table 5.8-11, vibration generated by construction equipment has the potential to be substantial. However, groundborne vibration is almost never annoying to people who are outdoors, so it is usually evaluated in terms of indoor receivers (FTA 2006). Vibration impacts may occur from construction equipment associated with development in accordance with the General Plan Update. Depending on the use of equipment and distance to the nearest receptors, the use of heavy equipment during construction would have the potential to cause annoyance and architectural damage at nearby uses. This could be a potentially significant impact. Construction related to development projects under the General Plan could result in a potentially significant vibration impact.

5.8.5 Existing Regulations

- California Code of Regulations, Title 24, Part 11, California Green Building Standards Code.
- City of Sierra Madre Municipal Code, Chapter 9.32, Noise

5.8.6 Level of Significance Before Mitigation

Upon compliance with the regulatory requirements and implementation of the General Plan Update policies and Implementation Program measures, the following impacts would be less than significant: 5.8-1, 5.8-2, 5.8-3, and 5.8-4.Without mitigation, the following impacts would be **potentially significant**:

- **Impact 5.8-5** Construction activities associated with buildout of the General Plan Update would substantially elevate noise levels in the vicinity of sensitive land uses.
- **Impact 5.8-6** Construction activities associated with buildout of the General Plan Update would expose sensitive uses to strong levels of groundborne vibration.

5.8.7 Mitigation Measures

Impact 5.8-5

8-1 Applicants for new development projects within 500 feet of sensitive receptors shall implement the following best management practices to reduce construction noise levels:

- Require that construction vehicles and equipment (fixed or mobile) be equipped with properly operating and maintained mufflers.
- Restrict haul routes and construction-related traffic
- Place stock piling and/or vehicle-staging areas as far as practical from residential uses.
- Replace audible backup warning devices with strobe lights or other warning devices during evening construction activity to the extent permitted by the California Division of Occupational Safety and Health.
- Reduce nonessential idling of construction equipment to no more than five minutes
- Consider the installation of temporary sound barriers for construction activities that are adjacent to occupied noise-sensitive structures, depending on length of construction, type of equipment used, and proximity to noise-sensitive uses.

Impact 5.8-6

8-2 Individual development projects that involve vibration-intensive construction activities—such as blasting, pile drivers, jack hammers, and vibratory rollers—within 200 feet of sensitive receptors shall be evaluated for potential vibration impacts. A construction-related vibration study shall be conducted for individual development projects where vibration-intensive impacts may occur. If construction-related vibration is determined to be perceptible at vibration-sensitive uses, additional requirements, such as use of less-vibration-intensive equipment or construction techniques, shall be implemented during construction (e.g., nonexplosive blasting methods, drilled piles as opposed to pile driving, etc.).

5.8.8 Level of Significance After Mitigation

Mitigation Measures 10-1 (construction-related noise) and 10-2 (construction-related vibration) would reduce impacts associated with construction activities to the extent feasible. However, due to the potential for proximity of construction activities to sensitive uses and potential longevity of construction activities, and despite the application of mitigation measures, Impacts 5.18-5 (construction noise) and 5.8-6 (construction vibration) would remain **significant and unavoidable**.

5.8.9 References

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