5.6 NOISE

The purpose of this section is to analyze Project related noise source impacts on-site and to surrounding land uses. Mitigation measures are also recommended to avoid or lessen the Project's impacts. This section evaluates short-term construction-related impacts as well as future long-term buildout conditions. Information in this section is based on the *Noise Impact Analysis: Foothill Parkway Westerly Extension* (*Noise Impact Analysis*), prepared by LSA Associates, Inc. (LSA), dated January 2008. The complete assessment is included as Appendix 15.6, ENVIRONMENTAL NOISE ASSESSMENT.

5.6.1 ACOUSTICAL TERMINOLOGY

NOISE SCALES AND DEFINITIONS

Sound is technically described in terms of the loudness (amplitude) and frequency (pitch). The standard unit of measurement of the loudness of sound is the decibel (dB). Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been revised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound 10 dBA higher than another is judged to be twice as loud, and 20 dBA higher four times as loud, and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). Examples of various sound levels in different environments are shown in Table 5.6-1, COMMON SOUND LEVELS AND THEIR NOISE SOURCES.

In general, a 3 dBA change in sound pressure level is considered a "just detectable" difference in most situations. A 5 dBA change is readily noticeable, and a 10 dBA change is considered a doubling (or halving) of the subjective loudness. It should be noted that a 3 dBA increase or decrease in the average traffic noise level is realized by a doubling or halving of the traffic volume, or by about a seven mile per hour (mph) increase or decrease in speed.

For each doubling of distance from a point noise source, the sound level will decrease by 6 dBA. In other words, if a person is 100 feet from a machine, and moves to 200 feet from that source, sound levels will drop approximately 6 dBA. For each doubling of distance from a line source, like a roadway, noise levels are reduced by three to five decibels, depending on the ground cover between the source and the receiver.

Table 5.6-1
Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in decibels (dBA)	Noise Environments	Subjective Evaluations
Near jet engine	140	Deafening	128 times as loud
Civil defense siren	130	Threshold of pain	64 times as loud
Hard rock band	120	Threshold of feeling	32 times as loud
Accelerating motorcycle at a few feet away	110	Very loud	16 times as loud
Pile driver; noisy urban street/heavy city traffic	100	Very loud	8 times as loud
Ambulance siren; food blender	95	Very loud	4 times as loud
Garbage disposal	90	Very loud	
Freight cars; living room music	85	Loud	2 times as loud
Pneumatic drill; vacuum cleaner	80	Loud	
Busy restaurant	75	Moderately loud	Reference level
Near freeway auto traffic	70	Moderately loud	
Average office	60	Quiet	½ as loud
Suburban street	55	Quiet	
Light traffic; soft radio music in apartment	50	Quiet	¼ as loud
Large transformer	45	Quiet	
Average residence without stereo playing	40	Faint	⅛ as loud
Soft whisper	30	Faint	
Rustling leaves	20	Very faint	Threshold of hearing
Human breathing	10	Very faint	
Source: *Noise Impact Analysis: Foothill Parkway Westerly Extension*, LSA Associates, Inc., January 2008.			

Numerous methods have been developed to measure sound over a period of time. These methods include: 1) the Community Noise Equivalent Level (CNEL); 2) the Equivalent Sound Level (Leq); and 3) Day/Night Average Sound Level (Ldn). These methods are described below in Table 5.6-2, DEFINITION OF ACOUSTICAL TERMS.

Table 5.6-2
Definition of Acoustical Terms

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

Source: *Noise Impact Analysis: Foothill Parkway Westerly Extension*, LSA Associates, Inc., January 2008.

HEALTH EFFECTS OF NOISE

Human response to sound is highly individualized. Annoyance is the most common issue regarding community noise. The percentage of people claiming to be annoyed by noise generally increases with the environmental sound level. However, many factors also influence people's response to noise. The factors can include the character of the noise, the variability of the sound level, the presence of tones or impulses, and the time of day of the occurrence. Additionally, non-acoustical factors, such as the person's opinion of the noise source, the ability to adapt to the noise, the attitude towards the source and those associated with it, and the predictability of the noise, all influence people's response. As such, response to noise varies widely from one person to another and with any particular noise, individual responses will range from "not annoyed" to "highly annoyed."

When the noise level of an activity rises above 70 dBA, the chance of receiving a complaint is possible, and as the noise level rises, dissatisfaction among the public steadily increases. However, an individual's reaction to a particular noise depends on many factors, such as the source of the sound, its loudness relative to the background noise, and the time of day. The reaction to noise can also be highly subjective; the perceived effect of a particular noise can vary widely among individuals in a community.

The effects of noise are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. The effects of noise on the community can be organized into six broad categories:

- Noise-Induced Hearing Loss;
- Interference with Communication;
- Effects of Noise on Sleep;
- Effects on Performance and Behavior;
- Extra-Auditory Health Effects; and
- Annoyance.

Although it often causes discomfort and sometimes pain, noise-induced hearing loss usually takes years to develop. Noise-induced hearing loss can impair the quality of life through a reduction in the ability to hear important sounds and to communicate with family and friends. Hearing loss is one of the most obvious and easily quantified effects of excessive exposure to noise. While the loss may be temporary at first, it could become permanent after continued exposure. The amount of hearing loss directly caused by the environment is difficult to quantify when combined with hearing loss associated with aging. Although the major cause of noise-induced hearing loss is occupational, substantial damage can be caused by non-occupational sources.

According to the United States Public Health Service, nearly ten million of the estimated 21 million Americans with hearing impairments owe their losses to noise exposure. Noise can mask important sounds and disrupt communication between individuals in a variety of settings. This process can cause anything from a slight irritation to a serious safety hazard, depending on the circumstance. Noise can disrupt face-to-face communication and telephone communication, and the enjoyment of music and television in the home. It can also disrupt effective

communication between teachers and pupils in schools, and can cause fatigue and vocal strain in those who need to communicate in spite of the noise.

Interference with communication has proved to be one of the most important components of noise-related annoyance. Noise-induced sleep interference is one of the critical components of community annoyance. Sound level, frequency distribution, duration, repetition, and variability can make it difficult to fall asleep and may cause momentary shifts in the natural sleep pattern, or level of sleep. It can produce short-term adverse effects on mood changes and job performance, with the possibility of more serious effects on health if it continues over long periods. Noise can cause adverse effects on task performance and behavior at work, and non-occupational and social settings. These effects are the subject of some controversy, since the presence and degree of effects depends on a variety of intervening variables. Most research in this area has focused mainly on occupational settings, where noise levels must be sufficiently high and the task sufficiently complex for effects on performance to occur.

Recent research indicates that more moderate noise levels can produce disruptive after-effects, commonly manifested as a reduced tolerance for frustration, increased anxiety, decreased incidence of “helping” behavior, and increased incidence of “hostile” behavior. Noise has been implicated in the development or exacerbation of a variety of health problems, ranging from hypertension to psychosis. As with other categories, quantifying these effects is difficult due to the amount of variables that need to be considered in each situation. As a biological stressor, noise can influence the entire physiological system. Most effects seem to be transitory, but with continued exposure some effects have been shown to be chronic in laboratory animals.

Annoyance can be viewed as the expression of negative feelings resulting from interference with activities, as well as the disruption of one’s peace of mind and the enjoyment of one’s environment. Field evaluations of community annoyance are useful for predicting the consequences of planned actions involving highways, airports, road traffic, railroads, or other noise sources. The consequences of noise-induced annoyance are privately held dissatisfaction, publicly expressed complaints to authorities, and potential adverse health effects, as discussed above. In a study conducted by the United States Department of Transportation, the effects of annoyance to the community were quantified. In areas where noise levels were consistently above 60 dBA CNEL, approximately nine percent of the community is highly annoyed. When levels exceed 65 dBA CNEL, that percentage rises to 15 percent. Although evidence for the various effects of noise have differing levels of certainty, it is clear that noise can affect human health. Most of the effects are, to a varying degree, stress related.

VIBRATION CHARACTERISTICS

Vibration refers to ground-borne noise and perceptible motion. Typically, ground-borne vibration generated by man-made activities attenuates rapidly as distance from the source of the vibration increases. Vibration, which spreads through the ground rapidly, diminishes in amplitude with distance from the source. The ground

motion caused by vibration is measured as particle velocity in inches per second, and, in the U.S. is referenced as vibration decibels (VdB).

Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernable but, without the effects associated with the shaking of a building, there is less adverse reaction. Vibration energy propagates from a source through intervening soil and rock layers, to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by the occupants as motion of building surfaces, rattling of items on shelves or hanging on walls, or as a low-frequency rumbling noise; refer to Figure 5.6-1, TYPICAL VIBRATION SOURCES AND SENSITIVITIES. The rumble noise is caused by the vibrating walls, floors, and ceilings radiating sound waves. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration from traffic is barely perceptible. In addition, some vibration effects can be caused by noise generated by windows rattling from truck pass-bys. Building damage is not a factor for normal transportation projects, including rail projects, with the occasional exception of blasting and pile driving during construction.

5.6.2 REGULATORY SETTING

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

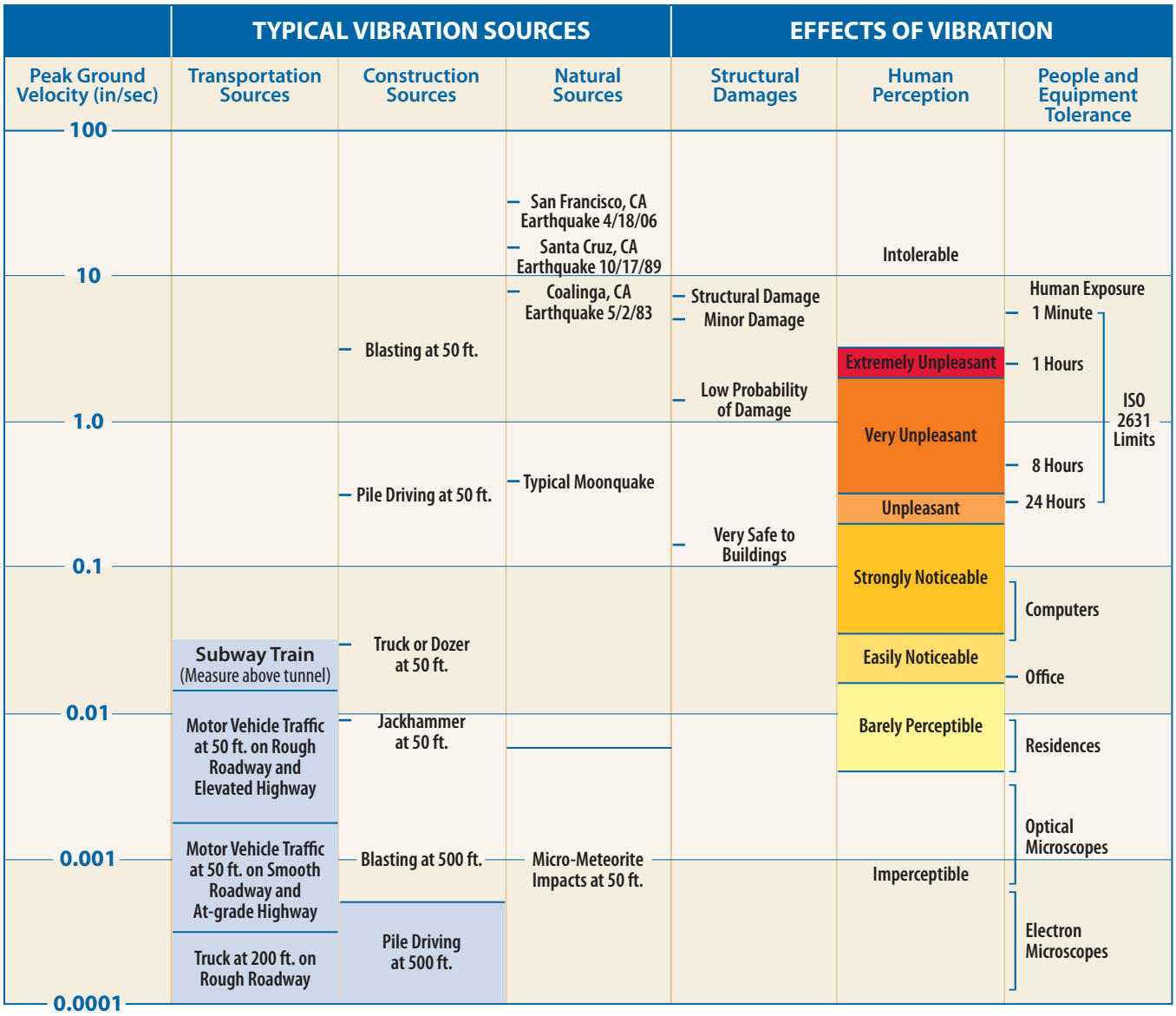
It is difficult to specify noise levels which are generally acceptable to everyone. What is annoying to one person may be unnoticed by another. Standards may be based on documented complaint activity in response to documented noise levels, or based on studies on the ability of people to sleep, talk, or work under various noise conditions. All such studies, however, recognize that individual responses vary considerably. Standards usually address the needs of most of the general population.

This section describes the laws, ordinances, regulations, and standards that are applicable to the proposed alignment. Regulatory requirements related to environmental noise are typically promulgated at the local level. However, Federal and State agencies provide standards and guidelines to the local jurisdictions.

STATE OF CALIFORNIA GUIDELINES

The California Environmental Quality Act (CEQA) was enacted in 1970 and requires that all known environmental effects of a project be analyzed, including environmental noise impacts. Under CEQA, a project has a potentially significant impact if the project exposes people to noise levels in excess of standards established in the local general plan or noise ordinance. Additionally, under CEQA, a project has a potentially significant impact if the project creates a substantial increase in the ambient noise levels in the project vicinity above levels existing without the project. If a project has a potentially significant impact, mitigation measures must be considered. If mitigation measures to reduce the impact to less than significant are not feasible due to economic, social, environmental, legal, or other conditions, the most feasible mitigation measures must be considered.

Typical Vibration Sources and Sensitivities



Source: Nugent & Amick, 1992, Environmental Monitor Vibration Considerations in Land Use Planning, Summer 1992.

Ogden, 1995, Typical Vibration Sources and Sensitivities.

California Government Code

California Government Code Section 65302 (f) mandates that the legislative body of each county and city adopt a noise element as part of their comprehensive General Plan. The local noise element must recognize the land use compatibility guidelines established by the State Department of Health Services as shown in Table 5.6-3, LAND USE COMPATIBILITY FOR EXTERIOR COMMUNITY NOISE.

Table 5.6-3
Land Use Compatibility for Exterior Community Noise

LAND USE CATEGORY	NOISE RANGE (L_{dn} or CNEL, dbA)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Passively Used Open Spaces	50	50 – 55	55 - 70	70 +
Auditoriums, Concert Halls, Amphitheaters	45 - 50	50 – 65	65 - 70	70 +
Residential: Low- Density Single-Family, Duplex, Mobile Homes	50 - 55	55 - 70	70 - 75	75 +
Residential: Multifamily	50 - 60	60 - 70	70 - 75	75 +
Transit Lodging: Motel, Hotels	50 - 60	60 - 70	70 - 80	80 +
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 - 60	60 - 70	70 - 80	80 +
Actively Used Open Space: playgrounds, neighborhood parks	50 - 67	-	67 - 73	73 +
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 - 70	-	70 - 80	80 +
Office Buildings, Business Commercial and Professional	50 - 67	67 - 75	75 +	-
Industrial, Manufacturing, Utilities, Agriculture	50 - 70	70 - 75	75 +	-

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

Source: *Noise Impact Analysis: Foothill Parkway Westerly Extension*, LSA Associates, Inc., January 2008.

The guidelines rank noise-land use compatibility in terms of “normally acceptable”, “conditionally acceptable”, “normally unacceptable” and “clearly unacceptable” noise levels for various land use types. Single-family homes are “normally acceptable” in exterior noise environments up to 55 CNEL and “conditionally acceptable” up to 70 CNEL. Multifamily residential homes are “normally acceptable” up to 60 CNEL and “conditionally acceptable” up to 70 CNEL. Schools, libraries, and churches are “normally acceptable” up to 60 CNEL and “conditionally acceptable” up to 70 CNEL. Industrial, manufacturing, utilities, and agriculture uses are “normally acceptable” up to 70 CNEL and “conditionally acceptable” up to 75 CNEL. Passively used open

space areas are "normally acceptable" at 50 CNEL and "conditionally acceptable" up to 55 CNEL. Actively used open space areas are "normally acceptable" up to 67 CNEL and "normally unacceptable" between 67 - 73 CNEL.

LOCAL JURISDICTIONS

City of Corona Noise Standards

The applicable standards for noise levels that apply to the proposed alignment are those within the Noise Element of the *City of Corona General Plan* and the *Municipal Code*. One of the goals of the City's Noise Element is to develop and adopt specific policies and an effective implementation program to abate and avoid excessive noise exposure in the City by requiring that effective noise mitigation measures be incorporated into the design of new noise-generating and noise-sensitive land uses. The City's *Municipal Code* (Section 17.84.040, Noise) noise standard for exterior living areas is 65 dBA CNEL, which is consistent with the State's guidelines. The interior noise standard is 45 dBA CNEL, which is consistent with the State Noise Insulation Standards (California Code of Regulation, Title 24) and Chapter 35 of the Uniform Building Code (UBC). The City's *Municipal Code* (Section 17.84.040) limits the hours of construction to the hours of 7:00 a.m. to 8:00 p.m. on Monday through Saturday and 10:00 a.m. to 6:00 p.m. on Sundays and federal holidays. Applicable Goals and Policies relative to the Project site within the Environmental Resources Element are included in Table 5.6-4, below.

Table 5.6-4
Consistency Analysis with the *City of Corona General Plan*
Goals and Policies for Noise

GOALS AND POLICIES	PROJECT CONSISTENCY
Environmental Resources Element Goals	
Noise Goal 11.4: *Ensure that appropriate actions are taken to protect residents, visitors, and noise sensitive land uses from adverse human health and environmental impacts created by excessive noise levels from ambient sources.*	Mitigation Measures 5.6-1a through 5.6-2 would ensure appropriate actions are taken to protect adjacent land uses from adverse impacts associated with short- and long-term noise levels. Although short-term construction noise impacts would remain significant and unavoidable, with implementation of the recommended mitigation measures the Project would be consistent with Goal 11.4 of the Environmental Resources Element, as the impacts would be temporary and mitigated to the extent feasible.
Noise Goal 11.5: *Prevent and mitigate the adverse impacts of excessive ambient noise exposure on residents, employees, visitors, and "noise sensitive" land uses within the City of Corona.*	Refer to the response for Noise Goal 11.4, above.
Environmental Resources Element Policies	
Noise Policy 11.4.1: *Provide for the reduction in noise impacts from transportation noise sources through the following actions:* • *Implement noise mitigation measures in the design and daily operation of arterial road improvement projects consistent with funding capabilities.*	Mitigation Measure 5.6-2 would reduce long-term operational noise impacts associated with the proposed alignment. With certification of the Final EIR, the City of Corona shall adopt a monitoring and reporting program for assessing and ensuring compliance with the required mitigation measures applied to the proposed Project. Therefore, the Project would be consistent with Policy 11.4.1 of the Environmental Resources Element.

Table 5.6-4 (Continued)
Consistency Analysis with the *City of Corona General Plan*
Goals and Policies for Noise

GOALS AND POLICIES	PROJECT CONSISTENCY
Noise Policy 11.4.2: *Minimize vehicle noise impacts from streets and freeways through proper route location and sensitive roadway design through the following strategies:* • *Assess the impacts of truck routes, the effects of a variety of truck traffic, and future motor vehicle volumes on noise levels adjacent to roadways when improvements to the circulation system are being planned.* • *Mitigate traffic volumes and vehicle speed through residential neighborhoods and school districts.*	The *Noise Impact Analysis* prepared for the proposed Project assesses traffic noise levels based on anticipated traffic volumes associated with the proposed Project. Section 5.4, TRAFFIC AND CIRCULATION, addresses anticipated traffic volumes in the Project vicinity and surrounding areas. Impact Discussion 5.6-2 concludes that vehicular noise impacts would be reduced to a less than significant level with the incorporation of Mitigation Measure 5.6-2. Therefore, the Project would be consistent with Policy 11.4.2 of the Environmental Resources Element.
Noise Policy 11.5.5: *Require development that generates increased traffic and substantial increases in ambient noise levels adjacent to noise sensitive land uses, to provide appropriate mitigation measures in accordance with the acceptable limits of the City Noise Ordinance.*	Recommended Mitigation Measure 5.6-2 would reduce traffic-generated noise levels below the City's exterior noise standards of 65 dBA CNEL (Municipal Code Section 17.84.040). Therefore, the Project would be consistent with Policy 11.5.5 of the Environmental Resources Element.
Noise Policy 11.5.6: *Require construction activities that occur in close proximity to existing "noise sensitive" uses, including schools, libraries, health care facilities, and residential uses to limit the hours and days of operation in accordance with City Noise Ordinance.*	The proposed Project shall adhere to the hours specified in Section 17.84.040, Noise, of the City's *Municipal Code* regarding construction activities (refer to recommended Mitigation Measure 5.6-1a). Therefore, the Project would be consistent with Policy 11.5.6 of the Environmental Resources Element.

5.6.3 EXISTING CONDITIONS

NOISE-SENSITIVE RECEPTORS

Noise-sensitive receptors include residences, schools, hospitals, and similar uses that are sensitive to noise. Existing land uses within the Project area include single-family residences, multi-family residences, future planned residential, and a recreational area. These noise-sensitive land use areas are located adjacent to Foothill Parkway, Green River Road, and other roadways within the Project area.

A total of 150 receptor locations were modeled to represent noise-sensitive land uses in the Project vicinity (refer to Figures 5.6-2A through 5.6-2G, MONITORING AND MODELED RECEPTOR LOCATIONS). The generalized land use data and locations of particularly sensitive receptors were used as the basis for the noise monitoring and analysis sites selected.

AMBIENT NOISE MEASUREMENTS

In order to quantify existing ambient noise levels in the Project area, noise measurements were conducted by LSA on June 27, 2006. Existing noise levels in the Project vicinity were sampled during off-peak traffic hours when traffic was flowing freely. All noise measurements for the study were performed using a Larson Davis Model 824 Type 1 sound level meter.

The primary source of ambient noise in the Project area is traffic on Green River Road and Foothill Parkway. Ambient noise measurements were conducted, for 20-minutes each, to document existing noise levels at ten representative sensitive receptor locations along the Project alignment (refer to Figures 5.6-2A through 5.6-2G, MONITORING AND MODELED RECEPTOR LOCATIONS, for locations). Table 5.6-5, SHORT-TERM AMBIENT NOISE MONITORING RESULTS, includes the results of these measurements. In areas with existing traffic in the Project vicinity, these noise measurements were used to calibrate the noise model and to predict the noise levels at noise-sensitive land uses in the Project area.

Table 5.6-5
Short-Term Ambient Noise Monitoring Results

Monitor Number	Location Description	Noise Sources	Time Interval	dBA L_{eq}
M-1	2000 San Antonio, near the backyard area	Traffic on Green River Road and Paseo Grande	9:01 a.m. – 9:21 a.m.	54.0
M-2	2004 Adobe Avenue, near the backyard area	Some local traffic on Adobe Avenue, faint traffic from Green River Road and Paseo Grande, dogs barking in the background, birds chirping, aircraft noise, person walking past the noise meter and talking, children playing in the backyard	9:44 a.m. – 10:04 a.m.	55.7
M-3	Outdoor recreation area at Crown Villas Condo	Birds chirping, street cleaner on Avenida Del Vista, and some aircraft noise	10:20 a.m. – 10:40 a.m.	43.8
M-4	1751 Chisholm Trail Circle, on the south side of Chisholm Trail Circle	Birds chirping, some aircraft noise, some gardening activity, and noise from leaf blower in the background	10:52 a.m. – 11:12 a.m.	48.3
M-5	2612 Falcon Circle, in the backyard	Birds chirping	11:37 a.m. – 11:57 a.m.	42.0
M-6	2659 Condor Circle, in the backyard	Resident next door playing loud music and birds chirping	12:39 a.m. – 12:59 a.m.	41.8
M-7	1490 Clearview Circle, in the backyard area	Heating, ventilating, and air conditioning noise and some aircraft noise	2:53 p.m. – 3:13 p.m.	51.0
M-8	3482 Amethyst Street, at the cul-de-sac	Construction noise in the background	3:23 p.m. – 3:43 p.m.	54.5
M-9	Between 1140 and 1105 Chase Circle, at the cul-de-sac	Some traffic on Foothill Parkway, aircraft noise, and heavy truck idling in the background	1:30 p.m. – 1:50 p.m.	58.1
M-10	11 Stoneberry Street, in the backyard	Traffic on Foothill Parkway, truck idling across the street, and some aircraft noise	2:09 p.m. – 2:29 p.m.	61.1

Source: *Noise Impact Analysis: Foothill Parkway Westerly Extension*, LSA Associates, Inc., January 2008.

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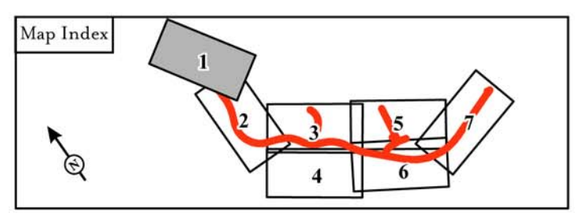
Source: Noise Impact Analysis, Foothill Parkway Westerly Extension, LSA, January 2008.

Legend

- Monitor Locations
- Receptor Locations
- Existing Walls



RBF CONSULTING

0 50' 100' 200'
APPROXIMATE

2/5/08 JN 10-104629-13633

FOOTHILL PARKWAY WESTERLY EXTENSION • DRAFT EIR

Monitoring and Modeled Receptor Locations

Figure 5.6-2A

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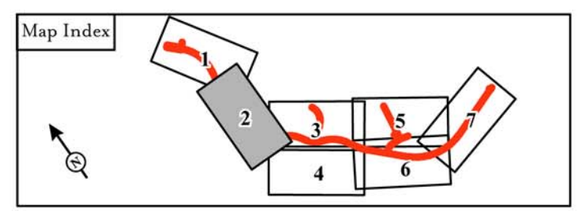
Source: Noise Impact Analysis, Foothill Parkway Westerly Extension, LSA, January 2008.

Legend

- Monitor Locations
- Receptor Locations
- Existing Walls



RBF CONSULTING

0 50' 100' 200'
APPROXIMATE

2/5/08 JN 10-104629-13633

FOOTHILL PARKWAY WESTERLY EXTENSION • DRAFT EIR

Monitoring and Modeled Receptor Locations

Figure 5.6-2B

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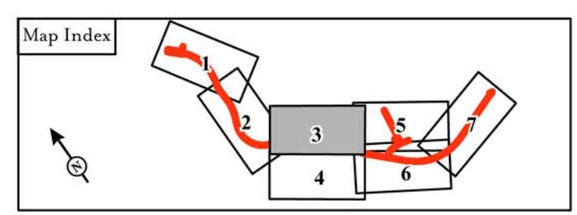
Source: Noise Impact Analysis, Foothill Parkway Westerly Extension, LSA, January 2008.

Legend

- Monitor Locations
- Receptor Locations
- Existing Walls



RBF CONSULTING

0 50' 100' 200'
APPROXIMATE

2/5/08 JN 10-104629-13633

FOOTHILL PARKWAY WESTERLY EXTENSION • DRAFT EIR

Monitoring and Modeled Receptor Locations

Figure 5.6-2C

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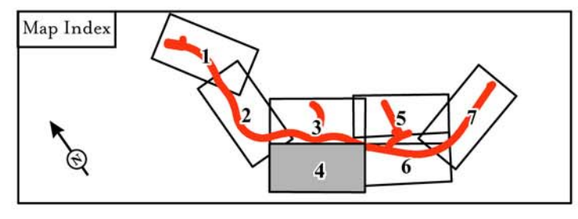
Source: Noise Impact Analysis, Foothill Parkway Westerly Extension, LSA, January 2008.

Legend

- Monitor Locations
- Receptor Locations
- Existing Walls



RBF CONSULTING

0 50' 100' 200'
APPROXIMATE

2/5/08 JN 10-104629-13633

FOOTHILL PARKWAY WESTERLY EXTENSION • DRAFT EIR

Monitoring and Modeled Receptor Locations

Figure 5.6-2D

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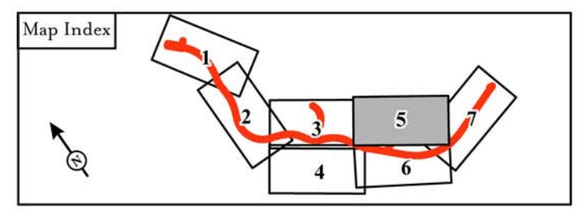
Source: Noise Impact Analysis, Foothill Parkway Westerly Extension, LSA, January 2008.

Legend

- Monitor Locations
- Receptor Locations
- Existing Walls



RBF CONSULTING

0 50' 100' 200'
APPROXIMATE

2/5/08 JN 10-104629-13633

FOOTHILL PARKWAY WESTERLY EXTENSION • DRAFT EIR

Monitoring and Modeled Receptor Locations

Figure 5.6-2E

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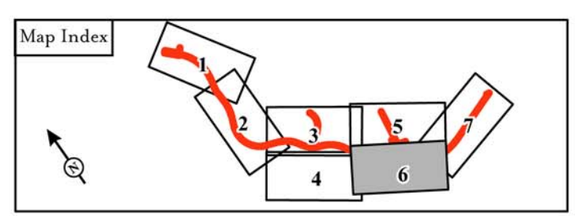
Source: Noise Impact Analysis, Foothill Parkway Westerly Extension, LSA, January 2008.

Legend

- Monitor Locations
- Receptor Locations
- Existing Walls



RBF CONSULTING

0 50' 100' 200'
APPROXIMATE

2/5/08 JN 10-104629-13633

FOOTHILL PARKWAY WESTERLY EXTENSION • DRAFT EIR

Monitoring and Modeled Receptor Locations

Figure 5.6-2F

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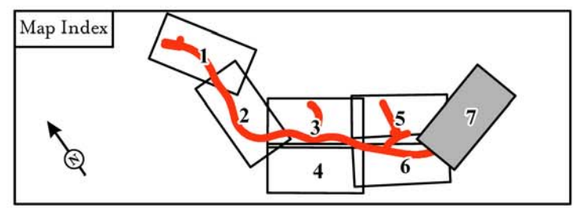
Source: Noise Impact Analysis, Foothill Parkway Westerly Extension, LSA, January 2008.

Legend

- Monitor Locations
- Receptor Locations
- Existing Walls



RBF CONSULTING

0 50' 100' 200'
APPROXIMATE

2/5/08 JN 10-104629-13633

FOOTHILL PARKWAY WESTERLY EXTENSION • DRAFT EIR

Monitoring and Modeled Receptor Locations

Figure 5.6-2G

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EXISTING TRAFFIC NOISE LEVELS

The Federal Highway Administration (FHWA) Traffic Noise Model (TNM) 2.5 model was used to evaluate traffic noise levels at noise-sensitive receptor locations in the Project vicinity, because the model can account for the large topographic changes in the Project area. The traffic volumes counted and the noise levels measured during the ambient noise monitoring were used to calibrate the Traffic Noise Model (TNM 2.5) model for existing conditions, excluding ambient noise monitoring locations with low vehicular traffic in the Project area. At locations with low vehicular traffic, ambient noise level measurements were used to establish existing noise levels at modeled receptor locations.

The TNM 2.5 program is the traffic noise model used to evaluate traffic noise impacts against the City's standards. Since TNM 2.5 generates noise levels in dBA L_{eq} and the City's noise standards are expressed in CNEL, 2 dBA is added to the L_{eq} to convert noise levels to CNEL.[1] The existing noise levels (2006) and 2025 traffic noise levels were calculated using traffic volumes provided by Meyer, Mohaddes Associates, Inc.[2] The traffic distributions obtained during ambient noise measurements were applied to existing and 2025 traffic noise modeling. The existing and 2025 traffic data are included in Appendix 15.6.

The primary existing noise sources in the Project area are transportation facilities. Traffic on Green River Road, Foothill Parkway, and other local streets is a steady source of ambient noise in the Project vicinity. Table 5.6-6, EXISTING (2006) TRAFFIC NOISE LEVELS, illustrates the existing noise levels in the Project vicinity. Table 5.6-6 also identifies the location and type of development for each modeled receptor location. Existing residences and planned future residences in the Project area would be exposed to existing noise levels ranging from 35 to 73 dBA CNEL (refer to Table 5.6-6).

Table 5.6-6
Existing (2006) Traffic Noise Levels

Receptor Number	Location	Type of Development	Existing Noise Level (dBA CNEL) [1, 2]
R-1	San Antonio Drive	Residential	**66**
R-2	San Antonio Drive	Residential	**66**
R-3	San Antonio Drive	Residential	**68**
R-4	San Rafael Drive	Residential	**73**
R-5	San Rafael Drive	Residential	**73**
R-6	San Rafael Drive	Residential	**73**
R-7	Adobe Avenue	Residential	57
R-8	Adobe Avenue	Residential	56
R-9	Adobe Avenue	Residential	53
R-10	Adobe Avenue	Residential	51

[1] California Department of Transportation, *Technical Noise Supplement: A Technical Supplement to the Traffic Noise Analaysis Protocol*, October 1998.
[2] Meyer, Mohaddes Associates, Inc. *Foothill Parkway Model Run Information*, June 2007.

Table 5.6-6 (Continued)
Existing (2006) Traffic Noise Levels

Receptor Number	Location	Type of Development	Existing Noise Level (dBA CNEL) [1, 2]
R-11	Adobe Avenue	Residential	48
R-12	Adobe Avenue	Residential	52
R-13	Adobe Avenue	Residential	51
R-14	Adobe Avenue	Residential	50
R-15	Adobe Avenue	Residential	48
R-16	Adobe Avenue	Residential	49
R-17	Adobe Avenue	Residential	48
R-18	Adobe Avenue	Residential	43
R-19	Adobe Avenue	Residential	44
R-20	Adobe Avenue	Residential	44
R-21	Adobe Avenue	Residential	44
R-22	Avenida Del Vista	Residential	48
R-23	Avenida Del Vista	Residential	47
R-24	Avenida Del Vista	Residential	46
R-25	Avenida Del Vista	Residential	45
R-26	Avenida Del Vista	Residential	42
R-27	Avenida Del Vista	Residential	37
R-28	Avenida Del Vista	Residential	35
R-29	Avenida Del Vista	Residential	36
R-30	Avenida Del Vista	Recreation	40
R-31	Avenida Del Vista	Residential	34
R-32	Avenida Del Vista	Residential	35
R-33	Avenida Del Vista	Residential	35
R-34	Avenida Del Vista	Residential	35
R-35	Avenida Del Vista	Residential	37
R-36	Avenida Del Vista	Residential	38
R-37	Chisholm Trail Circle	Residential	37
R-38	Chisholm Trail Circle	Residential	38
R-39	Chisholm Trail Circle	Residential	38
R-40	Chisholm Trail Circle	Residential	37
R-41	Chisholm Trail Circle	Residential	38
R-42	Chisholm Trail Circle	Residential	37
R-43	Vixen Trail Circle	Residential	38
R-44	Vixen Trail Circle	Residential	38
R-45	Vixen Trail Circle	Residential	38
R-46	Vixen Trail Circle	Residential	38
R-47	Vixen Trail Circle	Residential	37
R-48	Raven Circle	Residential	36
R-49	Raven Circle	Residential	36

Table 5.6-6 (Continued)
Existing (2006) Traffic Noise Levels

Receptor Number	Location	Type of Development	Existing Noise Level (dBA CNEL) [1, 2]
R-50	Raven Circle	Residential	38
R-51	Raven Circle	Residential	39
R-52	Falcon Circle	Residential	37
R-53	Falcon Circle	Residential	38
R-54	Falcon Circle	Residential	40
R-55	Condor Circle	Residential	41
R-56	Condor Circle	Residential	42
R-57	Condor Circle	Residential	51
R-58	Condor Circle	Residential	49
R-59	Condor Circle	Residential	48
R-60	Condor Circle	Residential	53
R-61	Condor Circle	Residential	60
R-62	Condor Circle	Residential	57
R-63	Eagle Circle	Residential	55
R-64	Cape Drive	Residential	46
R-65	Cape Drive	Residential	48
R-66	Cape Drive	Residential	46
R-67	Cape Drive	Residential	45
R-68	Cape Drive	Residential	44
R-69	Cape Drive	Residential	43
R-70	Bonnyview Circle	Residential	43
R-71	Bonnyview Circle	Residential	43
R-72	Bonnyview Circle	Residential	42
R-73	Bonnyview Circle	Residential	41
R-74	Bonnyview Circle	Residential	40
R-75	Clearview Circle	Residential	40
R-76	Clearview Circle	Residential	40
R-77	Clearview Circle	Residential	42
R-78	Clearview Circle	Residential	40
R-79	Clearview Circle	Residential	41
R-80	Clearview Circle	Residential	42
R-81	Meadowcrest Way	Residential	40
R-82	Meadowcrest Way	Residential	42
R-83	Meadowcrest Way	Residential	45
R-84	Meadowcrest Way	Residential	49
R-85	Meadowcrest Way	Residential	52
R-86	Meadowcrest Way	Residential	45
R-87	Meadowcrest Way	Residential	49
R-88	Meadowcrest Way	Residential	57

Table 5.6-6 (Continued)
Existing (2006) Traffic Noise Levels

Receptor Number	Location	Type of Development	Existing Noise Level (dBA CNEL) [1, 2]
R-89	Mangular Avenue	Residential	54
R-90	Mangular Avenue	Residential	46
R-91	Mangular Avenue	Residential	48
R-92	Chase Drive	Residential	46
R-93	Chase Drive	Residential	45
R-94	Foothill Parkway	Residential	38
R-95	Foothill Parkway	Residential	44
R-96	Folson Circle	Residential	44
R-97	Folson Circle	Residential	46
R-98	Folson Circle	Residential	53
R-99	Folson Circle	Residential	52
R-100	Folson Circle	Residential	49
R-101	Fanning Circle	Residential	55
R-102	Fanning Circle	Residential	63
R-103	Fanning Circle	Residential	61
R-104	Fanning Circle	Residential	54
R-105	Corbett Road	Residential	50
R-106	Corbett Road	Residential	49
R-107	Chase Drive	Residential	55
R-108	Skyline Drive	Residential	54
R-109	Amethyst Street	Residential	53
R-110	Amethyst Street	Residential	48
R-111	Amethyst Street	Residential	47
R-112	Amethyst Street	Residential	46
R-113	Amethyst Street	Residential	50
R-114	Amethyst Street	Residential	48
R-115	Elysia Street	Residential	51
R-116	Elysia Street	Residential	51
R-117	Elysia Street	Residential	53
R-118	Elysia Street	Residential	52
R-119	Bonsai Circle	Residential	55
R-120	Bonsai Circle	Residential	55
R-121	Bonsai Circle	Residential	56
R-122	Duxbury Circle	Residential	53
R-123	Duxbury Circle	Residential	57
R-124	Duxbury Circle	Residential	52
R-125	Duxbury Circle	Residential	52
R-126	Duxbury Circle	Residential	53
R-127	Duxbury Circle	Residential	54

Table 5.6-6 (Continued)
Existing (2006) Traffic Noise Levels

Receptor Number	Location	Type of Development	Existing Noise Level (dBA CNEL) [1, 2]
R-128	Greenvale Circle	Residential	49
R-129	Greenvale Circle	Residential	47
R-130	Langtree Lane	Residential	48
R-131	Langtree Lane	Residential	48
R-132	Langtree Lane	Residential	48
R-133	Langtree Lane	Residential	48
R-134	Stoneyberry Lane	Residential	48
R-135	Athlone Lane	Residential	59
R-136	Athlone Lane	Residential	59
R-137	Athlone Lane	Residential	58
R-138	Athlone Lane	Residential	62
R-139	Athlone Lane	Residential	61
R-140	Athlone Lane	Residential	58
R-141	Chase Drive	Residential	56
R-142	Chase Drive	Residential	61
R-143	Chase Drive	Residential	59
R-144	Brunstane Circle	Residential	60
R-145	Brunstane Circle	Residential	64
R-146	Brunstane Circle	Residential	63
R-147	Brunstane Circle	Residential	65
R-148	Brunstane Circle	Residential	65
R-149	Brunstane Circle	Residential	61
R-150	Brunstane Circle	Residential	63

Note:
[1] At locations with low vehicular traffic, ambient noise level measurements were used to establish existing noise levels at modeled receptor locations.

[2] Numbers in bold represent noise levels that exceed the City's exterior noise standards of 65 dBA CNEL.

Source: *Noise Impact Analysis: Foothill Parkway Westerly Extension*, LSA Associates, Inc., January 2008.

5.6.4 STANDARDS OF SIGNIFICANCE

SIGNIFICANCE CRITERIA

Appendix G, *Initial Study Checklist*, of the CEQA Guidelines contains analysis guidelines related to the assessment of noise impacts. These guidelines have been utilized as thresholds of significance for this analysis. As stated in Appendix G, a project may create a significant environmental impact if one or more of the following occurs:

- 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 (refer to *Impact Statements 5.6-1, 5.6-2*, *5.6-3*, and *5.6-4*);

- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels (refer to *Impact Statement 5.6-1*);

- A substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project (refer to *Impact Statements 5.6-2, 5.6-3*, and *5.6-5*);

- A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project (refer to *Impact Statement 5.6-1*);

- 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, would the Project expose people residing or working in the Project area to excessive noise levels (refer to Section 10.0, EFFECTS FOUND NOT TO BE SIGNIFICANT); and/or

- For a Project within the vicinity of a private airstrip, would the Project expose people residing or working in the Project area to excessive noise levels (refer to Section 10.0, EFFECTS FOUND NOT TO BE SIGNIFICANT).

As stated above, a project is considered to have a significant noise impact where it causes an adopted noise standard to be exceeded for the project site or for adjacent sensitive receptors. The City of Corona noise standards, identified above, have been utilized as the thresholds in this analysis.

METHODOLOGY

Traffic Noise Model Version 2.5 (TNM2.5)

In March 1998, the Federal Highway Administration (FHWA) released the Traffic Noise Model, Version 1.0 (FHWA TNM). It was developed as a means for aiding compliance with policies and procedures under FHWA regulations. Since its release in March 1998, Version 1.0a was released in March 1999, Version 1.0b in August 1999, Version 1.1 in September 2000, Version 2.0 in June 2002, Version 2.1 in March 2003, and the current version, Version 2.5, in April 2004. TNM is an entirely new, state-of-the-art computer program used for predicting noise impacts in the vicinity of a highway. It uses advances in personal computer hardware and software to improve upon the accuracy and ease of modeling highway noise, including the design of effective, cost-efficient noise barriers.

TNM contains the following components:

- Modeling of five standard vehicle types, including automobiles, medium trucks, heavy trucks, buses, and motorcycles, as well as user-defined vehicles;
- Modeling of both constant-flow and interrupted-flow traffic using a 1994/1995 field-measured database;
- Modeling of the effects of different pavement types, as well as the effects of graded roadways;
- Sound level computations based on a one-third octave-band database and algorithms;
- Graphically-interactive noise barrier design and optimization;
- Attenuation over/through rows of buildings and dense vegetation;
- Multiple diffraction analysis;
- Parallel barrier analysis; and
- Contour analysis, including sound level contours, barrier insertion loss contours, and sound-level difference contours.

TNM was used to evaluate traffic noise levels at noise-sensitive receptor locations in the Project vicinity.

Potential impacts associated with the proposed alignment have been identified. The impacts are categorized according to topic, then numbered consecutively under each category. The numbered mitigation measures in Section 5.6.6, MITIGATION MEASURES, directly correspond with the numbered impact statements.

5.6.5 IMPACTS

SHORT-TERM (CONSTRUCTION) NOISE IMPACTS

5.6-1 *Grading, construction, and construction-related vibration generated by construction equipment within the Project area would result in temporary noise and vibration impacts to nearby noise sensitive receptors.* ***Significance: Although implementation of the recommended Mitigation Measures 5.6-1a through 5.6-1f would reduce short-term construction impacts, construction activities still have the potential to exceed the City's noise standards. Therefore, short-term construction impacts would be significant and unavoidable.***

Impact Discussion: Short-term noise impacts would be associated with the excavation and grading activities along the proposed alignment during construction. Construction activities would result in short-term noise levels higher than existing

ambient noise levels in the Project area. However, these impacts would occur only during periods of construction and would cease once construction is completed.

Roadway construction is performed in discrete phases, each of which requires specific equipment, and consequently distinctive noise characteristics are associated with each phase. These various phases would change the character of the noise generated on-site. Noise levels during the construction vary as construction processes. Despite the variety in the types and sizes of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise impact ranges to be categorized by work phase. Table 5.6-7, TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVEL, identifies the maximum noise levels recommended for noise impact assessments for typical construction equipment based on a distance of 50 feet between the equipment and a noise receptor. Typical maximum noise levels range up to 96 dBA L_{max} at 50 feet during the noisiest construction phases. The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Generally, site preparation has the shortest duration of all construction phases. Activities that occur during this phase include earthmoving and soils compaction. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, draglines, and front loaders, and other earthmoving equipment such as compactors, scrapers, and graders. Operating cycles for these types of construction equipment may be one or two minutes of full-power operation followed by three to four minutes at lower power settings.

Table 5.6-7
Typical Construction Equipment Noise Level

Type of Equipment	Range of Maximum Sound Levels Measured (dBA at 50 Feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 Feet)
Rock Drills	83-99	96
Pneumatic Tools	78-88	85
Pumps	74-84	80
Dozers	77-90	85
Scrapers	83-91	87
Haul Trucks	83-94	88
Cranes	79-86	82
Portable Generators	71-87	80
Rollers	75-82	80
Tractors	77-82	80
Front-End Loaders	77-90	86
Hydraulic Backhoe	81-90	86
Hydraulic Excavators	81-90	86
Graders	79-89	86
Air Compressors	76-86	86
Truck	81-87	86

Notes: ft = feet
Source: *Noise Impact Analysis: Foothill Parkway Westerly Extension*, LSA Associates, Inc., January 2008.

Two major types of short-term noise impacts could occur during the construction of the proposed alignment, which include noise impacts related to noise generated during excavation, grading, and construction on-site, as well as noise generated from construction crews and the transportation of construction equipment and materials to the Project site.

Project construction time is estimated to occur over a two-year period. Construction crew commutes and the transport of construction equipment and materials to the Project site would increase noise levels incrementally on-site along access roads. Table 5.6-7, above, indicates the maximum noise levels of anticipated equipment to be utilized during the construction of the proposed alignment based on a distance of 50 feet between the equipment and a noise receptor. As shown in Table 5.6-7, trucks used during the construction phase have the potential to generate noise levels at a maximum of 86 dBA L_{max} with trucks passing at 50 feet. However, the projected construction traffic will be minimal when compared to the existing traffic volumes on Green River Road, Border Avenue, Mangular Avenue, and Foothill Parkway. Therefore, periodic increases in noise levels during short-term construction-related worker commutes and equipment transport noise impacts would not be substantial (exceed noise standards).

Construction of the proposed alignment is anticipated to utilize on-site scrapers, bulldozers, water trucks, and pickup trucks. Based on the information in Table 5.6-7, the maximum noise level generated by scrapers is assumed to be 87 dBA at 50 feet from the scraper. Each bulldozer would generate 85 dBA at 50 feet. The maximum level that would be generated by water trucks and pickup trucks is approximately 86 dBA at 50 feet from these vehicles.

Each doubling of sound sources with equivalent strength increases the noise level by 3 dBA. A reasonable worst-case assumption is that each piece of construction equipment would operate simultaneously and continuously at some distance from the other equipment. The combined noise level of construction equipment during this period of construction would be 91 dBA L_{max} at a distance of 50 feet from the noise source. The closest residences in the vicinity of the Project area are located approximately 50 feet from the Project area. The closest residences may be subject to short-term noise impacts reaching 91 dBA L_{max}, generated by construction activities near the Project boundary.

With the incorporation of recommended Mitigation Measures 5.6-1a through 5.6-1f, noise levels between noise sources and sensitive receptors would be reduced. Recommended Mitigation Measure 5.6-1a would require that all Project construction equipment be operated and maintained with noise reducing mufflers. In addition, adherence to the hours specified in Section 17.84.040, Noise, of the City's *Municipal Code* regarding construction activities would minimize construction noise impacts. Mitigation Measure 5.6-1b recommends all stationary construction equipment be directed away from sensitive noise receptors. Additionally, recommended Mitigation Measure 5.6-1c would further reduce noise impacts to noise-sensitive receptors by requiring the incorporation of noise reducing mufflers into construction vehicles and into construction methods to the extent feasible. Mitigation Measure 5.6-1d recommends all construction equipment staging areas to be located as far away from noise sensitive receptors as practical. Mitigation Measure 5.6-1e recommends temporary construction barriers with an effective height of 8 to 10 feet be installed

around construction activities located within 100 feet of residences, where it is feasible, in order to provide a noise reduction of 8 to 10 dBA. These barriers shall be provided along Green River Road, Paseo Grande, and Meadowcrest Street and near Condor Circle, Clearview Circle, and Folsom Circle. With implementation of Mitigation Measure 5.6-1e, the closest residence would experience a maximum noise level of 81 to 83 dBA L_{max}. As such, substantial (exceed noise standards) temporary and periodic increases in ambient noise levels in the Project vicinity above existing conditions would occur due to the operation of construction equipment. As construction activities would still potentially generate high noise levels with the installation of temporary construction barriers, construction noise would cause disturbance or annoyance to persons of normal sensitivity residing in the area. Therefore, construction noise impacts would have a significant and unavoidable impact on nearby residences. Mitigation Measure 5.6-1f recommends the Project Contractor develop and execute a community information program, notifying neighbors of planned construction schedules and periods of maximum activity. The notice shall provide a construction schedule, required noise conditions applied to the proposed alignment, and the name and telephone number of the Construction Project Manager who can address questions and problems that may arise during construction. Although, implementation of the recommended Mitigation Measures 5.6-1a through 5.6-1f would reduce short-term construction impacts, construction activities still have the potential to exceed the City's noise standards. Therefore, short-term construction impacts would be significant and unavoidable.

In conclusion, noise generated from construction crews and the transportation of construction equipment and materials to the Project site would not result in substantial temporary or periodic increases in ambient noise levels in the Project vicinity. As such, impacts are less than significant in this regard. However, operation of construction equipment associated with development of the proposed alignment would result in substantial temporary and periodical increases, above the City's noise standard, in ambient noise levels in the Project vicinity above existing conditions. Therefore, short-term construction impacts would be significant and unavoidable.

Short-Term Vibration Impacts

Impact Discussion: Short-term vibration impacts would be associated with construction activities along the proposed alignment. Construction-related vibration would not have the potential to cause damage to buildings located nearby. However, vibration levels generated by pile drivers and jackhammers during construction would result in residential annoyance. Short-term vibration impacts from pile drivers and jackhammers would cease once construction is completed. Construction-related vibration generated by construction equipment can result in varying degrees of ground vibration, depending on the equipment. The operation of construction equipment causes ground vibrations that spread through the ground and diminishes in strength with distance. Buildings situated on soil near the active construction area respond to these vibrations that range from no perception, low rumbling sounds with perceptible vibrations, to slight damage at the highest vibration levels. Typically, construction-related vibration does not reach levels that would result in damage to nearby structures.

Table 5.6-8, TYPICAL LEVELS OF GROUNDBORNE VIBRATION, shows the typical levels of groundborne vibration. Table 5.6-9 shows that a groundborne vibration level of 72 velocity in decibels (VdB) would result in community annoyance and levels of 100 VdB would result in damage to structures. The groundborne vibration threshold of 72 VdB that would result in residential annoyance is consistent with the groundborne vibration impact criteria shown in Table 5.6-9, GROUNDBORNE VIBRATION AND GROUNDBORNE NOISE IMPACT CRITERIA FOR GENERAL ASSESSMENT. The groundborne vibration threshold that would result in damage to structures as shown in Table 5.6-8 and the groundborne vibration impact criteria as shown in Table 5.6-9 was used to analyze potential short-term construction-related vibration impacts. Although the Federal Transit Authority's impact criteria in this document are prepared for railroads, the groundborne vibration thresholds were used to evaluate short-term construction-related groundborne vibration.

Table 5.6-8
Typical Levels of Groundborne Vibration

Response/Criteria	Velocity Level[1]	Typical Vibration Sources (50 feet from source)
Damage Threshold	100	Blasting from construction projects
Damage threshold, historic or fragile buildings	95	
		Bulldozers and other heavy tracked construction equipment
Difficulty with task such as reading a VDT screen	90	
	85	Commuter rail, upper range
	82	
Residential annoyance, infrequent events (e.g. freight trains)	80	Rapid transit, upper range
	75	Commuter rail, typical
Residential annoyance, frequent events (e.g. transit trains)	72	Bus or truck over bump
	70	Rapid transit, typical
Limit for vibration sensitive equipment. Approx. threshold for human perception of vibration	65	
	62	Bus or truck, typical
	60	
	52	Typical background vibration
	50	

Notes:
1 - RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second.
Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.

Table 5.6-9
Groundborne Vibration and Groundborne Noise Impact Criteria for General Assessment

Land Use Category	Groundborne Vibration Impact Levels (VdB re 1 micro inch/sec)			Groundborne Noise Impact Levels (dB re 20 micro Pascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where low ambient vibration is essential for interior operations	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB	35 dBA	43 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:
1 - "Frequent Events" is defined as more than 70 events per day of the same source per day. Most rapid transit project fall into this category.
2 - "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3 - "Infrequent Events" is defined as fewer than 30 events per day of the same kind per day. This category includes most commuter rail branch lines.
4 - This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research would require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

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

As shown in Table 5.6-10, VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT, typical pile drivers and jackhammers generate approximately 104 VdB and 79 VdB, respectively, when measured at 25 feet. Vibration velocity levels normally decrease at a rate of 6 VdB per doubling of distance from the source. The closest existing residence, located approximately 50 feet from potential heavy construction activity, would be exposed to a ground-borne vibration level of 98 VdB from pile drivers and 73 VdB from jackhammers. Table 5.6-9 shows that this level of ground-borne vibration exceeds the threshold for residential annoyance of 72 VdB. Therefore, short-term construction-related vibration levels from pile drivers and jackhammers would result in potential residential annoyance at the closest existing residence. However, this ground-borne vibration level would not result in damage to structures located nearby. Mitigation Measure 5.6-1g is recommended to reduce vibration levels generated by construction activities, by requiring alternative construction methods such as pre-drilling, drilled piles, Giken silent piling, pile cushioning, or any non-impact drivers be implemented if pile driving occur within 200 feet of sensitive receptors. Although Mitigation Measure 5.6-1g would minimize short-term construction-related vibration impacts on sensitive receptors, vibration noise levels are anticipated to exceed the City's noise standards. As such, exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels associated with construction of the proposed alignment would be significant and unavoidable.

Table 5.6-10
Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 feet (in/sec)	Approximate L_v[1] at 25 feet
Pile Divers (impact)	Upper Range	1.518	112
	Typical	0.644	104
Pile Drivers (sonic)	Upper Range	0.734	105
	Typical	0.170	93
Jackhammer		0.035	79

Notes: PPV = peak particle velocity
1 - RMS velocity in decibels (VdB) re 1 micro-inch/second.
Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.

LONG TERM OPERATIONAL IMPACTS

5.6-2 *Implementation of the proposed alignment would create a roadway extension of Foothill Parkway with connections to Border Avenue and Chase Drive/Mangular Avenue and introduce increased vehicular noise adjacent to existing sensitive uses.* ***Significance: Analysis has concluded that with the incorporation of recommended sound barriers, long-term vehicular-related noise would not exceed the City's 65 dB CNEL compatibility standard or increase existing noise levels by 3 dBA or more at adjacent residences; therefore impacts would be less than significant in this regard.***

Impact Discussion: Project implementation would result in a westerly extension of Foothill Parkway as a four-lane roadway from approximately 600 feet west of Skyline Drive to Green River Road, which includes roadway connections to Border Avenue and Chase Drive/Mangular Avenue. Currently, no vehicular traffic occurs within the Project area; therefore, the buildout of the proposed alignment would introduce vehicular traffic and thereby potentially increase ambient noise levels on sensitive receptors.

Roadways through canyons typically have shown noise increase of less than 3 dBA from canyon effects. Noise increases generated from highways in narrow canyons with steep side slopes theoretically could be greater than 3 dBA, depending on ground cover and the steepness and smoothness of side slopes. The canyon walls, to some extent, act as parallel sound walls with respect to multiple reflections. However, unless the slopes are perfectly vertical, build up of reflections would be more limited due to the slope angles. Highways on hillsides with near vertical rock cuts would experience no perceptible noise increases. Due to the angle of the cut slope, reflections are directed skyward, while receivers would most likely be below the highway. The TNM 2.5 takes local topography, pavement conditions, and surrounding vegetation into consideration of proposed noise and noise contours. Based upon the volume of traffic and predicted noise levels, a significant localized echo effect would not occur.[3]

[3] California Department of Transportation, *Technical Noise Supplement, A Technical Supplement to the Traffic Noise Analysis Protocol*, October 1998.

The *Noise Impact Analysis* evaluated traffic noise for Year 2025 as the worst-case traffic condition for the following possible Project development scenarios to identify noise levels associated without and with full development of the proposed alignment:

- ***No Project.*** Under this scenario, the proposed alignment would not be developed.

- ***With Proposed Alignment.*** Under this scenario, Foothill Parkway would be extended with connections to Border Avenue and Chase Drive/Mangular Avenue.

Potential long-term noise impacts associated with operations of the proposed alignment are solely generated from traffic noise. As previously discussed, the proposed alignment was modeled using the TNM 2.5 model. Each scenario was modeled using computer assisted drafting and design (CADD) maps provided by RBF Consulting. Using coordinates obtained from the CADD maps, 150 receptor locations where residential uses and recreational areas currently exist were evaluated in the TNM 2.5 model.

The TNM 2.5 model is sensitive to the volume of trucks on the roadway because trucks contribute disproportionately to the traffic noise. Traffic volumes, speeds, and truck percentages on Foothill Parkway and Green River Road were obtained from the traffic counts during ambient noise measurements. The traffic mix on these roadways comprises 94 percent automobiles, one percent medium-duty trucks, and five percent heavy-duty trucks. The traffic distribution for heavy-duty trucks is higher than on typical streets. Although the proposed Foothill Parkway is not designated as a truck route under the City's *General Plan*, the traffic mix obtained during ambient noise measurements would generate a worst-case noise level.

The traffic noise model results for existing conditions, Year 2025 without the Project alignment, and 2025 with proposed alignment are shown in Table 5.6-11, YEAR 2025 TRAFFIC LEVELS IN THE VICINITY OF THE PROJECT. The 2025 traffic noise levels at the representative sensitive receptor locations along the Project corridor were determined without sound barriers. Of the 150 modeled receptor locations, 17 receptors would exceed the City's noise standards for Year 2020 "With Proposed Alignment" conditions. In order to mitigate potentially significant Project-related noise impacts, sound barriers were analyzed for sensitive receptors that would exceed the City's exterior noise standard of 65 dBA CNEL and have a Project-related noise increase of 3 dBA or more (refer to Table 5.6-12, SOUND BARRIER MODELING, dBA CNEL). The bold numbers in Tables 5.6-10 and 5.6-11 indicate receptor locations with projected noise levels that exceed the City's noise standards. The following receptor locations would be exposed to noise levels that exceed the 65 dBA CNEL:

- **R-1 and R-4 through R-6,** these receptor locations represent existing residences located at San Antonio Drive and San Rafael Drive that have outdoor active use areas exposed to traffic noise on Green River Road and Paseo Grande. These receptors would not experience a Project-related noise increase of 3 dBA or more. Currently, no existing walls reduce noise levels for these residences. Traffic noise levels at these receptor locations are contributed by other roadways in the Project area, such as Green River

Road and Paseo Grande, and the Project traffic would not contribute significantly to these receptors. Therefore, no sound barriers were evaluated to mitigate noise impacts to these residences.

- **R-98,** this receptor location represents an existing residence located at Folson Circle that has outdoor active use areas exposed to traffic noise on Foothill Parkway. This receptor location would experience a Project-related noise increase of 3 dBA or more. No existing sound barriers were assumed for this residence. One sound barrier was modeled and recommended as mitigation to reduce noise impacts to this residence (refer to Mitigation Measure 5.6-2).

- **R-102 and R-103,** these receptor locations represent existing residences located at Fanning Circle that have outdoor active use areas exposed to traffic noise along the proposed Foothill Parkway. These receptors would experience a Project-related noise increase of 3 dBA or more. No existing barriers were assumed for these residences. One sound barrier was modeled and recommended as mitigation to reduce noise impacts to these residences (refer to Mitigation Measure 5.6-2).

- **R-135 through R-139, R-142, R-145, and R-146,** these receptor locations represent existing residences located at Athlone Lane, Chase Drive, and Brunstane Circle that have outdoor active use areas exposed to traffic noise on the existing Foothill Parkway. These receptors would experience a Project-related noise increase of 3 dBA or more. An existing wall 1.8 m (6 ft) in height along the residential property line currently reduces noise levels for these residences. One sound barrier was modeled and recommended as mitigation to reduce noise impacts to these residences (refer to Mitigation Measure 5.6-2).

- **R-147,** this receptor location represents an existing residence located at Brunstane Circle that has outdoor active use areas exposed to traffic noise on the existing Foothill Parkway. This receptor would not experience a Project-related noise increase of 3 dBA or more under the proposed alignment. Therefore, no sound barriers were evaluated to minimize noise impacts to this residence.

- **R-148,** this receptor location represents an existing residence located at Brunstane Circle that has outdoor active use areas exposed to traffic noise on the existing Foothill Parkway and Lincoln Avenue. This receptor would not experience a Project-related noise increase of 3 dBA or more. Traffic noise levels at this receptor location is contributed by other roadways in the Project area, such as Lincoln Avenue, and the Project traffic would not contribute significantly to this receptor. Therefore, no sound barriers were evaluated to minimize noise impacts to this residence.

The proposed alignment was used in the sound barrier modeling to create a worst-case noise levels for Year 2025. Sound barriers were analyzed and recommended as mitigation for sensitive receptors that exceed the City's exterior noise standards of 65 dBA CNEL and experience a project-related noise increase of 3 dBA or more (refer to Table 5.6-11 and Mitigation Measure 5.6-2).

Table 5.6-11
Year 2025 Traffic Noise Levels in the Vicinity of the Project

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	No Project (dBA CNEL)	With Proposed Alignment (dBA CNEL)
R-1	San Antonio Drive	**66**[2]	**68**	**66**
R-2	San Antonio Drive	**66**	**68**	65
R-3	San Antonio Drive	**68**	**69**	65
R-4	San Rafael Drive	**73**	**74**	**71**[2]
R-5	San Rafael Drive	**73**	**74**	**71**[2]
R-6	San Rafael Drive	**73**	**74**	**71**[2]
R-7	Adobe Avenue	57	58	60
R-8	Adobe Avenue	56	57	62
R-9	Adobe Avenue	53	55	64
R-10	Adobe Avenue	51	52	64
R-11	Adobe Avenue	48	49	64
R-12	Adobe Avenue	52	53	58
R-13	Adobe Avenue	51	53	58
R-14	Adobe Avenue	50	52	58
R-15	Adobe Avenue	48	50	60
R-16	Adobe Avenue	49	50	59
R-17	Adobe Avenue	48	49	58
R-18	Adobe Avenue	43	45	58
R-19	Adobe Avenue	44	46	56
R-20	Adobe Avenue	44	46	54
R-21	Adobe Avenue	44	45	53
R-22	Avenida Del Vista	48	49	56
R-23	Avenida Del Vista	47	48	54
R-24	Avenida Del Vista	46	47	53
R-25	Avenida Del Vista	45	47	52
R-26	Avenida Del Vista	42	44	60
R-27	Avenida Del Vista	37	38	59
R-28	Avenida Del Vista	35	37	58
R-29	Avenida Del Vista	36	38	60
R-30	Avenida Del Vista	40	42	61

Table 5.6-11 (Continued)
Year 2025 Traffic Noise Levels in the Vicinity of the Project

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	No Project (dBA CNEL)	With Proposed Alignment (dBA CNEL)
R-31	Avenida Del Vista	34	35	58
R-32	Avenida Del Vista	35	36	59
R-33	Avenida Del Vista	35	36	60
R-34	Avenida Del Vista	35	36	59
R-35	Avenida Del Vista	37	39	60
R-36	Avenida Del Vista	38	40	61
R-37	Chisholm Trail Circle	37	39	63
R-38	Chisholm Trail Circle	38	39	62
R-39	Chisholm Trail Circle	38	39	60
R-40	Chisholm Trail Circle	37	39	57
R-41	Chisholm Trail Circle	38	39	57
R-42	Chisholm Trail Circle	37	38	57
R-43	Vixen Trail Circle	38	39	61
R-44	Vixen Trail Circle	38	39	59
R-45	Vixen Trail Circle	38	39	57
R-46	Vixen Trail Circle	38	39	56
R-47	Vixen Trail Circle	37	38	57
R-48	Raven Circle	36	36	56
R-49	Raven Circle	36	37	55
R-50	Raven Circle	38	38	57
R-51	Raven Circle	39	39	55
R-52	Falcon Circle	37	37	60
R-53	Falcon Circle	38	39	59
R-54	Falcon Circle	40	40	57
R-55	Condor Circle	41	41	63
R-56	Condor Circle	42	42	61
R-57	Condor Circle	51	52	65
R-58	Condor Circle	49	49	61
R-59	Condor Circle	48	48	58
R-60	Condor Circle	53	53	59
R-61	Condor Circle	60	60	63
R-62	Condor Circle	57	57	59
R-63	Eagle Circle	55	55	57
R-64	Cape Drive	46	47	52
R-65	Cape Drive	48	48	53

Table 5.6-11 (Continued)
Year 2025 Traffic Noise Levels in the Vicinity of the Project

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	No Project (dBA CNEL)	With Proposed Alignment (dBA CNEL)
R-66	Cape Drive	46	46	53
R-67	Cape Drive	45	45	52
R-68	Cape Drive	44	44	51
R-69	Cape Drive	43	43	51
R-70	Bonnyview Circle	43	44	53
R-71	Bonnyview Circle	43	43	53
R-72	Bonnyview Circle	42	42	54
R-73	Bonnyview Circle	41	42	55
R-74	Bonnyview Circle	40	41	55
R-75	Clearview Circle	40	41	64
R-76	Clearview Circle	40	41	61
R-77	Clearview Circle	42	43	60
R-78	Clearview Circle	40	40	62
R-79	Clearview Circle	41	41	60
R-80	Clearview Circle	42	43	58
R-81	Meadowcrest Way	40	41	61
R-82	Meadowcrest Way	42	43	61
R-83	Meadowcrest Way	45	45	64
R-84	Meadowcrest Way	49	49	64
R-85	Meadowcrest Way	52	52	62
R-86	Meadowcrest Way	45	46	58
R-87	Meadowcrest Way	49	49	57
R-88	Meadowcrest Way	57	57	59
R-89	Mangular Avenue	54	54	57
R-90	Mangular Avenue	46	47	61
R-91	Mangular Avenue	48	50	63
R-92	Chase Drive	46	47	57
R-93	Chase Drive	45	46	55
R-94	Foothill Parkway	38	40	58
R-95	Foothill Parkway	44	45	63
R-96	Folson Circle	44	47	56
R-97	Folson Circle	46	49	58
R-98	Folson Circle	53	55	**67**
R-99	Folson Circle	52	55	62
R-100	Folson Circle	49	52	59
R-101	Fanning Circle	55	58	63
R-102	Fanning Circle	63	65	**71**
R-103	Fanning Circle	61	63	**68**
R-104	Fanning Circle	54	57	62

Table 5.6-11 (Continued)
Year 2025 Traffic Noise Levels in the Vicinity of the Project

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	No Project (dBA CNEL)	With Proposed Alignment (dBA CNEL)
R-105	Corbett Road	50	53	58
R-106	Corbett Road	49	51	57
R-107	Chase Drive	55	56	64
R-108	Skyline Drive	54	56	63
R-109	Amethyst Street	53	54	61
R-110	Amethyst Street	48	50	56
R-111	Amethyst Street	47	49	56
R-112	Amethyst Street	46	49	55
R-113	Amethyst Street	50	51	58
R-114	Amethyst Street	48	50	57
R-115	Elysia Street	51	52	59
R-116	Elysia Street	51	52	60
R-117	Elysia Street	53	54	61
R-118	Elysia Street	52	54	61
R-119	Bonsai Circle	55	57	63
R-120	Bonsai Circle	55	57	64
R-121	Bonsai Circle	56	57	64
R-122	Duxbury Circle	53	56	62
R-123	Duxbury Circle	57	60	65
R-124	Duxbury Circle	52	53	60
R-125	Duxbury Circle	52	54	61
R-126	Duxbury Circle	53	55	62
R-127	Duxbury Circle	54	56	63
R-128	Greenvale Circle	49	50	57
R-129	Greenvale Circle	47	49	55
R-130	Langtree Lane	48	50	56
R-131	Langtree Lane	48	49	55
R-132	Langtree Lane	48	50	55
R-133	Langtree Lane	48	49	54
R-134	Stoneyberry Lane	48	49	52
R-135	Athlone Lane	59	61	**68**
R-136	Athlone Lane	59	**60**	**67**
R-137	Athlone Lane	58	59	**66**
R-138	Athlone Lane	62	64	**70**
R-139	Athlone Lane	61	62	**69**
R-140	Athlone Lane	58	60	65
R-141	Chase Drive	56	58	65

Table 5.6-11 (Continued)
Year 2025 Traffic Noise Levels in the Vicinity of the Project

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	No Project (dBA CNEL)	With Proposed Alignment (dBA CNEL)
R-142	Chase Drive	61	63	**68**
R-143	Chase Drive	59	61	65
R-144	Brunstane Circle	60	62	65
R-145	Brunstane Circle	64	65	**69**
R-146	Brunstane Circle	63	64	**68**
R-147	Brunstane Circle	65	**66**	**68**
R-148	Brunstane Circle	65	**66**	**66**
R-149	Brunstane Circle	61	62	64
R-150	Brunstane Circle	63	64	64

Notes:
All numbers in bold represent noise levels that exceed the City's exterior noise standards of 65 Dba CNEL.

[1] At locations with low vehicular traffic, ambient noise level measurements were used to establish existing noise levels at modeled receptor locations.
[2] Due to the reduction in average daily traffic (ADT) along Paseo Grande, noise levels at this location would be reduced.

Source: *Noise Impact Analysis: Foothill Parkway Westerly Extension*, LSA Associates, Inc., January 2008.

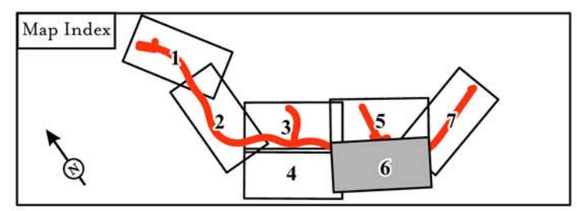
At each location, the following five sound barrier heights were analyzed: 6, 8, 10, 12, and 14 feet. The results of the noise barrier modeling are shown in Table 5.6-12, SOUND BARRIER MODELING (dBA CNEL). The locations of the modeled sounded barriers are shown in Figures 5.6-3A and 5.6-3B, MODELED SOUND BARRIERS AND RECEPTOR LOCATIONS.

Source: Noise Impact Analysis, Foothill Parkway Westerly Extension, LSA, January 2008.

Legend

- Receptor Locations
- Proposed Alignment
- Sound Barriers
- Sound Barriers*

* Additional Sound Barrier length is required to protect receptor R-147 under the no connections to Border Avenue and Mangular Avenue scenario.



RBF CONSULTING

0 50' 100' 200'
APPROXIMATE

2/5/08 JN 10-104629-13633

FOOTHILL PARKWAY WESTERLY EXTENSION • DRAFT EIR

Modeled Sound Barriers and Receptor Locations

Figure 5.6-3A

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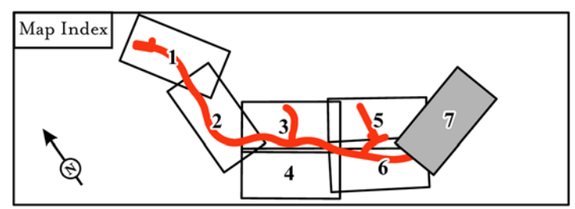
Source: Noise Impact Analysis, Foothill Parkway Westerly Extension, LSA, January 2008.

Legend

- Receptor Locations
- Proposed Alignment
- Sound Barriers
- Sound Barriers*

* Additional Sound Barrier length is required to protect receptor R-147 under the no connections to Border Avenue and Mangular Avenue scenario.



RBF CONSULTING

0 50' 100' 200'
APPROXIMATE

2/5/08 JN 10-104629-13633

FOOTHILL PARKWAY WESTERLY EXTENSION • DRAFT EIR

Modeled Sound Barriers and Receptor Locations

Figure 5.6-3B

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Table 5.6-12
Sound Barrier Modeling (dBA CNEL)

SB No.	Rec No.	2025 Foothill Extension (w/o Barrier)[1]	With Barrier H = 6 ft		With Barrier H = 8 ft		With Barrier H = 10 ft		With Barrier H =12 ft		With Barrier H = 14 ft	
			CNEL	IL	CNEL	IL	CNEL	IL	CNEL	IL	CNEL	IL
1	R-98	**67**	64	3	64	3	64	3	64	3	64	3
2	R-102	**71**	61	10	59	12	58	13	57	15	56	16
	R-103	**68**	60	9	61	7	61	8	61	8	61	8
3	R-135	**68**	**66**	4	61	9	59	10	58	12	57	13
	R-136	**67**	**69**	2	64	8	61	11	60	12	58	14
	R-137	**66**	59	6	58	7	57	8	56	9	55	10
	R-138	**70**	59	5	58	6	57	6	56	8	55	9
	R-139	**69**	65	4	61	7	60	9	58	10	57	12
	R-140	65	63	3	61	5	60	6	58	8	57	9
	R-141	65	62	3	60	5	58	6	57	8	56	9
	R-142	**68**	64	3	61	7	59	8	58	9	58	10
	R-143	65	62	3	61	4	58	7	57	8	56	9
	R-144	65	63	2	61	4	59	6	58	7	57	8
	R-145	**69**	**67**	2	62	7	61	8	59	10	59	11
	R-146	**68**	65	4	62	7	60	8	60	9	59	10
	R-147	**68**[2]	65	3	63	5	62	6	62	6	62	7
NA[3]	R-148	**66**[3]	--	--	--	--	--	--	--	--	--	--

Notes:
ft = feet
H = height
IL = Insertion Loss

[1] Sound barriers only analyzed sensitive receptor locations that would experience a Project-related noise increase of 3 dBA or more over existing noise levels or that exceed the City's exterior noise standard of 65 dBA CNEL. Numbers in bold represent noise levels that exceed the City's exterior noise standard of 65 dBA CNEL.

[2] Receptor R-147 would not experience a Project-related noise increase of 3 dBA or more. Therefore, no sound barriers were evaluated at this receptor for the proposed alignment. A sound barrier was modeled at this receptor for the "No Border Avenue or Chase Drive/Mangular Avenue Connections" Alternative (refer to Section 7.0, Alternatives to the proposed Project).

[3] Although receptors would continue to experience a traffic noise level exceeding the City's exterior noise standard of 65 dBA CNEL, no sound barriers were analyzed for this receptor because they would not experience a Project-related noise increase of 3 dBA or more.

Source: *Noise Impact Analysis: Foothill Parkway Westerly Extension*, LSA Associates, Inc., January 2008.

The following sound barriers were analyzed and recommended for mitigation (refer to Mitigation Measure 5.6-2) to reduce noise impacts to the sensitive receptor locations that would experience a Project-related noise increase of 3 dBA or more and would be exposed to a traffic noise level exceeding the City's exterior noise standard of 65 dBA CNEL:

- **Sound Barrier 1,** is located along the proposed Foothill Parkway along the residential property line to minimize noise impacts to Receptor R-98. A minimum barrier height of 6 feet would reduce traffic noise levels to 65 dBA CNEL or below. Refer to Figure 5.6-3A, SOUND BARRIER AND MODELED RECEPTOR LOCATIONS, for the location of this sound barrier.

- **Sound Barrier 2,** is located along the proposed Foothill Parkway along the residential property line to minimize noise impacts to Receptors R-102 and R-103. A minimum barrier height of 6 feet would reduce traffic noise levels to 65 dBA CNEL or below. It should be noted that a perimeter wall already exists in this current location. Prior to issuance of grading permits, the existing wall's acoustical barrier efficiency shall be tested to ensure it meets the requirements to reduce noise levels below 65 dBA. Refer to Figure 5.6-3A, SOUND BARRIER AND MODELED RECEPTOR LOCATIONS, for the location of this sound barrier.

- **Sound Barrier 3,** is located along the existing Foothill Parkway along the residential property line to minimize noise impacts to Receptors R-135 through R-139, R-142, R-145, and R-146 under the proposed alignment. A minimum barrier height of 8 to 10 feet would reduce traffic noise levels to 65 dBA CNEL or below. Refer to Figure 5.6-3B, SOUND BARRIER AND MODELED RECEPTOR LOCATIONS, for the location of this sound barrier.

No sound barriers were analyzed for sensitive receptors that would not be exposed to a traffic noise level exceeding 65 dBA CNEL or that would experience an increase in Project-related noise levels less than 3 dBA.

With the incorporation of recommended Mitigation Measure 5.6-2 (Sound Barriers 1 through 3), traffic noise impacts would be reduced below the City's noise exterior standards of 65 dBA CNEL (*Municipal Code* Section 17.84.040), or provide an increase in noise of less than 3 dBA. As such, implementation of the proposed alignment would result in a less than significant impact in this regard.

Potential Long-Term Vibration Impacts

As indicated above, transportation projects have the potential to create long-term vibration impacts as a result of vehicular traffic along roadways. A vibration effect, such as rattling of windows, is typically a direct result of airborne noise. Most problems with on-road vehicle-related vibration can be directly related to a pothole, bump, expansion joint, or other discontinuity in the road surface. Smoothing bumps, correcting uneven pavement surfaces, or filling existing potholes would usually solve the problem. If a roadway is smooth, the ground-borne vibration from traffic is barely perceptible. Rubber tires and vehicle suspension systems provide vibration isolation. Therefore, it is unusual for vehicles on roadways to cause ground-borne noise or vibration impacts. Long-term maintenance of the proposed alignment roadway

would be provided by the City of Corona to ensure surface degradation is minimized. As such, implementation of the proposed alignment would result in less than significant impacts in this regard. In conclusion, exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels associated with operation of the proposed alignment would be less than significant.

STATIONARY NOISE IMPACTS

5.6-3 *Stationary noise impacts associated with the proposed alignment are anticipated to be minimal.* ***Significance: Analysis has concluded that stationary noise impacts would be less than significant.***

Impact Discussion: Due to the scope and nature of the proposed alignment, no long-term stationary noise impacts have been identified. Stationary noise sources are generally associated with commercial and industrial developments involving mechanical equipment, trash compactors, loading areas, parking areas, heating, and ventilation units. No noise generating stationary operations are anticipated to be implemented into the Project design. Therefore, the proposed alignment would result in less than significant impacts.

CUMULATIVE IMPACTS

Threshold: A substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project.

Threshold: 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.

A cumulative noise impact would result if sensitive receptors are exposed to a noise increase of 3 dBA or more and would be exposed to a traffic noise level exceeding the City's exterior noise standard of 65 dBA CNEL. As indicated in Tables 5.6-13, CUMULATIVE NOISE SCENARIO, none of the 150-receptor locations analyzed in the *Noise Impact Analysis* would result in a noise increase of 3 dBA or more and exceed the City's exterior noise standard of 65 dBA CNEL. Therefore, no cumulative noise impacts would result from development of the proposed Project.

Table 5.6-13
Cumulative Noise Scenario

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	2025 With Project (dBA CNEL)	2025 No Project (dBA CNEL)	Overall Cumulative Degree of Change (dBA CNEL)[2]	Project Cumulative Contribution Degree of Change (dBA CNEL)[3]
R-1	San Antonio Drive	66[4]	66[5]	68	0	-2
R-2	San Antonio Drive	66	65	68	-1	-3

Table 5.6-13 (Continued)
Cumulative Noise Scenario

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	2025 With Project (dBA CNEL)	2025 No Project (dBA CNEL)	Overall Cumulative Degree of Change (dBA CNEL)[2]	Project Cumulative Contribution Degree of Change (dBA CNEL)[3]
R-3	San Antonio Drive	68	65	69	-3	-4
R-4	San Rafael Drive	73	71[5]	74	-2	-3
R-5	San Rafael Drive	73	71[5]	74	-2	-3
R-6	San Rafael Drive	73	71[5]	74	-2	-3
R-7	Adobe Avenue	57	60	58	3	2
R-8	Adobe Avenue	56	62	57	6	5
R-9	Adobe Avenue	53	64	55	11	9
R-10	Adobe Avenue	51	64	52	13	12
R-11	Adobe Avenue	48	64	49	16	15
R-12	Adobe Avenue	52	58	53	6	5
R-13	Adobe Avenue	51	58	53	7	5
R-14	Adobe Avenue	50	58	52	8	6
R-15	Adobe Avenue	48	60	50	12	10
R-16	Adobe Avenue	49	59	50	10	9
R-17	Adobe Avenue	48	58	49	10	9
R-18	Adobe Avenue	43	58	45	15	13
R-19	Adobe Avenue	44	56	46	12	10
R-20	Adobe Avenue	44	54	46	10	8
R-21	Adobe Avenue	44	53	45	9	8
R-22	Avenida Del Vista	48	56	49	8	7
R-23	Avenida Del Vista	47	54	48	7	6

Table 5.6-13 (Continued)
Cumulative Noise Scenario

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	2025 With Project (dBA CNEL)	2025 No Project (dBA CNEL)	Overall Cumulative Degree of Change (dBA CNEL)[2]	Project Cumulative Contribution Degree of Change (dBA CNEL)[3]
R-24	Avenida Del Vista	46	53	47	7	6
R-25	Avenida Del Vista	45	52	47	7	5
R-26	Avenida Del Vista	42	60	44	18	16
R-27	Avenida Del Vista	37	59	38	22	21
R-28	Avenida Del Vista	35	58	37	23	21
R-29	Avenida Del Vista	36	60	38	24	22
R-30	Avenida Del Vista	40	61	42	21	19
R-31	Avenida Del Vista	34	58	35	24	23
R-32	Avenida Del Vista	35	59	36	24	23
R-33	Avenida Del Vista	35	60	36	25	24
R-34	Avenida Del Vista	35	59	36	24	23
R-35	Avenida Del Vista	37	60	39	23	21
R-36	Avenida Del Vista	38	61	40	23	21
R-37	Chisholm Trail Circle	37	63	39	26	24
R-38	Chisholm Trail Circle	38	62	39	24	23
R-39	Chisholm Trail Circle	38	60	39	22	21
R-40	Chisholm Trail Circle	37	57	39	20	18
R-41	Chisholm Trail Circle	38	57	39	19	18
R-42	Chisholm Trail Circle	37	57	38	20	19
R-43	Vixen Trail Circle	38	61	39	23	22
R-44	Vixen Trail Circle	38	59	39	21	20

Table 5.6-13 (Continued)
Cumulative Noise Scenario

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	2025 With Project (dBA CNEL)	2025 No Project (dBA CNEL)	Overall Cumulative Degree of Change (dBA CNEL)[2]	Project Cumulative Contribution Degree of Change (dBA CNEL)[3]
R-45	Vixen Trail Circle	38	57	39	19	18
R-46	Vixen Trail Circle	38	56	39	18	17
R-47	Vixen Trail Circle	37	57	38	20	19
R-48	Raven Circle	36	56	36	20	20
R-49	Raven Circle	36	55	37	19	18
R-50	Raven Circle	38	57	38	19	19
R-51	Raven Circle	39	55	39	16	16
R-52	Falcon Circle	37	60	37	23	23
R-53	Falcon Circle	38	59	39	21	20
R-54	Falcon Circle	40	57	40	17	17
R-55	Condor Circle	41	63	41	22	22
R-56	Condor Circle	42	61	42	19	19
R-57	Condor Circle	51	65	52	14	13
R-58	Condor Circle	49	61	49	12	12
R-59	Condor Circle	48	58	48	10	10
R-60	Condor Circle	53	59	53	6	6
R-61	Condor Circle	60	63	60	3	3
R-62	Condor Circle	57	59	57	2	2
R-63	Eagle Circle	55	57	55	2	2
R-64	Cape Drive	46	52	47	6	5
R-65	Cape Drive	48	53	48	5	5
R-66	Cape Drive	46	53	46	7	7
R-67	Cape Drive	45	52	45	7	7
R-68	Cape Drive	44	51	44	7	7
R-69	Cape Drive	43	51	43	8	8
R-70	Bonnyview Circle	43	53	44	10	9
R-71	Bonnyview Circle	43	53	43	10	10
R-72	Bonnyview Circle	42	54	42	12	12
R-73	Bonnyview Circle	41	55	42	14	13
R-74	Bonnyview Circle	40	55	41	15	14

Table 5.6-13 (Continued)
Cumulative Noise Scenario

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	2025 With Project (dBA CNEL)	2025 No Project (dBA CNEL)	Overall Cumulative Degree of Change (dBA CNEL)[2]	Project Cumulative Contribution Degree of Change (dBA CNEL)[3]
R-75	Clearview Circle	40	64	41	24	23
R-76	Clearview Circle	40	61	41	21	20
R-77	Clearview Circle	42	60	43	18	17
R-78	Clearview Circle	40	62	40	22	22
R-79	Clearview Circle	41	60	41	19	19
R-80	Clearview Circle	42	58	43	16	15
R-81	Meadowcrest Way	40	61	41	21	20
R-82	Meadowcrest Way	42	61	43	19	18
R-83	Meadowcrest Way	45	64	45	19	19
R-84	Meadowcrest Way	49	64	49	15	15
R-85	Meadowcrest Way	52	62	52	10	10
R-86	Meadowcrest Way	45	58	46	13	12
R-87	Meadowcrest Way	49	57	49	8	8
R-88	Meadowcrest Way	57	59	57	2	2
R-89	Mangular Avenue	54	57	54	3	3
R-90	Mangular Avenue	46	61	47	15	14
R-91	Mangular Avenue	48	63	50	15	13
R-92	Chase Drive	46	57	47	11	10
R-93	Chase Drive	45	55	46	10	9
R-94	Foothill Parkway	38	58	40	20	18
R-95	Foothill Parkway	44	63	45	19	18
R-96	Folson Circle	44	56	47	12	9
R-97	Folson Circle	46	58	49	12	9

Table 5.6-13 (Continued)
Cumulative Noise Scenario

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	2025 With Project (dBA CNEL)	2025 No Project (dBA CNEL)	Overall Cumulative Degree of Change (dBA CNEL)[2]	Project Cumulative Contribution Degree of Change (dBA CNEL)[3]
R-98	Folson Circle	53	64	55	11	9
R-99	Folson Circle	52	62	55	10	7
R-100	Folson Circle	49	59	52	10	7
R-101	Fanning Circle	55	63	58	8	5
R-102	Fanning Circle	63	61	65	-2	-4
R-103	Fanning Circle	61	60	63	-1	-3
R-104	Fanning Circle	54	62	57	8	5
R-105	Corbett Road	50	58	53	8	5
R-106	Corbett Road	49	57	51	8	6
R-107	Chase Drive	55	64	56	9	8
R-108	Skyline Drive	54	63	56	9	7
R-109	Amethyst Street	53	61	54	8	7
R-110	Amethyst Street	48	56	50	8	6
R-111	Amethyst Street	47	56	49	9	7
R-112	Amethyst Street	46	55	49	9	6
R-113	Amethyst Street	50	58	51	8	7
R-114	Amethyst Street	48	57	50	9	7
R-115	Elysia Street	51	59	52	8	7
R-116	Elysia Street	51	64	52	13	12
R-117	Elysia Street	53	61	54	8	7
R-118	Elysia Street	52	61	54	9	7
R-119	Bonsai Circle	55	61	57	6	4
R-120	Bonsai Circle	55	62	57	7	5
R-121	Bonsai Circle	56	63	57	7	6
R-122	Duxbury Circle	53	62	56	9	6
R-123	Duxbury Circle	57	65	60	8	5
R-124	Duxbury Circle	52	60	53	8	7

Table 5.6-13 (Continued)
Cumulative Noise Scenario

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	2025 With Project (dBA CNEL)	2025 No Project (dBA CNEL)	Overall Cumulative Degree of Change (dBA CNEL)[2]	Project Cumulative Contribution Degree of Change (dBA CNEL)[3]
R-125	Duxbury Circle	52	61	54	9	7
R-126	Duxbury Circle	53	62	55	9	7
R-127	Duxbury Circle	54	63	56	9	7
R-128	Greenvale Circle	49	57	50	8	7
R-129	Greenvale Circle	47	55	49	8	6
R-130	Langtree Lane	48	56	50	8	6
R-131	Langtree Lane	48	55	49	7	6
R-132	Langtree Lane	48	55	50	7	5
R-133	Langtree Lane	48	54	49	6	5
R-134	Stoneyberry Lane	48	52	49	4	3
R-135	Athlone Lane	59	61	61	2	0
R-136	Athlone Lane	59	64	60	5	4
R-137	Athlone Lane	58	58	59	0	-1
R-138	Athlone Lane	62	58	64	-4	-6
R-139	Athlone Lane	61	61	62	0	-1
R-140	Athlone Lane	58	61	60	3	1
R-141	Chase Drive	56	60	58	4	2
R-142	Chase Drive	61	61	63	0	-2
R-143	Chase Drive	59	61	61	2	0
R-144	Brunstane Circle	60	61	62	2	-1
R-145	Brunstane Circle	64	62	65	-2	-3
R-146	Brunstane Circle	63	62	64	-1	-2
R-147	Brunstane Circle	65	63	66	-2	-3
R-148	Brunstane Circle	65	66[5]	66	1	0
R-149	Brunstane Circle	61	64	62	3	2

Table 5.6-13 (Continued)
Cumulative Noise Scenario

Receptor Number	Location	Existing Noise Level (dBA CNEL)[1]	2025 With Project (dBA CNEL)	2025 No Project (dBA CNEL)	Overall Cumulative Degree of Change (dBA CNEL)[2]	Project Cumulative Contribution Degree of Change (dBA CNEL)[3]
R-150	Brunstane Circle	63	64	64	1	0

Notes:

1 At locations with low vehicular traffic, ambient noise level measurements were used to establish existing noise levels at modeled receptor locations.
2 Overall Cumulative Degree of Change = 2025 Noise Level With Project (including mitigation) minus Existing Noise Level
3 Project Cumulative Contribution Degree of Change = 2025 Noise Level With Project (including mitigation) minus 2025 Noise Level No Project
4 Due to the reduction in average daily traffic (ADT) along Paseo Grande, noise levels at this location would be reduced.
5 Although receptors would continue to experience a traffic noise level exceeding the City's exterior noise standard of 65 dBA CNEL, no sound barriers were analyzed for these receptors because they would not experience a Project-related noise increase of 3 dBA or more.

Source: *Noise Impact Analysis: Foothill Parkway Westerly Extension*, LSA Associates, Inc., January 2008.

The proposed alignment does not include any stationary equipment. Therefore, the proposed alignment would not contribute to cumulative stationary noise impacts within the area. Future development proposals within the City of Corona would require separate discretionary approval and CEQA assessment, which would address potential noise impacts and identify necessary attenuation measures, where appropriate. Therefore, in conjunction with cumulative projects, the proposed alignment would not have the potential to result in significant cumulative stationary noise impacts.

Level of Significance Before Mitigation:

Overall Cumulative Impact: Potentially Significant Impact.

Project Cumulative Contribution: Potentially Significant Impact.

Level of Significance After Mitigation –

Overall Cumulative Impact: Less Than Significant Impact.

Project Cumulative Contribution: Less Than Significant Impact.

Mitigation Measures: 5.6-1a through 5.6-1g and 5.6-2.

<u>*Threshold*</u>: Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

<u>*Threshold*</u>: A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project.

Of the related projects that have been identified within the Project study area, the proposed Project has no control over the timing or sequencing of related projects, and as such, any quantitative analysis to ascertain the daily construction noise levels that assumes multiple, concurrent construction would be speculative. Construction noise is a localized activity that would affect only land uses located in proximity to each respective cumulative project's construction site. Noise from construction of the cumulative projects could expose adjacent receptors to noise levels between 70 and 90 decibels at 50 feet from the noise source. The degree of impact would be site-specific and would be dependant upon the distance between the construction site and the nearest noise sensitive receptor. The City's exterior residential noise standard (65 dBA) could be exceeded during the construction phase of the cumulative projects. Construction noise impacts would cease upon completion of grading/construction. Compliance with site-specific mitigation, as well as compliance with requirements of the City's *Municipal Code* (Section 17.84.040, Noise), would serve to minimize the length of time noise-sensitive receptors are exposed to significant noise levels. Additionally, because noise dissipates as it travels away from its source, noise impacts from construction activities would be limited to each of the respective sites and their vicinities. According to the City's *General Plan*, overall cumulative noise impacts associated with construction activities would not be cumulatively considerable and a less than significant impact would occur in this regard. Although Project-related short-term construction impacts would be significant and unavoidable, construction noise from cumulative projects would not interact with noise from the proposed Project due to distances between the specific sites. Therefore, a less than significant impact would occur in this regard.

Level of Significance Before Mitigation –

Overall Cumulative Impact: Potentially Significant Impact.

Project Cumulative Contribution: Potentially Significant Impact.

Level of Significance After Mitigation –

Overall Cumulative Impact: Less Than Significant Impact.

Project Cumulative Contribution: Less Than Significant Impact.

Mitigation Measures: 5.6-1a through 5.6-1g.

5.6.6 MITIGATION MEASURES

This section directly corresponds to the identified Impact Statements in the impacts subsection.

SHORT-TERM (CONSTRUCTION) NOISE IMPACTS

5.6-1a Prior to issuance of grading permits for the proposed alignment, the Project Contractor shall provide evidence acceptable to the City of Corona Public Works Director, or designee, that (1) all construction equipment, fixed and/or mobile, shall be equipped with properly operating and maintained

mufflers consistent with manufacturers' standards, (2) construction activities shall be limited to the designated daytime hours as specified by the City of Corona, currently 7:00 a.m. to 8:00 p.m. on Monday through Saturday and 10:00 a.m. and 6:00 p.m. on Sunday and federal holidays. These restrictions apply to all trucks, vehicles, and equipment that are making or involved with material deliveries, loading or transfer of materials, equipment service, and maintenance of any devices for or within the Project construction site.

5.6-1b During construction, the Project Contractor shall place all stationary construction equipment such that emitted noise is directed away from noise-sensitive receptors. The placement of the equipment shall meet the satisfaction of the Building Official and is subject to site inspection. Additionally, the Project Contractor shall provide evidence of the placement of the stationary equipment to the Building Official.

5.6-1c Prior to approval of the Project plans and specifications, the City of Corona Public Works Director, or designee, shall confirm that the Project plans and specifications stipulate that the Project Contractor shall incorporate feasible muffling features into all construction vehicles and equipment and into construction methods, and shall maintain all construction vehicles and equipment in efficient operating condition. The Project Contractor shall provide evidence to the City Planning Department that the above muffling and maintenance measures have been implemented.

5.6-1d Prior to approval of the Project plans and specifications, the City of Corona Public Works Director, or designee, shall confirm the Project plans and specifications stipulate that the Project Contractor shall locate stockpiling and construction vehicle staging areas as far away as practical from noise sensitive receptors during construction activities.

5.6-1e During construction, the Project Contractor shall install temporary construction barriers with an effective height of 8 to 10 feet around construction activities located within 100 feet of residences, where it is feasible, to provide a noise reduction of 8 to 10 dBA. These barriers shall be provided along Green River Road, Paseo Grande, and Meadowcrest Street and near the cul-de-sacs of Condor Circle, Clearview Circle, and Folson Circle.

5.6-1f Prior to issuance of grading permits for the proposed alignment, the Project Contractor shall develop and execute a community information program, notifying neighbors of planned construction schedules and periods of maximum activity. The notice shall provide a construction schedule, required noise conditions applied to the proposed alignment, and the name and telephone number of the Construction Project Manager who can address questions and problems that may arise during construction.

5.6-1g If pile driving occurs within 200 feet of sensitive receptors, alternative construction methods such as pre-drilling, drilled piles, Giken silent piling, pile cushioning, or any non-impact drivers shall be implemented to significantly reduce vibration levels generated by construction activities.

LONG TERM OPERATIONAL IMPACTS

5.6-2 Noise barriers (i.e., walls and/or earthen berms) shall be constructed at the following locations and heights; however, if the noise barriers identified below are already constructed as a community perimeter wall, during final design, these walls shall be examined to determine their efficiency at mitigating noise to the levels specified:

- A minimum barrier height of 6 feet for Sound Barrier 1 located along Foothill Parkway west of Trudy Way.[4]
- A minimum barrier height of 6 feet for Sound Barrier 2 located along Foothill Parkway east of Trudy Way.[5] Prior to issuance of grading permits, the existing wall's acoustical barrier efficiency shall be tested to ensure it meets the requirements to reduce noise levels below 65 dBA.
- A minimum barrier height of 8 to 10 feet for Sound Barrier 3 located along Foothill Parkway between Elysia Street and Lincoln Avenue.

STATIONARY NOISE IMPACTS

5.6-3 No mitigation measures are required.

CUMULATIVE IMPACTS

Refer to Mitigation Measures 5.6-1a through 5.6-1e, and 5.6-2.

5.6.7 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Compliance with the City of Corona *Municipal Code* (Section 17.84.040, Noise) and with implementation of recommended Mitigation Measure 5.6-2, long-term operation impacts associated with the proposed alignment would be less than significant. Although implementation of the recommended Mitigation Measures 5.6-1a through 5.6-1g would reduce short-term construction impacts, construction activities still have the potential to exceed the City's noise standards. Therefore, short-term construction would be significant and unavoidable.

If the City of Corona approves the Foothill Parkway Westerly Extension Project, the City shall be required to adopt findings in accordance with Section 15091 of the CEQA Guidelines and prepare a Statement of Overriding Considerations in accordance with Section 15093 of the CEQA Guidelines.

[4] Trudy Way is identified as Bartol Street in the *Noise Impact Analysis: Foothill Parkway Westerly Extension*, prepared by LSA Associates, Inc., dated January 2008. However, Bartol Street has been renamed as Trudy Way.

[5] Ibid.

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