3.11 Noise

This section evaluates the potential for noise and groundborne vibration impacts to result from implementation of the proposed project. This includes the potential for the proposed project to result in impacts associated with a substantial temporary and/or permanent increase in ambient noise levels in the vicinity of the project site; exposure of people in the vicinity of the project site to excessive noise and groundborne vibration levels; and whether this exposure is in excess of standards established in the local general plan or noise ordinance. Finally, mitigation measures to reduce the project's noise and vibration levels are proposed, where appropriate, to avoid or reduce potential significant impacts generated by the proposed project.

Data used to prepare this analysis were obtained from the Orange County General Plan Noise Element, the Orange County Codified Ordinances, and by measuring and modeling existing and future noise levels in the project site vicinity (see modeling data in Appendix I of this EIR). Information contained in the project *Transportation Impact Analysis* (TIA) prepared by Urban Crossroads was used in the modeling of traffic noise exposure (and is included as Appendix J of this EIR).

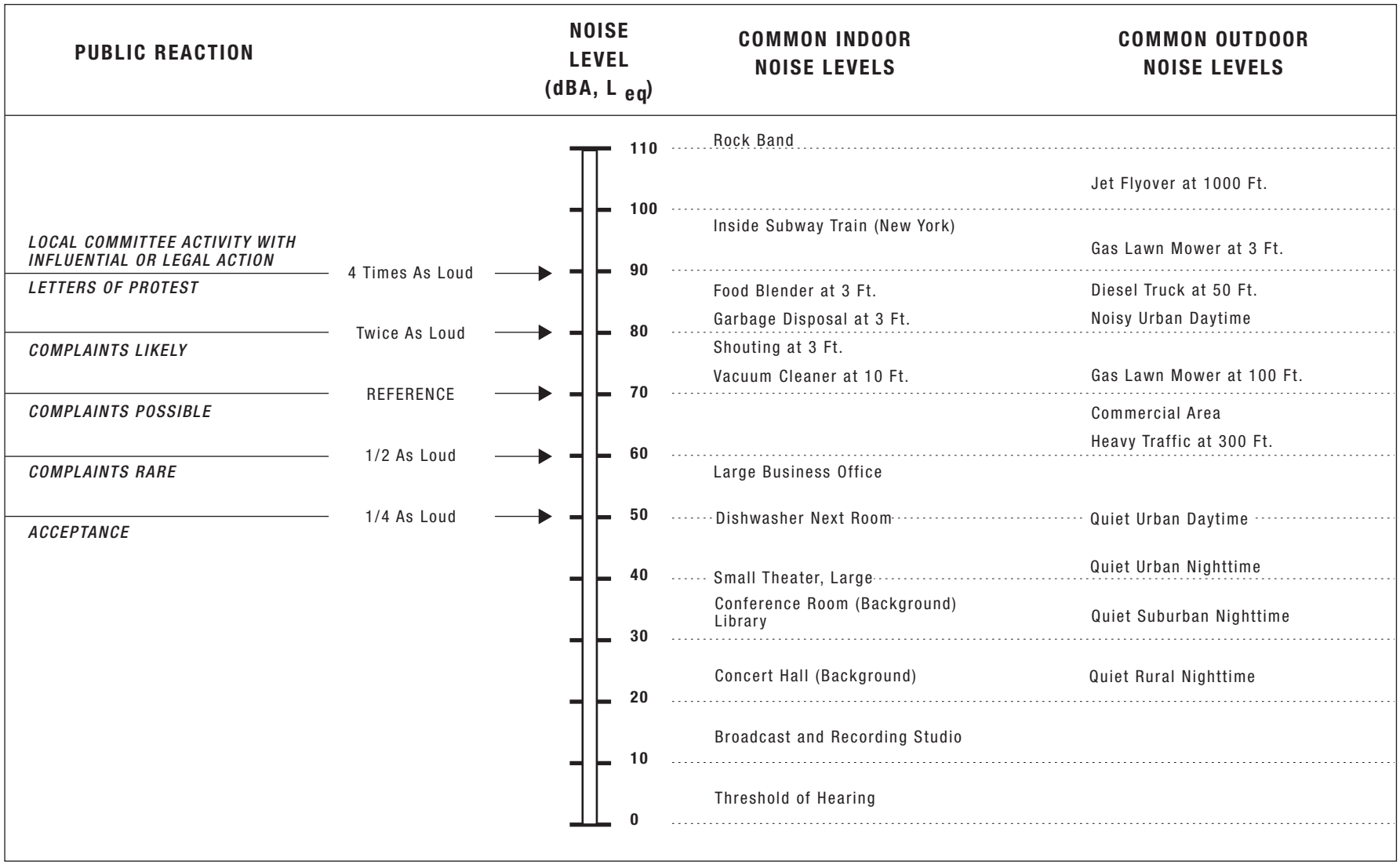
3.11.1 Environmental Setting

Noise Principles and Descriptors

Noise is generally defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) that is measured in decibels (dB), which is the standard unit of sound amplitude measurement. The dB scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound, with 0 dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude. When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that deemphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to extremely low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). A-weighting follows an international standard methodology of frequency deemphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown in **Figure 3.11-1.**



SOURCE: ESA, 2013

The Preserve at San Juan . 120826

Figure 3.11-1
Effects of Noise on People

Noise Exposure and Community Noise

An individual's noise exposure is a measure of noise over a period of time. A noise level is a measure of noise at a given instant in time. The noise levels presented in Figure 3.11-1 are representative of measured noise at a given instant in time; however, they rarely persist consistently over a long period of time. Rather, community noise varies continuously over a period of time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic. What makes community noise variable throughout a day, besides the slowly changing background noise, is the addition of short-duration, single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

These successive additions of sound to the community noise environment change the community noise level from instant to instant, requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

L_{eq}: The L_{eq}, or equivalent sound level, is used to describe noise over a specified period of time in terms of a single numerical value; the L_{eq} of a time-varying signal and that of a steady signal are the same if they deliver the same acoustic energy over a given time. The L_{eq} may also be referred to as the average sound level.

L_{max}: The maximum, instantaneous noise level experienced during a given period of time.

L_{min}: The minimum, instantaneous noise level experienced during a given period of time.

L_{dn}: Also termed the day-night average noise level (DNL), the L_{dn} is the average A-weighted noise level during a 24-hour day, obtained after an addition of 10 dBA to measured noise levels between the hours of 10:00 p.m. to 7:00 a.m. to account nighttime noise sensitivity.

CNEL: CNEL, or Community Noise Equivalent Level, is the average A-weighted noise level during a 24-hour day that is obtained after an addition of 5 dBA to measured noise levels between the hours of 7:00 p.m. to 10:00 p.m. and after an addition of 10 dBA to noise levels between the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively.

Effects of Noise on People

Noise is generally loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity that is a nuisance or disruptive. The effects of noise on people can be placed into four general categories:

- Subjective effects (e.g., dissatisfaction, annoyance);
- Interference effects (e.g., communication, sleep, and learning interference);
- Physiological effects (e.g., startle response); and

- Physical effects (e.g., hearing loss).

Although exposure to high noise levels has been demonstrated to cause physical and physiological effects, the principal human responses to typical environmental noise exposure are related to subjective effects and interference with activities. Interference effects of environmental noise refer to those effects that interrupt daily activities and include interference with human communication activities, such as normal conversations, watching television, telephone conversations, and interference with sleep. Sleep interference effects can include both awakening and arousal to a lesser state of sleep. With regard to the subjective effects, the responses of individuals to similar noise events are diverse and are influenced by many factors, including the type of noise, the perceived importance of the noise, the appropriateness of the noise to the setting, the duration of the noise, the time of day and the type of activity during which the noise occurs, and individual noise sensitivity.

Overall, there is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction on people. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual's past experiences with noise. Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted (i.e., comparison to the ambient noise environment). In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships generally occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3 dBA change in noise levels is considered to be a barely perceivable difference;
- A change in noise levels of 5 dBA is considered to be a readily perceivable difference; and
- A change in noise levels of 10 dBA is subjectively heard as doubling of the perceived loudness.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion, hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate between 6 dBA for hard sites and 7.5 dBA for soft sites for each doubling of distance from the reference measurement. Hard sites are those with a reflective surface between the source and the receiver, such as asphalt or concrete surfaces or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the changes in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dBA (per doubling distance) is normally assumed for soft sites. Line sources (such as traffic noise from vehicles) attenuate at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement (Caltrans, 1998).

Fundamentals of Vibration

As described in the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment (FTA, 2006), ground-borne vibration can be a serious concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard. In contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of ground-borne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving, and operation of heavy earth-moving equipment.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (VdB) is commonly used to measure RMS. The relationship of PPV to RMS velocity is expressed in terms of the "crest factor," defined as the ratio of the PPV amplitude to the RMS amplitude. Peak particle velocity is typically a factor of 1.7 to 6 times greater than RMS vibration velocity (FTA, 2006). The decibel notation acts to compress the range of numbers required to describe vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration sensitive equipment.

The effects of ground-borne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration levels exceed the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings. The FTA measure of the threshold of architectural damage for conventional sensitive structures is 0.2 inches per second (in/sec) PPV (FTA, 2006).

In residential areas, the background vibration velocity level is usually around 50 VdB (approximately 0.0013 in/sec PPV). This level is well below the vibration velocity level threshold of perception for humans, which is approximately 65 VdB. A vibration velocity level of 75 VdB is considered to be the approximate dividing line between barely perceptible and distinctly perceptible levels for many people (FTA, 2006).

Existing Conditions

Existing Ambient Daytime Noise Levels

The proposed project site consists of two non-contiguous sites (i.e., Phase 1 (south parcel) and Phase 2 (north parcel)) that are between 2,300 feet and 2,970 feet west of Ortega Highway, respectively, and separated by Long Canyon Road. As described in Chapter 2, *Project Description*, of this EIR, both Phase 1 (south parcel) and Phase 2 (north parcel) are surrounded by undeveloped vegetated Cleveland National Forest lands to the north, west, and south, and Ortega Highway to the east.

The closest sensitive uses to Phase 1 (south parcel) include a residence near Long Canyon Road that is 1,340 feet from the project site, the U.S. Forest Service El Cariso Hotshot Camp located approximately 1,400 feet to the north, and the Los Pinos Conservation Camp), which is also approximately 1,400 feet from the site. The closest sensitive uses to Phase 2 (north parcel) is an existing residence that is approximately 160 feet from the southeastern boundary of the site. In addition, there is currently one residence located within the southwest corner of Phase 2 (north parcel) that is currently occupied; however, this residence would be vacated prior the start of project construction.

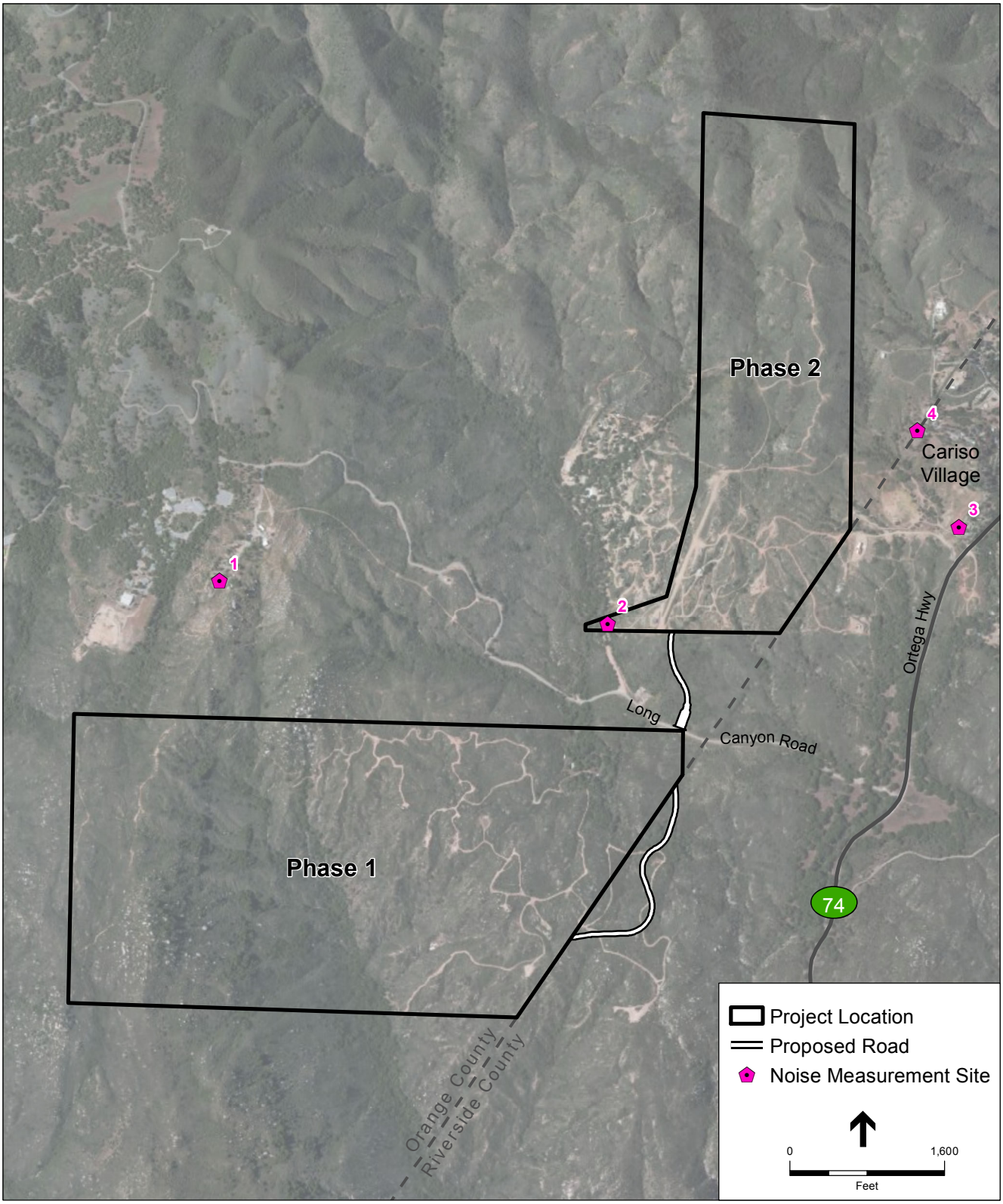
In order to characterize ambient noise conditions in the project area, short-term daytime noise level measurements were conducted on August 21, 2013 between 10:57 a.m. and 12:54 p.m. at several locations throughout the project area. Measurement sites were chosen to represent the existing condition around the project area and the location of the closest existing noise-sensitive uses include the existing residence located 160 feet from the southwestern boundary of the Phase 2 (north parcel), [1] and the single-family residence located approximately 670 feet east of Phase 2 (north parcel) near Monte Vista Street. Additionally, because an existing occupied residence is currently located within the southwest corner of Phase 2 (north parcel), a noise measurement was also conducted in that vicinity of the residence. Because the closest uses to the Phase 1 (south parcel) are substantially farther away (at 1,340 feet) project generated noise would attenuate to a much lower level than at the residences that are 160 and 670 feet from the project site. Furthermore, this EIR analysis provides an evaluation of the potential maximum effects of the project, which would not occur at uses 1,400 feet away from the project site. The noise surveys were conducted using a Metrosonics Model db-3080 sound level meter, which was calibrated prior to use to ensure the accuracy of the measurements. The results of the noise survey are shown in **Table 3.11-1**. The measurement locations are identified in **Figure 3.11-2**

Existing Roadway Noise Levels Off-Site

Existing roadway noise levels were calculated for eight roadway segments located in proximity to the project site, which are listed in **Table 3.11-2**. The roadway segments selected for analysis are those that are expected to be most directly impacted by project-related traffic; which, for the purpose of this analysis, includes the roadways that are located nearest to the project site. These roadways, when compared to roadways located further away from the project site, would experience the greatest percentage increase in traffic generated by the proposed project.

Calculation of the existing roadway noise levels was accomplished using the Federal Highway Administration Highway Noise Prediction Model (FHWA-RD-77-108) and traffic volumes at the study intersections analyzed in the proposed project's TIA. The model calculates the average noise level at specific locations based on traffic volumes, average speeds, and site environmental conditions. The average daily noise levels along these roadway segments shown in **Figure 3.11-3** are presented in **Table 3.11-2**.

[1] A noise measurement at the nearest off-site sensitive receptor to Phase 2 (north parcel), which is a single-family residence located approximately 160 feet from the site's southeastern boundary, was not able to be conducted because access to the residence would require vehicle travel through a private residential road.



SOURCE: ESRI.

The Preserve at San Juan . 120826

Figure 3.11-2

Noise Measurement Locations

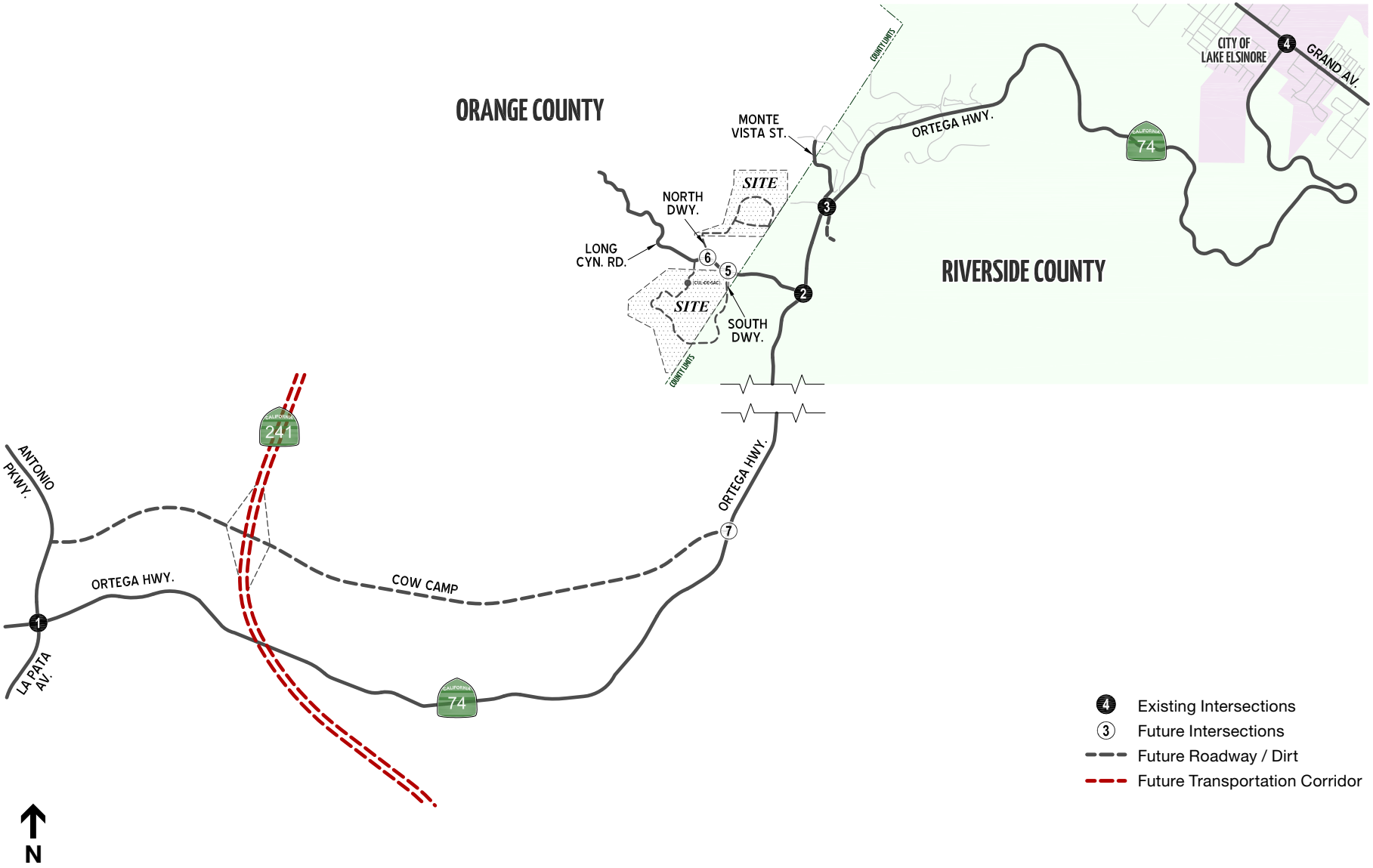
TABLE 3.11-1
EXISTING NOISE ENVIRONMENTS WITHIN THE PROJECT AREA

Location	Date and Time Period	L_{eq} dBA	L_{max} dBA	Noise Sources
Short-term Measurements				
1. Residential uses located approximately 1,340 feet to the north of Phase 1 (south parcel).	08/21/13 10:57 a.m. – 11:12 a.m.	41.6	55.5	Noise associated with birds; light breeze; occasional aircrafts overhead (e.g., planes and helicopters).
2. Mystic Oaks Private Retreat located in southwest portion of Phase 2 (north parcel).	08/21/13 11:45 a.m. – 12:00 p.m.	42.1	52.2	Noise associated with wind breeze, birds and insects, and occasional dog barking and whistle.
3. Residential uses located adjacent to Vista Road, east of Phase 2 (north parcel).	08/21/13 12:15 p.m. – 12:30 p.m.	44.9	58.5	Traffic on Ortega Highway; birds; heavy breeze on the exposed hillside; wind chimes; occasional helicopter overhead.
4. Residential uses located east of Phase 2 (north parcel), west of Monte Vista Street.	08/21/13 12:39 p.m. – 12:54 p.m.	50.1	65.3	Traffic on Ortega Highway; birds; heavy breeze on the exposed hillside, wind chimes; occasional helicopter overhead.

Source: ESA, 2014

Existing Groundborne Vibration Levels

Given the remote location of the project site in an undeveloped and densely vegetated part of the Santa Ana Mountains, no stationary sources of groundborne vibration are currently present in the project site area. The only sources of groundborne vibration in the project site vicinity would be occasional heavy-duty vehicular travel (e.g., refuse trucks and delivery trucks) on local roadways. Trucks traveling at a distance of 50 feet typically generate groundborne vibration velocity levels of around 63 VdB (approximately 0.006 in/sec PPV), and these levels could reach 72 VdB (approximately 0.016 in/sec PPV) where trucks pass over bumps in the road (FTA, 2006). In terms of PPV levels, a heavy-duty vehicle traveling at a distance of 50 feet can result in a vibration level of approximately 0.001 in/sec.



SOURCE: Urban Crossroads, 2014

The Preserve at San Juan

Figure 3.11-3

Roadway Noise Segments

TABLE 3.11-2
EXISTING (2013) ROADWAY NOISE LEVELS

Roadway	Roadway Segment	Existing Land Uses located along Roadway Segment	dB CNEL[a]
Ortega Highway	East of Antonio Parkway	Residential	67.2
	South of Long Canyon Road	Transient Lodging[b]	70.4
	North of Monte Vista Street	Residential	70.5
	South of Grand Avenue	Residential	65.4
Monte Vista Street	West of Ortega Highway	Residential	49.0
Antonio Parkway	North of Ortega Highway	Residential	65.0
Grand Avenue	West of Ortega Highway	Residential/Commercial	73.3
	East of Ortega Highway	Residential/Commercial	70.6

[a] Values represent noise levels from the centerline of each roadway to the property line of the nearest receptor.
[b] Ortega Oaks RV Park and Campground, which offers lodging.

Source: Urban Crossroads, 2014; ESA, 2014

Sensitive Receptors

Some land uses are more sensitive to noise levels than others due to the types of activities typically associated with the uses. Residences, hotels, schools, rest homes, and hospitals are generally more sensitive to noise than commercial and industrial land uses. Currently, existing noise-sensitive uses located in the vicinity of the project site include low density rural residential uses. As described above in the Existing Setting discussion, the nearest receptor to the project site is a single-family residence located approximately 160 feet from the boundary of Phase 2 (north parcel). In addition, one occupied residence is located within the southwest corner of Phase 2 (north parcel); however, this residence would be vacated prior to the start of project construction.

Regulatory Setting

Federal Noise Standards

There are no federal noise standards that directly regulate environmental noise related to the construction or operation of the proposed project. With regard to noise exposure and workers, the Office of Safety and Health Administration (OSHA) regulations safeguard the hearing of workers exposed to occupational noise. Federal regulations also establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 Code of Federal Regulations (CFR), Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 15 meters from the vehicle pathway centerline. These controls are implemented through regulatory controls on truck manufacturers.

Federal Transit Authority Vibration Standards

The FTA has adopted vibration standards that are used to evaluate potential building damage impacts related to construction activities. The vibration damage criteria adopted by the FTA are shown in **Table 3.11-3**.

TABLE 3.11-3
CONSTRUCTION VIBRATION DAMAGE CRITERIA

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

Source: FTA, 2006.

In addition, the FTA has also adopted standards associated with human annoyance for groundborne vibration impacts for the following three land-use categories: Vibration Category 1 – High Sensitivity, Vibration Category 2 – Residential, and Vibration Category 3 – Institutional. The FTA defines Category 1 as buildings where vibration would interfere with operations within the building, including vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and university research operations. Vibration-sensitive equipment includes, but is not limited to, electron microscopes, high-resolution lithographic equipment, and normal optical microscopes. Category 2 refers to all residential land uses and any buildings where people sleep, such as hotels and hospitals. Category 3 refers to institutional land uses such as schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment, but still have the potential for activity interference.

Under conditions where there are an infrequent number of events per day, the FTA has established thresholds of 65 VdB for Category 1 buildings, 80 VdB for Category 2 buildings, and 83 VdB for Category 3 buildings.[2] Under conditions where there are an occasional number of events per day, the FTA has established thresholds of 65 VdB for Category 1 buildings, 75 VdB for Category 2 buildings, and 78 VdB for Category 3 buildings.[3] No thresholds have been adopted or recommended for commercial and office uses.

California Department of Health Services Noise Standards

The California Department of Health Services (DHS) has established guidelines for evaluating the compatibility of various land uses as a function of community noise exposure. These guidelines for land use and noise exposure compatibility are shown in **Table 3.11-4**. In addition, Section 65302(f) of the California Government Code requires each county and city in the state to prepare and adopt a comprehensive long-range general plan for its physical development, with Section 65302(g) requiring a noise element to be included in the general plan. The noise element must: (1) identify and appraise noise

2 "Infrequent events" is defined by the Federal Transit Administration as being fewer than 30 vibration events of the same kind per day.

3 "Occasional events" is defined by the Federal Transit Administration as between 30 and 70 vibration events of the same source per day.

problems in the community; (2) recognize Office of Noise Control guidelines; and (3) analyze and quantify current and projected noise levels.

TABLE 3.11-4
COMMUNITY NOISE EXPOSURE (LDN OR CNEL)

Land Use	Normally Acceptable[a]	Conditionally Acceptable[b]	Normally Unacceptable[c]	Clearly Unacceptable[d]
Single-family, Duplex, Mobile Homes	50 - 60	55 - 70	70 - 75	above 75
Multi-Family Homes	50 - 65	60 - 70	70 - 75	above 75
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 - 70	60 - 70	70 - 80	above 80
Transient Lodging – Motels, Hotels	50 - 65	60 - 70	70 - 80	above 75
Auditoriums, Concert Halls, Amphitheaters	---	50 - 70	---	above 70
Sports Arena, Outdoor Spectator Sports	---	50 - 75	---	above 75
Playgrounds, Neighborhood Parks	50 - 70	---	67 - 75	above 75
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 - 75	---	70 - 80	above 80
Office Buildings, Business and Professional Commercial	50 - 70	67 - 77	above 75	---
Industrial, Manufacturing, Utilities, Agriculture	50 - 75	70 - 80	above 75	---

[a] 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.

[b] 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 included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

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

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

Source: Office of Planning and Research (OPR), 2003.

The State of California also establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the state pass-by standard is consistent with the federal limit of 80 dBA. The state pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dBA at 15 meters from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanction of vehicle operators by state and local law enforcement officials.

The state has also established noise insulation standards that are collectively known as the California Noise Insulation Standards (Title 24, California Code of Regulations). The noise insulation standards set forth an interior standard of 45 dBA CNEL in any habitable room. They require an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard where such units are proposed in areas subject to noise levels greater than 60 dBA CNEL. Title 24 standards are enforced by the County through the building permit and approval process.

State Vibration Standards

There are no state vibration standards applicable to the proposed project. Moreover, according to the Caltrans *Transportation- and Construction-Induced Vibration Guidance Manual* (2004), there are no official Caltrans standards for vibration. However, this manual provides guidelines for assessing vibration damage potential to various types of buildings, ranging from 0.08-0.12 in/sec PPV for extremely fragile historic buildings, ruins, and ancient monuments to 0.50-2.0 in/sec PPV for modern industrial/commercial buildings.

Orange County General Plan Noise Element

The Noise Element identifies the following uses as noise sensitive land uses: residents of all types, hospitals, rest homes, convalescent hospitals, places of worship, and schools. In addition, the County General Plan includes land use/noise compatibility guidelines to provide objectives for the compatibility of, and standards for, the integration of land uses, which are shown in **Table 3.11-5** (Table VIII-2 in the Orange County General Plan Noise Element).

TABLE 3.11-5
COMPATIBILITY MATRIX FOR LAND USE AND COMMUNITY NOISE EQUIVALENT LEVELS (CNEL)

Type of Use	65+ decibels CNEL	60 – 65 decibels CNEL
Residential	3a, b, e	2a, e
Commercial	2c	2c
Employment	2c	2c
Open Space		
Local	2c	2c
Community	2c	2c
Regional	2c	2c
Educational Facilities		
Schools (K through 12)	2c, d, e	2c, d, e
Preschool, college, other	2c, d, e	2c, d, e
Places of Worship	2c, d, e	2c, d, e
Hospitals		
General	2a, c, d, e	2a, c, d, e
Convalescent	2a, c, d, e	2a, c, d, e
Group Quarters	1a, b, c, e	2a, c, e
Hotel/Motels	2a, c	2a, c
Accessory Uses		
Executive Apartments	1a, b, e	2a, e
Caretakers	1a, b, c, e	2a, c, e

Notes:
1 = Allowed if interior and exterior community noise levels can be mitigated.
2 = Allowed if interior levels can be mitigated.
3 = New residential uses are prohibited in areas within the 65-decibel CNEL contour from any airport or air station.

Standards required for compatibility of land use and noise:
a = Interior Standard: CNEL of less than 45 decibels (habitable rooms only).
b = Exterior Standard: CNEL of less than 65 decibels in outdoor living areas.
c = Interior Standard: Leq (h) = 45 to 65 decibels interior noise level, depending on interior use.
d = Exterior Standard: Leq (h) of less than 65 decibels in outdoor living areas.
e = Interior Standard: As approved by the County for sound events of short duration such as aircraft flyovers or individual passing railroad trains.

Definitions:
Leq (h) – The A-weighted equivalent sound level average over a period of "h" hours. An example would be Leq (12) where the equivalent sound level is the average over a specified 12-hour period (such as 7:00 a.m. to 7:00 p.m.).

Source: Orange County Noise Element, Table VIII-2 and VIII-3, 2005.

Orange County General Plan Noise Element

The following General Plan Noise Element goals and policies are relevant to the proposed project:

Policy 4.1: To enforce the County's Noise Ordinance to prohibit or mitigate harmful and unnecessary noise within the County.

Policy 4.5: To require that noise from motors, appliances, air conditioners, and other consumer products does not disturb occupants of surrounding properties.

Goal 5: Noise/Land Use Planning – To fully integrate noise considerations in land use planning to prevent new noise/land use conflicts

Policy 5.1: To utilize the criteria of acceptable noise levels for various types of land uses as depicted on Tables VIII-2 and VIII-3 (Table 3.11-1 of this EIR) in the review of development proposals.

Policy 5.4: To stress the importance of building and design techniques in future site planning for noise reduction.

Goal 6: Noise Sensitive Land Uses - To identify and employ mitigation measures in order to reduce the impact of noise levels and attain the standards established by the Noise Element, for both interior areas and outdoor living areas for noise sensitive land uses.

Policy 6.2: To continue enforcement of Chapter 35 of the Uniform Building Code, currently adopted edition, and the California Noise Insulation Standards (Title 25 California Administrative Code).

Policy 6.3: To require that all new residential units have an interior noise level in living areas that is not greater than 45 decibels CNEL with it being understood that standard construction practices reduce the noise level by 12 decibels CNEL with the windows open and 20 decibels CNEL with the windows closed. Higher attenuation than listed above may be claimed if adequate field monitoring or acoustical studies are provided to and approved by the County.

Policy 6.5: All outdoor living areas associated with new residential uses shall be attenuated to less than 65 decibels CNEL.

Policy 6.7: To apply noise standards as defined in the Noise Element for noise-sensitive land uses.

Orange County Codified Ordinances

The following sections of the Orange County Codified Ordinances are relevant to the proposed project:

Section 4-6-5. Exterior Noise Standards

a) The following noise standards, unless otherwise specifically indicated shall apply to all residential property with a designated noise zone:

Noise Zone	Noise Level	Time Period
1[a]	55 dB(A)	7:00 A.M. – 10:00 P.M.
	50 dB(A)	10:00 P.M. – 7:00 A.M.

a The entire territory of Orange County, including incorporated and unincorporated territory, is designated as "Noise Zone 1."

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dB(A).

b) It shall be unlawful for any person at any location within the unincorporated area of the County to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured on any other residential property, either incorporated or unincorporated, to exceed:

1. The noise standard for a cumulative period of more than thirty (30) minutes in any hour; or
2. The noise standard plus five (5) dB(A) for a cumulative period of more than fifteen (15) minutes in any hour; or
3. The noise standard plus ten (10) dB(A) for a cumulative period of more than five (5) minutes in any hour; or
4. The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one (1) minute in any hour; or
5. The noise standard plus twenty (20) dB(A) for any period of time

c) In the event the ambient noise level exceeds any of the first four (4) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

Sec. 4-6-6. Interior Noise Standards

a) The following interior noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

Noise Zone	Noise Level	Time Period
1[a]	55 dB(A)	7:00 A.M. – 10:00 P.M.
	45 dB(A)	10:00 P.M. – 7:00 A.M.

[a] The entire territory of Orange County, including incorporated and unincorporated territory, is designated as "Noise Zone 1."

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dB(A).

b) It shall be unlawful for any person at any location within the unincorporated area of the County to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured within any other dwelling unit on any residential property, either incorporated or unincorporated, to exceed:

1. The interior noise standard for a cumulative period of more than five (5) minutes in any hour; or

2. The interior noise standard plus five (5) dB(A) for a cumulative period of more than one (1) minute in any hour; or
3. The interior noise standard plus ten (10) dB(A) for any period of time.

c) In the event the ambient noise level exceeds either of the first two (2) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the third noise limit category the maximum allowable noise level under said category shall be increased in reflect the maximum ambient noise level.

Section 4-6-7. Special Provisions

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

a) Activities conducted on the grounds of any public or private nursery, elementary, intermediate or secondary school or college.

b) Outdoor gatherings, public dances and shows, provided shall events are conducted pursuant to a license issued by the County of Orange pursuant to Title 5 of the Codified Ordinances of the County of Orange.

c) Activities conducted on any park or playground, provided such park or playground is owned and operated by a public entity.

d) Any mechanical device, apparatus or equipment used, related to or connected with emergency machinery, vehicle or work.

e) Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday.

f) All mechanical devices, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.

g) Mobile noise sources associated with agricultural operations, provided such operations do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or any time on Sunday or a federal holiday.

h) Mobile noise sources associated with agricultural pest control through pesticide application, provided that the application is made in accordance with restricted material permits issued by or regulations enforced by the Agricultural commissioner.

i) Noise sources associated with the maintenance of real property, provided said activities take place between 7:00 a.m. and 8:00 p.m. on any day except Sunday or a federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a federal holiday.

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

3.11.2 Thresholds of Significance

The *CEQA Guidelines* Appendix G provides guidance for assessing the significance of potential environmental impacts. Relative to noise, a project could have a significant effect on the environment if it would result in:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan or, where such plan has not been adopted, within two miles of a public airport or public use airport, exposure of people residing or working in the project area to excessive noise levels; or
- For a project within the vicinity of a private airstrip, exposure of people residing or working the project area to excessive noise levels.

It was determined in the NOP/Initial Study (see Appendices A1 and A2 of this EIR) that the project site is not located within an airport land use plan or within two miles of a public or private airport. The closest airport, Skylark Field Airport, is approximately seven miles east of the project site in the City of Lake Elsinore. Phase 2 (north parcel) includes the McConville Airstrip, which is a private airstrip that is no longer used, and would be converted to residential uses with implementation of the proposed project. Therefore, the proposed project would not result in noise impacts related to airports or airstrips, and no further analysis is included in this EIR.

Noise Criteria

For the purpose of determining whether the project would result in the exposure of persons to or generate noise levels that would exceed established noise standards, construction and stationary operational noise levels associated with the proposed project would result in a significant impact if the County's construction noise regulations are violated and the County's operational noise standards are exceeded.

With respect to whether the project would result in a substantial increase in noise levels, it should be noted that the state CEQA Guidelines does not define the levels at which permanent and temporary increases in ambient noise are considered "substantial." Therefore, the significance of the proposed project's ambient noise impacts is determined by comparing estimated project-related noise levels to County noise criteria in the General Plan Noise Element and the Noise Ordinance.

Generally speaking, the average healthy ear can barely perceive a noise level change of 3 dBA. A change from 3 to 5 dBA may be noticed by some individuals who are sensitive to changes in noise. A 5 dBA increase is readily noticeable, while the human ear perceives a 10 dBA increase as a doubling of sound (Caltrans, 2009). As such, for the purpose of the project's traffic noise analysis, it is assumed that a

significant impact on traffic noise levels from project operations would occur if the project would cause the ambient noise level measured at the property line of a County-identified noise-sensitive land use (i.e., residential uses, hospitals, rest homes, convalescent hospitals, places of worship, and schools) to increase by 3 dBA (CNEL) or more where the existing ambient noise level at the sensitive use is above 60 dBA CNEL, or by 5 dBA (CNEL) or more where the existing ambient noise level at the sensitive use is below 60 dBA CNEL.

The 60 dBA CNEL noise level is used to determine whether a 3 dBA or 5 dBA threshold is appropriate to assess the project's traffic noise impacts because, the County General Plan Noise Element states that areas with an ambient noise environment of 60 dBA CNEL or more is a noise-affected area; thus, the 3 dBA CNEL threshold is used in these areas. Conversely, where ambient noise levels are below 60 dBA CNEL, a 5 dBA increase is used because it is considered to be readily noticeable (Caltrans, 2009).

In regards to land uses that are not considered to be noise-sensitive (e.g., commercial, industrial, public service facilities, etc.), the County allows for the development in noise environments where the exterior noise levels exceed 65 dBA CNEL (as shown in **Table 3.11-5**); thus, a 5 dBA CNEL increase in ambient noise levels at these land uses from the project's traffic is used to assess whether a "substantial" increase in ambient noise levels would occur.

Vibration Criteria

The *CEQA Guidelines* also do not define the levels at which groundborne vibration or groundborne noises are considered "excessive." Thus, in terms of construction-related vibration impacts on buildings, the adopted guidelines/recommendations by the FTA to limit groundborne vibration based on the age and/or condition of the structures that are located in proximity to construction activity are used in this analysis to evaluate potential groundborne vibration impacts. Based on the FTA criteria, construction impacts relative to groundborne vibration would be considered significant if any of the following were to occur:

- Project construction activities would cause a PPV groundborne vibration level to exceed 0.5 in/sec at a reinforced concrete, steel, or timber building;
- Project construction activities would cause a PPV groundborne vibration level to exceed 0.3 in/sec at any engineered concrete and masonry building;
- Project construction activities would cause a PPV groundborne vibration level to exceed 0.2 in/sec at any non-engineered timber and masonry buildings; or
- Project construction activities would cause a PPV ground-borne vibration level to exceed 0.12 in/sec at any buildings "extremely susceptible to vibration damage" (i.e., a historical building).

In terms of groundborne vibration impacts associated with human annoyance, this analysis uses the FTA's vibration impact thresholds for sensitive buildings, residences, and institutional land uses under conditions where there are an infrequent number of events per day. The applicable threshold for this project is 80 VdB at residences and buildings where people normally sleep (FTA, 2006).

Any "excessive" groundborne vibration or noises that would occur from the project would be generated during project construction. During operation of the residential land uses, the proposed project would not involve the use of heavy machinery or generate heavy-duty truck trips that are often associated with large commercial or industrial uses. Operation of the vineyards would not require the use of large machinery

that could result in vibration. As such, no sources of "excessive" groundborne vibration or noise levels are anticipated to occur during project operations.

3.11.3 Methodology

The primary sources of noise associated with the proposed project would be construction activities at the project site and project-related traffic volumes associated with the operating residential development. Secondary sources of noise would include new stationary sources (such as heating, ventilation, and air conditioning units) associated with the new residential uses. The increase in noise levels generated by these activities and other sources associated with the proposed project have been quantitatively estimated and compared to the applicable noise standards and thresholds of significance.

Aside from noise levels, groundborne vibration would also be generated during construction of the proposed residential development by various construction-related activities and equipment. Thus, the groundborne vibration levels generated by these sources have also been quantitatively estimated and compared to the applicable thresholds of significance.

Construction Noise Levels

Construction noise levels were estimated by data published by the United States Environmental Protection Agency (USEPA) for general outdoor construction activities. These noise levels are then analyzed against the construction noise standards established in the County's Noise Ordinance to determine whether an exceedance of allowable noise levels would occur.

Although construction noise is exempt from land use related noise criteria as long as it occurs within allowable times pursuant to Section 4-6-7 of the County's Codified Ordinances, an increase in construction noise would be considered "substantial" based upon the allowable noise level changes and timelines identified in Section 4-6-5 of the County's Nose Ordinance, which provides the follow criteria for substantial increases in noise:

1. The noise standard for a cumulative period of more than thirty (30) minutes in any hour; or
2. The noise standard plus five (5) dB(A) for a cumulative period of more than fifteen (15) minutes in any hour; or
3. The noise standard plus ten (10) dB(A) for a cumulative period of more than five (5) minutes in any hour; or
4. The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one (1) minute in any hour; or
5. The noise standard plus twenty (20) dB(A) for any period of time.

Thus, a substial increase would occur if noise generated from the project exceeded the criteria listed above.

Roadway Noise Levels

Roadway noise levels were calculated for selected study roadway segments near the project site based on information provided in the Traffic Impact Analysis for the proposed project. The roadway segments

selected for analysis are expected to be most directly impacted by project-related traffic, which includes the roadways that are nearest to the project site. These roadways, when compared to roadways located further away from the project site, would experience the greatest percentage increase in traffic generated by the proposed project. The noise levels were calculated using the FHWA's Highway Traffic Noise Prediction Model (FHWA-RD-77-108) and traffic volumes from the Traffic Impact Analysis.

Heating, Ventilation, and Air Conditioning Systems Noise Levels

Specific Heating, Ventilation, and Air Conditioning (HVAC) systems that would be used on the project site are unknown at this stage of the project design; however, analysis using a typical large-sized residential condenser mounted on ground level pads provides a reasonable basis for analysis. The unit used in this analysis is a Carrier 38HDR060 split system condenser. The manufacturer's noise data is provided in **Table 3.11-6**, Estimated HVAC Noise. Based on this data, the HVAC unit generates a noise level of 56 dBA at a distance of 7 feet, and a noise level of 50 dBA at a distance of 14 feet (Carrier Enterprise, 2016).

TABLE 3.11-6
ESTIMATED HVAC NOISE

Noise Levels (dB) Measured at Octave Frequencies						
125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
63.0	61.5	64.0	66.5	66.0	64.5	55.5

Hz = Hertz; kHz = kilohertz
Source Carrier Enterprise, 2016.

Groundborne Vibration Levels

Groundborne vibration levels resulting from construction activities at the project site were estimated using data published by the FTA in its *Transit Noise and Vibration Impact Assessment* (2006) document. Potential vibration levels resulting from construction of the residential uses under the proposed project are identified for off-site residential locations based on their distance from construction activities. As the County has not adopted any thresholds for construction or operational groundborne vibration impacts, the proposed project is analyzed against the vibration thresholds established by the FTA to determine whether an exceedance of allowable vibration levels would occur.

3.11.4 Project Impacts

Impact 3.11-1: Would the project result in exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction

Significant and Unavoidable Impact. Construction of the proposed project would require the use of heavy equipment during the grading and excavation activities, installation of new utilities, paving, and construction of the proposed residential buildings. Development activities would also involve the use of smaller power tools, generators, and other sources of noise. During each stage of development, there would be a different mix of equipment. As such, construction activity noise levels at and near the project

site would fluctuate depending on the particular type, number, and duration of use of the various pieces of construction equipment. The USEPA has compiled data for outdoor noise levels for typical construction activities that are listed in **Table 3.11-7**. These composite noise levels from typical construction activities take into account both the number of pieces and spacing of heavy construction equipment that are typically used during each phase of construction. These noise levels would diminish rapidly with distance from the construction activity at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 84 dBA L_{eq} measured at 50 feet from the noise source to the receptor would reduce to 78 dBA L_{eq} at 100 feet from the source to the receptor, and reduce by another 6 dBA L_{eq} to 72 dBA L_{eq} at 200 feet from the source to the receptor. **Table 3.11-8** shows typical noise levels produced by various types of construction equipment.

TABLE 3.11-7
TYPICAL CONSTRUCTION NOISE LEVELS

Construction Phase	Noise Level (dBA, L_{eq})[a]
Ground Clearing	84
Excavation	89
Foundations	78
Erection	85
Finishing	89

[a] Average noise levels correspond to a distance of 50 feet from the noisiest piece of equipment and 200 feet from the rest of the equipment associated with that phase.

Source: USEPA, 1971.

TABLE 3.11-8
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dBA, L_{eq} at 50 feet)
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Crane (Mobile)	83
Dozer	85
Generator	81
Grader	85
Jack Hammer	88
Loader	85
Paver	89
Pile –Driver (Impact)	101
Pile-Driver (Sonic)	96
Roller	74
Saw	76
Scraper	89
Truck	88

Source: FTA, 2006.

Construction of the project would occur in two sequential phases; Phase 1 (south parcel) first and then Phase 2 (north parcel). The anticipated construction schedule for Phase 1 (south parcel) and Phase 2 (north parcel) are shown in Table 2-7 in Chapter 2, *Project Description*, of this EIR. Construction of Phase 1 (south parcel) would take 18 months and construction of Phase 2 (north parcel) would take 14 months. Construction of the parcels would not overlap.

Table 3.11-9 shows the estimated peak construction noise levels that would occur at the off-site sensitive uses during construction at Phase 1 (south parcel) and Phase 2 (north parcel) compared to the existing daytime ambient noise levels.

TABLE 3.11-9
EXTERIOR NOISE AT OFF-SITE SENSITIVE USES FROM PROJECT CONSTRUCTION

Off-site Sensitive Land Use	Location	Approximate Distance to Project Site Boundary (ft.)[a]	Existing Monitored Daytime Ambient Noise Levels (dBA L_{eq})	Estimated Peak Construction Noise Levels (dBA L_{eq})	Exceedance of 55 dBA Noise Standard	Increase in Ambient Noise Level (dBA L_{eq})
Residences	North of Phase 1 (south parcel), near Long Canyon Road.	1,340	41.6	60.4	5.4	18.8
Residence	East of Phase 2 (north parcel), near southeastern portion of site.	160	42.1[b]	78.9	23.9	36.8
Residences	East of Phase 2 (north parcel), adjacent to Vista Road.	1,171	44.9	61.6	6.6	16.7
Residences	East of Phase 2 (north parcel), west of Monte Vista Street.	670	50.1	66.5	11.5	16.4

[a] The approximate distances are measured from the project site to the nearest sensitive receptor property line.
[b] As noted previously, a noise measurement at this off-site sensitive receptor was not able to be conducted because access to the residence required vehicle travel through a private residential road. For the purpose of this analysis, it is assumed that ambient daytime noise level at this receptor would be similar to the daytime ambient noise level that was measured at the Mystic Oaks Private Retreat location at the southwest portion of Phase 2 (north parcel), as both of these locations are in remote areas that are located away from the local roadways of the surrounding area.
Source: ESA, 2013.

As shown in **Table 3.11-9**, the peak construction noise levels at the off-site sensitive receptors would range from 60.4 dBA L_{eq}, at the nearest residence located north of Phase 1 (south parcel), to 78.9 dBA L_{eq}, at the nearest residence located east of Phase 2 (north parcel). Thus, the construction activities associated with the proposed project would generate episodic noise levels well above the ambient noise levels currently experienced at the noise-sensitive receptors surrounding the project site. The increase in noise levels at the offsite locations during construction of the project site would be temporary in nature, and would not generate continuously high noise levels. Additionally, while the estimated construction noise levels at each of the offsite locations would be the loudest when construction activities are occurring at an area within the project site that is nearest to the offsite location, the majority of the time noise levels at these off-site locations would be reduced as construction activities conclude or move to another more distant location of the project site. Thus, the highest noise levels that would be experienced by the offsite receptors would only occur for a limited duration during construction of the proposed project.

According to Section 4-6-7 (Special Provision) of the County's Codified Ordinances, noise sources associated with construction activities are exempt from the County's noise standards provided that these activities do not occur between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday. As the construction activities associated with the proposed project would comply with these hours of operation (as included by Project Design Feature PDF-21), the proposed project would be exempted from the noise standards established in the County Codified Ordinances. Thus, impacts related to the generation of construction noise levels in excess of County standards would not occur.

However, the project's construction noise levels would result in an increase in noise levels at the nearest sensitive receptors. As shown in **Table 3.11-9**, the ambient exterior noise levels at all of the nearest off-site sensitive receptors would experience an increase in noise levels during construction of the proposed project that would result in noise higher than 55 dBA. The construction noise levels at the off-site sensitive receptors during construction would range from 60.4 dBA to 78.9 dBA. Although this noise is exempt, pursuant to the County's Noise Ordinance, a substantial increase in noise would occur. As described above, increases in ambient noise are considered "substantial" based upon Section 4-6-5 of the County's Nose Ordinance, which identifies the following increases:

- The noise standard plus five (5) dB(A) for a cumulative period of more than fifteen (15) minutes in any hour; or
- The noise standard plus ten (10) dB(A) for a cumulative period of more than five (5) minutes in any hour; or
- The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one (1) minute in any hour; or
- The noise standard plus twenty (20) dB(A) for any period of time.

As shown in **Table 3.11-9**, construction noise at each of the closest receptors would exceed these noise levels, and the duration of the noise would likely be longer than the allowable time spans. The project includes Project Design Feature PDF-21, which states that the following measures will be implemented to reduce construction-related noise:

- Construction activities will be limited to the hours between 7:00 a.m. to 8:00 p.m., Monday through Saturday, excluding federal holidays, which is consistent with the County's Noise Ordinance.
- During all excavation and grading on-site, the construction contractors will equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards to reduce construction equipment noise to the maximum extent practicable. The construction contractor will place all stationary construction equipment so that emitted noise is directed away from noise sensitive receptors.
- The construction contractor will stage equipment and material stockpiles in areas that will create the greatest distance between construction-related noise sources and noise sensitive receptors during project construction.

- The construction contractor will limit haul truck deliveries to the same hours specified for construction equipment.
- Electrically powered equipment to be used instead of pneumatic or internal combustion powered equipment, where feasible.
- Unnecessary idling of internal combustion engines (e.g., in excess of 5 minutes) will be prohibited.
- The use of noise-producing signals, including horns, whistles, alarms, and bells, will be for safety warning purposes only.

In addition, Mitigation Measure MM 3.11-1 would be implemented, which requires installation of temporary sound barriers in between the location of construction activities and the closest residences during construction activities that could exceed noise limits. Sound barriers can achieve between 5 and 15 dB of noise reduction (US DOT, 2016). Thus, with the use of sound barriers, temporary and intermittent construction noise at the closest residence (160 feet from the project boundary) could be reduced from 78.9 (shown in Table 3.11-8) to noise levels between 73.9 and 63.9 dBA. However, this noise is still between 18.9 and 8.9 dBA higher than the 55 dBA Nosie Ordinance criteria; and it would last longer than the time periods listed above. Thus, significant and unavoidable impacts related to short-term temporary increases in noise would occur from implementation of project construction.

Therefore, Mitigation Measure MM 3.11-2 has been included to provide notification about project activities to the sensitive uses that would be impacted by the project; and Mitigation Measure MM 3.11-3 would establish a “noise disturbance coordinator” who would be responsible for responding to noise concerns. However, even with implementation of Project Design Feature PDF-21 and Mitigation Measures MM3.11-1 through 3.11-3, short-term intermittent noise impacts generated from construction of the proposed project would be significant and unavoidable.

Mitigation Measures

MM 3.11-1 The project’s construction plans and grading specifications shall state that temporary sound barriers shall be installed between the location of construction activities and the closest residences during construction activities that could exceed noise limits. The temporary sound barriers shall remain in place until the conclusion of demolition, grading, and construction activities that could exceed noise limits. The design of the sound barrier will be:

- At least 14-feet in height above grade;
- located such that it will break the line-of-sight between the sound source and the receiver;
- Consist of an impervious material with a minimum surface density of 4 pounds per square foot;
- Not have any gaps or holes between the panels or at the bottom; and
- A minimum weight of two pounds per square foot with no gaps or perforations.

MM 3.11-2 The project's construction plans and grading specifications shall state that the project construction contractor shall post signs at the construction sites that are legible at a distance of 50-feet and two weeks prior to the commencement of construction of the project, the project proponent shall send a notice to the off-site residential uses located within a 0.5-mile radius from the project boundaries. All notices and signs shall provide the dates and duration of construction activities, as well as provide a telephone number where residents can inquire about the construction process and register complaints.

MM 3.11-3 The project's construction plans and grading specifications shall state that the construction contractor shall establish a "noise disturbance coordinator" who shall be responsible for responding to any local complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and shall be required to implement reasonable measures such that the complaint is resolved. All notices that are sent to residential units within 0.5-mile radius from the project boundaries and all signs posted at the construction site shall list the telephone number for the disturbance coordinator.

Operation

Less than Significant Impact. Typical stationary noise sources associated with operation of the proposed project would be HVAC systems that would be installed on the residential lots. As described above, specific HVAC systems that would be used on the project site are unknown at this stage of the project design; however, analysis using a typical large-sized residential condenser mounted on ground level pads provides a reasonable basis for analysis. The HVAC unit used in this analysis is a Carrier 38HDR060 split system condenser. This machine generates a noise level of 56 dBA at a distance of 7-feet, and a noise level of 50 dBA at a distance of 14-feet (Carrier Enterprise, 2016). Thus, at a distance of 14-feet, the noise of the HVAC unit would be within the 50 dBA CNEL nighttime noise criteria for single-family residential uses (per Section 4-6-5 of the County's Codified Ordinances).

The nearest off-site sensitive receptor is the single-family residence located approximately 160 feet east of Phase 2 (north parcel). Given the distance to this residence, the noise levels generated by project-related HVAC equipment would not be audibly perceptible above the existing ambient noise level at this offsite sensitive receptor. As the other offsite sensitive receptors are all located further away, they would also not be impacted. Therefore, noise impacts associated with the project's HVAC systems on offsite sensitive receptors would be less than significant.

The proposed project would develop residences, which are noise-sensitive receptors. Given that the average residential lot sizes of Phase 1 (south parcel) and Phase 2 (north parcel) are 23,997 square feet and 23,667 square feet, respectively, the distances between each residential dwelling unit would be sufficient to reduce noise from HVAC equipment to below the County's exterior noise standards for residential uses. As described previously, the noise of the HVAC unit would be within the 50 dBA CNEL nighttime noise criteria for single-family residential uses at a distance of 14-feet from the HVAC unit. The proposed lot sizes and landscaping areas would provide sufficient distance, such that HVAC noise from one residence would not impact another. Overall, noise impacts related to operation of the proposed project would be less than significant.

Noise/Land Use Compatibility

Less than Significant Impact. According to the County's noise/land use compatibility guidelines (refer to Table 3.11-5), new residential uses may be developed in areas where the exterior noise level environment is lower than 60 dBA CNEL. Where the exterior noise levels are between 60 to 65 dBA CNEL, residential uses may be developed provided that the interior noise levels at these residential buildings can be mitigated to 45 dBA CNEL at all habitable rooms. As shown on **Table 3.11-1**, the ambient noise levels near the project site range from 41.6 dBA to 50.1 dBA, which is lower than 60 dBA, and is compatible for new residential uses.

The future noise levels at the project site would be dominated by vehicular traffic on Long Canyon Road, the proposed driveways serving the proposed project. **Table 3.11-10** provides the estimated traffic noise levels of Long Canyon Road and the two proposed project driveways under future (2017 and 2035) traffic conditions. The future traffic volumes on these roadways were provided by the project's Traffic Impact Analysis.

TABLE 3.11-10
FUTURE (2017/2035) ROADWAY NOISE CONTOURS IN PROJECT VICINITY

Roadway Segment	CNEL at 100 feet[a]	Future (2017/2035) Average Daily Traffic Volumes[b]
Long Canyon Road, east of South Driveway	48.2	800
Long Canyon Road, between North Driveway and South Driveway	45.2	400
Long Canyon Road, west of North Driveway	39.1	100
South Driveway, south of Long Canyon Road	45.2	400
North Driveway, north of Long Canyon Road	43.9	300

ft. = feet
"--" = contour is located within the roadway lanes.
a The distance is from the centerline of the roadway.
b The traffic volumes on Long Canyon Road and the proposed project driveway are the same for both the project's near-term (2017) and long-range (2035) conditions as analyzed in the project's TIA.
Source: Urban Crossroads, 2017.

As shown in **Table 3.11-10**, traffic noise levels at 100 feet from the centerline of Long Canyon Road and the two proposed driveways would range from 39.1 dBA CNEL to 48.2 dBA CNEL. In addition, the 60 CNEL noise contour generated by traffic would be located within the roadway lanes of Long Canyon Road and the two driveways. Thus, the 60 CNEL noise contour would not reach the proposed single-family residences on either Phase 1 (south parcel) or Phase 2 (north parcel); or other existing residences in the area. Thus, noise resulting from traffic on Long Canyon Road and the project driveways would be below 60 dBA CNEL, and would be consistent with the County's noise/land use compatibility guidelines.

Thus, impacts associated with noise/land use compatibility related to traffic noise would be less than significant.

Additionally, as described above, HVAC units would generate other operational noise; however, this noise would not generate a noise/land use compatibility impact. As described above, at a distance of 14-feet, the noise of the HVAC unit would be within the 50 dBA CNEL nighttime noise criteria for single-family residential uses (per Section 4-6-5 of the County's Codified Ordinances) and the size of the residential parcels, landscaping, and fuel modification zones would provide the distance to attenuate HVAC noise to a less than significant level.

Impact 3.11-2: Would the project result in exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels?

Construction

Less than Significant Impact. Construction activities that would occur within Phase 1 (south parcel) and Phase 2 (north parcel) would include grading and excavation, which would have the potential to generate low levels of groundborne vibration. As such, the existing residential uses located in the immediate vicinity of the project site could be exposed to the generation of excessive groundborne vibration or groundborne noise levels related to construction activities. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to structural damage at the highest levels. Site ground vibrations from construction activities very rarely reach the levels that can damage structures, but they may be perceived in buildings very close to a construction site. As part of the project, no pile driving activities would be required. The various PPV and RMS velocity (in VdB) levels for the types of construction equipment that would generally operate during the construction of the proposed project are identified in **Table 3.11-11**.

TABLE 3.11-11
VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

	Approximate PPV (in/sec)					Approximate RMS (VdB)				
Equipment	25 Feet	50 Feet	60 Feet	75 Feet	100 Feet	25 Feet	50 Feet	60 Feet	75 Feet	100 Feet
Hoe Ram	0.089	0.031	0.024	0.017	0.011	87	78	76	73	69
Large Bulldozer	0.089	0.031	0.024	0.017	0.011	87	78	76	73	69
Loaded Trucks	0.076	0.027	0.020	0.015	0.010	86	77	75	72	68
Jackhammer	0.035	0.012	0.009	0.007	0.004	79	70	68	65	61
Small Bulldozer	0.003	0.001	0.0008	0.0006	0.0004	58	49	47	44	40

Source: FTA, 2006.

Based on the information presented in **Table 3.11-11**, vibration velocities could reach as high as approximately 0.089 inch-per-second PPV at 25 feet from the source activity, depending on the type of

construction equipment in use. This corresponds to a RMS velocity level (in VdB) of 87 VdB at 25 feet from the source activity.

As was described under Impact 3.11-1 above, construction activities would have the potential to impact the nearest off-site sensitive receptors to the project site, which include the single-family residences located north of Phase 1 (south parcel) and the single-family residences located east of the southeastern portion of Phase 2 (north parcel). **Table 3.11-12** shows the construction-related groundborne vibration levels that would occur at the identified off-site sensitive uses during construction of the proposed project.

TABLE 3.11-12
GROUNDBORNE VIBRATION LEVELS AT OFF-SITE SENSITIVE USES FROM PROJECT CONSTRUCTION

Offsite Sensitive Land Use	Approximate Distance to project site (feet)[a]	Estimated PPV (in/sec)	Estimated/Calculated Construction-Related Groundborne Vibration Levels (VdB)
Residences located north of Phase 1 (south parcel), near Long Canyon Road.	1,340	0.0002	35
Residence located east of Phase 2 (north parcel), near southeastern portion of site.	160	0.005	63
Residences located east of Phase 2 (north parcel), adjacent to Vista Road.	1,171	0.0003	37
Residences located east of Phase 2 (north parcel), west of Monte Vista Street.	670	0.0006	44

ft. = feet
in/sec = inches per second.
[a] The approximate distances are measured from the project site to the nearest sensitive receptor property line.
Source: ESA, 2014.

As shown in **Table 3.11-12**, the vibration velocities to occur at the off-site sensitive receptors would range from 0.0002 in/sec PPV at the residences located north of Phase 1 (south parcel) to 0.005 in/sec PPV at the nearest residence located east of Phase 2 (north parcel). None of the buildings at the identified off-site sensitive use locations are considered to be fragile structures that are extremely susceptible to vibration damage. For the purpose of this analysis, the identified off-site residential structures surrounding the project site are considered to be "non-engineered timber and masonry buildings." Based on the information shown in **Table 3.11-12**, none of the nearby residential structures surrounding the project site would be exposed to a PPV groundborne vibration level that exceeds 0.2 inches per second during construction of the proposed project. Thus, in terms of building damage, the vibration impacts at the off-site sensitive receptors would be less than significant.

In terms of human annoyance, the vibration levels forecasted to occur at the off-site sensitive receptors would range from 35 VdB at the residences located north of Phase 1 (south parcel) to 63 VdB at the nearest residence located east of Phase 2 (north parcel). As none of the nearby residential structures surrounding the project site would be exposed to vibration levels that would exceed the FTA's 80 VdB

threshold for residences or places where people may sleep during construction of the proposed project, this impact would be less than significant.

Overall, vibration impacts associated with building damage and human annoyance during project construction would be less than significant.

Operation

Less than Significant Impact. The proposed project would involve development of a residential project consisting of 72 single-family residences at the project site. Overall, the proposed residential uses would not include stationary equipment that would result in high vibration levels, which are more typical for large industrial projects. While groundborne vibration within and surrounding the project site may result from heavy-duty vehicular travel (e.g., refuse trucks and delivery trucks) on the nearby local roadways, this would not result in significant vibration impacts to the proposed project. As such, vibration impacts associated with operation of the proposed project would be less than significant.

Impact 3.11-3: Would the project cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Traffic Noise

Less than Significant Impact. The increase in traffic resulting from implementation of the proposed project would increase the ambient noise levels at sensitive uses located in proximity to the proposed project area. These concerns were addressed using the FHWA Model, which calculates the CNEL noise level for a particular set of input conditions, based on site-specific traffic volumes, distances, speeds, and/or noise barriers. The Traffic Impact Analysis prepared for the proposed project (included as Appendix J of this EIR) and an analysis of the surrounding land uses were used to forecast roadway noise levels to determine if the proposed project's vehicular traffic would result in a significant impact at noise-sensitive receptor locations in proximity to the proposed project area. The increases in noise levels at roadway segments located in proximity to the project site are identified in **Table 3.11-13**.

TABLE 3.11-13
ROADWAY NOISE LEVELS WITH PROJECT

		Noise Levels in dB CNEL[a]				
Roadway Segment	Existing Land Uses Located Along Roadway Segment	Existing Traffic Volumes	Existing Plus Project Traffic Volumes	Increase	Significance Threshold[b]	Significant?
Ortega Highway, east of Antonio Parkway	Residential	67.2	67.4	0.2	3.0	No
Ortega Highway, south of Long Canyon Road	Transient Lodging	70.4	70.7	0.3	3.0	No
Ortega Highway, north of Monte Vista Street	Residential	70.5	70.6	0.1	3.0	No

Roadway Segment	Existing Land Uses Located Along Roadway Segment	Noise Levels in dB CNEL[a]				
		Existing Traffic Volumes	Existing Plus Project Traffic Volumes	Increase	Significance Threshold[b]	Significant?
Ortega Highway, south of Grand Avenue	Residential	65.4	65.5	0.1	3.0	No
Monte Vista Street, west of Ortega Highway	Residential	49.0	49.0	0.0	5.0	No
Antonio Parkway, north of Ortega Highway	Residential	65.0	65.1	0.1	3.0	No
Grand Avenue, west of Ortega Highway	Residential	73.3	73.3	0.0	3.0	No
Grand Avenue, east of Ortega Highway	Residential	70.6	70.6	0.0	3.0	No

a Values represent noise levels from the centerline of each roadway to the approximate receptor property line.

b For the purpose of this analysis, it is assumed that a significant impact on traffic noise levels from project operations would occur if the project would cause the ambient noise level measured at the property line of a County-identified noise-sensitive land use (i.e., residential uses, hospitals, rest homes, convalescent hospitals, places of worship, and schools) to increase by 3 dBA (CNEL) or more where the existing ambient noise level at the sensitive use is above 60 dBA CNEL, or by 5 dBA (CNEL) or more where the existing ambient noise level at the sensitive use is below 60 dBA CNEL.

Source: Urban Crossroads, 2017; ESA, 2014.

As shown in **Table 3.11-13**, the proposed project would increase local noise levels by a maximum of 0.3 dBA CNEL at the roadway segment of Ortega Highway, south of Long Canyon Road. As this noise increase would not exceed the identified threshold of significance, this impact would be less than significant. In addition, as the other roadway segments that are located even further away from the project site would experience less traffic increases due to the proposed project, the increase in local noise levels at these roadway segments would also not exceed the thresholds of significance, and impacts would be less than significant.

HVAC Equipment Noise

Less than Significant Impact. As described under Impact 3.11-1, HVAC units would generate other operational noise; however, this noise would not generate a substantial permanent increase in ambient noise levels. As described above, at a distance of 14-feet, the noise of the HVAC unit would be within the 50 dBA CNEL nighttime noise criteria for single-family residential uses (per Section 4-6-5 of the County's Codified Ordinances) and the size of the residential parcels, landscaping, and fuel modification zones would provide the distance to lower HVAC noise to a less than significant level. Thus, permanent increase in ambient noise levels related to HVAC equipment noise would be less than significant.

Impact 3.11-4: Would the project cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Significant and Unavoidable Impact. As described under Impact 3.11-1, the construction-related noise levels associated with the proposed project would result in a substantial temporary increase in ambient

noise levels at the nearest offsite sensitive receptors. **Table 3.11-9** shows that construction noise levels at off-site sensitive receptors during construction would range from 60.4 dBA to 78.9 dBA. Thus, the project includes Project Design Feature PDF-21, implements measures to reduce construction-related noise that include: limiting construction and haul hours, location of equipment and staging areas, proper equipment use, and overall noise reduction methods. In addition, Mitigation Measure MM 3.11-1 requires installation of temporary sound barriers to reduce construction noise. However, as detailed previously, construction noise would continue to exceed Nosie Ordinance criteria; thus, significant impacts related to short-term temporary increases in noise would occur from implementation of project construction. Mitigation Measure MM 3.11-2 has been included to provide notification about project activities to the sensitive uses that would be impacted by the project; and Mitigation Measure MM 3.11-3 would establish a "noise disturbance coordinator" who would be responsible for responding to noise concerns. However, substantial temporary or periodic increases in ambient noise levels would occur from construction of the proposed project, and impacts would be significant and unavoidable.

3.11.5 Cumulative Impacts

Cumulative noise assessment considers development of the proposed project in combination with ambient growth and other development projects within the vicinity of the proposed project. As noise is a localized phenomenon, and drastically reduces in magnitude as distance from the source increases, only projects and ambient growth in the nearby area could combine with the proposed project to result in cumulative noise impacts. Similarly, the geographic area associated with cumulative construction noise impacts would be limited to areas directly affected by construction noise associated with the proposed project and the locations of the identified cumulative projects. The projects listed in Table 3-1 in Chapter 3, are not in the immediate vicinity of the project area. As shown in Figure 2-15, the closest cumulative project sites are located approximately 2.4 miles from the project site in the City of Lake Elsinore. The distance between the project site and the nearest related project, and the attenuation characteristics of noise and vibration, no receptors would be exposed to audible noise or perceptible levels of vibration from both of these sites simultaneously. Therefore, noise from construction and construction related vibration from the proposed project would not combine with any of the other foreseeable projects to result in a cumulative impact.

Cumulative mobile source noise impacts would occur primarily as a result of increased traffic on local roadways due to the proposed project and related projects within the study area. Therefore, cumulative traffic-generated noise impacts have been assessed for both the future year 2017 (near-term) and future year 2035 (long-range) cumulative base traffic volumes with the proposed project on the roadway segments in the project vicinity. The noise levels associated with existing traffic volumes and cumulative base traffic volumes with the proposed project (i.e., future cumulative traffic volumes) in 2017 and 2035 are identified in **Tables 3.11-14** and **3.11-15,** respectively. The comparison of the future year traffic noise levels in 2017 and 2035 against existing (baseline) traffic noise levels allows for identification of the incremental increase in noise levels that would be generated by cumulative development.

As shown in **Table 3.11-14**, cumulative development along with the proposed project in 2017 would increase local noise levels by a maximum of 0.6 dBA CNEL at the roadway segments of Ortega

Highway, south of Long Canyon Road and north of Long Canyon Road, and at the roadway segment of Antonio Parkway, north of Ortega Highway. As the increase in roadway noise at these roadway segments would not exceed 3.0 dBA CNEL, the noise increases at these segments would not be substantial. As all of the remaining roadways would be exposed to even lower noise level increases, the noise increases at these roadway segments would also not be substantial. Therefore, the cumulative impact associated with mobile source noise in 2017 would be less than significant.

TABLE 3.11-14
CUMULATIVE (2017) ROADWAY NOISE IMPACTS

		Noise Levels in dBA CNEL[a]				
Roadway Segment	**Existing Land Uses Located Along Roadway Segment**	**Existing (2013) Traffic Volumes**	**Future (2017) With Project Traffic Volumes**	**Increase**	**Significance Threshold[b]**	**Significant?**
Ortega Highway, east of Antonio Parkway	Residential	67.2	67.8	0.6	3.0	No
Ortega Highway, south of Long Canyon Road	Transient Lodging	70.4	71.0	0.6	3.0	No
Ortega Highway, north of Monte Vista Street	Residential	70.5	70.9	0.4	3.0	No
Ortega Highway, south of Grand Avenue	Residential	65.4	65.8	0.4	3.0	No
Monte Vista Street, west of Ortega Highway	Residential	49.0	49.0	0.0	5.0	No
Antonio Parkway, north of Ortega Highway	Residential	65.0	65.6	0.6	3.0	No
Grand Avenue, west of Ortega Highway	Residential	73.3	73.8	0.5	3.0	No
Grand Avenue, east of Ortega Highway	Residential	70.6	71.1	0.5	3.0	No

a Values represent noise levels from the centerline of each roadway to the approximate receptor property line.

b For the purpose of this analysis, it is assumed that a significant impact on traffic noise levels from project operations would occur if the project would cause the ambient noise level measured at the property line of a County-identified noise-sensitive land use (i.e., residential uses, hospitals, rest homes, convalescent hospitals, places of worship, and schools) to increase by 3 dBA (CNEL) or more where the existing ambient noise level at the sensitive use is above 60 dBA CNEL, or by 5 dBA (CNEL) or more where the existing ambient noise level at the sensitive use is below 60 dBA CNEL.

Source: Urban Crossroads, 2017; ESA, 2014.

As shown in **Table 3.11-15**, cumulative development along with the proposed project in 2035 would increase local noise levels by a maximum of 2.8 dBA CNEL at the roadway segments of Antonio Parkway, north of Ortega Highway, and Grand Avenue, east of Ortega Highway. As the increase in roadway noise at these roadway segments would not exceed 3.0 dBA CNEL, the noise increases at these segments would not be substantial. As all of the remaining roadways would be exposed to even lower noise level increases than 2.8 dBA CNEL, the noise increases at these roadway segments would also not be substantial. Therefore, the cumulative impact associated with mobile source noise in 2035 would be less than significant.

TABLE 3.11-15
CUMULATIVE (2035) ROADWAY NOISE IMPACTS

		Noise Levels in dBA CNEL[a]				
Roadway Segment	**Existing Land Uses Located Along Roadway Segment**	**Existing (2013) Traffic Volumes**	**Future (2035) With Project Traffic Volumes**	**Increase**	**Significance Threshold[b]**	**Significant?**
Ortega Highway, east of Antonio Parkway	Residential	67.2	69.6	2.4	3.0	No
Ortega Highway, south of Long Canyon Road	Transient Lodging	70.4	72.5	2.1	3.0	No
Ortega Highway, north of Monte Vista Street	Residential	70.5	72.4	1.9	3.0	No
Ortega Highway, south of Grand Avenue	Residential	65.4	67.0	1.6	3.0	No
Monte Vista Street, west of Ortega Highway	Residential	49.0	49.0	0.0	5.0	No
Antonio Parkway, north of Ortega Highway	Residential	65.0	67.8	2.8	3.0	No
Grand Avenue, west of Ortega Highway	Residential	73.3	76.0	2.7	3.0	No
Grand Avenue, east of Ortega Highway	Residential	70.6	73.4	2.8	3.0	No

[a] Values represent noise levels from the centerline of each roadway to the approximate receptor property line.

[b] For the purpose of this analysis, it is assumed that a significant impact on traffic noise levels from project operations would occur if the project would cause the ambient noise level measured at the property line of a County-identified noise-sensitive land use (i.e., residential uses, hospitals, rest homes, convalescent hospitals, places of worship, and schools) to increase by 3 dBA (CNEL) or more where the existing ambient noise level at the sensitive use is above 60 dBA CNEL, or by 5 dBA (CNEL) or more where the existing ambient noise level at the sensitive use is below 60 dBA CNEL.

Source: Urban Crossroads, 2017; ESA, 2013.