
5.10 Noise

This section summarizes the potential short-term and long-term noise impacts associated with the Proposed Project. Typical noise sources resulting in impacts may include traffic noise, aircraft noise, construction noise, operational noise, and noise from surrounding uses. The information in this section was based on a “Noise Impact Analysis” (Noise Analysis) prepared by Giroux & Associates, dated July 2013. A “Noise Addendum” prepared by Giroux & Associates, dated October 23, 2013, provided results of additional meter readings to determine baseline noise levels along Stonehaven Drive and San Antonio Road. A copy of both reports is included herein as Appendix N.

This analysis also relies on information contained in the Orange County General Plan and the City of Yorba Linda General Plan (Yorba Linda GP) related to noise standards.

5.10.1 Existing Conditions

The Project Site consists of largely undeveloped rolling hills and ravines surrounded by residential development to the south and the northwest. Chino Hills State Park is to the north and east of the site. The existing noise levels derive mainly from vehicular sources on adjacent roadways resulting in a low baseline level for purposes of analysis. Oil well operations exist on the site; however, noise sources are primarily the result of intermittent vehicular access to the oil well locations.

The ambient existing noise levels on the Project Site were analyzed by Giroux & Associates. Along Aspen Way, noise levels are approximately 46 decibels (dB) at mid-day. Along San Antonio Road, the existing ambient noise levels are 60 dB or less during mid-day hours. These readings indicate that existing ambient noise levels are low.

The Noise Addendum states that mid-day noise levels at the Stonehaven Drive meter averaged 45 to 49 dB CNEL. The meter at San Antonio Road averaged 57 to 59 dB CNEL.

1. Ambient Noise Levels

Existing noise levels on the Proposed Project Site consist mainly of vehicular sources on the adjacent roadways. Noise measurements were taken at two locations on November 6, 2012 between 2:00 p.m. and 3:00 p.m. Monitoring experience shows that 24-hour weighted CNELs can be reasonably well estimated from mid-afternoon noise readings.

Acronyms used in this section:

CalEEMod	California Emissions Estimator Model
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
DEIR	Draft Environmental Impact Report
FHWA	Federal Highway Administration
GP	General Plan
RMS	root mean square
VdB	vibration decibel

Meter 1 was located along Aspen Way near the Proposed Project access. Meter 2 was located along San Antonio Road, south of Aspen Way. The locations are depicted on Exhibit 5-101 – Noise Meter Locations, Meter 1 (Aspen Way) and Meter 2 (San Antonio Drive south of Aspen Way).

It should be noted that the noise levels at Meter 3 and Meter 4 were modeled in the original Noise Analysis. Subsequent to the original analysis, additional field measurements were conducted. The actual metered measurements are provided in the Addendum and showed that the prior modeling conformed to the results of the field-metered measurements. These additional noise measurements were conducted from October 18 through October 21 at two locations (Exhibit 5-102 – Noise Meter Location, Meter 3 (off Stonehaven Drive along current Water District Access Road) and Exhibit 5-103 – Noise Meter Location, Meter 4 (San Antonio Road at Proposed Project Access Road).

Meter 3 was located along the project access road off Stonehaven Drive along the current water district road. The meter was placed at the existing gate, approximately 200 feet from the Stonehaven Drive centerline. Measured CNELs at the gate were in the mid to upper 40s. This would equate to CNELs of 51-55 dB at 50 feet from the Stonehaven Drive centerline. Modeled existing noise levels are 53-55 dB CNEL at 50 feet from the centerline of Stonehaven Drive. Meter 4 was located along San Antonio Road approximately 50 feet from the roadway centerline at the approximately locale of the project access road option. Measured CNELs were in the 57-59 dB CNEL range. Modeled noise levels are approximately 57 dB CNEL at 50 feet from the centerline.

Table 5-10-1 below summarizes the results of the short-term noise measurements from all four meter locations.

Table 5-10-1 Measured Noise Levels (dBA)

	Leq	Lmax	Lmin	L10	L33	L50	L90
Meter 1	46.3	63.0	39.0	45.5	42.0	41.5	40.0
Meter 2	56.6	69.0	39.0	61.5	53.5	47.0	41.0
Meter 3	54.4	79.4	31.4	43.1	39.2	37.2	33.3
Meter 4	57.9	75.5	39.2	61.8	52.9	44.1	41.2

Results for Meter 1, along Aspen Way, indicate that existing noise levels are low with observed noise readings of 46 dB Leq. The Noise Analysis notes that monitoring experience has shown that 24-hour weighted CNELs can be reasonably well estimated from mid-afternoon noise readings. CNELs are approximately equal to mid-afternoon Leq plus 2 to 3 dB (per Caltrans Technical Noise Supplement, 2009). This would equate to an existing CNEL of 48 to 49 dB at the proposed site, well within the County's residential compatibility guidelines.

Results for Meter 2, along San Antonio Road south of Aspen Way, indicate that the observed Leq of almost 57 dB would equate to a CNEL of 59 to 60 dB. The readings demonstrate that existing ambient noise levels in the Project Area are low and do not indicate an impediment to the proposed residential development. However, the low baseline levels do suggest that the Proposed Project Area is sensitive to even a moderate increase in traffic noise.



Exhibit 5-101 – Noise Meter Locations, Meter 1 (Aspen Way) and Meter 2 (San Antonio Drive south of Aspen Way)



Exhibit 5-102 – Noise Meter Location, Meter 3 (off Stonehaven Drive along current Water District Access Road)



Exhibit 5-103– Noise Meter Location, Meter 4 (San Antonio Road at Proposed Project Access Road)

Results for Meter 3 show that measured and modeled traffic noise levels are in agreement and the results do not exceed the recommended 65 dB CNEL noise compatibility threshold for residential use.

As with Meter 3, measured and modeled traffic noise levels for Meter 4 are in agreement, and the results do not exceed the recommended 65 dB CNEL noise compatibility threshold for residential use.

2. Noise Descriptors

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air and is characterized by various parameters that describe the physical properties of sound waves. These properties include the rate of oscillation (frequency), the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound wave. The most common descriptor used to characterize the loudness of an ambient sound level is the sound pressure level.

a. Decibels

Sound pressures can be measured in units called microPascals. More commonly, sound pressure levels are described in logarithmic units of ratios of actual sound pressures called bels. A bel is subdivided into 10 decibels (dB) in order to provide a finer resolution. Sound or noise can vary in intensity by over one million times within the range of human hearing. However, the human ear is not equally sensitive to all sound frequencies within the entire spectrum. Noise levels at maximum human sensitivity from 500 to 2,000 cycles per second are factored more heavily into the A-weighting process. The perceived noise volume relative to human sensitivity is known as the A-weighted decibel (dBA) and is subjective to the hearer.

“Leq” is a time-averaged sound level, a single number value that expresses the time-varying sound level for the specified period as though it were a constant sound with the same total sound energy as the time-varying level. This unit is the decibel (dB). The most common averaging period for Leq is hourly.

Since decibels are logarithmic units, sound pressure levels cannot be added or subtracted by ordinary arithmetic means. For example, if an automobile produces a sound pressure level of 70 dB when passing an observer, two automobiles passing together would produce a sound pressure level of 73 dB rather than 140 dB. Therefore, doubling traffic volumes or the speed would increase the noise level by only 3 dB. Conversely, reducing the traffic volume by half would result in a 3 dB reduction in the noise level.

b. Community Noise Equivalent Level (CNEL)

A given level of noise may be more or less tolerable depending on the duration of exposure. Because community receptors are more sensitive to unwanted noise

intrusion during more sensitive evening and nighttime hours, state law requires that an artificial dBA increment be added to quiet time noise levels. The 24-hour noise descriptor with a specified evening and nocturnal penalty is called the Community Noise Equivalent Level (CNEL). The California Department of Transportation's Division of Aeronautics and the California Department of Housing and Community Development have adopted the CNEL. The CNEL scale represents a time weighted 24-hour average noise level based on the A-weighted decibel. The measure weights the average noise levels for the evening hours (7:00 p.m. to 10:00 p.m.), increasing them by 5 dB, and weights the late evening and morning hour noise levels (10:00 p.m. to 7:00 a.m.) by 10 dB. The daytime noise levels are combined with these weighted levels and averaged to obtain a CNEL value. Counties and cities adopt noise levels based on CNEL as further described in Section 5.10.2, Regulatory Setting below.

c. Vibration

Vibration is most commonly expressed in terms of the root mean square (RMS) velocity of a vibrating object. RMS velocities are expressed in units of vibration decibels. The range of vibration decibels (VdB) is as follows:

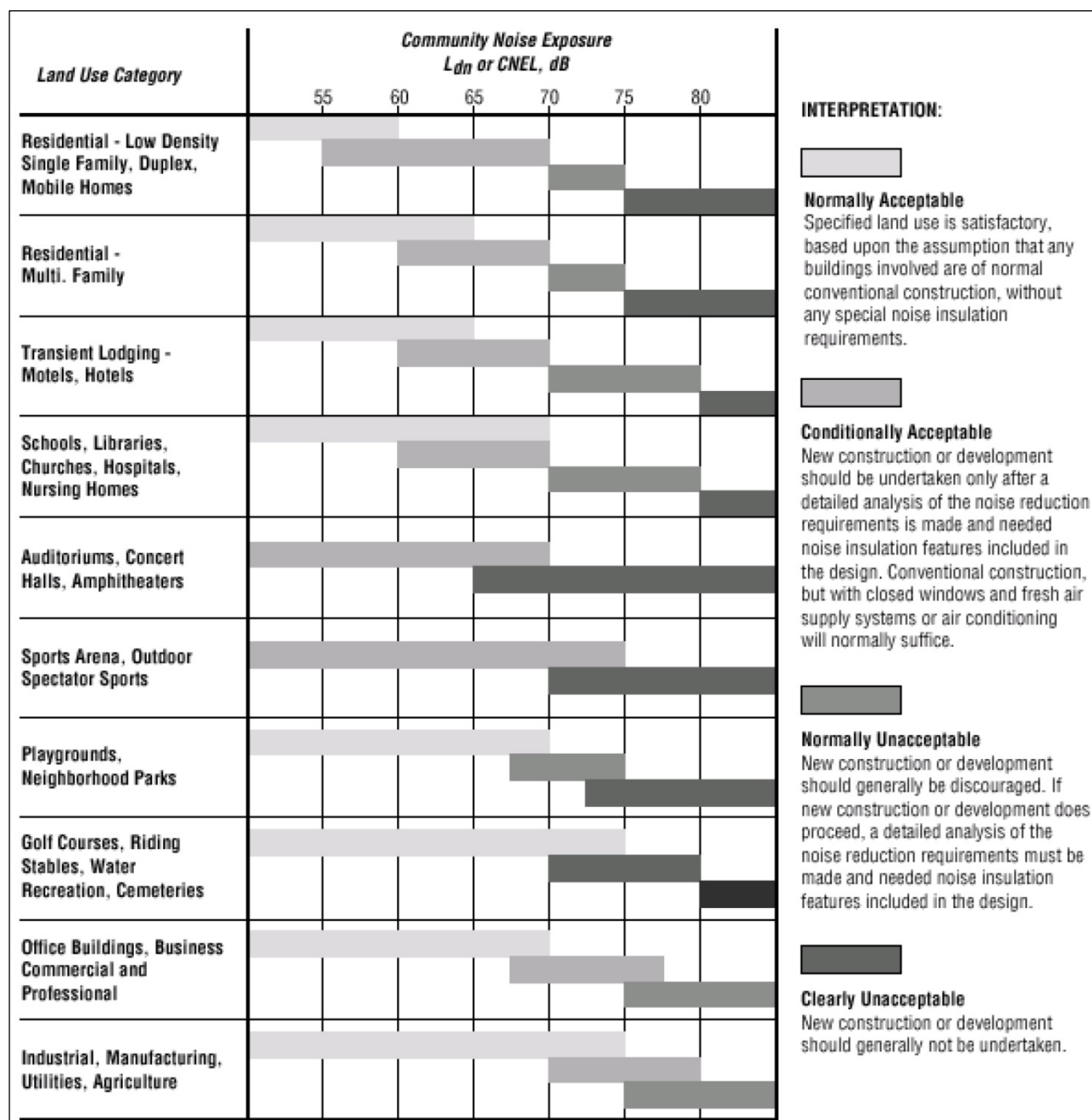
65 VdB	-	threshold of human perception
72 VdB	-	annoyance due to frequent events
80 VdB	-	annoyance due to infrequent events
94-98 VdB		minor cosmetic damage

5.10.2 Regulatory Setting

1. County of Orange Planning Standards

The County of Orange has developed guidelines based on the State of California's model for acceptable community noise levels. The guidelines are based upon the CNEL rating scale and ensure that noise exposure is considered in any development. Exhibit 5-104 depicts the County Land Use Compatibility Matrix for Community Noise Exposure. CNEL-based standards apply to noise sources whose noise generation is preempted from local control (e.g., on-road vehicles, trains, airplanes). The standards are used to make land use decisions regarding the suitability of a specific site for its intended use and are found in the Noise Element of the County General Plan.

As shown in Exhibit 5-104, a number of overlapping CNELs are present within several criteria. The County developed a more clear-cut matrix of acceptable noise levels in order to reduce the potential ambiguity within the conditionally acceptable levels. The matrix is presented in Table 5-10-2. The table identifies the noise levels for each type of use listed. For example, a residential use (3) is prohibited in a 65 dB CNEL contour for airports, but is allowed in other areas if the noise level can be mitigated. The table then provides the interior and exterior standards for the residence (a. interior CNEL of less than 45 dB in habitable rooms and b. exterior CNEL of less than 64 dB in outdoor living areas).



Source: Appendix C: Noise Element Guidelines, "General Plan Guidelines, 2003", State of California Governor's Office of Planning and Research

Exhibit 5-104 – Orange County Land Use Compatibility Matrix for Community Noise Exposure

The County recommends an exterior noise level of 60 to 65 dB CNEL and an interior noise level of 45 dB CNEL for new residential uses. The exterior level applies to outdoor recreational uses such as yards, patios, and spas. Interior standards apply to habitable rooms. Typical noise attenuation with closed, double-paned windows in modern frame and stucco construction is 20 to 30 dB CNEL. Noise attenuation with partially open windows is 10 to 15 dB CNEL. Interior standards can, therefore, be met without mitigation if exterior levels are 55 to 60 dB CNEL with open windows. Exterior levels of 65 to 75 dB CNEL can be accommodated with closed dual-paned windows while still meeting interior standards.

Table 5-10-2 Compatibility Matrix for Orange County Land Uses and Community Noise Equivalent Levels (CNEL)

Types of Use	65+ dB CNEL	60-65 dB 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		
School (K through 12)	2c, d, e	2c, e, 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, e, e	2a, c, e
Hotels/motels	2a, c	2a, c
Accessory uses		
Executive apartments	1a, b, e	2a, e
Caretakers	1a, b, c, e	2a, c, e

Explanation and Definitions

Action Required to Ensure Compatibility between Land Use and Noise from External Sources

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; allowed in other areas if interior and exterior community noise levels can be mitigated. The prohibition against new residential development excludes limited "in-fill" development within an established neighborhood.

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 64 decibels in outdoor living areas
- c. Interior Standard: $Leq(h)=46$ to 65 decibels interior noise level, depending on interior use
- d. Exterior Standard: $Leq(h)$ of less than 645 decibels in outdoor living areas
- e. Interior Standard: As approved by the Board of Supervisors for sound events of short duration such as aircraft flyovers or individual passing railroad trains

$Lea(h)$ – The A-weighted equivalent sound level averaged 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.). Typically, time period "h" is defined to match the hours of operation of a given type of use.

2. County of Orange Noise Standards

The County's noise standards for non-transportation sources are found in the Noise Ordinance. Division 6, Section 4-6 of the Orange County Code regulates noise from one land use crossing the property line of an adjacent property. As shown in Table 5-10-3 below, the County Code limits noise levels to 55 dBA (day) and 50 dBA (night) at any residential property line from noise generated on an adjacent property with some allowable deviation for specified periods of time. The larger the deviation from the baseline standard, the shorter the allowed duration of the event up to a maximum of 20 dB. After 10:00 p.m., all thresholds are decreased by 5 dB. The City has established identical noise standards (55 dBA day and 50 dBA night).

Table 5-10-3 Residential Exterior Noise Standards, Orange County

Noise Zone	Noise Level	Time Period
1	55 dB(A)	7:00 a.m. to 10:00 p.m.
	50 dB(A)	10:00 p.m. to 7:00 a.m.

It shall be unlawful for any period 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:

The noise standard for a cumulative period of more than 30 minutes in any hour, or

- +5 dB for a cumulative period of more than 15 minutes in any hour, or
- +10 dB for a cumulative period of more than 5 minutes in any hour, or
- +15 dB for a cumulative period of more than 1 minute in any hour, or
- +20 dB or the maximum measured ambient level for any period of time.

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

In the event the ambient noise level exceeds any of the noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise levels.

The County Noise Ordinance also provides construction noise requirements, limiting grading or construction to weekdays (including Saturday) from 7:00 a.m. to 8:00 p.m. Division 6 (Sec. 4-6-1, et seq.) of the County Code also contains standard requirements related to the distance separation between construction activities and any occupied dwellings. Construction noise levels are exempt from the numerical performance standards in the noise ordinance. However, the County's Standard Condition for Approval N10, which may be applied during project review and approval, requires that:

1. All powered equipment operating within 1,000 feet of a dwelling must have a properly operating and maintained muffler.
2. Stockpiling and staging activities must be located as far as practicable from dwellings.

3. City of Yorba Linda

The City has established similar noise compatibility thresholds as shown in Table 5-10-4 below. Therefore, both jurisdictions have a residential noise standard of 65 dBA CNEL exterior and 45 dB CNEL interior.

Table 5-10-4 Yorba Linda General Plan Land Use Noise Standards (dB CNEL)

General Plan Land Use Designation	Interior Standard	Exterior Standard
Residential, including public institutions and hospitals	45	65
Neighborhood Commercial	--	70
Office Commercial	50	70
Light Industry/Business Park	55	75
Open Space	--	70

Source: City of Yorba Linda General Plan, 1993, Table N-2

The City similarly exempts construction-related activities from noise regulations provided they take place between the hours of 7:00 a.m. and 8:00 p.m. on weekdays and Saturday. No construction is allowed at any time on Sunday or a federal holiday.

5.10.3 Thresholds of Significance

The state encourages local agencies to adopt their own thresholds, but it is not required. According to Appendix G of the CEQA Guidelines, the Proposed Project would have a potentially significant impact with respect to noise if the project will 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 a plan has not been adopted, within two miles of a public airport or public use airport, exposure of persons residing or working in the Project Area to excessive noise levels.
- For a project within the vicinity of a private airstrip, exposure of persons residing or working in the Project Area to excessive noise levels.

As shown in Table 5-10-3, Residential Exterior Noise Standards, Orange County above, the County has adopted noise standards for residential uses. The exterior noise standard for Orange County for residential uses is 65 dBA CNEL in usable outdoor space. If required, attenuation through setback and project perimeter barriers is

anticipated to reduce traffic noise to the 65 dBA CNEL goal. However, an inability to achieve this goal through the application of reasonably available mitigation measures would be considered a significant impact.

Impacts may also be significant if they create a substantial permanent or temporary increase. The term “substantial” is not quantified in the CEQA Guidelines. Typically, “substantial” is taken to mean a level that is clearly perceptible to humans. As analyzed in the Giroux Noise Analysis, a +3 dB increase was considered a significant increase if it causes the most stringent residential noise/land use guidelines of 65 dBA CNEL to be exceeded on a temporary or permanent basis. The following noise impacts due to project-related traffic would be considered significant:

1. If construction activities were to audibly intrude into adjacent residential areas during periods of heightened noise sensitivity, such as evening or night time hours.
2. If project traffic noise were to cause an increase by a perceptible amount (+3 dB CNEL) and expose receivers to levels exceeding the Orange County compatibility noise standards.

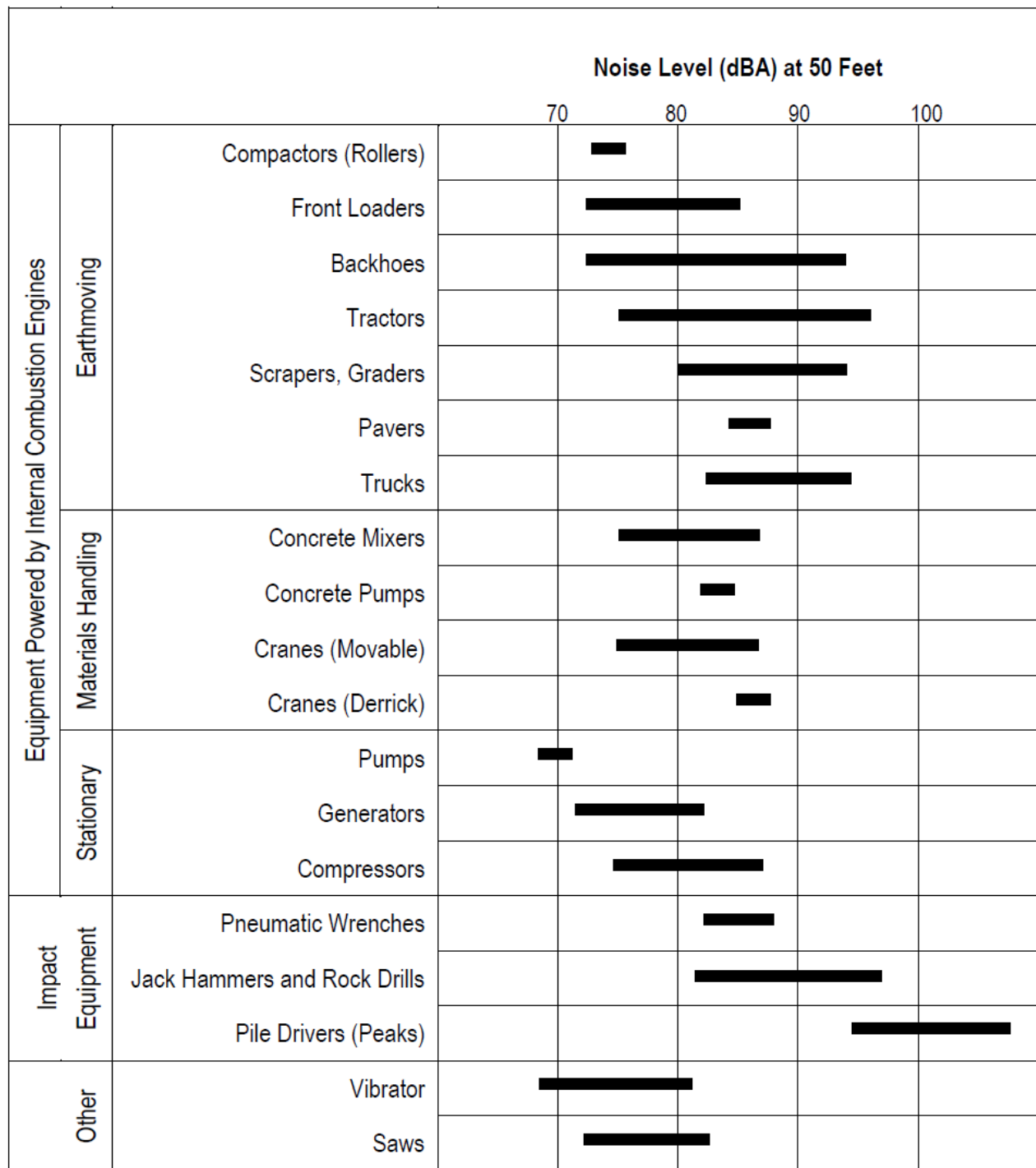
5.10.4 Project Impacts Prior to Mitigation

1. Construction Noise

a. Heavy Equipment

Short-term temporary construction noise impacts tend to occur in phases related to grading, foundation, and construction activities. The equipment used for each phase ranges widely and, therefore, the noise impacts will vary. The earth-moving equipment is the noisiest, typically ranging from 75 to 90 dBA at 50 feet from the source. Exhibit 5-105 – Typical Construction Equipment Noise Generation Levels depicts the range of noise emissions for various pieces of construction equipment.

Point sources of noise emissions are attenuated by a factor of 6 dBA per doubling of distance through geometrical (spherical) spreading of sound waves. At a distance of approximately 200 feet, quieter noise sources will drop to a 65 dBA exterior/45 dBA interior noise level. The loudest equipment (tractors, backhoes, jack hammers, pile drivers) may require over 1,000 feet distance from the source to achieve the same reduction to a 65 dBA exterior exposure level. This estimate assumes a clear line of sight from the source to the receiver. There are noise-sensitive receivers within 1,000 feet of planned construction activities. However, variations in terrain elevation or existing structures act as noise barriers that may interrupt equipment noise propagation. Construction noise impacts are, therefore, somewhat less than that predicted under idealized input conditions.



Source: EPA PB 206717, Environmental Protection Agency, December 31, 1971, "Noise from Construction Equipment and Operations."

Exhibit 5-105 – Typical Construction Equipment Noise Generation Levels

The Federal Highway Administration (FHWA) has developed a construction activity noise model that is an industry standard for assessing construction activity noise impacts. Quantitatively, the primary noise prediction equation is expressed as follows for the hourly average noise level (Leq) at distance D between the source and receiver (dBA):

$$Leq = L_{max} @ 50' - 20 \log(D/50') + 10 \log (U.F.\%/100) - I.L.(Bar)$$

Where:

L_{max} @ 50' is the published reference noise level at 50 feet

U.F.% is the usage factor for full power operation per hour

I.L.(bar) is the insertion loss for intervening barriers

Published reference noise levels for heavy construction equipment used in clearing, excavation and grading include the following (Noise Control for Buildings, BBN, 1987):

- Dozers - 85 dBA
- Tractors - 80 dBA
- Backhoes - 86 dBA
- Excavators - 86 dBA
- Graders - 86 dBA

Assuming three large pieces of equipment operate in close proximity, their combined L_{max} reference level is 91 dBA at 50 feet. Under a clear line of sight and a typical usage factor of 40%, the hourly noise level as a function of distance is shown in Table 5-10-5.

Table 5-10-5 Distance/Noise Level

Distance to Source	Hourly Level
100 feet	81 dBA
200 feet	75 dBA
300 feet	71 dBA
400 feet	69 dBA
500 feet	67 dBA
640 feet	65 dBA
800 feet	63 dBA
1,000 feet	61 dBA

County standards restrict construction activities using heavy equipment to hours of lesser residential sensitivity if occupied residences are nearby. Levels of 65 dBA can interfere with comfortable conversation and levels of 75 dBA can intrude into quiet interior activities even with closed windows. It is not anticipated that noise levels at adjacent residential uses will reach 75 dBA Leq during construction. However, equipment noise may reach 65 dBA at the closest existing homes, which are approximately 600 feet from the nearest residential lot within the Project Site. Noise attenuation can be achieved as the terrain changes and structures and walls associated with the Proposed Project are completed, providing buffers between equipment

operations and adjacent uses, thereby reducing noise impacts from construction operations.

As noted, the Orange County Municipal Code permits construction during the hours of 7:00 a.m. to 8:00 p.m. on weekdays and Saturdays. Construction is not permitted on Sundays or federal holidays. Construction permits are conditioned to these limits to minimize adverse construction noise impacts. The City of Yorba Linda has adopted these standards with respect to construction noise, which is exempted as long as there is compliance with the daytime and nighttime requirements.

2. Movement of Construction Equipment and Workers

The movement of construction equipment onto and from the site and the daily ingress and egress of construction workers will generate temporary traffic noise along access routes. The major pieces of heavy equipment moving into the development areas could also impact currently low ambient noise levels. The project proposes two potential access points. Option 1 utilizes Stonehaven Drive for access and Option 2 utilizes an extension of the existing terminus of Aspen Way.

Depending on final site design, several alternative access points for construction traffic could be developed. The CalEEMod computer model predicts the peak construction day for the most intensive traffic period in terms of worker traffic, vendor trucks, and heavy-duty diesel vehicles delivering equipment and building supplies. The forecast peak daily traffic is presented in the table below.

Table 5-10-6 Peak Daily Construction Traffic

Source	Trips Per Day
Worker trips	136/day
Vendor (medium) trucks	20/day
Vendor (heavy) trucks	20/day
Total Trips Per Day	176/day

Assuming the traffic occurs between 7:00 a.m. and 3:00 p.m., the calculated CNEL is 54 dB at 50 feet from the centerline. The measured daytime baseline noise level was 46 dB Leq. CNEL is typically 2 to 3 dB higher than daytime Leq levels due to nocturnal noise penalties in the CNEL calculation. A background level of 49 dB CNEL is considered representative at homes near candidate access points. As noted, the Orange County General Plan standard for usable outdoor residential space is 65 dB CNEL. The City standard is also 65 dB CNEL.

For purposes of the Noise Analysis, three access points were considered where construction traffic noise was calculated as follows:

Table 5-10-7 Construction Traffic Noise Locations

Access Location	Distance to Receiver
Stonehaven Drive	50 feet
Aspen Way	50 feet
San Antonio Road south of Aspen Way	250 feet

The calculated peak daily construction traffic noise, compared to the measured baseline and the General Plan standard is shown in the table below.

Table 5-10-8 Construction Noise Comparison

Access Location	Peak Noise (dB CNEL)	Compared to	
		Baseline	GP Standard
Stonehaven Drive	54 dB	+5 dB	-11 dB
Aspen Way	54 dB	+5 dB	-11 dB
San Antonio Road	47 dB	-2 dB	-18 dB

As noted above, construction noise is exempt from noise regulation by the County and the City if the activity is restricted to hours of lesser sensitivity (7:00 a.m. to 8:00 p.m.). While peak construction activity traffic will be temporary, as a general rule, increases of +5 dB above the baseline are often considered a clearly noticeable increase. Therefore, peak daily construction access noise would be temporarily noticeable at Stonehaven Drive and Aspen Way, but less than background at San Antonio Road.

3. Vibration

Background vibration levels in residential areas are usually 50 VdBA (vibration decibels) or less, below the threshold of human perception. Typically, such vibrations are attributed to the operation of heating and air conditioning units, doors slamming or street traffic. Some of the most common external sources of vibration that are perceptible inside residences are construction and traffic.

Construction activities generate groundborne vibration when heavy equipment travels over unpaved surfaces or when it is engaged in soil movement. Effects of groundborne vibration could include discernible movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls and rumbling sounds. Vibration related problems generally occur due to resonances in the structural components of a building because structures amplify groundborne vibration. Ground vibration is quickly damped out within the “soft” sedimentary surfaces of much of southern California and is almost never annoying to people who are outdoors.

While very few jurisdictions have adopted significance thresholds for vibration, such thresholds have been adopted by counties and cities for major public works construction projects. Such thresholds mostly relate to structural protection rather than to human annoyance.

Table 5-10-9 below provides estimates of vibration levels induced by construction equipment at various distances in order to determine the potential impacts from the Proposed Project's construction activities.

Table 5-10-9 Approximate Vibration Levels Induced by Construction Equipment

Equipment	Vibration Decibels (VdBA)*				
	25 feet	50 feet	100 feet	600 feet	1000 feet
Large bulldozer	87	81	75	59	55
Loaded truck	86	80	74	58	54
Jackhammer	79	73	67	51	47
Small bulldozer	58	52	46	30	26

*FTA Transit Noise & Vibration Assessment, Chapter 12, Construction, 2006)

As shown in Table 5-10-9, the maximum potential vibration will be created by the large bulldozer. The nearest existing residence is approximately 600 feet from the nearest lot in the Proposed Project, at which point the vibration dissipates to 59 VdB and below the threshold of human perception. Most construction equipment will operate at greater distance separation. However, some grading activity could occur at a distance less than the nearest residential lot. This will be a short-term impact and, based on the table above, would reach the level of annoyance at distances of 100 feet. Therefore, construction activity vibration could cause perceptible noise impacts depending on distance from the nearest residence. However, vibration impacts are less than significant because vibration will dissipate as distances increase and construction activity will occur only during the hours specified by the County and City noise standards.

4. Long Term Vehicular Noise

Long-term noise impacts will primarily be due to mobile sources on project roadways. Analysis of potential noise impacts was conducted using the California specific vehicle noise curves (CALVENO) in the federal roadway noise model (FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108). The model calculates the Leq noise level for a particular reference set of input conditions and then makes a series of adjustments for site-specific traffic volumes, distances, roadway speeds, or noise barriers. Typical Orange County day-night travel percentages and auto-truck vehicle mixes are then applied to convert one-hour Leq levels to a weighted 24-hour CNEL.

Utilizing data from the traffic analysis prepared for the project by Linscott, Law & Greenspan, Inc., three timeframes were evaluated: Existing Conditions With and Without Project, Year 2020 With and Without Project, and Year 2035 With and Without Project. The 24-hour CNEL level at 50 feet from the roadway centerline was calculated along adjacent roadway segments. Two project options were evaluated with differing project access points.

- Option 1 provides access via Stonehaven Drive
- Option 2 provides access via Aspen Way

The results of the near-term traffic noise analysis are depicted in Table 5-10-10 below.

The results of the Year 2020 project related noise impacts are depicted in Table 5-10-11 below.

The results of the Year 2035 project related noise impacts are depicted in Table 5-10-12 below.

Vehicular traffic volumes and roadway travel speeds were obtained from the Traffic Impact Analysis for this project. It is unlikely that build-out would occur immediately with a project this large. By 2020 and 2035, when area build-out occurs, the project impacts are diluted and not as significant as under current conditions. Therefore, existing conditions were overlaid with project traffic to provide a worst case impact analysis even though project build-out will not occur for several years. Analysis determined that each option will cause a significant noise increase along the primary access route, because the Project-related noise increase will exceed 3.0 dBA, which is considered to be a perceptible increase in noise levels.

Option 1 (Stonehaven Drive)

Option 1, which provides access via Stonehaven Drive, causes a significant impact along Via del Agua and Stonehaven Drive. As shown in Table 5-10-10 above near-term traffic noise would result in a 3.1 dB increase in noise levels from 58.6 dB (existing) to 61.8 dB (existing + Option 1), which is above the CEQA threshold of 3.0 dB. Table 5-10-11 above shows that noise levels would increase 3.0 dB from 59.0 dB (existing) to 61.9 dB (2020 + Option 1). Table 5-10-12 shows an increase of 2.0 dB from 59.6 (existing) to 61.6 (2035 + Option), which is less than the CEQA impact threshold. However, even at area build-out in horizon year 2035, the “With Project” traffic noise levels at 50 feet from the roadway centerline are less than 65 dB CNEL, which is the recommended compatibility threshold for sensitive uses. The increase in noise resulting from Project-related traffic would exceed 3.0 dBA, which is a perceptible increase in noise and exceeds the CEQA threshold. However, the noise level at 50 feet from the roadway centerline is less than the 65 dBA CNEL exterior noise standard prescribed by the County.

Table 5-10-10 Near-Term Traffic Noise Impact Analysis

Road Segment	CNEL in dB at 50 feet from Centerline						
	Existing	Existing + Option 1	Existing + Option 2	Existing + Option 2A	Existing Impacts Option 1	Existing Impacts Option 2	Existing Impacts Option 2A
Yorba Linda Boulevard/ Imperial Hwy-Kellogg Drive Village Center-San Antonio San Antonio-La Palma	72.0 72.0 72.0	72.2 72.3 72.0	70.9 71.0 70.9	72.2 72.3 72.2	0.1 0.3 0.0	-1.1 -0.9 -1.0	0.1 0.3 0.2
Weir Canyon/ E of La Palma	74.0	74.1	74.1	74.1	0.1	0.1	0.1
San Antonio Road/ N of Yorba Linda Boulevard	56.5	56.5	60.8	60.8	0.0	4.4	4.43
Aspen Way/ E of San Antonio	43.4	-	58.0	-	-	14.6	0.0
Via Del Agua/ W of site entrance N of Yorba Linda Boulevard	52.3 55.6	59.8 60.6	- -	- -	7.4 5.0	- -	- -
Stonehaven Drive/ E of site entrance N of Yorba Linda Boulevard	53.1 55.2	56.2 57.4	- -	- -	3.1 2.2	- -	- -

Table 5-10-11 Project-Related Noise Impact Analysis, Year 2020

Road Segment	CNEL in dB at 50 feet from Centerline						
	2020	2020 + Option 1	2020 + Option 2	2020 + Option 2A	2020 Impacts Option 1	2020 Impacts Option 2	Existing Impacts Option 2A
Yorba Linda Boulevard/ Imperial Hwy-Kellogg Drive Village Center-San Antonio San Antonio-La Palma	72.7 72.4 72.5	72.8 72.7 72.5	71.6 71.4 71.5	72.8 72.7 72.7	0.1 0.3 0.0	-1.1 -1.0 -1.0	0.1 0.3 0.2
Weir Canyon/ E of La Palma	74.5	74.6	74.6	74.6	0.1	0.1	0.1
San Antonio Road/ N of Yorba Linda Boulevard	57.0	-	61.1	61.1	-	4.1	4.1
Aspen Way/ E of San Antonio	47.6	-	58.3	-	-	10.7	-
Via Del Agua/ W of site entrance N of Yorba Linda Boulevard	52.7 58.4	59.8 61.7	- -	- -	7.1 3.3	- -	- -
Stonehaven Drive/ E of site entrance N of Yorba Linda Boulevard	53.4 55.6	56.4 57.6	- -	- -	3.0 2.0	- -	- -

Table 5-10-12 Project-Related Noise Impacts, 2035

Road Segment	CNEL in dB at 50 feet from Centerline						
	2035	2035 + Option 1	2035 + Option 2	2035 + Option 2A	2035 Impacts Option 1	2035 Impacts Option 2	2035 Impacts Option 2A
Yorba Linda Boulevard/ Imperial Hwy-Kellogg Drive Village Center-San Antonio San Antonio-La Palma	72.3 71.2 71.8	72.4 71.4 71.8	72.4 71.4 72.0	73.6 72.7 73.2	0.1 0.2 0.0	0.1 0.2 0.2	1.3 1.5 1.4
Weir Canyon/ E of La Palma	74.9	75.0	75.0	75.0	0.1	0.1	0.1
San Antonio Road/ N of Yorba Linda Boulevard	57.2	-	61.8	61.8	-	4.6	4.6
Aspen Way/ E of San Antonio	50.2	-	58.6	-	-	8.4	-
Via Del Agua/ W of site entrance N of Yorba Linda Boulevard	55.5 60.0	60.5 62.5	- -	- -	5.0 2.5	- -	- -
Stonehaven Drive/ E of site entrance N of Yorba Linda Boulevard	55.8 57.9	57.8 59.2	- -	- -	2.0 1.3	- -	- -

Option 2 (Aspen Way)

Under Option 2, which provides access via Aspen Way, Table 5-10-10 shows a 43.4 dB (year 2020 existing) at 50 feet from roadway centerline and a 58.0 dB (existing + Option 2). This results in an increase of 14.7 dB due to the existing low utilization of Aspen Way under current conditions. As shown on Table 5-10-11, noise levels rise from 47.6 dB (year 2020 existing) to 58.3 dB (existing + Option 2) resulting in a 10.7 dB increase. Table 5-10-12 shows a change from 50.2 dB (year 2035 existing) to 58.6 (existing + Option 2), resulting in an 8.4 dB increase. The decreases in noise levels between existing, year 2020, and year 2035 are primarily due to the dilution of noise as the Project Area is built out, and contrasts with existing conditions are not as significant. While considered substantial, the overall noise level, even in 2035, is less than the 65 dB CNEL residential exterior noise compatibility threshold (assuming a 25 mph travel speed) at 50 feet from the roadway centerline.

Residences along the eastern alignment of San Antonio Road between Aspen Way and Yorba Linda Boulevard are set back from the roadway centerline by more than 100 feet, reducing the year 2035 noise levels at the nearest residence to 59 dB CNEL, less than the 65 dB CNEL compatibility threshold and the County's noise standard.

Two residences are within 50 feet of the Aspen Way centerline such that these residences would be expected to experience the full 58 dB CNEL noise level in the future as compared to 43 dB CNEL currently. Traffic noise impacts would exceed the CEQA-designated perceptible noise increase of +3 dB as compared to "Existing Without Project" levels. Area traffic noise levels would remain below 65 dB CNEL and, therefore, would not exceed the County's 65 dB CNEL threshold.

The Noise Analysis indicates a substantial noise increase from Project-related traffic on Aspen Way and Stonehaven Drive under Option 2 for the existing and future time periods. The increase in noise levels is expected to exceed +3 dB at 50 feet from the roadway centerline, which is considered a perception threshold. This is a significant impact with regard to a perceptible increase in noise levels. However, overall traffic noise is expected to be less than 60 dB CNEL at 50 feet from the Aspen Way centerline and would also be less than significant.

While all access options would result in a noticeable noise increase over existing conditions to nearby residences, the overall traffic noise environment remains below 65 dB CNEL. The increase in Project-related traffic noise levels will exceed the +3.0 dB CEQA threshold, which is considered a significant increase. However, because noise levels are forecast to remain below the 65 dB CNEL exterior noise standard, no mitigation measures are required. There are no feasible mitigation measures, such as sound walls, to reduce the 3 dB perceptible increase in noise, because such walls are not typically used in residential neighborhoods. Because the existing noise levels are low, the addition of Project-related traffic will increase noise levels more than the +3 dB perception threshold, and no mitigation measures are available under "With Project" conditions.

5.10.5 Mitigation Measures

- N-1 During the construction phase, Project Applicant shall ensure that all construction activities shall be limited to the hours of 7:00 a.m. to 8:00 p.m. on weekdays and Saturdays with no construction permitted on national holidays or Sundays in compliance with the Orange County Noise Ordinance. High noise-producing activities should be scheduled between the hours of 8:00 a.m. and 5:00 p.m. to minimize disruption to sensitive uses.
- N-2 During the construction phase, Project Applicant shall ensure that all construction and demolition equipment shall be fitted with properly operating and maintained mufflers.
- N-3 During the construction phase, Project Applicant shall ensure that all noise-generating construction equipment and construction staging areas should be located as far as possible from existing residences.
- N-4 During the construction phase, Project Applicant shall ensure that construction-related equipment, including heavy duty equipment, shall be turned off when not in use for more than 10 minutes.
- N-5 Prior to construction, the Project Applicant shall prepare and submit to the County for approval a haul plan for construction-related traffic that limits impacts on residential development by avoiding such residential development areas where feasible.
- N-6 During the construction phase, Project Applicant shall ensure that construction hours, allowable work days, and the telephone number of the job superintendent are clearly posted at all construction entrances to allow residents to contact the job superintendent. If the job superintendent receives a complaint, the superintendent shall investigate, take appropriate corrective action, and report the action taken to the appropriate reporting party.

5.10.6 Level of Significance after Mitigation

1. Short-Term Construction Impacts

Short-term construction noise and vibration impacts will be limited by the requirement for compliance with County of Orange regulations and ordinances. Peak daily construction traffic noise would be noticeable for either Stonehaven-Drive (Option 1) or Aspen Way (Option 2), but is not expected to exceed the General Plan standard of 65 dB CNEL.

Implementation of the mitigation measures provided herein will reduce impacts due to construction equipment noise. However, the low baseline levels for ambient noise in the project vicinity show that the Proposed Project Area is sensitive to even a moderate increase in noise and that construction noise will be perceptible to adjacent development. It is estimated that equipment noise may reach 65 dB at the closest existing homes, which are 600 feet from the nearest Esperanza Hills lot. The County exempts construction-related noise during the hours of 7:00 a.m. to 8:00 p.m. on weekdays and Saturdays. Therefore, exceedance of the County's exterior noise

threshold is not considered significant with compliance to the Noise Ordinance hours of operation. However, it should be noted that distance attenuation will reduce the impact as equipment moves away from the existing residences. The projected levels are within County and City standards for exterior noise levels. These impacts are temporary and will cease upon construction completion.

2. Long-Term Operational Impacts

The Noise Analysis indicates that the noise increase from Project-related traffic in the existing and future time period under Option 1 and Option 2 would exceed +3 dB at 50 feet from the roadway centerline, which is considered a perceptible increase in noise levels. This increase is a significant impact based on CEQA thresholds, because a 3 dB increase is a perceptible increase in noise levels. However, the overall noise levels with the Project will be within the 65 dB CNEL standard established by the Orange County General Plan noise compatibility guidelines for residential uses. The City has established the same noise standards.

While projected noise levels along Via del Agua and Stonehaven Drive (Option 1) and Aspen Way (Option 2) will increase significantly under existing, Year 2020, or Year 2035 conditions, levels at 50 feet from the roadway centerline will remain below the 65 dB CNEL threshold. The County noise compatibility guidelines for residential uses identify 65 dB CNEL as the exterior standard in outdoor living areas. No mitigation measures are required for long-term operation of the Proposed Project because noise levels will remain under the 65 dB CNEL threshold.

The Proposed Project has the potential to expose persons to noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies due to short term construction as detailed above. However, adherence to County and City noise ordinances for construction will result in a less than significant impact.

The short-term construction activities will expose adjacent residences to groundborne vibration and noise levels, but at the nearest existing residence, levels will be below the threshold for exterior noise.

The Proposed Project will result in a temporary increase in ambient noise levels due to construction activities. Adherence to County and City noise ordinances for hours of operation will reduce the impact to less than significant. Permanent increases in the ambient noise level will result from vehicular traffic. The increases will exceed the CEQA threshold of +3 dB; however, levels will remain below the exterior noise ordinance levels of 65 dB CNEL.

The Proposed Project is not located within an airport land use plan or within the vicinity of a private airport, and no impacts in this area will occur.

5.10.7 Cumulative Impacts

The Noise Analysis indicates that a significant cumulative traffic noise increase of +14.7 dB CNEL will occur along Aspen Way under Option 2 conditions. San Antonio Road north of Yorba Linda Boulevard is also anticipated to experience a significant cumulative impact with a +4.1 dB CNEL increase in traffic noise at 50 feet from roadway centerline under Option 2 conditions. Therefore, since the impacts are greater than the +3 dB CNEL CEQA threshold, it is anticipated that the Proposed Project will result in significant cumulative noise impacts due to project-generated traffic, notwithstanding that County noise level standards of 65 dB CNEL will not be exceeded.

As shown in the Noise Analysis, projected noise levels will range from 58.0 to 61.9 dB depending on which access option is selected. The addition of the proposed Cielo Vista project will also increase traffic volumes. With the construction of 112 residential units, noise levels could remain under the 65 dB CNEL; however, the additional units would further exceed the 3 dB CNEL threshold. Therefore, the Noise Analysis concludes that cumulative operational noise levels for typical residential uses will be within the Orange County noise compatibility guidelines, but will result in a significant increase, exceeding the 3 dB CEQA threshold of a perceptible noise increase.

5.10.8 Unavoidable Adverse Impacts

Implementation of the Proposed Project will result in a 3 dB increase in noise due to traffic at two intersections:

- Aspen Way (Option 2) under near term, Year 2020, and Year 2035 conditions
- Stonehaven Drive (Option 1) under near term and Year 2035 conditions

This increase is a significant impact based on CEQA thresholds, because a 3dB increase is a perceptible increase in noise levels. This impact is considered significant and unavoidable.