5.11 NOISE

This section of the Draft Environmental Impact Report (DEIR) discusses the fundamentals of sound; examines federal, state, and local noise guidelines, policies, and standards; reviews noise levels at existing noise-sensitive receptor locations; evaluates potential noise and vibration impacts associated with the Laguna Niguel City Center Mixed Use Project (proposed project); and provides mitigation to reduce noise impacts at sensitive receptor locations. The noise impact analysis is in accordance with the City's CEQA Manual. It also uses procedures and methodologies specified by the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), and the California Department of Transportation (Caltrans). Appendix J of this DEIR provides supplementary, project-specific background information, construction noise calculation worksheets, and project-generated traffic noise modeling results.

5.11.1 Environmental Setting

5.11.1.1 SOUND FUNDAMENTALS

Sound is a pressure wave transmitted through the air. It is described in terms of loudness or amplitude (measured in decibels), frequency or pitch (measured in Hertz [Hz] or cycles per second), and duration (measured in seconds or minutes). The standard unit of measurement of the loudness of sound is the decibel (dB). Changes of 1 to 3 dBA are detectable under quiet, controlled conditions and changes of less than 1 dBA are usually indiscernible. A 3 dBA change in noise levels is considered the minimum change that is detectable with human hearing in outside environments. A change of 5 dBA is readily discernable to most people in an exterior environment whereas a 10 dBA change is perceived as a doubling (or halving) of the sound.

The human ear is not equally sensitive to all frequencies. Sound waves below 16 Hz are not heard at all and are "felt" more as a vibration. Similarly, while people with extremely sensitive hearing can hear sounds as high as 20,000 Hz, most people cannot hear above 15,000 Hz. In all cases, hearing acuity falls off rapidly above about 10,000 Hz and below about 200 Hz. Since the human ear is not equally sensitive to sound at all frequencies, a special frequency dependent rating scale is usually used to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by weighting frequencies in a manner approximating the sensitivity of the human ear.

Noise is defined as unwanted sound and is known to have several adverse effects on people, including hearing loss, speech and sleep interference, physiological responses, and annoyance. Based on these known adverse effects of noise, the federal government, the State of California, and many local governments have established criteria to protect public health and safety and to prevent disruption of certain human activities.

Technical Terminology

Noise is most often defined as unwanted sound. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness." The following are brief definitions of terminology used in this section:

- **Sound.** A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale.
- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Equivalent Continuous Noise Level (L_{eq}); also called the Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.
- **Statistical Sound Level (L_n).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."
- **Day-Night Sound Level (L_{dn} or DNL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.
- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added from 7:00 pm to 10:00 pm and 10 dB from 10:00 pm to 7:00 am. For general community/environmental noise, CNEL and L_{dn} values rarely differ by more than 1 dB (with the CNEL being only slightly more restrictive, that is, higher than the L_{dn} value). As a matter of practice, L_{dn} and CNEL values are interchangeable and are treated as equivalent in this assessment.
- **Peak Particle Velocity (PPV).** The peak signal value of an oscillating vibration velocity waveform, usually expressed in inches per second (in/sec).
- **Vibration Decibel (VdB).** A unitless measure of vibration, expressed on a logarithmic scale and with respect to a defined reference vibration velocity. In the U.S., the standard reference velocity is 1 micro-inch per second ($1x10^{-6}$ in/sec).
- **Sensitive Receptor.** Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.
- **RCNM.** Federal Highway Administration Roadway Construction Noise Model

Sound Measurement

Sound pressure is measured through the A-weighted measure to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies.

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale, representing points on a sharply rising curve. On a logarithmic scale, an increase of 10 dBA is 10 times more intense than 1 dBA, while 20 dBA is 100 times more intense, and 30 dBA is 1,000 times more intense. A sound as soft as human breathing is about 10 times greater than 0 dBA. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. This phenomenon is known as "spreading loss." For a single point source, sound levels decrease by approximately 6 dBA for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by on-site operations from stationary equipment or activity at a project site. If noise is produced by a line source, such as highway traffic, the sound decreases by 3 dBA for each doubling of distance in a hard site environment. Line source noise in a relatively flat environment with absorptive vegetation decreases by 4.5 dBA for each doubling of distance.

Time variation in noise exposure is typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called L_{eq}), or alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. For example, the L_{50} noise level represents the noise level that is exceeded 50 percent of the time. Half the time the noise level exceeds this level and half the time the noise level is less than this level. This level is also representative of the level that is exceeded 30 minutes in an hour. Similarly, the L_2, L_8 and L_{25} values represent the noise levels that are exceeded 2, 8, and 25 percent of the time, or 1, 5, and 15 minutes per hour. These "Ln" values are typically used to demonstrate compliance for stationary noise sources with a city's noise ordinance, as discussed below. Other values typically noted during a noise survey are the L_{min} and L_{max}. These values represent the minimum and maximum root-mean-square noise levels obtained over the measurement period.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law and the City require that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL) or Day-Night Noise Level (L_{dn}). The CNEL descriptor requires that an artificial increment of 5 dBA be added to the actual noise level for the hours from 7:00 p.m. to 10:00 p.m. and 10 dBA for the hours from 10:00 p.m. to 7:00 a.m. The L_{dn} descriptor uses the same methodology except that there is no artificial increment added to the hours between 7:00 p.m. and 10:00 p.m. Both descriptors give roughly the same 24-hour level with the CNEL being only slightly more restrictive (i.e., higher).

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, and thereby affecting blood pressure, the heart, and the nervous system. In comparison, extended periods of noise exposure above 90 dBA could result in permanent hearing damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. Table 5.11-1 shows typical noise levels from familiar noise sources.

Table 5.11-1 Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Onset of physical discomfort	120+	
	110	Rock Band (near amplification system)
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at three feet		
	90	
Diesel Truck at 50 feet, at 50 mph		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime		
	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans 2013a.

5.11.1.2 VIBRATION FUNDAMENTALS

Vibration is an oscillating motion in the earth. Like noise, vibration is transmitted in waves, but in this case through the earth or solid objects. Unlike noise, vibration is typically of a frequency that is felt rather than heard.

Vibration can be either natural as in the form of earthquakes, volcanic eruptions, or landslides, or human-made as from explosions, heavy machinery, or trains. Both natural and human-made vibration may be continuous such as from operating machinery, or impulsive as from an explosion.

As with noise, vibration can be described by both its amplitude and frequency. Amplitude may be characterized in three ways—displacement, velocity, and acceleration. Particle displacement is a measure of the distance that a vibrated particle travels from its original position and for the purposes of soil displacement is typically measured in inches or millimeters. Particle velocity is the rate of speed at which soil particles move in inches per second or millimeters per second. Particle acceleration is the rate of change in velocity with respect to time and is measured in inches per second or millimeters per second. Typically, particle velocity (measured in inches per second) and/or acceleration (measured in gravities) are used to describe vibration.

The way in which vibration is transmitted through the earth is called propagation. As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level striking a given point is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced with distance as a result of material damping in the form of internal friction, soil layering, and void spaces. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

5.11.1.3 REGULATORY BACKGROUND

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. There are no federal regulations directly applicable to the project under CEQA.

State

California Building Code

The California Building Code requires that interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room (Cal. Code of Reg. Title 24, Part 2, Volume 1, Chapter 12, Section 1207.11.2, Allowable Interior Noise Levels). The noise metric is evaluated as either the day-night average sound level (Ldn) or the community noise equivalent level (CNEL), consistent with the noise element of the local general plan.

The State of California's noise insulation standards for nonresidential uses are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, and Part 11, California Green Building Standards Code (CALGreen). CALGreen noise standards are applied to new or renovation construction projects in California to control interior noise levels resulting from exterior noise sources. Proposed projects may use either the prescriptive method (Section 5.507.4.1) or the performance method (Section 5.507.4.2) to

show compliance. Under the prescriptive method, a project in a noise environment of 65 dBA CNEL or higher must demonstrate transmission loss ratings for the wall and roof-ceiling assemblies and exterior windows when located within a noise environment of 65 dBA CNEL or higher. Under the performance method, a project must demonstrate that interior noise levels do not exceed 50 dBA $L_{eq(1hr)}$.

Local Noise Standards

Laguna Niguel General Plan

The Noise Element of the Laguna Niguel General Plan has goals, policies, and actions to protect residential neighborhoods and noise-sensitive receptors from excessive noise levels. The City uses the land use noise compatibly guidelines shown in Table 5.11-2 when siting new development and making land use decisions.

Table 5.11-2 Laguna Niguel Land Use Noise Standards (CNEL dBA)

Land Use	Interior Standard	Exterior Standard
Residential Detached Residential Attached	45	65
Neighborhood Commercial Community Commercial	-	70
Professional Office	50	
Community Commercial/Professional Office	-	70
Industrial/Business Park	55[1]	75
Professional Office/Industrial/Business Park Industrial/Business Park/Professional Office/Community Commercial	-	75
Public/Institutional Public Institutional/Professional Office	50	70
Schools	50	65[2]
Parks and Recreations	-	70

Source: City of Laguna Niguel CEQA Manual.
[1] Where quiet is a basis for use.
[2] In interior or exterior classroom areas during school operating hours

Laguna Niguel Municipal Code

The Laguna Niguel Municipal Code, Division 6, Noise Control Table 5.11-3, summarizes the City's noise standards. These limits apply to all residential properties within the City.

Table 5.11-3 Exterior Noise Standards: City of Laguna Niguel

Time Period	Noise Level, dBA				
	L_{50}	L_{25}	L_8	L_2	L_{max}
7:00 am–10:00 pm	55	60	65	70	75
10:00 pm–7:00 am	50	55	60	65	70

Source: City of Laguna Niguel Municipal Code, Sec. 6-6.5 Exterior Noise Standards.

1. A 5 dBA penalty shall be applied in the event of an alleged offensive noise such as impact noise, simple tones, speech, music, or any combination of thereof.
2. The noise standards shall not exceed:
   a The noise standard for a cumulative period of more than 30 minutes in any hour (L_{50}); or
   b The noise standard plus 5 dBA for a cumulative period of more than 15 minutes in any hour (L_{25}); or
   c The noise standard plus 10 dBA for a cumulative period of more than 5 minutes in any hour (L_8); or
   d The noise standard plus 15 dBA for a cumulative period of more than 1 minute in any hour (L_2); or
   e The noise standard plus 20 dBA for any period of time (L_{max}).
3. If the ambient noise level exceeds any of the first four noise limit categories, the cumulative period applicable to such category shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under such category shall be increased to reflect the maximum ambient noise level.

Exemptions

The Municipal Code (Division 6 Noise Control, Section 6-6-7) exempts noise sources associated with construction, repair, remodeling, or grading during the hours of 7:00 am to 8:00 pm on weekdays and Saturday. Construction noise on Sundays and federal holidays is not exempt from the City's noise standards. In addition, outdoor gatherings, public dances, and shows are exempt, provided such events are conducted pursuant to a license issued by the City. The Municipal Code also exempts noise sources associated with the maintenance of real property, provided such 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.

5.11.1.4 EXISTING NOISE ENVIRONMENT

In general, the City is subject to typical urban and suburban noise sources. Noise from traffic flows, commercial and retail centers, temporary construction, property maintenance activities, and day-to-day outdoor activities (e.g., periodic landscaping, children playing, animal sounds) characterizes the City's noise environments. The City also has several transportation noise sources, including the I-5 and SR-73 freeways as well as major arterials, such as Crown Valley Parkway, Aliso Creek Road, Niguel Road, Cabot Road, Alicia Parkway, and La Paz Road. There are no notable noise sources related to railroads or aircraft facilities near the project site.

Sensitive Receptors

Certain land uses are particularly sensitive to noise and vibration, including schools, residences, hospital facilities, religious facilities, and open space/recreation areas where quiet environments are necessary for the enjoyment, public health, and safety of the community. Commercial and industrial uses are not considered noise- and/or vibration-sensitive uses.

Land uses surrounding the project site are shown on Figure 5.11-1, *Nearest Noise-Sensitive Receptors to Project Site.* The nearest sensitive uses to the project site include residential uses, a church, and a daycare facility. The nearest residential uses are adjacent to the southwest. The Laguna Niguel Presbyterian Church is across the street from the project site, at the corner of Pacific Island Drive and Alicia Parkway. Additional residential uses are across Crown Valley Parkway and Pacific Island Drive. Note that sensitive receptors in Figure 5.11-1 are named the

same as discussed in the construction noise and vibration impact analysis and tables below. The impact analysis will discuss the various distances from receptors to noise and vibration sources (construction, mechanical equipment, recreational, special events, etc.).

Ambient Noise Measurements

To determine baseline noise levels in the project vicinity, ambient noise monitoring was conducted by PlaceWorks in September 2019. Long-term (48-hour) measurements were conducted at two locations, and short-term (15-minute) measurements were conducted at four locations. Measurements were made during weekdays, and short-term measurements were during the peak evening traffic hours of 3:00 pm to 6:00 pm. All measurements were conducted Tuesday, September 3, through Thursday, September 5, 2019[1].

The primary noise sources around the measurements were traffic, aircraft overflights, and maintenance noise from the County Maintenance Yard. Urban activity noise, such as dogs barking and birds chirping also contributed to the overall noise environment. Meteorological conditions during the measurement periods were favorable for outdoor sound measurements and were noted to be representative of the typical conditions for the season. Generally, conditions included mostly clear skies with daytime temperatures of 83 degrees Fahrenheit (°F) and average wind speeds of 1 mile per hour (mph). All sound level meters were equipped with a windscreen during measurements.

All sound level meters used for noise monitoring satisfy the American National Standards Institute standard for Type 1 instrumentation.[2] The sound level meters were set to "slow" response and "A" weighting (dBA). The meters were calibrated prior to and after the monitoring period. All measurements were at least five feet above the ground and away from reflective surfaces. Noise measurement locations are described below and shown on Figure 5.11-2, *Approximate Noise Monitoring Locations*.

- **Long-Term Location 1 (LT-1)** was on Pacific Island Drive, south of Alicia Parkway and north of Highlands Avenue. The meter was approximately 30 feet north of the nearest travel lane centerline. A 48-hour noise measurement began at 3:00 pm on Tuesday, September 03, 2019. The noise environment of this site is characterized primarily by traffic from Pacific Island Drive. However, it should be noted that across the street is a fire station and the county maintenance yard. While in the field, alarms or fire truck sirens were not observed; however, this area is subject to these existing noise sources.

- **Long-Term Location 2 (LT-2)** was on Crown Valley Parkway south of Alicia Parkway, in front of the Orange County Library. The meter was approximately 35 feet west of the nearest southbound travel lane centerline. A 48-hour noise measurement began at 4:00 pm on Tuesday, September 3, 2019. The noise environment of this site is characterized primarily by traffic from Crown Valley Parkway.

[1] Noise measurements were taken pre-pandemic lockdown, which avoids the unique changes in traffic and activity patterns during the pandemic. Furthermore, no substantive new development has occurred in the surrounding area that would change the noise environment.

[2] Monitoring of ambient noise was performed using Larson-Davis model LxT and 820 sound level meters.

Figure 5.11-1 - Nearest Noise Sensitive Receptors to Project Site
5. Environmental Analysis

Project Boundary

1 Residential Uses to the North

2 Laguna Niguel KinderCare

3 Laguna Niguel Presbyterian Church

4 Residential Uses to Southeast

5 Residential Uses to Southwest

6 Residential Uses to West

0 350
Scale (Feet)

Source: Nearmap, 2019

5. Environmental Analysis
NOISE

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Figure 5.11-2 - Approximate Noise Monitoring Locations
5. Environmental Analysis

Project Boundary

ST-X Short-Term Noise Measurement Locations (4)

LT-X Long-Term Noise Measurement Locations (2)

0 350
Scale (Feet)

Source: Nearmap, 2019

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NOISE

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- **Short-Term Location 1 (ST-1)** was at the end of Via Reata on the northwest corner property line. A 15-minute noise measurement began at 4:10 pm on Thursday, September 5, 2019. The noise environment of this site is characterized primarily by distant traffic from Pacific Island Drive, HVAC equipment from the Niguel Summit Condominiums, and vehicle maintenance activity from the county maintenance yard. Traffic noise levels generally ranged from 46 to 50 dBA, and maintenance yard activity from 46 to 52 dBA. Background noise levels (consisting of HVAC noise) were 44 dBA.

- **Short-Term Location 2 (ST-2)** was behind 30286 Via Reata at the property boundary between the project site and residences. A 15-minute noise measurement began at 3:48 pm on Thursday September 5, 2019. The noise environment of this site is characterized primarily by distant traffic from Pacific Island Drive and Crown Valley Parkway, HVAC noise, and vehicle maintenance activity from the county maintenance yard. County yard maintenance noise generally ranged from 45 to 50 dBA, and traffic noise levels from 47 to 50 dBA. Other noise sources included church bells at 48 dBA and one aircraft overflight that ranged from 44 to 54 dBA. The background ambient was observed to be as low as 41 dBA.

- **Short-Term Location 3 (ST-3)** was at the intersection of Via Corona and Via Venida facing the Orange County Library. A 15-minute noise measurement was conducted beginning at 4:39 pm on Thursday, September 5, 2019. The noise environment of this site is characterized primarily by traffic from Crown Valley Parkway. Traffic noise levels generally ranged from 47 to 50 dBA. One aircraft overflight was observed ranging from 50 to 55 dBA. One heavy-duty truck was observed up to 65 dBA traveling on Crown Valley Parkway. The background ambient was observed to be as low as 42 dBA.

- **Short-Term Location 4 (ST-4)** was at Alicia Parkway and Town Center near the nonoperational South County Justice Center. A 15-minute noise measurement was conducted, beginning at 5:02 pm on Thursday, September 5, 2019. The noise environment of this site is characterized primarily by Alicia Parkway traffic. Traffic noise levels generally ranged from 66 to 71 dBA. Ambient noise levels during red lights with no traffic were as low as 50 dBA.

Ambient Noise Monitoring Results

During the ambient noise survey, the CNEL noise levels at monitoring locations ranged from 69 to 71 dBA CNEL. The long-term and short-term noise measurement results are summarized in Tables 5.11- 4 and 5.11-5, respectively. A summary of the daily trend during long-term noise measurements is provided in Appendix J.

Table 5.11-4 Long-Term Noise Measurements Summary in A-Weighted Sound Levels

Monitoring Location	Description	CNEL	Lowest L_{eq}, 1-hr	Highest L_{eq}, 1-hr
LT-1	Pacific Island Drive – South of Alicia Parkway	69	49.3	71.6
LT-2	Crown Valley Parkway – South of Alicia Parkway	71	51.0	74.7

Table 5.11-5 Short-Term Noise Measurements Summary in A-Weighted Sound Levels

Monitoring Location	Description	15-minute Noise Level, dBA						
		L_{eq}	L_{max}	L_{min}	L_2	L_8	L_{25}	L_{50}
ST-1	End of Reata St, Property Line 4:10 PM, 09/05/2019	46.1	52.0	43.0	49.8	48.2	46.5	45.5
ST-2	30286 Via Reata, 3:48 PM 09/05/2019	47.1	56.4	41.4	53.5	49.4	47.5	46.1
ST-3	Via Corona/Via Venida, 4:39 PM 09/05/2019	50.3	65.5	42.3	55.0	52.9	51.3	48.8
ST-4	Town Center & Alicia Parkway, 5:02 PM, 09/05/2019	64.4	73.7	49.8	70.0	68.7	65.9	62.9

5.11.2 Thresholds of Significance

Noise and vibration impacts can occur from construction operations and long-term operation of the project, both of which must be analyzed. According to Appendix G of the CEQA Guidelines and the City's CEQA Manual, a project would normally have a significant effect on the environment if the project would result in:

N-1 Generation of long-term operational mobile and stationary noise that would exceed the noise standards set forth in the Laguna Niguel CEQA Manual.

N-2 Construction activities occurring within 500 feet of a sensitive use and exceeding the construction noise standards in the Laguna Niguel CEQA Manual.

N-3 Generation of groundborne vibration or groundborne noise levels at sensitive receptors in excess of Caltrans criteria in Tables 5.11-6 and 5.11-7.

N-4 For a project located within the vicinity of a private airstrip or 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, if the project would expose people residing or working in the project area to excessive noise levels.

Operational Noise

Project operational impacts are generally due to the project including single or multiple noise sources within the project site, or causing increases in vehicular traffic on city streets, or both. The City's CEQA Manual uses the following screening criteria to determine whether further study is required:

- Would the proposed project introduce a stationary noise source audible beyond the property line of the project site?

- Would the project include 75 or more dwelling units, 100,000 square feet or greater of nonresidential development, or have the potential to generate 1,000 or more averaged daily vehicle trips? [3]

Mobile

A project would have a significant operational mobile noise impact on sensitive receptors if:

- The project results in ambient exterior noise levels at nearby noise-sensitive uses to increase above the City standards in Table 5.11-2 (i.e., 65 dB CNEL for residential land uses); or
- Baseline noise levels at nearest noise-sensitive land uses without the project are below 55 dBA CNEL and the project results in noise level increases of 10 dBA CNEL or more in ambient noise levels; or
- Baseline noise levels at nearest noise-sensitive land uses without the project are in the range of 55 to 60 dBA CNEL, and the project results in ambient noise level that are 5 dBA CNEL or more above baseline noise levels; or
- Baseline noise levels at nearest noise-sensitive land uses without the project are above 60 dBA CNEL, and the project results in a noise level increase of 3 dBA CNEL or more above baseline noise levels.

Stationary (Mechanical)

Laguna Niguel Municipal Code Division 6 establishes noise standards applicable to stationary sources. Section 6-6-5 establishes a 55 dBA daytime exterior noise standard (7:00 am to 10:00 pm) and a 50 dBA nighttime exterior noise standard (10:00 pm to 7:00 am), which constitute the thresholds of significance for stationary sources.

A significant impact would occur if noise levels on any other residential property exceed the exterior noise level standards in Table 5.11-3:

- The noise standard for a cumulative period of more than 30 minutes in any hour (L_{50});
- The noise standard plus five dB(A) for a cumulative period of more than 15 minutes in any hour (L_{25});
- The noise standard plus ten dB(A) for a cumulative period of more than five minutes in any hour (L_{8});
- The noise standard plus 15 dB(A) for a cumulative period of more than one minute in any hour (L_{2}); or
- The noise standard plus 20 dB(A) for any period of time (L_{max}).+

If the ambient noise level exceeds any of the first four noise limit categories listed above, the cumulative period applicable to such category shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category listed above, the maximum allowable noise level under such category shall be increased to reflect the maximum ambient noise level.

[3] Through prior study, development projects of less intensity than these thresholds have been demonstrated to not result in noise level increase above 3 dBA in typical city settings. An increase of 3 dBA is the point where noise increases become barely perceptive to most individuals with normal hearing. A less than 3 dBA increase would therefore not be a noticeable increase and therefore, less than significant.

Construction Noise

As stated in the City's CEQA Manual, construction noise typically does not cause a substantial noise at distances beyond 500 feet from construction activities or when construction is limited to allowed days and times.[4] Therefore, the following noise screening criteria are used for a new project construction:

- Would construction occur within 500 feet of a noise sensitive use?[5]
- Would construction occur between the hours of 8:00 pm and 7:00 am Monday through Saturday, or anytime on Sunday or federal holidays?

A "yes" to either screening question, would warrant further analysis. If a project requires further study of construction noise, a detailed construction noise analysis shall be done according to the methodology and criteria contained in the Federal Transit Administration (FTA), Transit and Vibration Impact Assessment Manual (FTA 2018) or the most current version. Specifically, the construction noise assessment shall be prepared in accordance with "Option B: Detailed Analysis" included in the FTA Manual.

A significant construction noise impact would occur where construction is located within 500 feet of a noise sensitive use and:

- The daytime construction noise exceeds the threshold of 80 dBA $Leq_{(8hr)}$[6] at the property line of the residential receptor

Nighttime construction activities are generally prohibited by the Laguna Niguel Municipal Code, however if an exemption is provided, the construction noise thresholds at residential receptors is 70 dBA $Leq_{(8hr)}$.

Vibration

Vibration Damage

The City's CEQA Manual has adopted the Caltrans vibration or groundborne criteria to determine vibration damage impacts. Therefore, the Caltrans standards summarized in Table 5.11-6 are the thresholds of significance for vibration impacts.

[4] The distance of 500 feet is applied as a screening threshold because noise naturally attenuates at 6 dB every doubling of distance from the reference noise source. Most construction equipment has a reference noise source of 50 feet. Therefore, at 500 feet noise will have naturally attenuated over 20 dB without accounting for other natural attenuation such as topography, vegetation, or other structures. A 20 dB reduction would substantially reduce noise emissions from the loudest construction equipment to below a level that would regularly impair speech, resulting in a less than significant impact.

[5] Noise-sensitive land uses are defined in Chapter VI of the Noise Element of the Laguna Niguel General Plan as "residential areas, school sites, childcare areas, library, parks and a senior center site."

[6] The Leq 8 hour is an average of noise levels over an 8-hour period to approximate a full-day of construction.

Table 5.11-6 Construction Vibration Building Damage Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.10
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial /commercial buildings	2.0	0.5

Source: Caltrans 2013b.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Vibration Annoyance

The City's CEQA Manual has adopted the Caltrans vibration or groundborne criteria to determine vibration annoyance impacts (see Table 5.11-7). The proposed project does not propose transient vibration sources as defined in the CEQA Manual. Therefore, through adoption of the City's CEQA Manual, the Caltrans "distinctly perceptible" vibration level of 0.04 in/sec PPV for continuous/frequent intermittent sources is the threshold of significance for vibration annoyance impacts. This is equivalent to approximately 80 VdB. [7]

Table 5.11-7 Groundborne Vibration Potential Annoyance Criteria

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: Caltrans 2013b.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and seat equipment, vibratory pile drivers, and vibratory compaction equipment.

5.11.3 Plans, Programs, and Policies

PPP N-1 The proposed project shall comply with City of Laguna Niguel Municipal Code's Exterior Noise Standards (see Section 5.11.1.3, *Regulatory Background*) and limited construction hours (Monday through Saturday from 7:00 am to 8:00 pm, and no construction on Sundays or

[7] RMS velocity in decibels, VdB re 1 micro-in/sec.
The ratio of PPV to maximum rms amplitude is defined as the *crest factor* for the signal. The crest factor is always greater than 1.71. For groundborne vibration the crest factor is usually 4 to 5..

federal holidays) and Policy 4.1 of the Laguna Niguel Noise Element related to construction noise.

PPP N-2 The proposed project shall comply with Goal 4, Policy 4.1, and Action 4.1.1 of the General Plan to enforce the noise ordinance for all nonemergency construction operations.

PPP N-3 The Applicant shall implement the following best management practices (BMPs) during grading, demolitions, and construction to limit construction-related noise prior to issuance, During the entire active construction period, equipment and trucks used for project construction shall use the best available noise control techniques (e.g., improved mufflers, use of intake silencers, ducts, engine enclosures, acoustically attenuating shields, shrouds wherever feasible.

- Require that impact tools (e.g., jack hammers and hoe rams) be hydraulically or electrically powered wherever possible. Where the use of pneumatic tools is unavoidable, an exhaust muffler shall be used on the compressed air exhaust as shall external noise jackets on the tools.
- Stationary equipment such as generators and air compressors shall be located as far as feasible from nearby noise-sensitive uses.
- Stockpiles of materials shall be located as far as feasible from nearby noise-sensitive receptors.
- Signs will be posted at the job site entrance(s), within the on-site construction zones, and along queueing lanes (if any) to reinforce the prohibition of unnecessary engine idling. All other equipment will be turned off if not in use for more than five minutes.
- During the entire activity construction period and to the extent feasible, the use of noise-producing signals, including horns, whistles, alarms, and bells will be for safety warning purposes only. The construction manager shall use smart back-up alarms, which automatically adjust the alarm level based on the background noise level, or switch off back-up alarms and replace with human spotters in compliance with all safety requirements and laws.

PPP N-4 Per the California Building Code Title 24 requirement of 45 dBA CNEL or lower for habitable dwellings, the project applicant shall retain a qualified acoustical specialist to prepare a detailed analysis of interior residential noise levels resulting from all exterior sources during the design phase pursuant to requirements set forth in the State Building Code and City requirements. The study will review the final site plan, building elevations, and floor plans prior to construction and recommend building (residential building 1 and 2) treatments to reduce residential interior noise levels to 45 dBA CNEL or lower at the project site. Treatments would include, but are not limited to, sound-rated windows and doors, sound-rated wall and window constructions, acoustical caulking, protected ventilation openings, etc. The specific determination of what noise insulation treatments are necessary shall be conducted during

final design of the project. Results of the analysis, including the description of the necessary noise control treatments, shall be submitted to the City, along with the building plans and design, prior to issuance of a building permit. Upon approval by the City, the treatments shall be incorporated into final building and design plans prior to issuance of a building permit.

5.11.4 Environmental Impacts

5.11.4.1 METHODOLOGY

This noise evaluation was prepared in accordance with the requirements of CEQA and the City's CEQA Manual to determine if the proposed project would result in significant construction and operational impacts at nearby sensitive receptors. Construction noise modeling was conducted using the FHWA Roadway Construction Noise Model (RCNM). Transportation noise sources were modeled using a version of the FHWA's Traffic Noise Prediction Model and the average daily traffic segment volumes provided by Linscott Law & Greenspan, Engineers (see Appendix L).

5.11.4.2 IMPACT ANALYSIS

The following impact analysis addresses thresholds of significance. The applicable thresholds are identified in brackets after the impact statement.

Impact 5.11-1: Project implementation would result in long-term operation-related noise that would not exceed the City's standards. [Threshold N-1]

Stationary Noise

HVAC/Mechanical Equipment

The proposed project would have HVAC systems. Typical HVAC equipment generates noise levels ranging up to 72 dBA at 3 feet. The nearest sensitive receptors would be to the south and southwest, approximately 150 feet from any possible future HVAC unit locations. At that distance, noise levels would attenuate to approximately 38 dBA. This would not exceed the City's daytime and nighttime noise standards of 55 and 50 dBA L_{50}, respectively. Operational noise from HVAC and mechanical equipment would be less than significant.

Residential Recreational Outdoor Spaces

The project would consist of two separate and distinct apartment buildings, Residential 1 and Residential 2. The nearest proposed residential building to existing sensitive receptors is Residential 2 near the northwest corner of the site along Pacific Island Drive west of OCFA's Fire Station No. 5. Residential 2 building amenities include a private lounge situated immediately adjacent to and integrated with a resort-style pool and spa. These common areas would be approximately 400 feet to the nearest sensitive receptor property line. These common areas and amenities could potentially generate noise from interpersonal conversations. A typical conversation is approximately 60 dBA between two people at distance of 3 feet. At a distance of 400 feet, noise levels would attenuate to less than 20 dBA and are expected to be inaudible over the existing ambient noise environment.

This would not exceed the City's daytime and nighttime noise standards of 55 and 50 dBA L_{50}, respectively. Therefore, this impact would be less than significant.

Daily Retail Uses and Special Events

General hours of operations would be from 10:00 am to 9:00 pm seven days a week for all commercial uses. Some exceptions include coffee and breakfast cafes that may be open as early as 6:00 am, restaurant bars that may be open until 12:00 am, and selected restaurants that may be open until 11:00 pm on weekends. Many service uses, such as salons and banks, as well as most stores and shops would close earlier than 9:00 pm. Unlike some special events, daily activities would not include amplified speech or planned and organized events. Therefore, daily activities would not significantly increase ambient noise levels and impacts would be less than significant. Special events, including festivals, movie screenings, concerts, and farmers markets, would typically be held on weekends. Small events held weekly may include yoga in the park with approximately 20 people; medium events held monthly may include movies in the park with approximately 100 people; and larger events held quarterly could include craft festivals, larger-scale food and wine events, or community-based seasonal events. Per COA-N1, all special events would conclude no later than 10:00 pm.

Movie screenings and concerts may include amplified sound from speakers and may take place during evening hours. The nearest sensitive receptors are in the El Niguel residential community to the southwest, approximately 475 feet from the center of the Town Green area. Section 6-6-7(2) exempts noise from outdoor gatherings, public dances, and shows from the Municipal Code exterior noise standards provided such events are conducted pursuant to a license issued by the City. Since activities conducted at the project site would be exempt from the Municipal Code standards. To minimize the potential noise impact to surrounding residences, special events with outdoor amplified music or sound will be required to comply with the following Condition of Approval (COA) for the proposed project:

COA N-1 Prior to special events with outdoor amplified music or sound, the event promoter shall obtain a Temporary Use Permit from the City. The Temporary Use Permit shall demonstrate that special event noise will not exceed 65 dBA L_{eq} at off-site residential property lines. All amplified speech, music, or movie nights shall be concluded by 10:00 p.m. Measures to achieve the performance standard of 65 dBA L_{eq} include, but are no limited, to:

- Orient speakers away from nearby residences;
- Position speakers between project buildings or use other shielding and barrier methods to break line-of-sight with nearby residential uses;
- Incorporate bandwidth and/or peak limiters into the sound system;
- Other speaker angling and directivity techniques.

Because special events are exempt from the Municipal Code standards and would be required to comply with COA-N-1 to reduce noise levels at nearby residential uses, the noise impacts of these activities would be less than significant

Deliveries

Expected hours of deliveries would occur between 8:00 am and 11:00 am (daytime hours). PlaceWorks measured noise from truck unloading and loading activities, and the results indicate that truck unloading produces noise levels of 40 dBA L_{50} at a distance of 50 feet (PlaceWorks 2012). The closest loading and unloading activity that could occur near sensitive receptors would be near Building 1 and Building 2 along Crown Valley Parkway. The nearest sensitive receptors to that building are approximately 140 feet to the southwest from there rear of the building. At that distance noise levels would attenuate to approximately 31 dBA L_{50}. This would not exceed the City's daytime and nighttime noise standards of 55 and 50 dBA L_{50}, respectively.

Parking Structure

Typical parking lot/structure noises include car-door slams, car horns, car audio systems, people talking, vehicle pass-bys, engine idling, and car beeps. Other types of disruptive noise that could occur within the parking structure would be car alarm noise and horns. Each of these individual noise sources lasts for a short duration, and their occurrences would be infrequent. The proposed project would construct a three-level parking structure with a rooftop level. A similar parking structure noise at another location in Orange County was previously modeled—specifically, a three-story parking structure with open rooftop level for the Mariner's Pointe Project in Newport Beach. Modeling shows that a three-story parking structure would generate noise levels of approximately 45 dBA L_{eq} at 45 feet from the parking structure. The nearest receptors to the proposed parking structure are the residences to the southwest at approximately 75 feet. Noise levels at 75 feet would attenuate to approximately 41 dBA L_{eq}. This would not exceed the City's daytime and nighttime noise standards of 55 and 50 dBA, respectively. Therefore, impacts would be less than significant.

Trash Compactor/Trash Pick-Up

The proposed project would have a trash compactor near the southwest property line, just north of the residential community, El Niguel. Trash compactors typically generate noise levels of 74 dBA at 10 feet (DEHS 2018). The nearest residences at the El Niguel community are approximately 100 feet away. At 100 feet, noise levels would attenuate to 54 dBA. Trash compactor noise would not exceed the City's daytime noise standards of 55 dBA but could exceed the nighttime noise standard of 50 dBA. To minimize the potential noise impact to surrounding residences, trash compactor operation will be required to comply with the following Condition of Approval (COA) for the proposed project:

COA N-2 Operation of the trash compactor shall not occur between the hours of 10:00 pm and 7:00 am.

, Since no trash compacting activities would occur between the hours of 10:00 pm and 7:00 am., and because daytime operation would not exceed the City's standards , impacts would be less than significant.

Trash pick-up can be considered noisy and a nuisance to noise sensitive receptors. However, this sanitation operation typically occurs no more than once a day, two to three time per week, and is short lived. In addition, the City has an exclusive franchise hauler, CR&R Environmental Services Inc (CR&R); CR&R and the City

have a written agreement, "Agreement for the Collection, Transpiration, Processing and Diversion of Recyclable Materials, Food Scraps, Yard Trimming, Wood, Construction and Demolition Debris and Other Materials and for the Collection, Transpiration and Disposal of Municipal Solid Waste" (Agreement). Section 4.09(B) of the Agreement, "Collection Standards, Noise," states that all collection operations shall be conducted as quietly as possible and shall conform to City noise level regulations.

> The noise level during the stationary compaction process shall not exceed 75 decibels at a distance of 25 feet from the Collection vehicle measured at an elevation of five (5) feet above ground level. Contractor shall submit to City, upon City's request, a certificate of vehicle noise testing by an independent testing facility of a representative sample of Collection vehicles. The City may also conduct random checks of noise emission levels to ensure such compliance.

In addition, trash-pick up is considered part of regular maintenance and Section 6-6-7(9) states that noise sources associated with the maintenance of real property, provided such 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 are exempt. No impact would occur.

Traffic Noise

Traffic noise increases were calculated using a version of the FHWA's Traffic Noise Prediction Model and based on existing and future traffic volumes. Vehicle mix (auto, medium-duty trucks, and heavy-duty trucks) was based on project area traffic counts, and Caltrans vehicle mix data were applied to Pacific Coast Highway. The posted speed limits and number of travel lanes were also input to the model. Table 5.11-8 shows the calculated existing and future noise levels at 50 feet from the nearest travel centerline as well as the traffic noise increase with implementation of the proposed project. Cumulative traffic noise impacts are discussed under Section 5.11.5, *Cumulative Impacts*.

Table 5.11-8 Traffic Noise Levels for Existing and Project Buildout Conditions

	Traffic Volumes (average daily trips)				Traffic Noise Level at 50 Feet (dBA CNEL)				Traffic Noise Increase (dBA CNEL)		
Roadway Segment	Existing	Existing Plus Project	2040 Buildout Plus Project	2040 Buildout No Project	Existing	Existing Plus Project	2040 No Project	2040 With Project	Project Noise Increase	Cumulative Noise Increase[1]	Cumulative Noise Increase due to Project[2]
Alicia Parkway – Aliso Creek to Highland Avenue	43,566	46,404	48,086	50,924	76.6	76.9	77.0	77.3	0.3	0.7	0.2
Alicia Parkway – Highlands Avenue to Niguel Road	32,294	35,511	35,628	38,845	75.3	75.7	75.7	76.1	0.4	0.8	0.4
Alicia Parkway – Niguel Road to Pacific Island Drive/Ivy Glenn Drive	21,891	25,108	24,126	27,343	73.6	74.2	74.1	74.6	0.6	1.0	0.5
Crown Valley Parkway – Greenfield Drive to Moulton Parkway/Golden Lantern Street	35,764	38,035	40,935	43,206	75.8	76.0	76.3	76.6	0.3	0.8	0.2
Crown Valley Parkway – Moulton Parkway/Golden Lantern Street to La Paz Road	29,492	32,330	32,892	35,730	73.8	74.2	74.3	74.6	0.4	0.8	0.4
Crown Valley Parkway – La Paz Road – to Niguel Road	30,894	33,922	34,423	37,451	74.0	74.4	74.4	74.8	0.4	0.8	0.4
Crown Valley Parkway – Hillhurst Drive to Via Valle	27,425	29,317	30,909	32,801	73.5	73.8	74.0	74.2	0.3	0.8	0.3
Crown Valley Parkway – Club House Drive to Pacific Island Drive/Camino del Avion	24,231	25,934	27,275	28,978	74.1	74.4	74.6	74.8	0.3	0.8	0.3
Niguel Road – Crown Valley Parkway to La Hermosa Avenue	20,090	20,941	21,954	22,805	72.0	72.1	72.3	72.5	0.2	0.6	0.2
Pacific Coast Highway – Crown Valley Parkway to Niguel Road[1]	28,172	28,834	35,618	36,280	75.9	76.0	76.9	77.0	0.1	1.1	0.1

Source: Traffic data provided by LLG, 2021. Traffic noise modeled using the FHWA Traffic Noise Prediction Model methodology.
[1] Cumulative Noise Increase = 10*Log (Future Plus Project/Existing No Project)
[2] Cumulative Noise increase due to Project = 10*Log (Future Plus Project/ Future No Project).

5. Environmental Analysis
NOISE

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As shown in Table 5.11-8, roadway segments are estimated to experience a traffic noise increase of up to 0.6 dBA or less due to project-generated traffic. Traffic noise increases would not:

- Result in ambient exterior noise levels at nearby noise-sensitive uses to increase above the City exterior standards in Table 5.11-2 (i.e., 65 dB CNEL for residential land uses).
- Increase by 10 dBA CNEL or more at the nearest noise-sensitive land uses where the ambient baseline noise levels are below 55 dBA CNEL without the project.
- Increase by 5 dBA CNEL or more at the nearest noise-sensitive land uses where the ambient baseline without the project is in the range of 55 to 60 dBA CNEL.
- Increase by 3 dBA CNEL or more at the nearest noise-sensitive land uses where the ambient baseline noise levels are above 60 dBA CNEL without the project.

This would not exceed the City's CEQA Manual operational mobile noise thresholds. Therefore, impacts would be less than significant.

Noise and Land Use Compatibility

Residential 1

The Laguna Niguel Land Use with Noise Standards table (Table N-9 in the General Plan Noise Element) identifies noise exterior environments up to 65 dBA CNEL as acceptable levels for residential, attached and detached, uses. Exterior ambient noise levels above 65 dBA CNEL would be considered unacceptable for new residential uses. The interior noise standard for residential uses is 45 dBA CNEL. Based on ambient noise monitoring and traffic noise modeling ambient noise levels at future onsite proposed residential uses are 70.1 dBA CNEL along Pacific Island Drive within 30 feet of the nearest travel lane and up to 74.6 dBA CNEL along Alicia Parkway within 50 feet from the nearest travel lane.

The proposed Residential 1 building would be within 50 feet of the nearest travel lane along Alicia Parkway, and therefore, above the acceptable land use compatibility standard of 65 dBA CNEL. Outdoor recreational areas would be fully shielded from the roadways by the residential building itself providing at least a 15 dBA CNEL noise reduction. Noise levels at the outdoor area (pool and courtyard) would be approximately 59.6 dBA CNEL, which is within the acceptable exterior residential noise and land use category (65 dBA CNEL or less).

Typical buildings provide an exterior-to-interior noise attenuation of 25 dBA with windows closed, and interior noise levels at Residential 1 are estimated to be 49.1 dBA CNEL. Therefore, without PPP N-4, the interior noise standard of 45 dBA CNEL could be exceeded, and the residential building would be in an area that exceeds the City's 65 dBA CNEL standard. With implementation of PPP N-4, impacts would be less than significant.

Residential 2

Residential 2 buildings would be approximately 70 feet from the nearest travel lane along Pacific Island Drive. Ambient noise monitoring conducted at LT-1 indicates that existing ambient noise levels are 69 dBA CNEL at

30 feet from the nearest travel lane along Pacific Island Drive. To estimate future noise levels along this roadway, the highest cumulative noise increase of 1.1 dBA CNEL in Table 5.11-8 is added to LT-1 for a projected future noise level of 70.1 dBA CNEL at 30 feet. At 70 feet, noise levels would be approximately 66.4 dBA CNEL at the nearest façade of Residential 2. This would place Residential 2 within the unacceptable (65 dBA CNEL or greater) noise and land use category. The outdoor pool and courtyard area, as shown in the site plans, would be partially shieled from roadways by the building itself and approximately 280 feet from Pacific Island Drive. Noise levels at the outdoor area (pool and courtyard) would be 60 dBA CNEL or less, which is within the acceptable exterior residential noise and land use category (65 dBA CNEL or less). However, since Residential 2 would be located within the unacceptable category at the nearest building façade, this indicates that interior noise levels could exceed 45 dBA CNEL. With implementation of PPP N-4, impacts would be less than significant.

Level of Significance Before Mitigation: Less than significant.

Impact 5.11-2 Construction activities would not exceed the City's construction noise thresholds. [Threshold N-2]

Two types of short-term noise impacts could occur during construction: (1) mobile-source noise from transport of workers, material deliveries, and debris and soil haul and (2) stationary-source noise from use of construction equipment. Based on the Laguna Niguel Noise Ordinance (Division 6.6 of the Laguna Niguel Municipal Code), construction noise would be limited to 7:00 am to 8:00 pm on weekdays and Saturdays. No construction is allowed by the City on Sundays or federal holidays. Construction activities associated with the proposed project would occur during these designated hours, although workers may be onsite conducting non-noise-generating activities, such as office tasks, outside of those hours.

Construction Vehicles

The transport of workers and materials to and from the construction site would incrementally increase noise levels along roadways in the vicinity of the project site. Individual construction vehicles pass-bys and haul truck trips may create momentary noise levels of up to approximately 85 dBA (L_{max}) at 50 feet from the vehicle, but these occurrences would generally be infrequent and short lived.

Construction generates temporary worker and vendor trips that vary by activity phase. Overlapping phases are anticipated to generate 898 combined daily trips from workers and vendors.[8] Haul trips would range between 34 to 198 daily trips during soil and grading importing and exporting phases.[9] When compared to the tens of thousands of existing trips (Table 5.11-8), traffic noise increases due to temporary construction trips are estimated to result in less than 1 dBA CNEL.[10] Therefore, temporary construction vehicle noise would be less than significant.

[8] Based on information provided by the applicant; see Appendix C, Table 5.2-9 and Table 5.2-10.
[9] Based on information provided by the applicant; see Appendix C.
[10] dBA CNEL increase calculated by 10*log((new construction trips + existing daily trips)/(existing daily trips)).

Construction Equipment

Noise generated by on-site construction equipment is based on the type of equipment used, its location relative to sensitive receptors, and the timing and duration of noise-generating activities. Each phase of construction involves different types of equipment and has distinct noise characteristics. Noise levels from equipment noise source is typically the engine, although work-piece noise (such as dropping of materials) can also be audible.

The noise produced at each construction phase is estimated by combining the L_{eq} contributions from the simultaneous use of each piece of equipment modeled, while accounting for the ongoing time variations of noise emissions (commonly referred to as the usage factor). Heavy equipment, such as a dozer or a loader, can have maximum, short-duration noise levels of up to 85 dBA at 50 feet. However, overall noise emissions vary considerably, depending on what specific activity is being performed at any given moment.

Factors such as noise attenuation due to distance, the number and type of equipment, and the load and power requirements to accomplish tasks at each construction phase would result in different noise levels from construction activities at a given receptor. Since noise from construction equipment is intermittent and diminishes at a rate of at least 6 dBA per doubling distance (conservatively ignoring other attenuation effects from air absorption, ground effects, and shielding effects), the average noise levels at noise-sensitive receptors could vary considerably, because some construction equipment would move around the site with different loads and power requirements.

Construction noise levels at sensitive receptors are estimated by modeling the simultaneous use of at least one of each type of construction equipment per activity phase from the construction equipment list provided by the applicant (see Appendix C, AQ/GHG). Equipment is modeled using the RCNM. After modeling construction equipment per activity phase, including overlapping phases, the distances to various sensitive receptors are estimated using Google Earth. Estimating distances from various construction phases to various receptors is explained below, followed by Table 5.11-9 showing the results of construction noise modeling. Distances to sensitive receptors may differ between noise analysis and air quality analysis due to differences in the methodologies for analyzing noise emissions versus air quality and GHG emissions. See the descriptions below of the distances for noise for varying construction activity phases (also see Table 5.11-9).

Demolition, Site Preparation, and Rough Grading Overlapping Phases

Distances to the nearest sensitive receptors (residences to southwest) to the activity phases were measured from the approximate acoustical center of the project site to the nearest surrounding sensitive receptors, because these activities would occur throughout the entire site all in one phase.[11] The center of the site best represents average noise levels as denoted by the noise descriptor: Leq-time-average sound level. In addition, onsite rock crushing operations from demolition debris, would take place at the center of the site. The Roadway Construction Noise Model does not have reference noise levels for rock crushing equipment, however, it has

[11] Overlapping site prep, rough grading; overlapping demolition, site preparation, and rough grading; overlapping site prep, rough grading, utility trenching; building construction (site preparation, rough grading, utility trenching, fine grading, paving; overlapping site preparation, rough grading; utilities trenching fine grading.

been substituted with a mounted impact hammer in the modeling which generates noise levels equivalent to known rock crushing operations.

Paving

The project proposes various areas of paving throughout the project site, including parking lots and a parking structure for the retail and residential uses. Other paving would take place for the vehicular circulation component, but the majority of paving and paving noise would be in parking lots and the parking structure. Therefore, using Google Earth, the distances to the nearest receptors were estimated from the acoustical center of proposed parking lots and parking structure. For example, paving noise levels at receptors to the north were estimated by measuring the distance from the acoustical center of the proposed parking area for Residential 2 (the closest proposed paving area to those receptors), and the paving noise levels at receptors to the southeast were estimated by measuring the distance from the acoustical center of the proposed parking area to the south (where the soon-to-be demolished library is currently located).

Building Construction

The same approach used for paving was used to determine the distances from various sensitive receptors to building construction activity. The proposed project has various building construction components spread throughout the project site. Using Google Earth, the distances to the nearest receptors from each building construction component were estimated from the acoustical center of the proposed buildings.

Demolition

The same approach used for paving and building construction is used to determine the distances to various sensitive receptors to demolition activity. The project site has existing buildings spread throughout that are proposed to be demolished. Using Google Earth, the distances to the nearest receptors to each proposed building demolition were estimated from its acoustical center, with the exception of the accompanied rock crushing which is from the center as mentioned above in overlapping phases.

Architectural Coating and Landscaping

Because architectural coating, finishes, and landscaping occur on and around buildings, noise levels from these activity phases were estimated by determining the nearest receptor to a proposed building's façade and not acoustical center.

As shown in Table 5.11-9, construction noise would occur within 500 feet of a noise-sensitive receptor. Construction noise levels, however, would not exceed the City's construction noise threshold of 80 dBA L_{eq} at noise sensitive receptors. Therefore, impacts would be less than significant.

Table 5.11-9 Exterior Construction Noise Impacts at Nearby Sensitive Receptors

Construction Phases	Sensitive Receptors			
	Residential Uses to West/Southwest	Residential Uses to Southeast	Residential/KinderCare to North	Laguna Niguel Presbyterian Church to North
	Estimated RCNM Noise Levels at Sensitive Receptors, dBA L_{eq}			
Distance in feet	*550*	*800*	*750*	*900*
Site Abatement	53	50	50	48
Overlapping Site Prep, Rough Grading	67	64	64	62
Overlapping Demolition rock crushing, Site Preparation, and Rough Grading[3]	70	67	67	66
Overlapping Site Prep, Rough Grading, Utility Trenching	67	64	64	63
Building Construction (SP, RG, UT, FG, Paving Overlap)	67	64	65	63
Overlapping Site Preparation, Rough Grading, Utilities Trenching, Fine Grading	67	64	64	62
Fine Grading	64	60	61	59
Distance in feet	*180*	*260*	*230*	*540*
Paving	75	72	73	66
Distance in feet	*180*	*340*	*350*	*475*
Building Construction	72	67	67	64
Distance in feet	*125*	*200*	*200*	*300*
Architectural Coating	66	62	62	58
Finishing/Landscaping	72	68	68	64
Distance in feet	*245*	*270*	*NA*	*NA*
Demolition (Library) [1, 2]	73	72	-	-
Distance in feet	*NA*	*NA*	*230*	*440*
Demolition (Justice Support Buildings)[1]	-	-	74	68
Distance in feet	*220*	*NA*	*635*	*NA*
Demolition (Modular Buildings)[1]	74	-	65	-
Exceeds 80 dBA L_{eq}?	**No**	**No**	**No**	**No**
Significant Impact?[5]	**No**	**No**	**No**	**No**

Notes: RCNM Software and attenuation due to distance calculations are included in Appendix J.
[1] RCNM Mounted Impact Hammer (hoe ram) equipment used as representative of crusher/crushing equipment.
[2] Based on available information, the library will be relocated to interim location prior to any construction activity, including demolition and grading.

Level of Significance Before Mitigation: Less than significant.

Impact 5.11-3: The project would generate groundborne vibration or groundborne noise that would not exceed City's standards. [Threshold N-3]

Potential vibration impacts associated with development projects are usually related to the use of heavy construction equipment during the demolition and grading phases of construction. Construction can generate

varying degrees of ground vibration, depending on the construction procedures and equipment. Construction equipment generates vibrations that spread through the ground and diminish with distance from the source. The effect on buildings in the vicinity of the construction site depends on soil type, ground strata, and receptor-building construction. The effects from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels. Vibration from construction activities rarely reaches the levels that can damage structures.

Operational Vibration

There are no existing substantial sources of vibration in the project vicinity. For on-road trucks, Caltrans has studied the effects of propagation of vehicle vibration on sensitive land uses and notes that "heavy trucks, and quite frequently buses, generate the highest earthborn vibrations of normal traffic" (Caltrans 2013b). Caltrans further notes that the highest traffic-generated vibrations are along freeways and state routes. Their study finds that "vibrations measured on freeway shoulders (five meters from the centerline of the nearest lane) have never exceeded 0.08 inches per second, with the worst combinations of heavy trucks and poor roadway conditions (while such trucks were moving at freeway speeds). This level coincides with the maximum recommended safe level for ruins and ancient monuments (and historic buildings)." Additionally, the proposed project would not include any substantial long-term vibration sources such as subway or rail. Thus, no significant vibration effects from operations sources would occur.

Construction Vibration Building Damage

For reference, Caltrans uses a peak particle velocity of 0.3 in/sec PPV as the limit for older residential structures (i.e., surrounding residential structures conservatively assuming they are older), and a peak particle velocity of 0.5 in/sec PPV is used for engineered modern industrial/commercial buildings and new residential buildings (i.e., Laguna Niguel City Hall). Table 5.11-10 summarizes vibration levels published by the FTA for typical construction equipment at a reference distance of 25 feet and at the nearest structures. Typical construction equipment can generate vibration levels ranging up to 0.21 in/sec PPV at 25 feet. Pile driving is not proposed as part of the project.

Table 5.11-10 Vibration Impact Levels for Typical Construction Equipment

	in/sec PPV		
Equipment	Reference levels at 25 feet	Residences Vibration levels at 82 feet	City Hall Vibration levels at 100 feet
Vibratory Roller	0.21	0.035	0.026
Large Bulldozer	0.089	0.015	0.011
Caisson Drilling	0.089	0.015	0.011
Loaded Trucks	0.076	0.013	0.010
Jackhammer	0.035	0.006	0.004
Small Bulldozer	0.003	0.001	<0.001

Source: FTA 2018.
Note: Distances are measured from the nearest edge of the construction site to the nearest receptors.

The nearest residences are approximately 82 feet from the nearest proposed project construction activities. At this distance, construction vibration would not exceed the threshold of 0.3 in/sec PPV for residential structures. City Hall is approximately 100 feet from the nearest proposed project construction activities at which distance construction vibration would not exceed the threshold of 0.5 in/sec PPV for modern/industrial buildings nor the 0.3 in/sec PPV older residential buildings. Since the nearest buildings are beyond the distance for potential architectural damage from project construction activities, impacts would be less than significant.

Groundborne Vibration Annoyance

Prolonged construction activities involving blasting pile driving, vibratory compaction, demolition, drilling, or heavy grading or excavation near sensitive receptors could result in a vibration annoyance. No rock blasting or pile driving is proposed, but the use of other heavy equipment is proposed for demolition, paving, site preparation, and grading. As shown in Table 5.11-7, the Caltrans criterion for a distinctly perceptible continuous vibration level is 0.04 in/sec PPV. Vibration annoyance is based on the human body response and because it takes time for the human body to respond to vibration signals an average vibration amplitude (the root-mean squared amplitude) is used, denoted by vibration decibel (VdB).[12] The FTA Guidance Manual (FTA 2018), which provides reference VdB levels for various construction equipment, is used to estimated VdB levels at the vibration sensitive receptors. When converted, a 0.04 in/sec PPV vibration level is equivalent to approximately 80 VdB.[13] The distances from vibration source (construction activity) to receiver (sensitive receptor) are the same ones used in the construction noise analysis above. Because vibration annoyance is concerned with human perception of average vibration and not instantaneous vibration for architectural damage, the distances to sensitive receptors are from the acoustic center of various construction phases. All phases that use heavy construction equipment that could cause a perceived vibration disturbance were modeled. The worst-case scenarios were building construction and paving, which could generate up to 68 VdB at the nearest sensitive receptors. Detailed modeling of four complete scenarios can be found in Appendix G. Vibration annoyance levels would not exceed the 80 VdB/0.04 in/sec PPV threshold. Therefore, impacts would be less than significant.

Level of Significance Before Mitigation: Less than significant.

Impact 5.11-4: The proximity of the project site to an airport or airstrip would not result in exposure of future residents or workers to excessive airport-related noise. [Threshold N-4]

There are no airports or private airstrips within two miles of the proposed project, and the project site is not within an airport land use plan.

Level of Significance Before Mitigation: No impact.

[12] RMS velocity in decibels, VdB re 1 micro-in/sec.

[13] The ratio of PPV to maximum rms amplitude is defined as the *crest factor* for the signal. The crest factor is always greater than 1.71. For groundborne vibration the crest factor is usually 4 to 5.

5.11.5 Cumulative Impacts

Cumulative Operational Impact

A cumulative traffic noise increase would be considered significant if the cumulative noise increase was found to be potentially significant and the project's contribution to the cumulative increase is greater than 1 dBA CNEL. As shown in Table 5.11-8, the cumulative traffic noise would increase up to 1.1 dBA in an ambient noise environment of 75.9 dBA CNEL. This would not exceed the 3 dBA CNEL threshold when the ambient baseline noise level is above 60 dBA CNEL without the project. The project's contribution to cumulative traffic noise increase would be up to 0.5 dBA. Therefore, cumulative traffic noise impacts would be less than significant.

Stationary onsite operational noise would elevate existing ambient noise levels, but not to a significant level as discussed above. As stated in Chapter 4, *Environmental Setting*, of this DEIR, the proposed project is surrounded by existing residential and retail/commercial development. The immediate surrounding land uses are built-out with the nearest commercial and retail uses located across Alicia Parkway and Pacific Island Drive away from nearby residences. Since stationary noise is highly localized and because the closest commercial and retail uses are located away from nearby off-site sensitive receptors, cumulative operational stationary noise impacts would be less than significant.

Cumulative Construction Noise and Vibration

Cumulative construction impacts could occur if other projects are being constructed in the vicinity of the proposed project at the same time. The nearest cumulative project is the proposed Cove at El Niguel, approximately 1,600 feet (0.3-mile) to the south (LLG 2021). All other planned and approved cumulative projects are even farther. At 1,600 feet, construction noise would substantially attenuate. Considering most construction equipment does not generate noise levels greater than 85 dBA at a distance of 50 feet, at 1,600 feet, noise levels would attenuate to 55 dBA from distance alone (not considering additional attenuation provided by topography and existing developments). Cumulative construction noise would not exceed the City's construction noise threshold of 80 dBA L_{eq}. Therefore, cumulative construction impacts would be less than significant.

5.11.6 Level of Significance Before Mitigation

The following impacts would be less than significant: 5.11-1, 5.11-2, 5.11-3 and 5.11-4.

5.11.7 Mitigation Measures

Noise and vibration impacts from implementation of the project would be less than significant and no mitigation measures are required.

5.11.8 References

Airnav, LLC. 2019. Airport Information. Accessed December 12, 2019. http://www.airnav.com/airports.

California Department of Transportation (Caltrans). 2013a, September. "Technical Noise Supplement" ("TeNS").

———. 2013b, September. *Transportation and Construction Vibration Guidance Manual*.

Department of Environmental Health and Science (DEHS). 2018, June. *Noise Navigator*. Sound Level Database. University of Michigan.

Engineering ToolBox (2005). "Voice Level at Distance." Accessed October 30, 2019. https://www.engineeringtoolbox.com/voice-level-d_938.html.

Extec Screens & Crushers Ltd. 2007, November. *Operating and Maintenance Manual: C12+ Crusher*.

Federal Highway Administration. 2006, August. *Construction Noise Handbook*.

———. 2017, June 28 (updated). "Mitigation." Chapter 4 of *Highway Construction Noise: Measurement, Prediction, and Mitigation*. https://www.fhwa.dot.gov/environment/noise/construction_noise/special_report/.

Federal Transit Administration (FTA). 2018, September. *Transit Noise and Vibration Impact Assessment*.

Governor's Office of Planning and Research. 2017. *State of California General Plan 2017 Guidelines*.

Harris, Cyril M. 1998. *Handbook of Acoustical Measurements and Noise Control*. 3rd edition. Woodbury, NY: Acoustical Society of America.

Laguna Niguel, City of. 1992, August. "Noise." Chapter 6 of City of Laguna Niguel General Plan. https://www.cityoflagunaniguel.org/132/General-Plan.

———. 2016, October. Authorized Truck Routes. https://www.cityoflagunaniguel.org/DocumentCenter/View/12596/Truck-Routes-PDF.

———. 2022, February. City of Laguna Niguel CEQA Manual.

———. 2021, October. Municipal Code City of Laguna Niguel. https://library.municode.com/ca/laguna_niguel/codes/code_of_ordinances.

———. 2018, November. "Agreement for the Collection, Transportation, Processing and Diversion of Recyclable materials, Food Scraps, Yard Trimmings, Wood, Construction and Demolition Debris and Other Materials and for the Collection, Transpiration and Disposal of Municipal Solid Waste Between the City of Laguna Niguel and CR&R Incorporated." https://www.cityoflagunaniguel.org/1169/Trash-Collection-and-Recycling-Services.

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———. 2019, December. Municipal Code City of Laguna Niguel, California. https://library.municode.com/ca/laguna_niguel/codes/code_of_ordinances?nodeId=MUCOLANICA.

———. 2021, May. City of Laguna Niguel CEQA Manual. https://www.cityoflagunaniguel.org/DocumentCenter/View/20870/Laguna-Niguel---CEQA-Manual_060121_Final

LLG, Engineers. 2019, September. Traffic Impact Analysis for City of Laguna Niguel General Plan Project Environmental Impact Report for the Laguna Niguel Town Center Project Laguna Niguel, California.

PlaceWorks. 2012. Macy's Trucking Yard Noise Survey. Trailer Hook-up Simulation (typical). Prepared for the City of Industry.