NOISE AND VIBRATION IMPACT ANALYSIS

SAN CLEMENTE SENIOR HOUSING PROJECT

SAN CLEMENTE, CALIFORNIA

LSA

July 2022

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Project No. MEA2202

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LIST OF ABBREVIATIONS AND ACRONYMS

µin	microinches
µin/sec	microinches per second
AADT	annual average daily traffic
ADT	average daily traffic
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
City	City of San Clemente
CNEL	Community Noise Equivalent Level
County	County of Orange
dB	decibel(s)
dBA	A-weighted decibel(s)
EPA	United States Environmental Protection Agency
FAR	Final Acoustical Report
FHWA	Federal Highway Administration
ft	foot/feet
FTA	Federal Transit Administration
FTA Manual	Federal Transit Administration *Transit Noise and Vibration Impact Assessment Manual* (2018)
HVAC	heating, ventilation, and air conditioning
I-5	Interstate 5
in/sec	inch/inches per second
JWA	John Wayne Airport
L_{dn}	day-night average noise level
L_{eq}	equivalent continuous sound level
L_{max}	maximum instantaneous noise level
L_V	velocity in decibels

PPV	peak particle velocity
project	San Clemente Senior Housing Project
RMS	root-mean-square (velocity)
sf	square foot/feet
STC	sound transmission class
VdB	vibration velocity decibel(s)

INTRODUCTION

This noise and vibration impact analysis has been prepared to evaluate the potential noise and vibration impacts and mitigation measures associated with the proposed San Clemente Senior Housing Project (project) in San Clemente, California. This report is intended to satisfy the City of San Clemente's (City) requirement for a project-specific noise and vibration impact analysis by examining the impacts of the proposed uses on the project site and identifies any necessary mitigation measures to reduce project noise impacts.

PROJECT LOCATION AND DESCRIPTION

The 6.63-acre project site is at 654 Camino De Los Mares in San Clemente, California. Figure 1 shows the project location. The project proposes the demolition of the existing buildings and the construction of a 250-dwelling-unit senior house project consisting of two residential apartment buildings (Building 1 [99 units] and Building 2 [155 units]) and a 7,500-square-foot (sf), two-story medical office (Building 3). The senior housing would consist of 61 studio units (540 sf), 119 one-bedroom units (650–897 sf), and 70 two-bedroom units (985–1,120 sf), for a total of 192,568 net leasable square feet. The project proposes both indoor and outdoor amenities for the residents, including a common clubroom, a fitness center, a rooftop deck, a resort-style pool deck, landscaped courtyards, and a central paseo walkway. Both the senior housing and medical office would have all-access drives with surface parking areas around the perimeters of the buildings. Figure 2 shows the site plan.

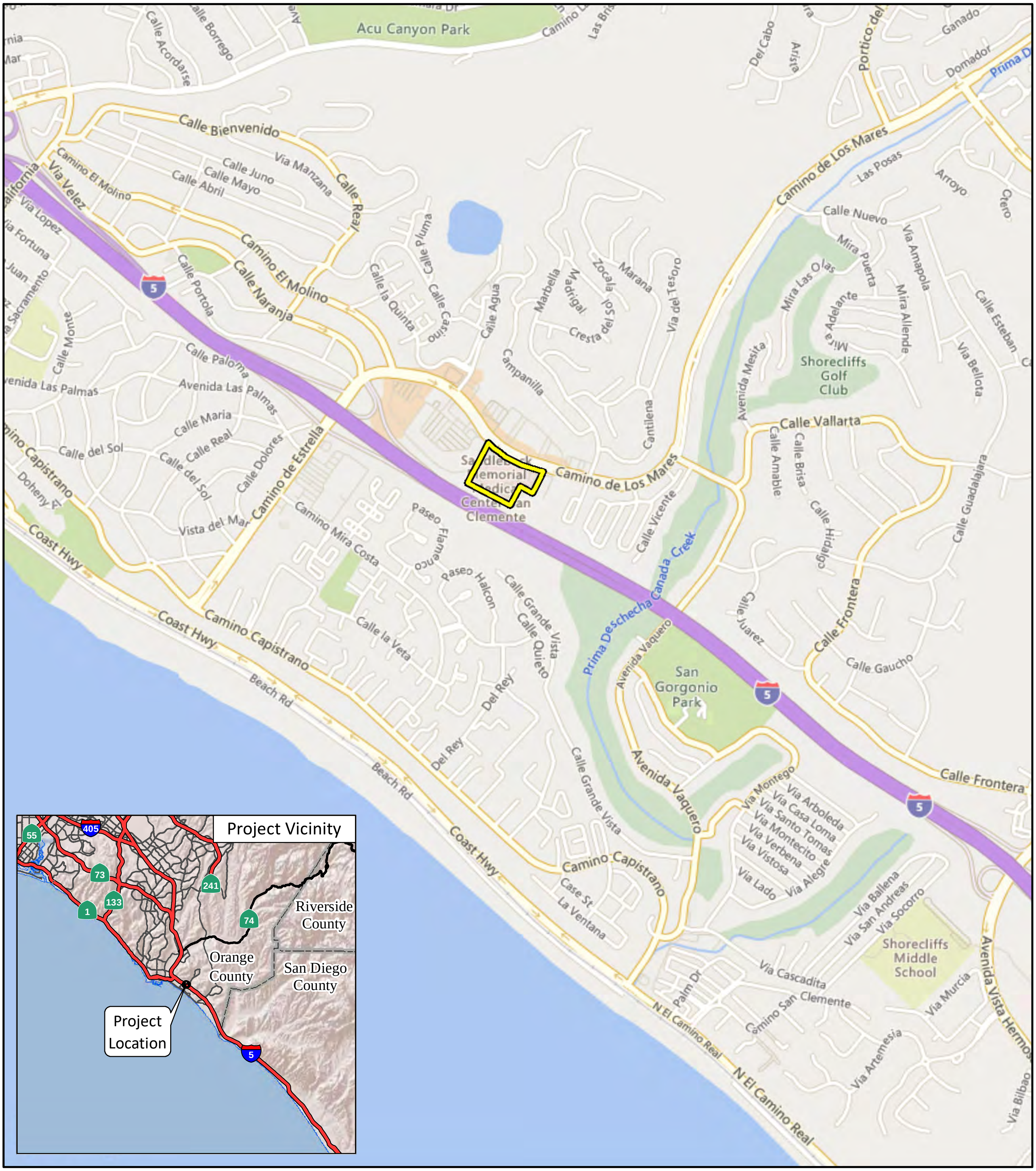
Access to the project site would be provided via Camino De Los Mares, with two entries at the west and east ends of the project's frontage. The west entry would serve as the main entry and drop-off site, while the east entry would be the main access point for the medical office building, as well as a secondary access point for the senior apartments. The site would have a total of 301 parking spaces, of which 250 would be for the senior apartments and 32 would be for the medical office. The remaining spaces would be part of a shared parking agreement. Once operational, the proposed project would generate approximately 1,080 average daily trips.

Construction of the proposed project is anticipated to begin in fall 2023 and would continue for 18 to 24 months. Based on the preliminary grading plans, 11,587 cubic yards of earth would be exported from the project site.

EXISTING LAND USES IN THE PROJECT AREA

The project site is surrounded primarily by commercial and residential (assisted living) uses. The areas adjacent to the project site include the following uses:

- **North:** Existing commercial uses opposite Camino De Los Mares
- **East:** Existing San Clemente Villas by the Sea, an assisted living use
- **South:** Interstate 5 (I-5)
- **West:** Existing commercial uses (Ocean View Plaza)



LSA

LEGEND

Project Location

FIGURE 1

0 750 1500
FEET

San Clemente Senior Housing Project

Project Location and Vicinity

SOURCE: Bing Maps (2021)

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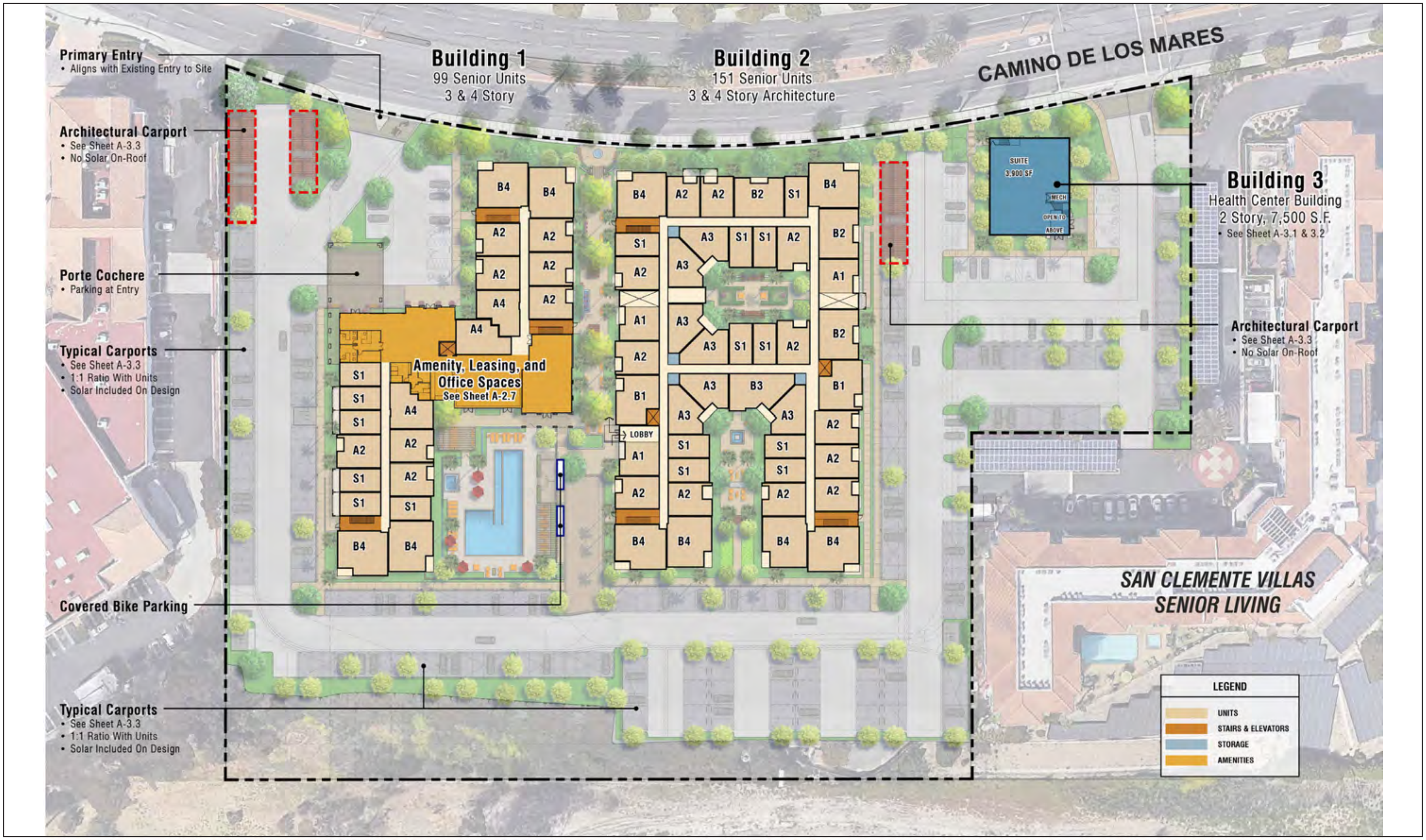

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FIGURE 2

San Clemente Senior Housing Project

Site Plan

SOURCE: TCA Architects, June 21, 2022

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NOISE AND VIBRATION FUNDAMENTALS

CHARACTERISTICS OF SOUND

Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a sound wave, which results in the tone's range from high to low. Loudness is the strength of a sound, and it describes a noisy or quiet environment; it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound wave combined with the reception characteristics of the human ear. Sound intensity refers to the power carried by sound waves per unit area in a direction perpendicular to that area. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound pressure level and its effect on adjacent sensitive land uses.

Measurement of Sound

Sound pressure level is measured with the A-weighted decibel scale 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. Decibels, unlike linear units (e.g., inches or pounds), are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 decibels (dB) is 10 times more intense than 1 dB, 20 dB is 100 times more intense than 1 dB, and 30 dB is 1,000 times more intense than 1 dB. Thirty decibels (30 dB) represents 1,000 times as much acoustic energy as 1 dB. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the sound's loudness. Ambient sounds generally range from 30 dB (very quiet) to 100 dB (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound levels dissipate exponentially with distance from their noise sources. For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations) the sound decreases 3 dB for each doubling of distance in a hard site environment. Line source sound levels decrease 4.5 dB for each doubling of distance in a relatively flat environment with absorptive vegetation.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. The equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and Community Noise Equivalent Level (CNEL) or the day-night average noise level (L_{dn}) based on A-weighted decibels (dBA). CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noise occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the relaxation and sleeping hours. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable. The City uses the CNEL noise scale for long-term noise impact assessment.

Other noise rating scales of importance when assessing the annoyance factor include the maximum instantaneous noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. It is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first category includes audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3 dB or greater because this level has been found to be barely perceptible in exterior environments. Additionally, an increase of more than 5 dBA is typically considered readily perceptible in an exterior environment. The second category, potentially audible, refers to a change in the noise level between 1 dB and 3 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category includes changes in noise levels of less than 1 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to sound levels higher than 85 dBA. Exposure to high sound levels affects the entire system, with prolonged sound exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of sound exposure above 90 dBA would result in permanent cell damage. When the sound level reaches 120 dBA, a tickling sensation occurs in the human ear, even with short-term exposure. This level of sound is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by a feeling of pain in the ear (i.e., the threshold of pain). A sound level of 160–165 dBA will result in dizziness or a loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less-developed areas.

Table A lists definitions of acoustical terms, and Table B shows common sound levels and their sources.

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of sound level that denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in 1 second (i.e., the number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. (All sound levels in this report are A-weighted unless reported otherwise.)
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels that are equaled or exceeded by a fluctuating sound level 1%, 10%, 50%, and 90% of a stated time period, respectively.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dBA to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time. It is usually a composite of sound from many sources from many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.

Source: *Handbook of Acoustical Measurements and Noise Control* (Harris 1991).

Table B: Common Sound Levels and Their Noise Sources

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1,000 ft		
	— 100 —	
Gas lawn mower at 3 ft		
	— 90 —	
Diesel truck at 50 ft at 50 mph		Food blender at 3 ft
	— 80 —	Garbage disposal at 3 ft
Noisy urban area, daytime		
Gas lawn mower, 100 ft	— 70 —	Vacuum cleaner at 10 ft
Commercial area		Normal speech at 3 ft
Heavy traffic at 300 ft	— 60 —	
		Large business office
Quiet urban daytime	— 50 —	Dishwasher in 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: *Technical Noise Supplement,* California Department of Transportation (September 2013).
dBA = A-weighted decibels
ft = feet
mph = miles per hour

FUNDAMENTALS OF VIBRATION

Vibration refers to ground-borne noise and perceptible motion. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernible, but without the effects associated with the shaking of a building there is less adverse reaction. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by occupants as the motion of building surfaces, the rattling of items sitting on shelves or hanging on walls, or a low-frequency rumbling noise. The rumbling noise is caused by the vibration of walls, floors, and ceilings that radiate sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of ground-borne vibration are construction activities (e.g., blasting, pile-driving, and operating heavy-duty earthmoving equipment), steel-wheeled trains, and occasional traffic on rough roads. Problems with both ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 feet (ft) from the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 ft (FTA 2018). When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible.

Ground-borne noise is not likely to be a problem because noise arriving via the normal airborne path will usually be greater than ground-borne noise.

Ground-borne vibration has the potential to disturb people and damage buildings. Although it is very rare for train-induced ground-borne vibration to cause even cosmetic building damage, it is not uncommon for construction processes such as blasting and pile-driving to cause vibration of sufficient amplitudes to damage nearby buildings (FTA 2018). Ground-borne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or peak particle velocity (PPV). The RMS is best for characterizing human response to building vibration, and PPV is used to characterize potential for damage. Decibel notation acts to compress the range of numbers required to describe vibration. Vibration velocity level in decibels is defined as:

$$L_v = 20 \log_{10} [V/V_{ref}]$$

where "L_v" is the vibration velocity in decibels (VdB), "V" is the RMS velocity amplitude, and "V_{ref}" is the reference velocity amplitude, or 1×10^{-6} inches/second (in/sec) used in the United States.

REGULATORY SETTING

APPLICABLE NOISE STANDARDS

Because the City of San Clemente has not established transportation-related noise standards for sensitive uses, the County of Orange (County) criteria are utilized within this analysis. The City of San Clemente Municipal Code noise criteria are used to assess off-site stationary operational noise impacts. Lastly, the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) (FTA Manual) provides noise criteria used to assess potential noise impacts during construction activities.

County of Orange

Noise Element of the General Plan

The noise standards guidelines in the Noise Element of the County's General Plan are used as a guideline to evaluate the acceptability of the noise levels generated by traffic. These standards are used for the assessment of land use compatibility related to the exterior ambient noise levels. Table C shows land use noise compatibility taken from Tables VIII-2 and VIII-3 of the County's General Plan Noise Element (County of Orange 2005).

Table C: County Land Use Noise Compatibility

Land Use Categories	Exterior Ambient Noise Level (CNEL)	
	65+ dBA	60 to 65 dBA
Residential	3A, B, E	2A, E
Commercial	2C	2C
Employment	2C	2C
Open Space	2C	2C
Educational Facilities	2C, D, E	2C, D, E
Places of Worship	2C, D, E	2C, D, E
Hospitals	2A, C, D, E	2A, C, D,E
Group Quarters	1A, B,C, E	2A, C, E
Hotels/Motels	2A, C	2A, C
Accessory Uses (Executive Apartments, Caretakers)	1A, B, E 1A, B, C, E	2A, E 2A, C, E

Source: County of Orange General Plan, Noise Element, Tables VIII-2 and VIII-3 (2005).

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 dBA CNEL contour from any airport or air station but allowed in other areas if interior and exterior community noise levels can be mitigated. The prohibition against new residential development excludes limited "infill" development within an established neighborhood.

Standards required for compatibility of land use and noise:
A: Interior Standard: CNEL of less than 45 dBA (habitable rooms only).
B: Exterior Standard: CNEL of less than 65 dBA in outdoor living areas.
C: Interior Standard: L_{eq} (h) = 45 to 65 dBA interior noise level, depending interior use.
D: Exterior Standard: L_{eq} (h) of less than 65 dBA in outdoor living areas.
E: Interior Standard: As approved by Board of Supervisors for sound events of short duration such as aircraft flyovers or individual passing railroad trains.

CNEL = Community Noise Equivalent Level dBA = A-weighted decibel(s) L_{eq} =equivalent continuous sound level

City of San Clemente

Municipal Code

Consistent with Division 6 – Noise Control of the County's Municipal Code, Chapter 8.48, Noise Control, of the City's Municipal Code (City of San Clemente 2022) establishes the maximum permissible noise level that may intrude into a neighbor's property. Sections 8.48.050 and 8.48.060 of the Noise Control Ordinance establish exterior and interior noise level standards for residential land uses categories affected by stationary noise sources. It is unlawful for any person at any location within San Clemente to create any noise or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person which causes the noise level, when measured on any property within designated noise zones to exceed the applicable noise standards shown in Table D.

Table D: City of San Clemente Maximum Noise Level Standards

Land Use	Exterior/ Interior	Time Period	L_{50} (30 mins) dBA	L_{25} (15 mins) dBA	L_8 (5 mins) dBA	L_2 (1 min) dBA	L_{max} (Anytime) dBA
Residential	Exterior	7:00 a.m. to 10:00 p.m.	55	60	65	70	75
		10:00 p.m. to 7:00 a.m.	50	55	60	65	70
	Interior	7:00 a.m. to 10:00 p.m.	50	—	55	60	65
		10:00 p.m. to 7:00 a.m.	40	—	45	50	55
Residential portions of mixed-use, or residences located on property zoned for commercial, industrial, or manufacturing land use	Exterior	7:00 a.m. to 10:00 p.m.	60	65	70	75	80
		10:00 p.m. to 7:00 a.m.	50	55	60	65	70
	Interior	7:00 a.m. to 10:00 p.m.	50	—	55	60	65
		10:00 p.m. to 7:00 a.m.	40	—	45	50	55
Commercial	Exterior	7:00 a.m. to 10:00 p.m.	65	70	75	80	85
		10:00 p.m. to 7:00 a.m.[1]	60	65	70	75	80
Industrial or manufacturing	Exterior	7:00 a.m. to 10:00 p.m.	70	75	80	85	90
		10:00 p.m. to 7:00 a.m.[1]	70	75	80	85	90

Source: City of San Clemente Municipal Code (City of San Clemente 2022).
[1] The exterior noise standards only apply if commercial, industrial or manufacturing buildings are occupied during these hours.
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel(s)
L_{max} = maximum instantaneous noise level
min/mins = minute/minutes

Each of the noise standards specified above shall be reduced by 5 dBA for impact, or predominant tone noise or for noises consisting of speech or music. 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 level. In the event the ambient noise level exceeds the last noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

Construction noise is temporary and will stop after project construction is complete. Section 8.48.090 of the City's Municipal Code Noise Ordinance regulates the timing of construction activities and includes special provisions for sensitive land uses. The City's Municipal Code allows construction between the hours of 7:00 a.m. and 6:00 p.m., Monday through Friday, and between 8:00 a.m. and 6:00 p.m. on Saturday. Construction is not permitted outside of these hours, on Sunday, or on a City-recognized holiday unless a temporary waiver is granted by the development services director or his/her authorized representative, or in emergencies, including maintenance work on City rights-of-way. The limitations on construction activity also apply to vehicles and equipment involved with deliveries, loading or transferring materials, equipment service, or maintenance of any devices or appurtenances for or within a construction project.

Federal Transit Administration

Because the City does not have construction noise level limits, construction noise was assessed using criteria from the FTA Manual. Table E shows the FTA's General Assessment Construction Noise Criteria based on the composite noise levels of the two noisiest pieces of equipment per construction phase.

Table E: General Assessment Construction Noise Criteria

Land Use	Daytime 1-hour L_{eq} (dBA)	Nighttime 1-hour L_{eq} (dBA)
Residential	90	80
Commercial	100	100
Industrial	100	100

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
dBA = A-weighted decibel(s)
L_{eq} = equivalent continuous sound level

APPLICABLE VIBRATION STANDARDS

Federal Transit Administration

Vibration standards included in the FTA Manual are used in this analysis for ground-borne vibration impacts on human annoyance. The criteria for environmental impact from ground-borne vibration and noise are based on the maximum levels for a single event. Table F provides the criteria for assessing the potential for interference or annoyance from vibration levels in a building.

Table G lists the potential vibration building damage criteria associated with construction activities, as suggested in the FTA Manual. FTA guidelines show that a vibration level of up to 0.5 in/sec in PPV is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster), and would not result in any construction vibration damage. For non-engineered timber and masonry buildings, the construction building vibration damage criterion is 0.2 in/sec in PPV.

Table F: Interpretation of Vibration Criteria for Detailed Analysis

Land Use	Max L_v (VdB)[1]	Description of Use
Workshop	90	Vibration that is distinctly felt. Appropriate for workshops and similar areas not as sensitive to vibration.
Office	84	Vibration that can be felt. Appropriate for offices and similar areas not as sensitive to vibration.
Residential Day	78	Vibration that is barely felt. Adequate for computer equipment and low-power optical microscopes (up to 20×).
Residential Night and Operating Rooms	72	Vibration is not felt, but ground-borne noise may be audible inside quiet rooms. Suitable for medium-power microscopes (100×) and other equipment of low sensitivity.

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).

Table F: Interpretation of Vibration Criteria for Detailed Analysis

Land Use	Max L_v (VdB)[1]	Description of Use

[1] As measured in 1/3-Octave bands of frequency over the frequency range 8 to 80 Hertz.
FTA = Federal Transit Administration
Max = maximum
L_V = velocity in decibels
VdB = vibration velocity decibels

Table G: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)
Reinforced concrete, steel, or timber (no plaster)	0.50
Engineered concrete and masonry (no plaster)	0.30
Non-engineered timber and masonry buildings	0.20
Buildings extremely susceptible to vibration damage	0.12

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
FTA = Federal Transit Administration
PPV = peak particle velocity
in/sec = inch/inches per second

OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

This section describes the existing noise environment in the project site vicinity. Noise monitoring and traffic noise modeling were used to quantify existing and future noise levels at the project site. In San Clemente, vehicle traffic is the primary source of noise. Other significant local noise sources include industrial noise, construction noise, and mechanical equipment noise.

EXISTING NOISE LEVEL MEASUREMENTS

To assess existing noise levels, LSA conducted two long-term noise measurements in the vicinity of the project site. The long-term noise measurements were recorded from April 13 through April 14, 2022. The long-term noise measurements captured data in order to calculate the hourly L_{eq} and CNEL at each location, which incorporate the nighttime hours. Sources that dominate the existing noise environment include traffic on I-5, light traffic on Camino De Los Mares, and occasional aircraft noise. Noise measurement data collected during the long-term noise monitoring are summarized in Table H. Figure 3 shows the noise monitoring locations. Noise measurement sheets are provided in Appendix A.

Table H: Existing Noise Level Measurements—Long Term

Location	Description	Date	Daytime Noise Levels[1] (dBA L_{eq})	Evening Noise Levels[2] (dBA L_{eq})	Nighttime Noise Levels[3] (dBA L_{eq})	Daily Noise Level (dBA CNEL)
LT-1	654 Camino De Los Mares, on top of roof, near southwest corner of building, approximately 3 ft from edge of roof, 300 ft from I-5 centerline.	4/13/2022	66.9–68.0	65.2–67.0	59.4–66.8	71.0
LT-2	654 Camino De Los Mares, north side of building facing Camino De Los Mares, approximately 80 ft from Camino De Los Mares centerline.	4/13/2022	61.8–62.9	59.3–61.4	46.6–60.7	64.1

Source: Compiled by LSA (June 2022).

[1] Daytime Noise Levels = noise levels during the hours from 7:00 a.m. to 7:00 p.m.

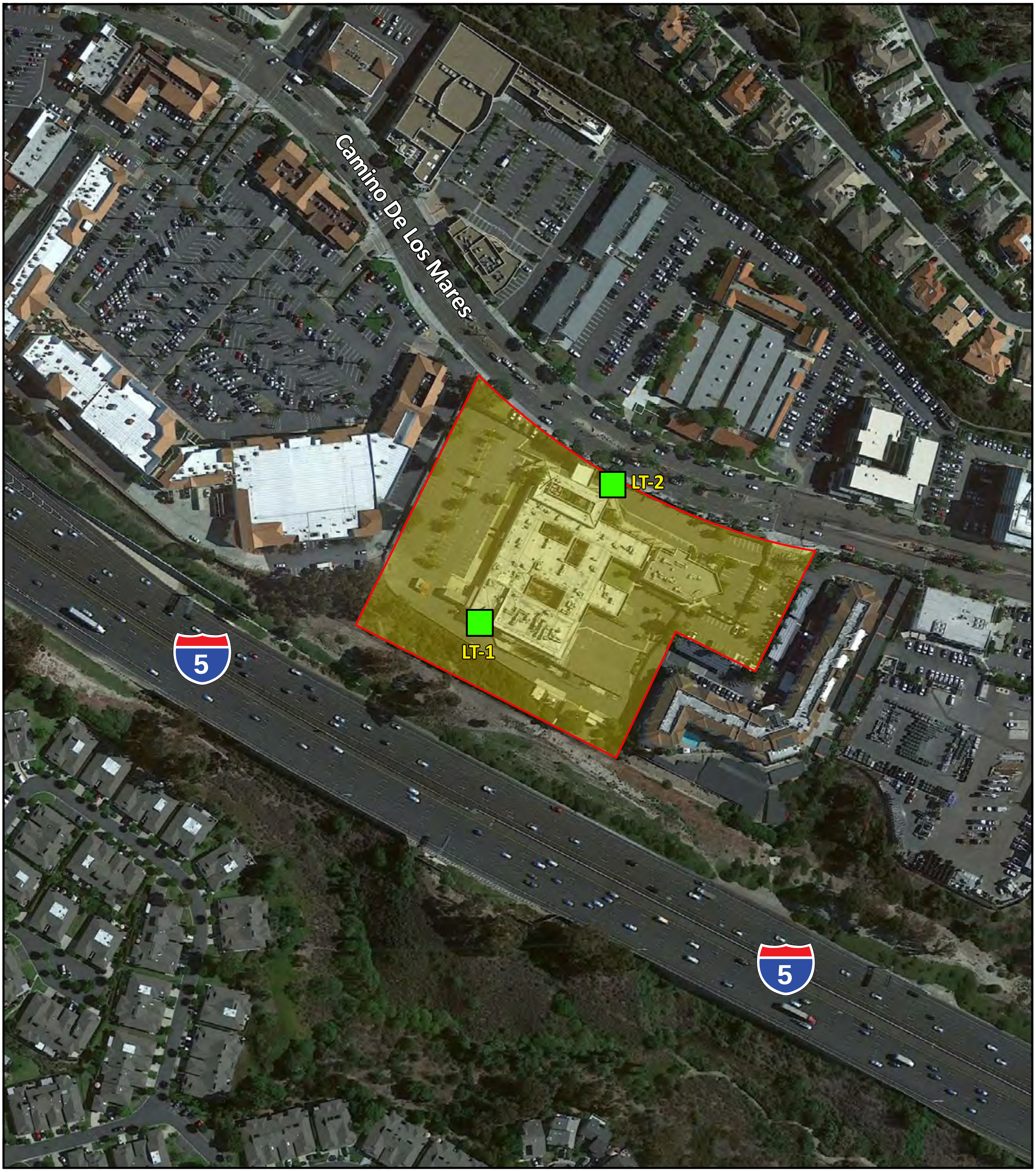
[2] Evening Noise Levels = noise levels during the hours from 7:00 p.m. to 10:00 a.m.

[3] Nighttime Noise Levels = noise levels during the hours from 10:00 p.m. to 7:00 a.m.

CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = foot/feet
I-5 = Interstate 5
L_{eq} = equivalent continuous sound level

AIRCRAFT NOISE

Airport-related noise levels are primarily associated with aircraft engine noise made while aircraft are taking off, landing, or running their engines while still on the ground. The closest airport to the project site is John Wayne Airport (JWA), approximately 19.4 miles to the north. The project site is well outside the 60 dBA CNEL noise contour of JWA based on the JWA Airport Impact Zones map in the Airport Environs Land Use Plan (Airport Land Use Commission 2008). Therefore, no further analysis is necessary.



LSA

LEGEND

- Project Site Boundary

LT-1 - Long-Term Noise Monitoring Location

FIGURE 3

N

0 150 300
FEET

SOURCE: Google Earth 2022

San Clemente Sr Housing

Noise Monitoring Locations

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PROJECT IMPACTS

SHORT-TERM CONSTRUCTION NOISE IMPACTS

Two types of short-term noise impacts would occur during project construction: (1) equipment delivery and construction worker commutes; and (2) project construction operations.

The first type of short-term construction noise would result from transport of construction equipment and materials to the project site and construction worker commutes. The project would generate an estimated total of 285 hauling truck trips over a 20-day demolition phase (14 trips per day) and an estimated total of 1,448 hauling truck trips over a 20-day grading phase (72 trips per day) based on the California Emission Estimator Model (Version 2020.4.0) output provided in Appendix A of the *Air Quality and Greenhouse Gas Impact Analysis for the San Clemente Senior Housing Project* (LSA 2022a). These transportation activities would incrementally raise noise levels on access roads leading to the site. It is expected that larger trucks used in equipment delivery would generate higher noise impacts than trucks associated with worker commutes. The single-event noise from equipment trucks passing at a distance of 50 ft from a sensitive noise receptor would reach a maximum level of 84 dBA L_{max}. However, the pieces of heavy equipment for grading and construction activities would be moved on site just one time and would remain on site for the duration of each construction phase. This one-time trip, when heavy construction equipment is moved on and off site, would not add to the daily traffic noise in the project vicinity. The total number of daily vehicle trips would be minimal when compared to existing traffic volumes on the affected streets, and the long-term noise level change associated with these trips would not be perceptible. Therefore, equipment transport noise and construction-related worker commute impacts would be short-term and would not result in a significant off-site noise impact.

The second type of short-term noise impact is related to noise generated during demolition, site preparation, grading, building construction, architectural coating, and paving on the project site. Construction is undertaken in discrete steps, each of which has its own mix of equipment, and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the project site. Therefore, the noise levels vary as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table I lists the maximum noise levels recommended for noise impact assessments for the project-specific construction equipment list based on a distance of 50 ft between the equipment and a noise receptor.

Typical operating cycles for these types of construction equipment may involve 1 to 2 minutes of full-power operation followed by 3 to 4 minutes at lower power settings.

Table I: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)	Maximum Noise Level (L_{max}) at 50 Feet[1]
Compressor	40	80
Cranes	16	85
Dozers	40	85
Drill Rig	20	84
Flat-bed Trucks	40	84
Forklift	20	85
Front-end Loaders	40	80
Generator	50	82
Man-lift	20	85
Impact Pile Driver	20	95
Rollers	20	85
Water Truck	40	84
Welder	40	73

Source: Roadway Construction Noise Model (FHWA 2006).
Note: Noise levels reported in this table are rounded to the nearest whole number.
[1] Maximum noise levels were developed based on Specification 721.560 from the Central Artery/Tunnel program to be consistent with the City of Boston's Noise Code for the "Big Dig" project.
L_{max} = maximum instantaneous sound level

In addition to the reference maximum noise level, the usage factor provided in Table I is used to calculate the hourly noise level impact for each piece of equipment based on the following equation:

$$L_{eq}(equip) = E.L. + 10\log(U.F.) - 20\log\left(\frac{D}{50}\right)$$

where: L_{eq} *(equip)* = L_{eq} at a receiver resulting from the operation of a single piece of equipment over a specified time period.

E.L. = noise emission level of the particular piece of equipment at a reference distance of 50 ft.

U.F. = usage factor that accounts for the fraction of time that the equipment is in use over the specified period of time.

D = distance from the receiver to the piece of equipment.

Each piece of construction equipment operates as an individual point source. Using the following equation, a composite noise level can be calculated when multiple sources of noise operate simultaneously:

$$Leq\ (composite) = 10 * \log_{10}\left(\sum_{1}^{n} 10^{\frac{Ln}{10}}\right)$$

Using the equations from the methodology above, the reference information in Table I, and the construction equipment list provided, the composite noise level of each construction phase was calculated. The project construction composite noise levels at a distance of 50 ft would range from 74 dBA L_{eq} to 87 dBA L_{eq}, with the highest noise levels occurring during the site preparation phase, as shown in Table J.

Table J: Potential Construction Noise Impacts by Phase

Phase	Equipment (Quantity)	Composite Noise Level at 50 feet (dBA L_{eq})
Demolition	Concrete Saw (1), Excavator (1), Dozer (2)	86
Site Preparation and Grading	Excavator (1), Grader (1), Dozer (2), Tractor (2)	87
Building Construction	Crane (1), Forklift (3), Tractor (2)	84
Paving	Paver (2), Paving Equipment (2), Roller (2)	86
Architectural Coating	Air Compressor (1)	74

Source: Compiled by LSA (2022).
dBA L_{eq} = average A-weighted hourly noise level

Once composite noise levels are calculated, reference noise levels can then be adjusted for distance using the following equation:

$$Leq\ (at\ distance\ X) = Leq\ (at\ 50\ feet) - 20 * \log_{10}\left(\frac{X}{50}\right)$$

In general, this equation shows that doubling the distance would decrease noise levels by 6 dBA while halving the distance would increase noise levels by 6 dBA.

Table K shows the nearest sensitive uses that surround the project site, the distances of their respective property lines from the center of construction activities, and the noise levels expected during site preparation activities. These noise level projections do not take into account intervening topography or barriers. Construction equipment calculations are provided in Appendix B.

Table K: Potential Construction Noise Impacts by Phase

Receptor	Distance (feet)	Noise Level (dBA L_{eq})
San Clemente Villas Senior Living (East)	260	73
Commercial (West and North)	350	70

Source: Compiled by LSA (2022).
dBA L_{eq} = average A-weighted hourly noise level

While construction noise will vary, it is expected that composite noise levels during construction at the nearest off-site residential land uses to the south would reach 73 dBA L_{eq} during the site preparation phase. It is expected that composite noise levels during construction at the nearest commercial land uses to the west and north would reach 70 dBA L_{eq}. These predicted noise levels would only occur when all construction equipment is operating simultaneously at the closest point of construction and, therefore, are assumed to be rather conservative in nature. While construction-related short-term noise levels have the potential to be higher than existing ambient noise levels in the project area under existing conditions, the noise impacts would no longer occur once project construction is completed.

As stated above, noise impacts associated with construction activities are regulated by the City's noise ordinance. The proposed project will be required to comply with the construction hours specified in the City's Noise Ordinance, which states that construction activities are allowed between 7:00 a.m. and 6:00 p.m., Monday through Friday, and between 8:00 a.m. and 6:00 p.m. on Saturday. Construction is not permitted outside of these hours, on a Sunday, or on a City-recognized holiday unless a temporary waiver is granted by the development services director or his/her authorized representative, or in emergencies, including maintenance work on City rights-of-way.

As it relates to off-site uses, construction-related noise impacts would remain below the 90 dBA L_{eq} and 100 dBA L_{eq} 1-hour construction noise level criteria, as established by the FTA for residential and commercial land uses, respectively, and therefore would be considered less than significant. To minimize noise impacts to the extent feasible, the following practices shall be incorporated:

- All construction vehicles or equipment, fixed or mobile, operated within 1,000 ft of a dwelling shall be equipped with operating and maintained mufflers.
- Stockpiling and/or vehicle storage areas shall be located as far as practicable from and out of view of dwellings.

SHORT-TERM CONSTRUCTION VIBRATION IMPACTS

The following construction vibration impact analysis discusses the level of human annoyance using vibration levels in VdB and assesses the potential for building damages using vibration levels in PPV (in/sec). This is because vibration levels calculated in RMS are best for characterizing human response to building vibration, while calculating vibration levels in PPV is best for characterizing the potential for damage.

Table L shows the PPV and VdB values at 25 ft from the construction vibration source. As shown in Table L, bulldozers and other heavy-tracked construction equipment (expected to be used for this project) generate approximately 0.089 PPV in/sec or 87 VdB of ground-borne vibration when measured at 25 ft, based on the FTA Manual. The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the project construction boundary (assuming the construction equipment would be used at or near the project setback line).

Table L: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 ft	
	PPV (in/sec)	L_V (VdB)[1]
Pile Driver (Impact), Typical	0.644	104
Pile Driver (Sonic), Typical	0.170	93
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large Bulldozer[2]	**0.089**	**87**
Caisson Drilling	0.089	87
Loaded Trucks[2]	**0.076**	**86**
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
1 RMS vibration velocity in decibels (VdB) is 1 µin/sec.
2 Equipment shown in **bold** is expected to be used on site.
µin/sec = microinches per second
ft = foot/feet
FTA = Federal Transit Administration
in/sec = inch/inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibel(s)

The formulae for vibration transmission are provided below, and Tables M and N provide a summary of off-site construction vibration levels.

$$L_v dB\ (D) = L_v dB\ (25\ ft) - 30\ Log\ (D/25)$$

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

As shown in Table F, above, the threshold at which vibration levels would result in annoyance would be 84 VdB and 78 VdB for office-type uses and daytime residential uses, respectively. As shown in Table G, the FTA guidelines indicate that for a non-engineered timber and masonry building, the construction vibration damage criterion is 0.2 in/sec in PPV.

Table M: Potential Construction Vibration Annoyance Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (VdB) at 25 ft[1]	Distance (ft)[2]	Vibration Level (VdB)
Residence (East)	87	260	56
Commercial (West and North)		350	53

Source: Compiled by LSA (2022).
1 The reference vibration level is associated with a large bulldozer, which is expected to be representative of the heavy equipment used during construction.
2 The reference distance is associated with the average condition, identified by the distance from the center of construction activities to surrounding uses.
ft = foot/feet
VdB = vibration velocity decibel(s)

Table N: Potential Construction Vibration Damage Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (PPV) at 25 ft[1]	Distance (ft)[2]	Vibration Level (PPV)
Residence (East)	0.089	25	0.089
Commercial (West)		40	0.044
Commercial (North)		120	0.008

Source: Compiled by LSA (2022).

[1] The reference vibration level is associated with a large bulldozer, which is expected to be representative of the heavy equipment used during construction.

[2] The reference distance is associated with the peak condition, identified by the distance from the perimeter of construction activities to surrounding structures.

ft = foot/feet

PPV = peak particle velocity

Based on the information provided in Table M, vibration levels are expected to approach 56 VdB at the closest residence located immediately east of the project site and 53 VdB at the closest commercial uses located west and north of the project site, which is below the 78 VdB and 84 VdB thresholds for annoyance, respectively.

The closest structure to the project site is the residence to the east of the site, approximately 25 ft from the limits of construction activity. It is expected that vibration levels generated by dump trucks and other large equipment that would be as close as 25 ft from the property line would generate ground-borne vibration levels of up to 0.089 PPV (in/sec) at the closest structure to the project site and would not exceed the 0.2 PPV (in/sec) threshold. All other structures are further away and would experience lower vibration levels. Therefore, vibration impacts would be less than significant.

Because construction activities are regulated by the City's Municipal Code, which states that construction activities are only allowed between 7:00 a.m. and 6:00 p.m., Monday through Friday, and between 8:00 a.m. and 6:00 p.m. on Saturday, vibration impacts would not occur during the more sensitive nighttime hours.

LONG-TERM NOISE IMPACTS

Traffic Noise Impacts to Off-Site Receivers

In order to assess the potential traffic impacts related to the proposed project, LSA estimates the proposed project would result in 1,080 trips. Based on volume counts provided by Counts Unlimited, Inc., the peak-hour traffic is 1,899. Assuming the average daily traffic (ADT) is 10 times the peak-hour traffic, the ADT is 18,990 in the vicinity of the project. The following equation was used to determine potential impacts of the project:

$$\text{Change in CNEL} = 10 \log_{10} [V_{e+p}/V_{existing}]$$

Where: $V_{existing}$ = the existing daily volume
V_{e+p} = the existing daily volumes plus project
Change in CNEL = the increase in noise level due to the project

The results of the calculations show that an increase of approximately 0.24 dBA CNEL is expected along Camino De Los Mares. A noise level increase of less than 3 dBA would not be perceptible to the human ear; therefore, the traffic noise increases along Camino De Los Mares resulting from the proposed project would be less than significant. No mitigation is required.

Heating, Ventilation and Air Conditioning Equipment

The project would include rooftop heating, ventilation, and air conditioning (HVAC) units. While Building 3 (Health Center Building) would contain rooftop HVAC equipment, noise impacts would only occur during daytime operational hours. For the proposed living units in Buildings 1 and 2, the HVAC equipment could operate 24 hours per day. Rooftop HVAC equipment for a single unit would generate a noise level of 66.6 dBA L_{eq} at 5 ft based on previous measurements conducted by LSA.

Table O presents the noise levels from HVAC equipment at the nearest noise-sensitive location. The closest off-site sensitive uses to the proposed location of an on-site HVAC unit would be located approximately 140 ft away. According to the site plan, 20 banks of HVAC units are proposed to be installed. Per the building plans for the proposed project, each building would have parapet walls to hide the mechanical equipment, which would reduce noise levels by a minimum of 5 dBA, resulting in a reference level of 72.4 dBA L_{eq} at 5 ft from each bank of HVAC units. After distance attenuation, noise generated from the four closest banks of HVAC equipment would be up to 48.0 dBA L_{eq} at the nearest sensitive use. This noise level would not exceed the City's exterior daytime (7:00 a.m. to 11:00 p.m.) and nighttime (11:00 p.m. to 7:00 a.m.) noise standards of 55 dBA L_{eq} and 50 dBA L_{eq}, respectively. In addition, the projected noise level would be below the quietest existing ambient noise levels at the nearest off-site sensitive building façade. Therefore, noise associated with the on-site HVAC equipment would be less than significant, and no mitigation is required.

Table O: Summary of HVAC Noise Levels

Off-Site Land Use (Direction)	Distance from HVAC Units (ft)	Reference Noise Level for 1 Unit at 5 ft (dBA L_{eq})	Reference Noise for a Bank of 12 Units at 5 ft (dBA L_{eq})[1]	Distance Attenuation (dBA)	Noise Level (dBA L_{eq})	Combined Noise Level (dBA L_{eq})
San Clemente Villas Senior Living (East)	140	66.6	72.4	29	43.0	48.0
	150			30	43.0	
	190			32	41.0	
	195			32	41.0	

Source: Compiled by LSA (2022).
1 Includes a minimum reduction of 5 dBA provided by rooftop parapet walls.
dBA = A-weighted decibel(s)
ft = foot/feet
HVAC = heating, ventilation, and air conditioning
L_{eq} = equivalent continuous sound level

ON-SITE LAND USE COMPATIBILITY ASSESSMENT

While impacts to the project site from the surrounding environment are not considered an impact related to the California Environmental Quality Act (CEQA), the following analysis assesses compliance with the local land use compatibility standards. The proposed project is in an area where parcels to the east, west, and north are currently occupied and operational. For this reason, this analysis relies on the existing measured noise levels as well as future predicted noise levels to provide the most accurate description of the noise environment related to traffic noise impacts.

EXTERIOR NOISE ASSESSMENT

Based on the monitoring results shown in Table H, the existing measured noise levels at the project site range from approximately 64.1 dBA CNEL on the northern portion of the site, close to Camino De Los Mares, to 71.0 dBA CNEL on the southern portion of the site, close to I-5.

To assess the exterior noise levels at the proposed pool area south of Building 1, the future noise levels project were based on existing measured noise levels and an estimated noise increase based on future growth. The current annual average daily traffic (AADT) on I-5 in the vicinity of the project is 179,700 (Caltrans 2020). The estimated future AADT, assuming a time period of 20 years and a 1 percent growth rate, would be 215,640, resulting in a 0.8 dB increase. Therefore, the exterior noise levels at the recreational pool area closest to I-5 would approach 72 dBA CNEL.

Based on the project site grading plan, with a minimum 7 ft high solid barrier around the pool area at Building 1 and the rooftop deck, noise levels would be reduced by approximately 8 dBA, resulting in a noise level of 44 dBA CNEL. Noise levels at these locations would be below the County's 65 dBA CNEL exterior noise level standard. Therefore, with the minimum recommended barrier heights, no additional noise reduction features would be necessary to comply with land use compatibility standards.

Based on the project site plan, an additional outdoor recreation area, the central courtyard in the northern portion of Building 2, is considered an exterior sensitive use. With future exterior noise levels approaching 64.4 dBA CNEL (existing noise level of 64.1 dBA CNEL + 0.3 dBA CNEL growth from the proposed project) and significant noise reduction provided by the building on all sides, the noise level would be well below the County's 65 dBA CNEL exterior noise level standard. Therefore, no additional noise reduction features would be required.

Noise levels at Buildings 1 and 2 would approach up to 72 dBA CNEL, which is normally considered unacceptable for residential buildings, however, the City would require a detailed analysis of the noise reduction requirements and needed noise insulation features in order to meet the interior noise standards. This detailed analysis would be completed as part of a Final Acoustical Report (FAR).

INTERIOR NOISE ASSESSMENT

As discussed above, per the Noise Element of the County's General Plan, an interior noise level standard of 45 dBA CNEL or less is required for all noise-sensitive rooms. Based on the expected future exterior noise levels at the southern façades of Buildings 1 and 2 closest to I-5 noise levels would approach 72 dBA CNEL and a minimum noise reduction of 27 dBA would be required. Because the project would include a form of mechanical ventilation, windows and doors could remain closed.

As presented above, exterior façades for the southern portions of Buildings 1 and 2 closest to I-5 would experience noise levels approaching 72 dBA CNEL. Previously completed sample interior noise calculations assume standard building construction and upgraded window assemblies. Based on reference information from transmission loss test reports for various Milgard windows (Milgard 2008), the southern, western, and eastern façades would require windows with sound transmission class (STC) ratings of approximately 30–35, depending on the glass-to-wall ratio at the façades with a view of I-5. For units facing Camino De Los Mares, as well as units facing the center of the project buildings, interior noise levels of 45 dBA CNEL or less would be achieved by using standard building construction along with standard windows (typically in the STC 25–28 range).

Once final plans are available and a window manufacturer has been chosen, a FAR would be required to confirm the reduction capability of the exterior façades and to identify any specific upgrades necessary to achieve an interior noise level of 45 dBA CNEL or below.

LONG-TERM VIBRATION IMPACTS

The streets surrounding the project area are paved, smooth, and unlikely to cause significant ground-borne vibration. In addition, the rubber tires and suspension systems of buses and other on-road vehicles make it unusual for on-road vehicles to cause ground-borne noise or vibration problems. It is therefore assumed that no such vehicular vibration impacts would occur and no vibration impact analysis of on-road vehicles is necessary. Additionally, once constructed, the proposed project would not contain uses that would generate ground borne vibration.

CONCLUSION

OFF-SITE CONSTRUCTION IMPACTS

As described in the analysis above, construction of the proposed project would not result in short-term noise and vibration impacts on adjacent land uses. Construction activities would be short-term and would be less than significant. Therefore, no mitigation measures are required. To minimize noise impacts to the extent feasible, the following practices shall be incorporated:

- All construction vehicles or equipment, fixed or mobile, operated within 1,000 ft of a dwelling shall be equipped with operating and maintained mufflers.

- Stockpiling and/or vehicle storage areas shall be located as far as practicable from and out of view of dwellings.

OFF-SITE OPERATIONS IMPACTS

The proposed project would not result in a substantial increase in traffic volumes; therefore, the proposed project would not result in or generate a substantial long-term traffic noise level increase. Implementation of the proposed project would also generate on-site stationary noise from HVAC equipment. However, potential stationary-source noise impacts would be less than significant.

ON-SITE OPERATIONS IMPACTS

On-site noise conditions from traffic noise have the potential to exceed both exterior and interior noise criteria for the on-site sensitive uses. During the final design of the project, a FAR will be completed to confirm the details of the noise reduction measures necessary to achieve compliance with all applicable noise standards. Although exterior noise levels for portions of Buildings 1 and 2 would exceed the City's Land Use Noise Compatibility standards, enhanced window and wall assemblies would achieve an interior/exterior noise reduction such that interior noise levels would meet the City's interior noise standards and would therefore be considered acceptable.

Prior to issuance of a building permit, the City's Director of Development Services, or designee, shall verify that the applicant of the proposed project has obtained from an acoustical consultant a FAR that assesses the following requirements and provides the necessary recommendations for the proposed project to comply with City standards:

- Confirm that the building façade and interior assembly construction details are adequate to achieve the necessary noise reduction for compliance with the City interior noise standard of 45 dBA CNEL and other building code requirements.

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APPENDIX A

LONG-TERM NOISE MEASUREMENT SHEETS

Noise Measurement Survey – 24 HR

Project Number: MEA2202
Project Name: San Clemente Senior Housing

Test Personnel: Corey Knips
Equipment: Spark 906RC (SN:18905)

Site Number: LT-1 Date: 4/13/2022

Time: From 10:00 a.m. To 10:00 a.m.

Site Location: 654 Camino De Los Mares, on top of roof, near the southwest corner of the building. Approximately three feet from the edge of the roof, and 300 feet from the Interstate 5 (I-5) centerline.

Primary Noise Sources: Traffic on I-5.

Comments:

Photo:

Long-Term (24-Hour) Noise Level Measurement Results at LT-1

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
10:00 AM	4/13/2022	68.0	78.0	63.2
11:00 AM	4/13/2022	67.4	81.6	61.9
12:00 PM	4/13/2022	67.4	81.7	62.1
1:00 PM	4/13/2022	67.2	77.8	61.7
2:00 PM	4/13/2022	67.6	78.4	61.1
3:00 PM	4/13/2022	67.8	84.4	62.6
4:00 PM	4/13/2022	67.3	76.9	60.3
5:00 PM	4/13/2022	67.5	83.4	61.3
6:00 PM	4/13/2022	66.9	80.2	59.2
7:00 PM	4/13/2022	67.0	84.7	60.3
8:00 PM	4/13/2022	66.1	82.9	59.0
9:00 PM	4/13/2022	65.2	79.5	56.7
10:00 PM	4/13/2022	64.4	77.2	52.5
11:00 PM	4/13/2022	62.9	72.6	50.1
12:00 AM	4/13/2022	61.7	78.8	48.9
1:00 AM	4/14/2022	60.8	80.3	45.0
2:00 AM	4/14/2022	59.4	71.2	42.1
3:00 AM	4/14/2022	60.7	69.0	44.3
4:00 AM	4/14/2022	62.7	73.7	49.2
5:00 AM	4/14/2022	65.7	75.2	56.5
6:00 AM	4/14/2022	66.8	79.0	58.6
7:00 AM	4/14/2022	67.4	75.5	61.4
8:00 AM	4/14/2022	67.7	84.0	62.3
9:00 AM	4/14/2022	67.7	79.9	60.4

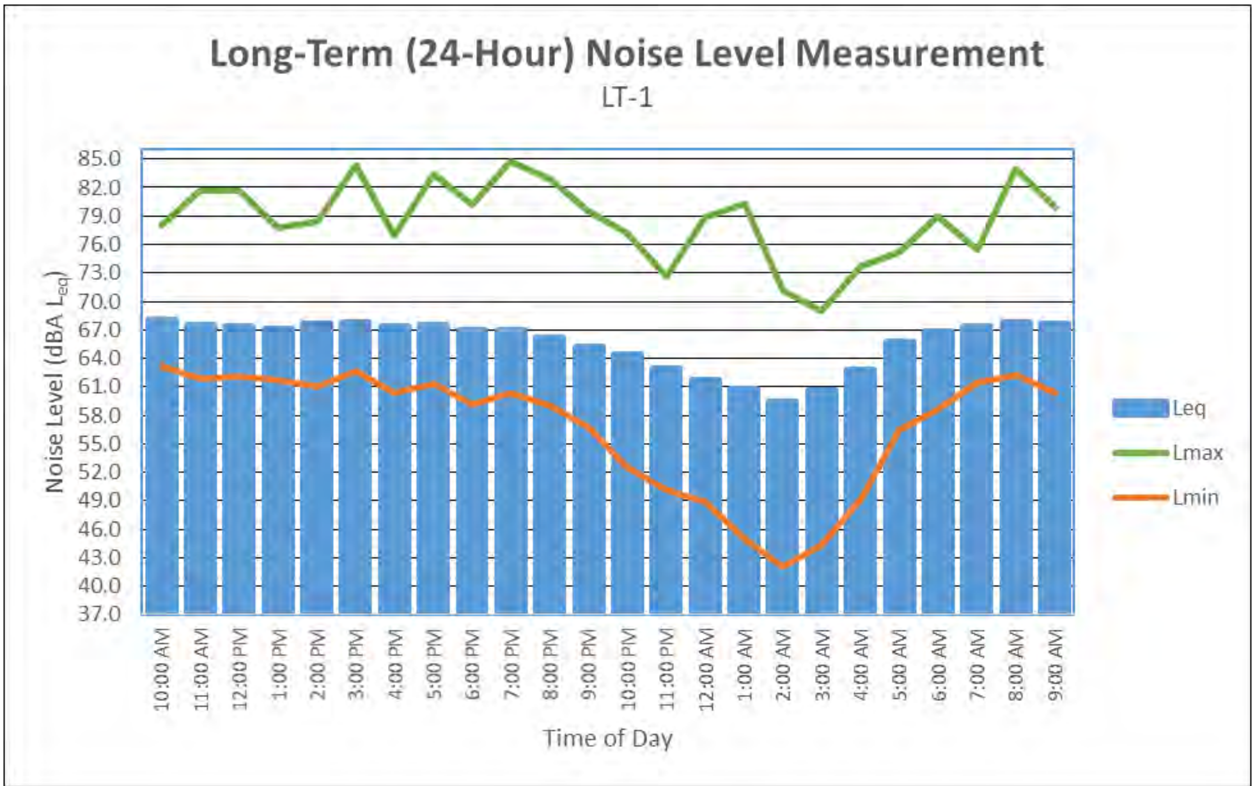
Source: Compiled by LSA Associates, Inc. (2022).

dBA = A-weighted decibel

L_{eq} = equivalent continuous sound level

L_{max} = maximum instantaneous noise level

L_{min} = minimum measured sound level



Noise Measurement Survey – 24 HR

Project Number: MEA2202
Test Personnel: Corey Knips
Project Name: San Clemente Senior Housing
Equipment: Spark 906RC (SN:18906)

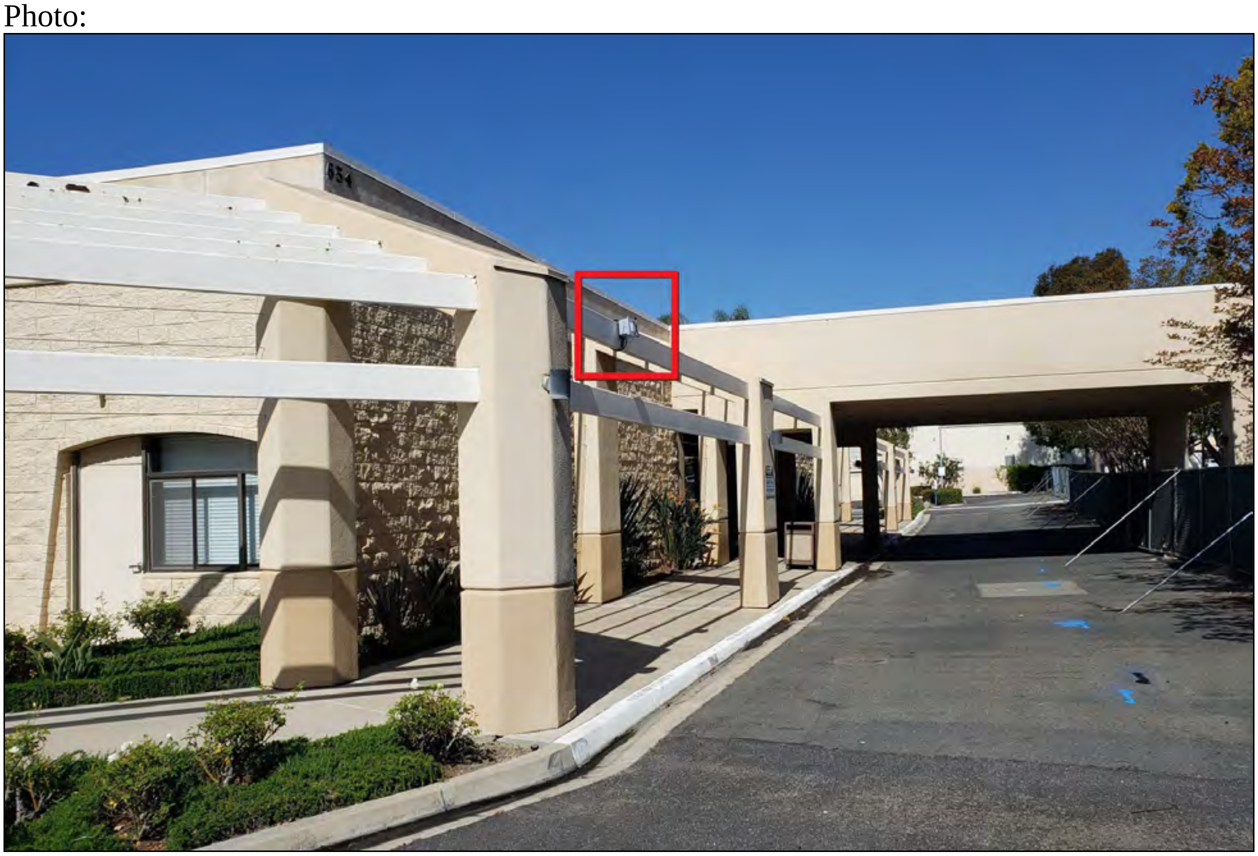
Site Number: LT-2 Date: 4/13/2022
Time: From 10:00 a.m. To 10:00 a.m.

Site Location: 654 Camino De Los Mares, on the north side of the building (facing Camino De Los Mares). Approximately 80 feet from the centerline of Camino Del Los Mares.

Primary Noise Sources: Traffic on Camino Del Los Mares, faint traffic on Interstate 5 (I-5).

Comments:

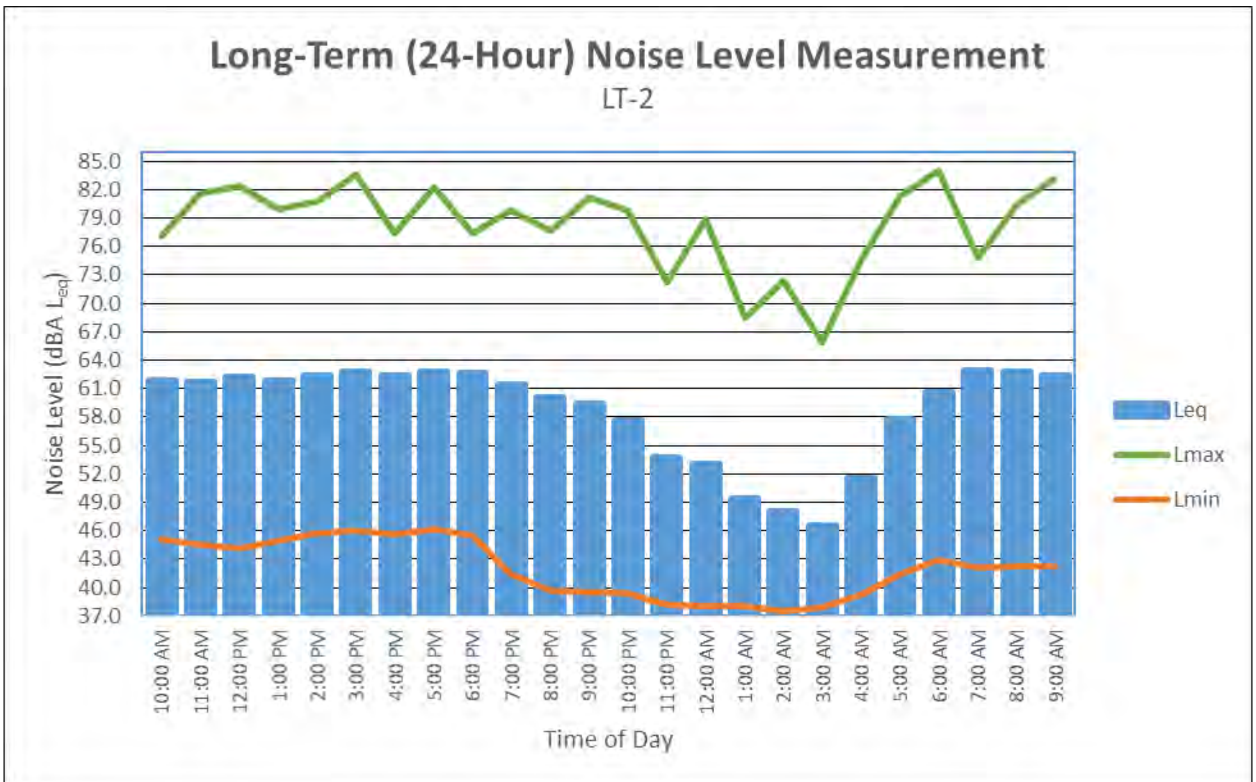
Photo:



Long-Term (24-Hour) Noise Level Measurement Results at LT-2

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
10:00 AM	4/13/2022	61.8	77.1	45.1
11:00 AM	4/13/2022	61.8	81.6	44.5
12:00 PM	4/13/2022	62.2	82.4	44.1
1:00 PM	4/13/2022	61.8	80.0	45.0
2:00 PM	4/13/2022	62.4	80.8	45.7
3:00 PM	4/13/2022	62.8	83.6	46.0
4:00 PM	4/13/2022	62.4	77.4	45.6
5:00 PM	4/13/2022	62.8	82.2	46.1
6:00 PM	4/13/2022	62.6	77.4	45.5
7:00 PM	4/13/2022	61.4	79.8	41.4
8:00 PM	4/13/2022	60.1	77.6	39.7
9:00 PM	4/13/2022	59.3	81.2	39.6
10:00 PM	4/13/2022	57.6	79.8	39.4
11:00 PM	4/13/2022	53.7	72.2	38.2
12:00 AM	4/13/2022	53.0	78.8	38.1
1:00 AM	4/14/2022	49.4	68.5	38.0
2:00 AM	4/14/2022	48.0	72.4	37.5
3:00 AM	4/14/2022	46.6	65.9	37.9
4:00 AM	4/14/2022	51.5	74.6	39.2
5:00 AM	4/14/2022	57.7	81.3	41.4
6:00 AM	4/14/2022	60.7	84.0	42.9
7:00 AM	4/14/2022	62.9	74.8	42.1
8:00 AM	4/14/2022	62.8	80.4	42.3
9:00 AM	4/14/2022	62.3	83.2	42.3

Source: Compiled by LSA Associates, Inc. (2022).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level



APPENDIX B

CONSTRUCTION NOISE IMPACT CALCULATIONS

Construction Calculations

Phase: Demolition

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Concrete Saw	1	90	20	50	0.5	90	83
Excavator	1	81	40	50	0.5	81	77
Dozer	2	82	40	50	0.5	82	81
					Combined at 50 feet	**91**	**86**
					Combined at Receptor 260 feet	**77**	**71**
					Combined at Receptor 350 feet	**74**	**69**

Phase: Site Prep and Grading

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Excavator	1	81	40	50	0.5	81	77
Grader	1	85	40	50	0.5	85	81
Dozer	2	82	40	50	0.5	82	81
Tractor	2	84	40	50	0.5	84	83
					Combined at 50 feet	**89**	**87**
					Combined at Receptor 260 feet	**75**	**73**
					Combined at Receptor 350 feet	**72**	**70**

Phase:Building Construstion

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Crane	1	81	16	50	0.5	81	73
Man Lift	3	75	20	50	0.5	75	73
Tractor	2	84	40	50	0.5	84	83
					Combined at 50 feet	**86**	**84**
					Combined at Receptor 260 feet	**72**	**69**
					Combined at Receptor 350 feet	**69**	**67**

Phase:Paving

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Paver	2	77	50	50	0.5	77	77
All Other Equipment > 5 HP	2	85	50	50	0.5	85	85
Roller	2	80	20	50	0.5	80	76
					Combined at 50 feet	**87**	**86**
					Combined at Receptor 260 feet	**72**	**72**
					Combined at Receptor 350 feet	**70**	**69**

Phase:Architectural Coating

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Compressor (air)	1	78	40	50	0.5	78	74
					Combined at 50 feet	**78**	**74**
					Combined at Receptor 260 feet	**64**	**60**
					Combined at Receptor 350 feet	**61**	**57**

Sources: RCNM

[1]- Percentage of time that a piece of equipment is operating at full power.
dBA – A-weighted Decibels
Lmax- Maximum Level
Leq- Equivalent Level