Section 3.10
Noise

The purpose of this section is to evaluate the proposed project's potential noise impacts. This section evaluates short-term construction-related impacts and long-term operational conditions. It also presents relevant regulatory guidelines and local goals and policies related to noise. The analysis in this section is based on the technical *Noise Study*, prepared by Ldn Consulting, Inc. (2022; see Appendix J) and information provided in the *Transportation Impact Study* prepared by Intersecting Metrics (2022; Appendix K). Analysis in this section also draws upon data in the *City of Encinitas General Plan* (1991) and the *City of Encinitas 2013-2021 Housing Element Update Environmental Assessment* (2018). Third-party technical reports were peer-reviewed by Michael Baker International and the City of Encinitas.

ENVIRONMENTAL SETTING

Fundamentals of Noise and Vibration

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound and is expressed as cycles per second, or hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as airborne sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. A typical noise environment consists of a base of steady background noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These sources can vary from an occasional aircraft or train passing by to virtually continuous noise from, for example, traffic on a major highway. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a large and awkward range of numbers. To avoid this, sound levels are described in decibel (dB) units. The decibel scale uses the hearing threshold (20 micropascals) as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The impacts of noise are not a function of loudness alone. The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

Addition of Decibels

The decibel scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound and twice as loud as a 60 dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions (FTA 2006). Under the decibel scale, three sources of equal loudness together would produce an increase of 5 dB (Caltrans 2013).

Sound Propagation and Attenuation

Generally, sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately 6 dB for each doubling of distance from a stationary or point source. Sound from a line source, such as a highway, propagates outward in a cylindrical pattern, often referred to as cylindrical spreading (FHWA 2011). Sound levels attenuate at a rate of approximately 3 dB for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics (FHWA 2011). Similarly, a halving of the energy of a noise source would result in a 3 dB decrease. No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed (FHWA 2011).

Noise levels may also be reduced by intervening structures or landforms; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA (FHWA 2006). The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units is generally 30 dBA or more.

Noise Descriptors

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise on people is largely dependent on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The L_{eq} is a measure of ambient noise, while the L_{dn} and community noise equivalent level (CNEL) are measures of community noise. Each is applicable to this analysis and defined in Table 3.10-1, Definitions of Acoustical Terms.

The A-weighted decibel sound level scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends on the distance between the receptor and the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Table 3.10-1: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micropascals (or 20 micronewtons per square meter), where 1 pascal is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micropascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and ultrasonic sounds are above 20,000 Hz.

Table 3.10-1, continued

Term	Definitions
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. 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.
Equivalent Noise Level, L_{eq}	The average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night. For example, $L_{eq(1)}$ is the equivalent noise level over a one-hour period and $L_{eq(8)}$ corresponds to an eight-hour period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	A 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.
Community Noise Equivalent Level, CNEL	A 24-hour average L_{eq} with a 5 dBA "weighting" during the hours of 7:00 p.m. to 10:00 p.m. and a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends on its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings with

noise levels as low as 20 dBA and quiet, suburban, residential streets with noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with noisier urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in A-weighted noise levels, the following relationships should be noted in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by humans.
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference.
- A change in level of at least 5 dBA is required before any noticeable change in community response would be expected. An increase of 5 dBA is typically considered substantial.
- A 10 dBA change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

Effects of Noise on People

Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise, but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over 8 hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues

to be disagreement about the relative annoyance of these different sources. For ground vehicles, a noise level of about 55 dBA L_{dn} is the threshold at which a substantial percentage of people begin to report annoyance.

Sensitive Receptors

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

Long-term (24-hour) noise measurements were conducted at one location in the project vicinity, as shown in Table 3.10-2, Measured Ambient Noise Levels, and on Figure 3.10-1, Noise Measurement Locations. The nearest noise-sensitive land uses to the project site are residences immediately to the east. The monitoring location (LT-1) is located in the southern portion of the project site, which has relatively flat topography and is not obstructed by trees or structures. The monitoring location was chosen based on project site access and the noise impact potential on sensitive uses.

Table 3.10-2: Measured Ambient Noise Levels

Measurement Identification	Time	Noise Levels (dBA)	
		L_{eq}	L_{dn}
LT-1	12:00 PM	64.8	64.8
	1:00 PM	65.6	65.6
	2:00 PM	65.6	65.6
	3:00 PM	63.5	63.5
	4:00 PM	65.5	65.5
	5:00 PM	65.3	65.3
	6:00 PM	65.0	65.0
	7:00 PM	67.7	67.7
	8:00 PM	68.1	73.1
	9:00 PM	67.8	72.8
	10:00 PM	66.7	71.7
	11:00 PM	65.8	75.8
	12:00 AM	64.3	74.3
	1:00 AM	61.9	71.9
	2:00 AM	61.3	71.3
	3:00 AM	60.9	70.9
	4:00 AM	63.0	73.0
	5:00 AM	62.0	72.0
	6:00 AM	63.9	73.9
	7:00 AM	67.7	77.7
	8:00 AM	66.3	66.3
	9:00 AM	63.6	63.6
	10:00 AM	64.8	64.8
	11:00 AM	62.3	62.3
Overall		**65.2**	**71.2**

Source: Ldn Consulting 2022 (see Appendix J).

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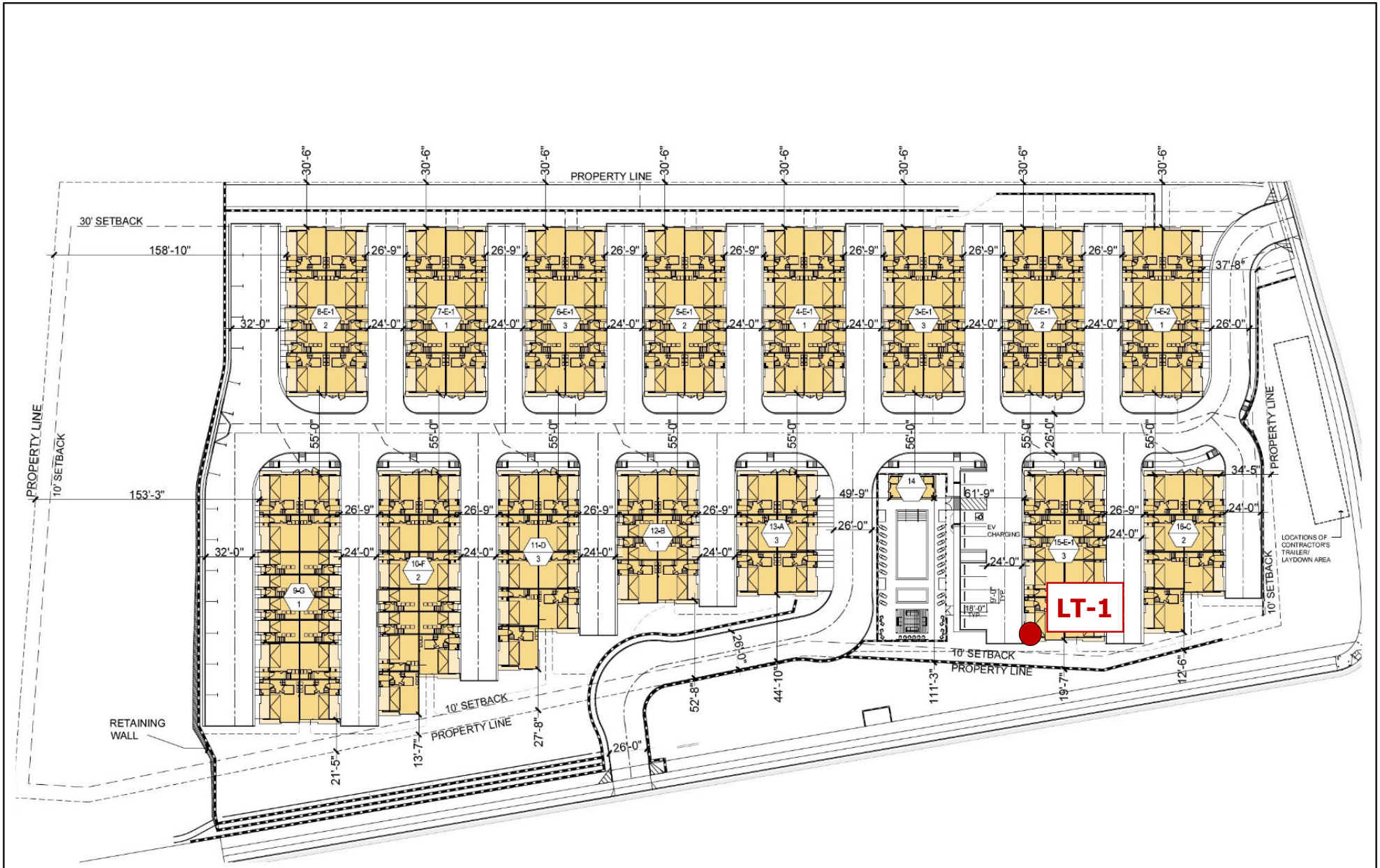

LT-1: Long-term Noise Measurement Location
Not to Scale

Source: Ldn Consulting, Inc., August 2022

Michael Baker INTERNATIONAL

File: 189273Figures.indd

PIRAEUS POINT
ENVIRONMENTAL IMPACT REPORT

Noise Measurement Locations

Figure 3.10-1

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Existing Conditions

The subject site is generally located on the northeast corner of Piraeus Street and Plato Place in the Leucadia community of the City of Encinitas, California. The site is located just east of Interstate 5 (I-5) between La Costa Avenue and Leucadia Boulevard. Piraeus Street lies directly to the west, Plato Place to the south, and existing single-family homes to the north and east. To the north is undeveloped land (to remain in its current state as a proposed off-site preserve area).

On-site elevations range from approximately 15 to 175 feet above mean sea level across the project site (ECORP 2022). Topography of the project site is relatively flat, with slopes on the western and northern edges. A steep slope is present in the vicinity of where the site meets the proposed off-site preserve area.

Ambient noise in the project area is primarily generated by traffic along I-5, as well as Piraeus Street and Plato Place. Other ambient noise sources are typically from the surrounding residential land uses, such as lawnmowers and barking dogs.

REGULATORY FRAMEWORK

Federal

US Environmental Protection Agency

The US Environmental Protection Agency offers guidelines for community noise exposure in the *Noise Effects Handbook – A Desk Reference to Health and Welfare Effects of Noise* (EPA 1981). These guidelines consider occupational noise exposure as well as noise exposure in homes. The EPA recognizes an exterior noise level of 55 decibels day-night level (dB L_{dn}) as a general goal to protect the public from hearing loss, activity interference, sleep disturbance, and annoyance. The EPA and other federal agencies have adopted suggested land use compatibility guidelines which indicate that residential noise exposures of 55 to 65 dB L_{dn} are acceptable. However, the EPA notes that these levels are not regulatory goals, but are levels defined by a negotiated scientific consensus, without concern for economic and technological feasibility or the needs and desires of any particular community.

State

The California Governor's Office of Planning and Research's (OPRs) noise element guidelines include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The guidelines contain a land use compatibility table that describes the compatibility of various land uses with a range of environmental noise levels in terms of the CNEL. Table 3.10-3, Land Use Compatibility for

Community Noise Environments, presents guidelines for determining acceptable and unacceptable community noise exposure limits for various land use categories. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

Table 3.10-3: Land Use Compatibility for Community Noise Environments

Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dBA)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential – Low Density, Single-Family, Duplex, Mobile Homes	50–60	55–70	70–75	75–85
Residential – Multiple Family	50–65	60–70	70–75	70–85
Transient Lodging – Motel, Hotels	50–65	60–70	70–80	80–85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50–70	60–70	70–80	80–85
Auditoriums, Concert Halls, Amphitheaters	NA	50–70	NA	65–85
Sports Arenas, Outdoor Spectator Sports	NA	50–75	NA	70–85
Playgrounds, Neighborhood Parks	50–70	NA	67.5–75	72.5–85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50–70	NA	70–80	80–85
Office Buildings, Business Commercial and Professional	50–70	67.5–77.5	75–85	NA
Industrial, Manufacturing, Utilities, Agriculture	50–75	70–80	75–85	NA

Source: OPR 2017.

Notes: NA: not applicable; L_{dn}: average day/night sound level; CNEL: community noise equivalent level

Normally Acceptable – Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable – New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

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

Clearly Unacceptable – New construction or development should generally not be undertaken.

Local

City of Encinitas General Plan

The *City of Encinitas General Plan* (1991) is the primary source of long-range planning and policy direction used to guide growth and preserve the quality of life in Encinitas. The Encinitas General Plan states that a goal of the City is to analyze proposed land uses to ensure that the designations would contribute to a proper balance of land uses within the community. The relevant goals and policies for the project include:

GOAL 1: **Provide an acceptable noise environment for existing and future residents of the City of Encinitas.**

Policy 1.7: Apply Title 24 of the California Administrative Code, associated with noise insulation standards, to single-family dwellings.

GOAL 2: **Require that new development be designed to provide acceptable indoor and outdoor noise environments.**

Policy 2.1: The Noise and Land Use Compatibility Guidelines and the accompanying discussion set forth the criteria for siting new development in the City of Encinitas. Any project which would be located in a normally unacceptable noise exposure area, based on the Land Use Compatibility Guidelines, shall require an acoustical analysis. Noise mitigation in the future shall be incorporated in the project as needed. As a condition of approval of a project, the City may require post-construction noise monitoring and sign off by an acoustician to ensure that City requirements have been met.

GOAL 3: **Ensure that residents are protected from harmful and irritating noise sources to the greatest extent possible.**

Policy 3.1: The City will adopt and enforce a quantitative noise ordinance to resolve neighborhood conflicts and to control unnecessary noise in the City of Encinitas. Examples of the types of noise sources that can be controlled through the use of a quantitative noise ordinance are barking dogs, noisy mechanical equipment such as swimming pool and hot tub pumps, amplified music in commercial establishments, etc.

GOAL 4: **Provide for measures to reduce noise impacts from stationary noise sources.**

Policy 4.1: Ensure inclusion of noise mitigation measures in the design and operation of new and existing development.

City of Encinitas Municipal Code

The City's Municipal Code establishes noise criteria to prevent noise and vibration that may jeopardize the health or welfare of the City's citizens or degrade their quality of life. Chapter 9.32, Noise Abatement and Control, and Chapter 30.40, Performance Standards, establish property line noise level limits. These limits apply to existing uses, but will also apply to future uses and are used for evaluating potential impacts of future on-site generated noise levels. Chapter 9.32.410 states that it shall be "unlawful for any person, including the City, to operate

construction equipment at any construction site on Sundays, and days appointed by the President, Governor or the City Council for a public fast, thanksgiving, or holiday. Notwithstanding the above, a person may operate construction equipment on the above-specified days between the hours of 10:00 a.m. and 5:00 p.m. No such equipment, or combination of equipment regardless of age or date of acquisition, shall be operated so as to cause noise at a level in excess of 75 decibels for more than eight hours during any 24-hour period when measured at or within the property lines of any property which is developed and used either in part or in whole for residential purposes."

The property line noise limits are summarized in Table 3.10-4, City of Encinitas Exterior Noise Limits. As stated in Section 30.40.10, "Every use shall be so operated that the noise generated does not exceed the following levels at or beyond the lot line and does not exceed the limits of any adjacent zone."

Table 3.10-4: City of Encinitas Exterior Noise Limits

Adjacent Zone	Noise Level [dB(A)]	
	7:00 a.m. to 10:00 p.m.	10:00 p.m. to 7:00 a.m.
Rural Residential (RR), Rural Residential-1 RR-1), Rural Residential-2 (RR-2), Residential-3 (R-3), Residential-5 (R-5), Residential-8 (R-8)	50	45
Residential-11 (R-11), Residential Single Family-11 (RS-11), Residential-15 (R-15), Residential-20 (R-20), Residential-25 (R-25), Mobile Home Park (MHP)	55	50
Office Professional (OP), Limited Local Commercial (LLC), Local Commercial (LC), General Commercial (GC), Limited Visitor Serving Commercial (L-VSC), Visitor Serving Commercial (VSC)	60	55
Light Industrial (L-I), Business Park (BP)	60	55

Source: Ldn Consulting 2022 (see Appendix J).

The property line ground vibration limits are summarized in Table 3.10-5, City of Encinitas Ground Vibration Limits. As stated in Section 30.40.10 (B), "Every use shall be so operated that the ground vibration generated at any time and measured at any point along the lot line of the lot on which the use is located shall not be perceptible and shall not exceed the following."

Table 3.10-5: City of Encinitas Ground Vibration Limits

Adjacent Zone	Vibration in Inches per Second	
	Impact	Steady-State
Residential	.006	0.03
Commercial	.010	0.05
Light Industrial	.040	0.020
Public/Semi-Public	.010	0.05

Source: Ldn Consulting 2022 (Appendix J).

In addition to the above operational ground vibration limits, Caltrans has established construction-related vibration limits for human perception and building damage potential. Caltrans' *Transportation and Construction Vibration Guidance Manual* (Caltrans 2020) discloses limits for transient (one-time) sources and continuous/frequent intermittent sources (refer to Table 19 of the Caltrans Manual). The property line ground vibration limit for "older residential structures" is 0.3 inches/second peak particle velocity for continuous/frequent intermittent sources.

STANDARDS OF SIGNIFICANCE

Thresholds of Significance

The following thresholds of significance are based on CEQA Guidelines Appendix G. For purposes of this EIR, the proposed project may have a significant adverse impact related to noise and vibration if it would result in:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Generation of excessive groundborne vibration or groundborne noise levels.
- 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 2 miles of a public airport or public use airport, exposure of people residing or working in the project area to excessive noise levels.

PROJECT IMPACTS AND MITIGATION

EXCEED NOISE STANDARDS

Impact 3.10-1	**The project would not generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. Impacts would be less than significant with mitigation incorporated.**

Noise-sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas would each be considered noise sensitive and may warrant unique measures for protection from intruding noise. The nearest sensitive receptors to

the project site are the predominantly single-family residences located adjacent to the east of the project site.

Project Construction

Project construction would involve construction activities such as building demolition, grading, building construction, paving, and architectural coating. The temporary construction noise associated with on-site equipment could potentially expose sensitive receptors to noise levels in excess of the applicable noise standard and/or result in a noticeable increase in ambient noise levels, and/or an exceedance of daytime hour noise standards.

Temporary construction noise levels are expected to be at their highest during grading operations, when the heaviest and most energy-intensive equipment would be utilized on-site. The City of Encinitas requires that noise levels from construction activities do not exceed a sustained noise level of 75 dBA for more than 8 hours at residential property lines, and that construction activity be limited to the hours of 7:00 a.m. to 7:00 p.m. Monday through Saturday.

As detailed in Table 3.10-6, Construction Noise Levels, noise levels from construction equipment during grading activities are expected to range from 73 dBA to 79 dBA at 50 feet from the equipment.

Table 3.10-6: Construction Noise Levels

Construction Equipment	Quantity	Source Level @ 50 Feet (dBA)*	Cumulative Noise Level @ 50 Feet (dBA)
Tractor/Backhoe	3	72	76.8
Dozer	1	74	74.0
Loader/Grader	1	73	73.0
Excavator	1	79	79.0

Notes: *EPA 1971 and Empirical Data
Source: Ldn Consulting 2022 (see Appendix J).

Throughout the grading process, construction equipment would operate within 50 feet of a sensitive receptor for a short duration, after which it would move to another part of the project site, further from existing sensitive receptors. Based on the data shown in Table 3.10-6, construction noise levels are only expected to be 75 dBA or greater when construction activities occur within close proximity to the property line. Such conditions would only occur for brief periods of time over a given day. However, construction activities that occur on other portions of the project site are anticipated to be less than 75 dBA due to the large area of the site and the constraint of operating multiple heavy construction equipment simultaneously.

Since all grading activities would occur in the first phase of development and grading near the property lines would occur intermittently throughout the day, noise levels would not result in a sustained noise level of 75 dBA for more than 8 hours at any residential property lines. Therefore, with compliance with the City's Municipal Code (i.e., limiting construction activities to hours between 7:00 a.m. and 7:00 p.m. Monday through Saturday), project construction noise would not generate a substantial temporary increase in ambient noise levels in the project vicinity in excess of standards established in the General Plan or noise ordinance. Mitigation measure **NOI-1** would ensure that temporary construction noise complies with the City's noise ordinance by requiring the project applicant to prepare a Construction Noise Control Plan. Implementation of mitigation measure **NOI-1** would reduce potential construction noise impacts to **less than significant with mitigation incorporated.**

Project Operation

According to Section 30.40 of the City's Municipal Code, properties zoned R-2 have a noise limit of 50 dBA between the hours of 7:00 a.m. and 10:00 p.m., and 45 dBA between the hours of 10:00 p.m. and 7:00 a.m.[1] The most sensitive uses to operational noise sources in the project vicinity would be the existing residences immediately to the east of the project site that are zoned R-2. As such, the project must meet the R-2 noise standards (50 dBA daytime level and 45 dBA evening level) at the property line. The following section analyzes potential stationary noise levels associated with operation of the proposed project.

Mechanical Equipment Noise

Noise from a fixed or point source drops off at a rate of 6 dBA for each doubling of distance, which means that a noise level of 70 dBA at 5 feet would be 64 dBA at 10 feet and 58 dBA at 20 feet. Noise from the proposed on-site mechanical ventilation systems (heating, ventilation, and air conditioning, or HVAC) would be a potential source of stationary noise. As air conditioning equipment may be operational during nighttime hours, the more stringent nighttime noise limits would also apply at surrounding properties.

Each residential unit would have a HVAC unit for temperature control installed on the rooftop. The HVAC units would cycle on and off throughout the day. To predict the property line noise level, a reference noise level of 69 dBA at 3 feet was used to represent the HVAC units.

[1] Per Municipal Code Section 30.08.010: "R-30 OL: Residential 30 Overlay is intended to provide for compatible high-density multiple family residential development including apartments, condominiums, and senior housing, with a maximum density of 30 units per net acre and a minimum density of 25 units per net acre. The purpose of the R-30 Overlay Zone is to diversify the housing options available in the community, and expand opportunities for creating affordable housing."

The HVAC units are located a minimum of 38 feet from the property lines and would be shielded by a proposed screen wall that would break the line of sight to the HVAC units and provide a minimum 5 dBA reduction. The typical locations of the proposed HVAC units are shown in Figure 3.10-2. Two HVAC units maybe located near each other with the proposed buildings separating them and would create the worst case cumulative noise level. The remainder of the units are separated by at least 80 feet and the proposed screen walls shielding them. This separation of 80 feet would result in a 20 dBA difference between two separate HVAC units and would not cumulatively increase the noise levels. Therefore, a worst case combined noise from HVAC operations would occur from four units.

Utilizing a 6 dBA decrease per doubling of distance, as shown in Table 3.10-7, Project HVAC Noise Levels (Eastern Property Line), operational noise levels from the HVAC equipment would be 45 dBA at the eastern property line, which is in compliance with the City's daytime 50 dBA standard and evening 45 dBA standard for the R-2 zone. Therefore, no impacts are anticipated at the residential property line to the east with the proposed screen walls. All other property lines would be located further from the proposed HVAC units and the resulting noise levels would be below the 45 dBA threshold. Impacts would be **less than significant.**

Table 3.10-7: Project HVAC Noise Levels (Eastern Property Line)

Description	Value
Distance to Nearest Observer Location (Feet)	38
Hourly Reference Noise Level (dBA)	69.0
Noise Source Reference Distance (Feet)	3.0
Noise Reduction Due to Distance (dBA)	-22.1
Reduction Due to Buildings (dBA)	-5.0
Noise Level at Property Line (dBA)	41.9
Quantity	2
Property Line Cumulative Noise Level (dBA)*	45.0

*Complies with the nighttime noise standard of 45 dBA.
Source: Ldn Consulting, 2022 (see Appendix J).

Transportation-Related Noise Levels

Noise levels are calculated on a logarithmic scale where a doubling of traffic noise, without changing the vehicle speeds or mix ratio, would result in a noise level increase of 3 dBA. Noise level changes greater than 3 dBA are often identifiable as audibly louder by the average resident, while changes less than 1 dBA will not be discernible. As such, increases greater than 3 dBA are considered potentially significant.

To determine if direct off-site noise level increases associated with the project would contribute to noise impacts, traffic volumes for the existing conditions were compared with the traffic volume increase of existing plus the proposed project. The project is estimated to generate 894 daily trips with a peak hour volume of 81 trips according to the project traffic study (Intersecting Metrics 2022). According to the traffic study, existing year traffic volumes along Piraeus Street are estimated at 1,786 average daily trips (ADT). Typically, a direct project impact requires that a project double (or add 100%) existing traffic volumes, or otherwise substantially contribute to existing traffic volumes, in order to increase noise levels by 3 dBA L_{dn}. Based on the number of ADT generated, the project would not cause a doubling in traffic volumes along any area roadways, or otherwise substantially increase area traffic volumes, that would contribute to a 3 dBA L_{dn} increase in noise levels.

Additionally, existing homes in the project area are located to the east of the project site and the project would not cause a substantial increase in traffic (and therefore, related mobile noise levels) along any segment of Plato Place. Therefore, the project is not anticipated to contribute to a significant direct (long-term) mobile noise impact in this regard.

Interior noise levels at on-site residences are estimated to be at or below 45 dBA L_{dn}, the City's Noise Compatibility Guidelines for residential structures (refer to Appendix J for additional discussion). However, the project applicant would be required to prepare an interior noise assessment once final architectural plans are available and prior to issuance of the first building permit.

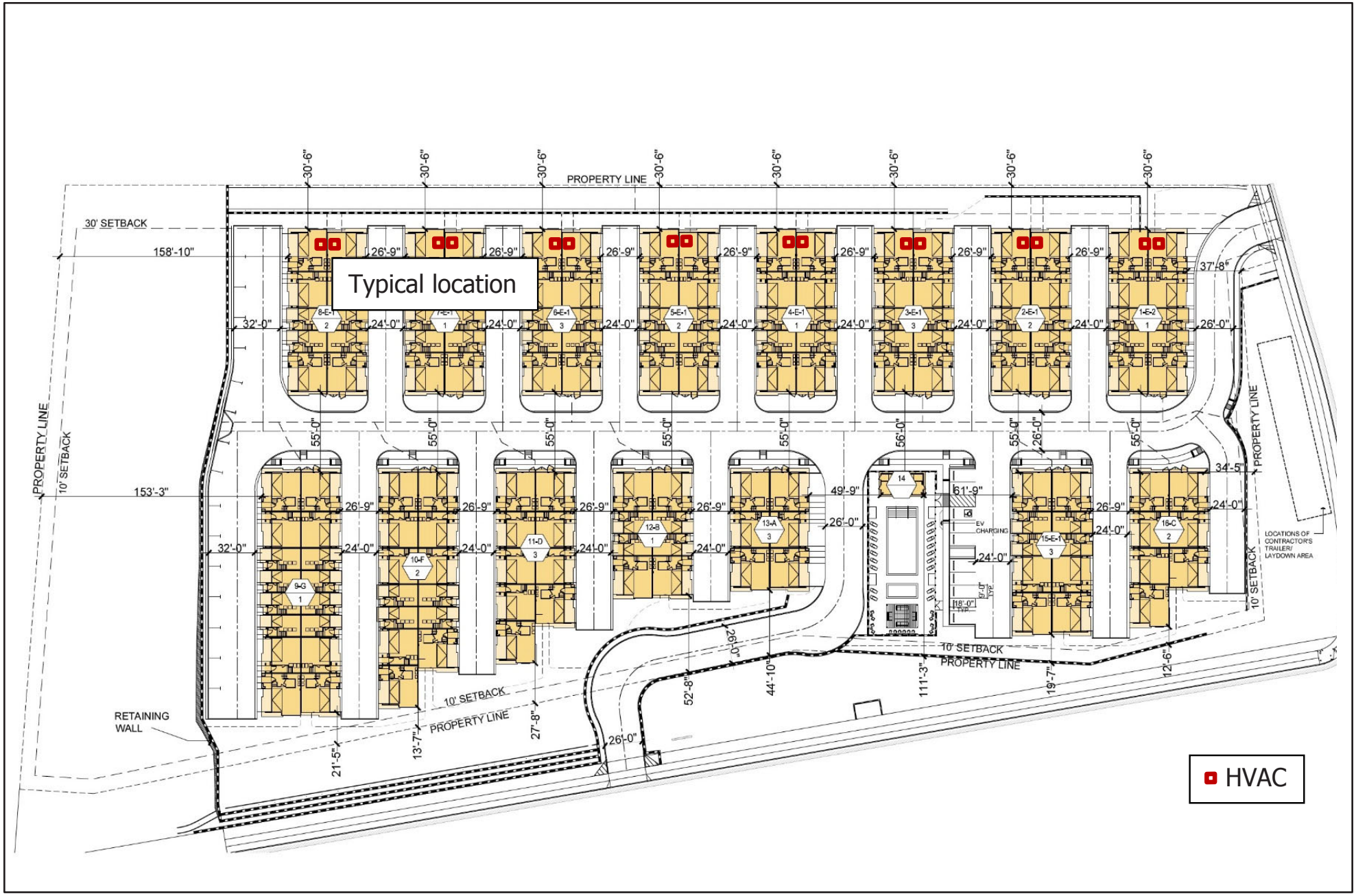
Due to existing traffic along I-5, noise levels at outdoor areas of the project site, including the proposed private rooftop decks and the common pool area, are calculated to be 77 dBA L_{dn} without shielding, which exceeds the City's "conditionally acceptable" noise threshold of 70 dBA L_{dn} for residential uses (refer to Appendix J for additional discussion). Therefore, mitigation measure **NOI-2** would be implemented to require installation of noise barriers at the site, thereby reducing noise levels at outdoor areas in compliance with the City's 70 dBA L_{dn} noise threshold (refer to Figure 3.10-3, Proposed Noise Barrier Locations). Potential impacts would be reduced to **less than significant with mitigation incorporated**.

Mitigation Measure:

NOI-1 **Construction Noise Control Plan.** A Construction Noise Control Plan shall be prepared to the satisfaction of the City. The plan shall demonstrate compliance with the City's noise ordinance, including the requirements that construction equipment, or combination of equipment, would not sustain or exceed the City's 75 dBA significance threshold continuously over the course of an 8 hour period.

NOI-2 **Noise Barriers.** A minimum 5-foot noise barrier shall be located along private rooftop decks and a minimum 8-foot barrier shall be located around the on-site common pool area.

Level of Significance: Less than significant.



Michael Baker INTERNATIONAL

File: 189273Figures.indd

Not to Scale

Source: Ldn Consulting, Inc., 9/26/22

PIRAEUS POINT
ENVIRONMENTAL IMPACT REPORT

Proposed HVAC Locations

Figure 3.10-2

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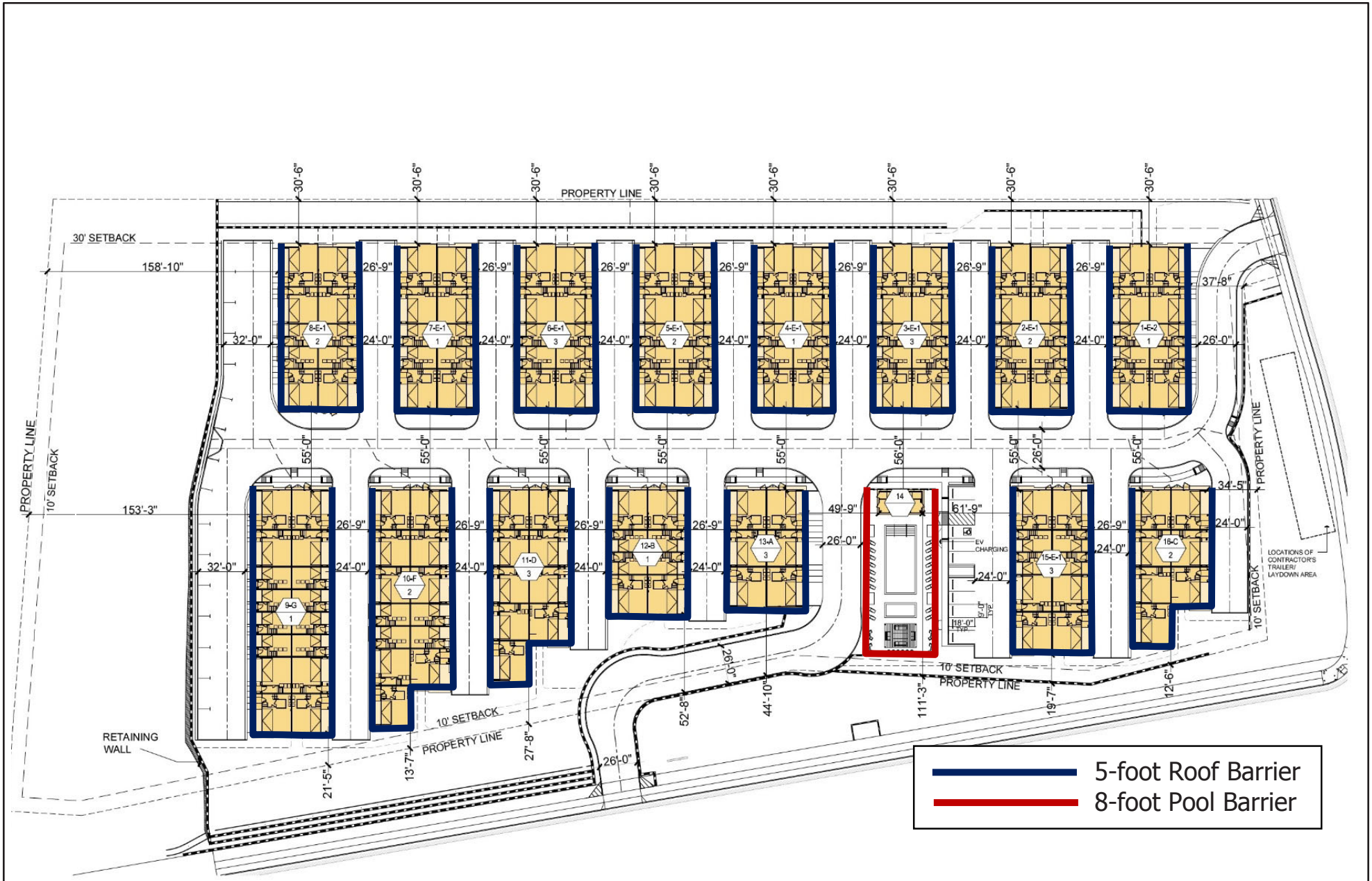

Michael Baker INTERNATIONAL

File: 189273Figures.indd

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Source: Ldn Consulting, Inc., August 2022

PIRAEUS POINT
ENVIRONMENTAL IMPACT REPORT

Noise Barrier Locations

Figure 3.10-3

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EXCESSIVE VIBRATIONS OR NOISE

Impact 3.10-2 **The project would not result in the generation of excessive groundborne vibration or groundborne noise levels. Impacts would be less than significant.**

Construction

Project construction can generate varying degrees of groundborne vibration, depending on the construction procedure and construction equipment. Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of the construction site often varies depending on soil type, ground strata, and construction characteristics of the receiver building(s). The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. Groundborne vibrations from construction activities rarely reach levels that damage structures.

Construction vibration impacts include human annoyance and building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic (e.g., plaster cracks) or structural. The distance at which damage from vibration could be experienced can vary substantially depending on the age and composition of the building structure, soil composition and underground geological layer between vibration source and receiver. In addition, not all buildings respond similarly to vibration generated by construction equipment. For example, buildings that are constructed with typical timber frames and masonry show that a vibration level of up to 0.2 inches/second peak particle velocity (PPV) is considered safe and would not result in any construction vibration damage. This evaluation uses the Federal Transit Administration (FTA) architectural damage criterion for continuous vibrations at non-engineered timber and masonry buildings of 0.2 in/sec PPV. The FTA has published standard vibration velocities for construction equipment operations.

The project does not propose the use of pile drivers during construction. Furthermore, it is acknowledged that construction activities would occur throughout the project site and would not be concentrated at a point closest to the sensitive receptors for an extended period of time.

Groundborne vibration decreases rapidly with distance. The nearest vibration-sensitive uses are the residential uses immediately east of the project site, at least 60 feet from the proposed construction. Table 3.10-8, Vibration Levels from Construction Activities (Nearest Receptors), provides the anticipated average vibration levels that would be experienced at the nearest

sensitive receptors from temporary construction activities. To be conservative, vibration levels from loaded trucks traveling on-site were assessed at a minimum distance of 60 feet from proposed on-site construction activities.

Table 3.10-8: Vibration Levels from Construction Activities (Nearest Receptors)

Equipment	Approximate Velocity Level at 25 Feet (VdB)	Approximate RMS Velocity at 25 Feet (in/sec)[1]	Approximate RMS Velocity at 60 Feet (in/sec)[2]
Small bulldozer	58	0.003	0.0008
Jackhammer	79	0.035	0.0094
Loaded trucks	86	0.076	0.0204
Large bulldozer	87	0.089	0.0239
		City Criteria	0.03
		Significant Impact?	**No**

[1] RMS Velocity provided by the FTA (2006).
[2] PPV (Peak Particle Velocity) at Distance D = PPVref x (25/D)1.5 provided by the FTA (2006).
Notes: RMS = root-mean square. The RMS velocity is that of a wave through sub-surface layers of different interval velocities along a specific ray path.
In/sec = inches per second
Source: Ldn Consulting 2022 (see Appendix J).

Table 3.10-8 shows that vibration levels from construction equipment would not exceed the City's vibration threshold of 0.03 inches per second. Therefore, groundborne vibration impacts from construction equipment would be **less than significant**.

Mitigation Measures: None required.

Level of Significance: Less than significant.

Operational

The project proposes a residential development. Project operations would involve occasional truck deliveries (e.g., personal and maintenance purposes) and trash pick-up, which would potentially generate groundborne vibration. However, such truck operations would not be substantial, and related groundborne vibration levels would not be perceptible or felt at surrounding uses.

Project operation would not generate substantial levels of vibration due to the absence of vibration-generating sources. Therefore, noise impacts would be less than significant in this regard.

Mitigation Measures: None required.

Level of Significance: Less than significant.

PUBLIC AIRPORT OR PRIVATE AIRSTRIP

Impact 3.10-3	**The project would not be located in the vicinity of a private airstrip or an airport land use plan or, where such plan has not been adopted, within 2 miles of a public airport or public use airport, and would not expose people residing or working in the project area to excessive noise levels. No impact would occur.**

There are no public or private airports located within 2 miles of the project site and the project site is not within the boundaries of an airport land use plan. The closest (public) airport is McClellan-Palomar Airport, located approximately 3.1 miles northeast of the project site in the City of Carlsbad. No private airstrips are located in the project vicinity.

As such, the project would not expose people residing or working in the project area to excessive noise levels. **No impact** would occur.

Mitigation Measures: None required.

Level of Significance: No impact.

CUMULATIVE IMPACTS

Impact 3.10-4	**The project would not result in a significant cumulative noise impact. Impacts would be less than cumulatively considerable.**

Geographic Scope

When determining whether the overall noise (and vibration) impacts from cumulative projects would be cumulatively significant and whether the proposed project's incremental contribution to any significant cumulative impacts would be cumulatively considerable, it is important to note that noise and vibration are localized occurrences; as such, they decrease rapidly in magnitude as the distance from the source to the receptor increases. Therefore, only those cumulative projects identified in Table 3.0-1 and Figure 3.0-1 in Section 3.0 of this EIR that are in the direct vicinity of the project study areas and those that are considered influential in regard to noise and vibration would have the potential to be considered in a cumulative context with the proposed project's incremental contribution.

Additionally, to be conservative, the cumulative analysis is based on the "worst-case" assumption that all 2019 HEU sites develop under maximum density bonus unit allowances. The cumulative impact analysis includes all 2019 HEU sites to the extent they may contribute to certain issue-specific cumulative effects (see Table 3.0-2).

Potential Cumulative Impacts

When determining whether the overall noise (and vibration) impacts from cumulative projects would be cumulatively significant and whether the proposed project's incremental contribution to any significant cumulative impacts would be cumulatively considerable, it is important to note that noise and vibration are localized occurrences; as such, they decrease rapidly in magnitude as the distance from the source to the receptor increases.

Short-Term Construction Cumulative Noise Impacts

Construction activities associated with the proposed project and cumulative projects may overlap, resulting in construction noise in the area. However, as analyzed above, construction noise impacts primarily affect the areas immediately adjacent to the project site. As a condition of project approval, the project would be required to prepare a Construction Noise Control Plan to demonstrate that all construction activity is in compliance with all applicable City noise standards and submit it to the City's Planning and Building Department for review and approval, which would to reduce construction noise impacts to less than significant levels. All other housing projects covered under the 2019 HEU would be subject to the same requirements. The construction activities associated with other cumulative development projects would also be required to comply with the City's Municipal Code and would incorporate mitigation measures on a project-by-project basis, as applicable, to reduce construction noise pursuant to CEQA provisions. Therefore, with implementation of a City-approved Construction Noise Control Plan, the project's contribution to cumulative short-term construction impacts would be less than cumulatively considerable.

Long-Term (Mobile) Cumulative Noise Impacts

Long-term cumulative noise impacts from mobile sources would occur primarily as a result of increased traffic on area roadways due to buildout of the proposed project and other projects in the vicinity. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions (FTA 2006). An increase of 3 dB is widely accepted as "barely perceptible." With regard to traffic noise, traffic volumes would need to roughly double to result in a perceptible change in ambient noise levels.

To determine if direct or cumulative off-site noise level increases associated with the project would contribute to noise impacts, traffic volumes for the existing conditions were compared with the traffic volume increase of existing plus the proposed project. The project is estimated to generate 894 daily trips with a peak hour volume of 81 trips according to the project traffic study (Intersecting Metrics 2022). According to the traffic study, existing year traffic along Piraeus Street is 1,786 ADT. Typically, a direct project impact requires that a project double (or add 100%)

existing traffic volumes, or otherwise substantially contribute to cumulative traffic volumes, in order to increase noise levels by 3 dBA L_{dn}. Based on the number of ADT generated, the project would not cause a doubling in traffic volumes along any area roadways, or otherwise substantially increase area traffic volumes, that would contribute to a 3 dBA L_{dn} increase in noise levels.

Additionally, existing homes in the project area are located to the east of the project site and the project would not cause a substantial increase in traffic (and therefore, related mobile noise levels) along any segment of Plato Place.

Therefore, the project is not anticipated to contribute to a significant cumulative (long-term) mobile noise impact in this regard. Impacts would be less than cumulatively considerable**.**

Mitigation Measures: None required.

Level of Significance: Less than cumulatively considerable.

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