5.10 NOISE

This section discusses the fundamentals of sound; examines federal, state, and local noise guidelines, policies, and standards; reviews noise levels at existing receptor locations; evaluates potential noise impacts associated with the Butcher-Solana Residential Development Project (proposed project); and provides mitigation to reduce noise impacts at sensitive residential locations. This evaluation uses procedures and methodologies as specified by Caltrans and the Federal Highway Administration (FHWA).

The analysis in this section is based in part on the following technical report: Noise Analysis Technical Report for the Solana Torrance Project City of Torrance, California, Dudek, November 2018. A complete copy of this study is included in Appendix H of this DEIR.

Forty-two comments relating to noise impacts on the neighboring community due to construction and operation of the proposed project were received in response to the Initial Study/Notice of Preparation circulated for the proposed project. The potential for excessive noise to create impacts from construction and operation of the proposed development has been analyzed in this section.

5.10.1 Environmental Setting

5.10.1.1 NOISE AND VIBRATION CONCEPTS

Noise is generally defined as loud, unexpected, or undesired sound typically associated with human activity that interferes with or disrupts normal activities. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm, or when it has adverse effects on health. The definition of noise as unwanted sound implies that it has an adverse effect on people and their environment.

The following is a brief discussion of fundamental noise concepts and basic terminology.

Sound Pressure Level and Decibels

The amplitude of a sound determines its loudness. Loudness of sound increases with increasing amplitude. Sound pressure amplitude is measured in units of micronewton per square meter, also called micropascal. One micropascal is approximately one-hundred billionth (0.00000000001) of normal atmospheric pressure. The pressure of a very loud sound may be 200 million micropascals, or 10 million times the pressure of the weakest audible sound. Because expressing sound levels in terms of micropascal would be very cumbersome, sound pressure level in logarithmic units is used instead to describe the ratio of actual sound pressure to a reference pressure squared. These units are called Bels. To provide a finer resolution, a Bel is subdivided into 10 decibels (dB).

A-Weighted Sound Level

Sound pressure level alone is not a reliable indicator of loudness. The frequency, or pitch, of a sound also has a substantial effect on how humans will respond. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness, or human response, is determined by the characteristics of the human ear.

Human hearing is limited not only in the range of audible frequencies, but also in the way it perceives the sound in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 and 5,000 hertz, and it perceives a sound within that range as more intense than a sound of higher or lower frequency with the same magnitude. To approximate the frequency response of the human ear, a series of sound level adjustments is usually applied to the sound measured by a sound level meter. The adjustments (referred to as a weighting network) are frequency dependent.

The A-scale weighting network approximates the frequency response of the average young ear when listening to ordinary sounds. When people make judgments about the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds.

Other weighting networks have been devised to address high noise levels or other special situations (e.g., B-scale, C-scale, D-scale), but these scales are rarely used in conjunction with most environmental noise. Noise levels are typically reported in terms of A-weighted sound levels. All sound levels discussed in this report are A-weighted decibels (dBA). Examples of typical noise levels for common indoor and outdoor activities are depicted in Table 5-10.1, *Typical Sound Levels in the Environment and Industry*.

Table 5.10-1 Typical Sound Levels in the Environment and Industry

Common Outdoor Activities	Noise Level (dB)	Common Indoor Activities
	110	Rock band
Jet fly over at 300 meters (1,000 feet)	100	
Gas lawn mower at 1 meter (3 feet)	90	
Diesel truck at 15 meters (50 feet), at 80 kilometers per hour (50 miles per hour)	80	Food blender at 1 meter (3 feet); garbage disposal at 1 meter (3 feet)
Noisy urban area, daytime; gas lawn mower at 30 meters (100 feet)	70	Vacuum cleaner at 3 meters (10 feet)
Commercial area; heavy traffic at 90 meters (300 feet)	60	Normal speech at 1 meter (3 feet)
Quiet urban, daytime	50	Large business office; dishwasher next room
Quiet urban, nighttime	40	Theater; large conference room (background)
Quiet suburban, nighttime	30	Library
Quiet rural, nighttime	20	Bedroom at night; concert hall (background)
	10	Broadcast/Recording studio
Lowest threshold of human hearing	0	Lowest threshold of human hearing

Source: Caltrans 2013.

Human Response to Changes in Noise Levels

Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern changes in sound levels of 1 dBA when exposed to steady, single-frequency signals in the mid-frequency range. Outside such controlled conditions, the trained ear can detect changes of 2 dBA in normal environmental noise. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dBA. A change of 5 dBA is readily perceptible, and a change of 10 dBA is perceived as twice or half as loud. A doubling of sound energy results in a 3 dBA increase in sound, which means that a doubling of sound energy (e.g., doubling the volume of traffic on a road) would result in a barely perceptible change in sound level.

Noise Descriptors

Additional units of measure (i.e., noise metrics) have been developed to evaluate the long-term characteristics of sound. The equivalent sound level (L_{eq}) is also referred to as the time-average sound level. It is the equivalent steady-state sound level that in a stated period of time would contain the same acoustical energy as the time-varying sound level during the same time period. The 1-hour A-weighted equivalent sound level, L_{eq}(h), is the energy average of the A-weighted sound levels occurring during a 1-hour period, and is the primary basis for the City of Torrance noise ordinance criteria for stationary sources. Additional noise metrics include the L_{max}, which is the maximum instantaneous noise level experienced during a given period of time, the L_{min}, which is the minimum instantaneous noise level experienced during a given period of time, and L_n. The L_n noise metric represents the noise level equaled or exceeded 'n' percent of the time. For example, L_{10} is the level equaled or exceeded 10 percent of the time.

People are generally more sensitive and annoyed by noise occurring during the evening and nighttime hours. Thus, another noise descriptor used in community noise assessments—the community noise equivalent level (CNEL)—was introduced. The CNEL scale represents a time- weighted, 24-hour average noise level based on the A-weighted sound level. The CNEL accounts for the increased noise sensitivity during the evening hours (7 am to 10 pm) and nighttime hours (10 pm to 7 am) by adding 5 dBA and 10 dBA, respectively, to the average sound levels occurring during the evening and nighttime hours. The CNEL noise metric, or a similar noise metric, the Day Night Level (L_{dn}),[1] is the basis for the City's standards for mobile source noise such as traffic and aircraft noise.

Sound Propagation

Sound propagation (i.e., the passage of sound from a noise source to a receiver) is influenced by geometric spreading, ground absorption, atmospheric effects, and shielding by natural and/or built features.

Sound levels attenuate (or diminish) at a rate of approximately 6 dBA per doubling of distance from an outdoor point source due to the geometric spreading of the sound waves. Atmospheric conditions such as humidity, temperature, and wind gradients can also temporarily either increase or decrease sound levels. In general, the greater the distance the receiver is from the source, the greater the potential for variation in sound levels due to atmospheric effects. Additional sound attenuation can result from built features such as intervening walls and buildings, and by natural features such as hills and dense woods.

[1] Ldn (also known as DNL) is comparable to CNEL, except that there is no evening component: the period from 7 am to 10 pm is classified as daytime, and no adjustment to the noise levels is made during these hours. The period from 10 pm to 7 am is classified as nighttime, and 10 decibels is added to the hourly L_{eq}s occurring during these hours.

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5.10.1.2 VIBRATION FUNDAMENTALS

Groundbourne Vibration Fundamentals

Groundborne vibration is a small, rapidly fluctuating motion transmitted through the ground, and can be described in terms of displacement, velocity, or acceleration. Displacement is the distance that a point on a surface moves away from its original static position; vibration velocity is the instantaneous speed that a point on a surface moves; and acceleration is the velocity's rate of change. Each of these descriptors can be used to correlate vibration to environmental effects such as human response and building damage.

Several basic measurement units are commonly used to describe the intensity of ground vibration. The peak particle velocity (PPV) or the root mean square (RMS) velocity is usually used to describe vibration amplitudes. PPV is defined as the maximum instantaneous peak of the vibration signal and RMS is defined as the square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage, whereas RMS is typically more suitable for evaluating human response.

The units for PPV and RMS velocity are normally inches per second (in/sec). Often, vibration is presented and discussed in dB units. In this study, all PPV and RMS velocity levels are in in/sec and all vibration levels are in dB relative to one microinch per second (abbreviated as VdB). A comparison of common groundborne vibration levels, in terms of PPV and VdB, is shown in Table 5.10-2, *Human Reaction to Typical Vibration Levels*. As shown in Table 5.10-2, the threshold of perception is approximately 65 VdB. Typical background vibration levels are between 50 and 60 VdB, and the level for minor cosmetic damage to fragile buildings or blasting generally begins at 100 VdB (FTA 2006), which is equivalent to approximately 0.42 inches per second in terms of PPV.

The strength of groundborne vibration attenuates fairly rapidly over distance. Some soil types transmit vibration quite efficiently; other types (primarily sandy soils) do not. Typically, groundborne vibration generated by humans attenuates rapidly with distance from the source of the vibration. Man-made vibration problems are usually confined to relatively short distances (approximately 500 to 600 feet or less) from the source (FTA 2006).

The calculation to determine PPV at a given distance is:

$$PPV_{distance} = PPV_{ref}*(25/D)^{1.5}$$

Where:

- PPVdistance = the peak particle velocity in inches per second of the equipment adjusted for distance
- PPVref = the reference vibration level in inches per second at 25 feet
- D = the distance from the equipment to the receiver

The calculation to determine the root-mean square at a given distance is as follows:

$$Lv(D) = Lv(25\ feet) - 30*\log(D/25)$$

Where:

- Lv(D) = the vibration level at the receiver
- Lv(25 feet) = the reference source vibration level
- D = the distance from the vibration activity to the receiver

Caltrans guidelines recommend that a vibration level of 0.2 in/sec PPV not be exceeded for the protection of normal residential buildings, and that 0.08 in/sec PPV not be exceeded for the protection of old or historically significant structures (Caltrans 2013). With respect to human response within residential uses (i.e., annoyance), the Federal Transit Administration recommends a maximum acceptable vibration standard of 80 VdB.

Table 5.10-2 Human Reaction to Typical Vibration Levels

Peak Particle Velocity (PPV)[1]		
Vibration Level	**Human Reaction**	**Effect on Buildings**
0.006–0.019	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage
Vibration Decibels (VdB)[2]		
Vibration Level	**Human Reaction**	
65 VdB	Approximate threshold of perception for many people.	
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.	
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.	

Sources:
1 Caltrans 2002.
2 FTA 2006

5.10.1.3 REGULATORY FRAMEWORK

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. No federal noise standards apply to this project. The following summarizes the regulations that apply to the proposed project.

California Regulations

Title 24 of the California Code of Regulations requires that an affected building be oriented, shielded, and designed to have sound insulation such that with all exterior doors and windows in the closed position, the

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interior noise exposure level attributable to exterior sources will not exceed 45 dBA Day-Night Average Sound Level (Ldn) in any habitable room. Title 24 thus requires an acoustical analysis for any new multifamily residential structures in an area with a noise level of 60 dBA Ldn/CNEL or greater.

City of Torrance Noise Standards

General Plan Noise Element

Recognizing that environmental noise is an important factor in the quality of life for both residents and visitors, the City adopted an update to the Noise Element of the General Plan in 2010. The Noise Element establishes policies to guard against creation of new noise/land use conflicts and to minimize the impact of existing noise sources on the community.

The Noise Element's Table N-3, Torrance Noise/Land Use Compatibility Guidelines, provided in this DEIR as Table 5.10-3, specifies exterior and interior noise standards by proposed land use type and proposed density or intensity (Torrance 2010). The proposed project would have a density of 10.0 dwelling units per acre (du/ac) for the entire site, which equates to a low medium density pursuant to the housing element (adopted October 1, 2013).[2] As shown in Table 5.10-3, the exterior noise standard for low medium density residential uses is 65 dBA Ldn or CNEL, and the interior noise standard is 45 dBA Ldn or CNEL. The maximum acceptable exposure from aircraft-related noise is 60 dBA CNEL.

As stated in the Noise Element,

> These compatibility criteria serve as guidelines. For example, an acoustical analysis must be prepared when noise-sensitive land uses are proposed within noise impact areas. The analysis must show that the project is designed to attenuate noise to meet the City's noise standards in order to receive approval. If the project design does not meet the noise standards, mitigation can be recommended in the analysis. If the analysis demonstrates that the noise standards can be met by implementing the mitigation measures, the project can be approved conditioned upon implementation of the mitigation measures.

Table 5.10-3 Torrance Noise/Land Use Compatibility Guidelines

Property Receiving Noise		Maximum Noise Level Ldn or CNEL, dBA	
Type of Use	**Land Use Designations**	**Interior**	**Exterior[3]**
Residential	Low Density Residential Low Medium Density Residential Medium Density Residential	45	60/65[1]
	Medium High Density Residential	45	65 / 70[2]
	High Density Residential	45	70[1]
Commercial and Office	General Commercial Center	--	70
	Residential Office	50	70
Industrial	Business Park Light Industrial Heavy Industrial	55	75

[2] Lot 1 within the project site, which is the portion of the project site upon which the proposed project would be constructed, would have a density of 43.8 du/ac (43.4 du/ac net); this corresponds to a medium-high density, for which a slightly more permissive set of noise standards for on-site noise (up to 70 dBA Ldn or CNEL exterior) would apply, if the overall project site were of such a density. Because that is not the case, the slightly more restrictive noise standard of 65 dBA Ldn or CNEL is used.

Public and Medical Uses	Public/Quasi-Public/Open Space	50	65
	Hospital/Medical	50	70
Airport	Airport	--	70

Source: Table N-3, Torrance General Plan Noise Element.
1 The normally acceptable standard is 60 dBA. The higher standard is acceptable subject to inclusion of noise-reduction features in project design and construction.
2 Maximum exterior noise levels up to 70 dB CNEL are allowed for Multiple-Family Housing.
3 Regarding aircraft-related noise, the maximum acceptable exposure for new residential development is 60 dBA CNEL.

City of Torrance Municipal Code

Stationary Source Noise

Whereas the noise standards of the Noise Element are primarily used to ensure noise/land use compatibility with transportation noise sources, the noise regulations in the Municipal Code are used to regulate noise from local on-site noise sources, such as mechanical equipment or event noise. Municipal Code, Division 4, Public Health and Welfare, Chapter 6, Noise Regulation, establishes noise level limits in most residential areas of 50 to 55 dBA between 7 am and 10 pm, and 45 to 50 dBA between 10 pm and 7 am, depending on location. The regulations establish regions with differing noise regulations, with the noise standards in Region 3 (where this project site is located as well as the residences to the north) being the most stringent. As shown in Table 5.10-4, *Torrance Municipal Code Noise Regulations*, the highest permitted noise level for residences in Region 3 is 50 dBA from 7 am to 10 pm and 45 dBA from 10 pm to 7 am. as measured from residential property line. Section 46.7.2, subsection 3c of the Municipal Code states that for noises occurring less than 30 minutes per day or less than 6 minutes per night, the highest allowable noise level is adjusted upward by 15 dBA (i.e., for Region 3, 65 dBA from 7 am to 10 pm and 60 dBA from 10 pm to 7 am).

Table 5.10-4 Torrance Municipal Code Noise Regulations

Region of Noise Receiver	Noise Level (dB)	
	Day	Night
3	50	45
4	55	50

Source: City of Torrance Municipal Code, Division 4, Chapter 6, Article 7, Section 46.7.2.

Construction Noise

Noise from construction activities is regulated in the Municipal Code Section 46.3.1, Construction of Buildings and Projects. It is unlawful for any person in the City to operate power construction tools, equipment, or engage in the performance of any outside construction or repair work on buildings, structures, or projects in or adjacent to a residential area involving the creation of noise beyond 50 dB as measured at property lines, except between the hours of 7:30 am and 6:00 pm, Monday through Friday, and 9:00 am to 5:00 pm on Saturdays. Construction is prohibited on Sundays and holidays observed by the City. An exception exists between the hours of 10:00 am to 4:00 pm for homeowners that reside at the property.

Additionally, heavy construction equipment such as pile drivers, mechanical shovels, derricks, hoists, pneumatic hammers, compressors, or similar devices are prohibited to operate at any time within or adjacent to a residential area without first obtaining permission from the Community Development Director to do so. Such request for permission shall include a list and type of equipment to be used and the requested hours and locations of its use, and the applicant shall be required to show that the selection of equipment and construction techniques has been based on minimization of noise within the limitations of such equipment as is commercially available or combinations of such equipment and auxiliary sound barriers. Such permission to operate heavy construction equipment will be revoked if operation of such equipment is not in accordance with the approval of the Community Development Director. (TMC Section 46.3.1).

5.10.1.4 EXISTING NOISE ENVIRONMENT

A sound level survey was conducted on May 11, 2016, to evaluate existing sound levels and assess potential project noise impacts on the surrounding area. Noise measurements were conducted using a Piccolo Integrating Sound Level Meter equipped with a 0.5-inch, pre-polarized condenser microphone with pre-amplifier. The sound level meter meets the current American National Standards Institute (ANSI) standard for a Type 2 (General Use) sound level meter. The calibration of the sound level meter was verified before and after the measurements, and the measurements were conducted with the measurement microphone covered with a windscreen and positioned approximately five feet above the ground. Each noise measurement lasted for 15 minutes.

Four noise measurement locations were selected (ST1 through ST4), representing existing and/or future noise-sensitive receptors on the project site and in the project vicinity. The measurement locations and measurement data are in the Appendix H (Noise Measurement Locations), and the measured average noise levels and measurement locations are in Table 5.10-5, *Noise Measurement Levels*. As shown in Table 5.10-5, measured ambient noise levels ranged from approximately 58 dBA L_{eq} at ST1 (southeast side of proposed project site) to 64 dBA L_{eq} at ST2 (northeast side of proposed project). The primary noise sources at the sites consisted of traffic along the adjacent roadways. Secondary noise sources included aircraft noise, birds, rustling leaves, distant aircraft, and distant landscaping activities.

Table 5.10-5 Noise Measurement Levels

Monitoring Site	Date	Time	dBA		
			L_{eq}	L_{10}	L_{max}
ST1 Southeast side of project site adjacent to Hawthorne Blvd.	May 11, 2016	11:53 a.m. – 12:08 p.m.	57.5	59.0	64.9
ST2 Northeast side of project site, adjacent to Via Valmonte	May 11, 2016	12:28 p.m. – 12:42 p.m.	64.4	67.0	74.0
ST3 Residence at 3662 Blair Way, east of project site	May 11, 2016	1:33 p.m. – 1:48 p.m.	62.9	65.0	68.5
ST4 Residence at 24648 Via Valmonte, north of project site	May 11, 2016	2:02 p.m. – 2:17 p.m.	60.5	63.0	74.5

Noise monitoring conducted on 05/11/2016 during the hours of 11:53 am to 2:17 pm.

5.10.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would result in:

N-1 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.

N-2 Generation of excessive groundborne vibration or groundborne noise levels.

N-3 For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, if the project would expose people residing or working in the project area to excessive noise levels.

The Initial Study, included as Appendix A, determined that impacts related to be located in the vicinity of a private airstrip would be less than significant. With the publication of the updated CEQA Guidelines in December 2018, the thresholds of significance for noise impacts have been revised. This EIR utilizes the revised CEQA Guidelines.

Significant Changes In Ambient Noise Levels

The City of Torrance noise regulations do not directly address the incremental threshold for community noise increases (i.e., Threshold N-1, "A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project"). Neither the City's General Plan Noise Element nor the Municipal Code have quantified levels of increase in noise above ambient that are considered "substantial." Some guidance regarding the determination of a substantial permanent increase in ambient noise levels in the project vicinity above existing levels is provided by the 1992 findings of the Federal Interagency Committee on Noise (FICON), which assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The FICON recommendations are based upon studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a qualitative measure of the adverse reaction of people to noise that interferes with speech or the desire for a tranquil environment or disturbs sleep.

The rationale for the FICON recommendations is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of Ldn. The changes in noise exposure that are shown in Table 5.10-6, *Measures of Substantial Increase for Community Noise Sources*, are expected to result in equal changes in annoyance at sensitive land uses. Although the FICON recommendations were specifically developed to address aircraft noise impacts, they are used in this analysis to define a substantial increase in community noise levels related to all transportation noise sources and permanent non-transportation noise sources.

Table 5.10-6 Measures of Substantial Increase for Community Noise Sources

Ambient Noise Level without Project (Ldn)	Assumed Significant If Ambient Noise Levels Increase by:
<60	+ 5 dB or more
60-65 dB	+ 3 dB or more
>65 dB	+ 2 dB or more

Source: FICON, 1992

Construction Noise

For the purposes of determination of significant impact from temporary construction noise, the City of Torrance applies a threshold of 75 dBA, based in part upon Table N-2 of the General Plan Noise Element. The City of Torrance General Plan Update Draft EIR (2009), and included in Appendix H, further states in Impact N-4 that "construction activities substantially elevating the ambient noise environment at noise-sensitive uses for a substantial amount of time" would be considered to result in a substantial temporary or periodic noise increase, resulting in a significant impact.

Vibration Standards

Impacts related to excessive groundborne vibration would be significant if the project results in the exposure of persons to or generation of excessive ground-borne vibration equal to or in excess of 80 VdB for annoyance criteria or 0.2 inches/second PPV for potential for structural damage. Construction activities within 200 feet and pile driving within 600 feet would be potentially disruptive to vibration-sensitive operations (such as concert halls or television studios) (FTA 2006).

5.10.3 Environmental Impacts

The following impact analysis addresses increases in noise and vibration levels for which the Initial Study disclosed potentially significant impacts. The applicable thresholds are identified in brackets after the impact statement.

Impact 5.10-1: Construction activities would result in temporary noise increases in the vicinity of the proposed project in excess of standards. [Threshold N-1]

Exterior Noise Levels During Construction

Construction of the proposed project is anticipated to take place over a period of approximately 29 months. As detailed above in Regulatory Standards, the City restricts the times of day when construction may occur (i.e., 7:30 am to 6 pm Mondays through Fridays, 9 am to 5 pm on Saturdays and not at all on Sundays and holidays observed by the City). Also, operation of heavy construction equipment such as pile drivers, mechanical shovels, compressors, or similar devices are prohibited without first obtaining permission from the Community Development Director. For the purposes of determining significant impacts from construction noise, a threshold of 75 dBA is used.

Construction of the proposed project would take place within the hours specified in Article 3, Section 46.3.1 of the City's Municipal Code. Construction operations shall not occur between 6 pm and 7:30 am Monday through Friday, 9 am to 5 pm on Saturday or at any time on Sunday or on holidays observed by the City of Torrance. The hours of construction, including noisy maintenance activities and all spoils and material transport, shall be restricted to the periods and days permitted by the local noise or other applicable ordinance. Additionally, no construction vehicles, material deliveries, or staging prior to the allowable hours listed above, and no early or continuous concrete pours shall be permitted that extend beyond the hours listed above. Permission for operation of heavy equipment shall be submitted to the Community Development Director;

however, no special construction techniques (i.e., pile driving or blasting) are anticipated to be necessary for this project.

Construction noise is difficult to quantify because of the many variables involved, including the specific equipment types, size of equipment used, percentage of time each piece is in operation, condition of each piece of equipment, and number of pieces that would operate on the site. The range of maximum noise levels for various types of construction equipment at a distance of 50 feet is presented in Table 5.10-7, *Typical Construction Equipment Noise Element Levels*. The noise values represent maximum noise generation, or full-power operation of the equipment. As an example, a loader and two dozers, all operating at full power and relatively close together, would generate a maximum sound level of approximately 90 dBA at 50 feet from their operations. As the distance between equipment or separation of areas with simultaneous construction activity increases, dispersion and distance attenuation reduce the effects of the separate noise sources added together. In addition, typical operating cycles may involve 2 minutes of full-power operation, followed by 3 or 4 minutes at lower levels. The average noise level during construction activities is generally lower (typical levels of approximately 88 dBA Leq at a distance of 50 feet) because maximum noise generation may only occur up to 50 percent of the time. Noise levels from construction operations decrease at a rate of approximately 6 dB per doubling of distance from the source.

Table 5.10-7 Typical Construction Equipment Noise Element Levels

Equipment	Typical Sound Level (dBA) 50 Feet from Source
Air compressor	81
Backhoe	80
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane, mobile	83
Dozer	85
Generator	81
Grader	85
Impact wrench	85
Jackhammer	88
Loader	85
Paver	89
Pneumatic tool	85
Pump	76
Roller	74
Saw	76
Truck	88

Source: FTA 2006.

In order to assess noise from construction activities, air quality and greenhouse gas construction data was used, summarized here in Table 5.10-8, *Construction Equipment Assumptions*. Distances and acoustical shielding (where applicable) were input into the Federal Highway Administration's Roadway Construction Noise Model (RCNM)

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noise model. Input variables for the RCNM consist of the receiver/land use types, the equipment type and number of each (e.g., two excavators, a loader, a dump truck), the duty cycle for each piece of equipment (i.e., percentage of hours the equipment typically works per day), acoustical shielding from intervening terrain or structures, and the distance from the sensitive noise receptor. The RCNM has default duty cycle values for the various pieces of equipment, which were derived from an extensive study of typical construction activity patterns. Those default duty cycle values were used for this noise analysis.

Table 5.10-8 Construction Equipment Assumptions

	L_{min}	L_{eq}	L_{max}
Monitoring Site	**Equipment Type**	**Quantity**	**Usage Hours**
Grading	Excavators	2	8
	Rubber tired loaders	1	8
Building Construction – Parking Garage	Tractors/loaders/backhoes	2	8
Paving	Pavers	1	8
	Paving equipment	1	8
	Rollers	1	8
Building Construction – Residential (above garage)	Cranes	1	6
	Forklifts	2	8
	Welders	1	4
Architectural Coating	—	—	—

Source: Appendix B

The nearest noise-sensitive land use (the residence at 24648 Via Valmonte) is located approximately 77 feet north of the development site property line, approximately 118 feet or more from actual building construction work, and approximately 250 feet away from the acoustic center of construction activity (the idealized point from which the energy sum of all construction activity noise near and far would be centered). During short periods of time (during grading/swale construction activities and perimeter retaining wall construction), construction activities would take place within approximately 77 feet of the nearest residential property; however, the direct view of the work occurring in proximity of the nearest residence would be shielded by an existing intervening berm[3] at the top of the slope. Based upon calculations estimating terrain shielding, the berm would provide a theoretical benefit of approximately 19 dB noise reduction (Dudek 2018).[4] In real-life applications, noise barrier attenuation is generally limited to approximately 10 to 15 dB. For the purposes of this analysis, it was conservatively assumed that the berm would provide approximately 12 dB of noise reduction during the periods when construction takes place near the project boundary, but during other work phases no shielding would occur. For the third- and fourth-nearest residences, no terrain shielding was assumed.

The construction noise analysis input and output are provided in Appendix H. The results (as shown in Table 5.10-9, *Construction Noise Model Results Summary*) are presented for each of the four nearest residences adjacent

[3] The elevation of the nearest residence (located at 2648 Via Valmonte) is approximately 230 feet at the residential property line; the work area nearest to the residence has an elevation of approximately 204 feet; and the intervening berm, located approximately 30 feet from the residential property line, has an elevation of approximately 240 feet.

[4] Provided in Appendix H.

to the project site, for both the nearest point of the construction work and the more typical condition where construction equipment would be at varying locations near and far on-site. The table shows the L_{eq} (average noise level), the estimated maximum noise level (L_{max}), and the level equaled or exceeded 10 percent of the time (L_{10}). As shown in Table 5.10-9, noise levels on an L_{eq} basis during construction at the nearest residential receivers are estimated to range from approximately 55 dBA to 73 dBA L_{eq}; noise levels on an L_{10} basis during construction are estimated to range from approximately 58 dBA to 76 dBA L_{10}; and noise levels on an L_{max} basis are estimated to range from approximately 59 dBA to 74 dBA L_{max}. The third-nearest residential location (24704 Via Valmonte) is predicted to have higher noise levels than the two nearer residences. This is because the first and second residences have the benefit of terrain shielding, particularly when the construction equipment would be near the project boundary, whereas the third and fourth residences do not. It is also noted that in several instances the L_{10} noise levels are higher than the L_{max} noise levels. This is because the RCNM model shows the maximum noise level of the loudest piece of equipment for each construction phase, whereas the L_{10} noise level (similarly to the L_{eq} noise level) represents the cumulative sum of each phase.[5]

Table 5.10-9 Construction Noise Model Results Summary

Residence	Construction Phase	Construction Noise at Receiver Distances (dBA)				
		Nearest or Typical Construction Work Location Distance (feet)	Leq	L10	Lmax	75 dBA Significance Threshold Exceeded?
24648 Via Valmonte	Grading	Nearest Construction Work (77.5')	65	68	65	No
		Typical Construction Work (245')	68	71	67	No
	Paving	Nearest Construction Work (77.5')	63	66	64	No
		Typical Construction Work (245')	66	70	67	No
	Building Construction - Parking Garage	Nearest Construction Work (96')	63	66	66	No
		Typical Construction Work (164')	71	74	74	No
	Building Construction - Residential	Nearest Construction Work (96')	59	62	63	No
		Typical Construction Work (164')	63	66	67	No
24660 Via Valmonte	Grading	Nearest Construction Work (177')	60	63	60	No
		Typical Construction Work (410')	63	66	62	No
	Paving	Nearest Construction Work (177')	59	62	59	No
		Typical Construction Work (410')	62	65	62	No
	Building Construction - Parking Garage	Nearest Construction Work (200')	59	62	61	No
		Typical Construction Work (307')	66	69	68	No
	Building Construction - Residential	Nearest Construction Work (200')	55	58	59	No
		Typical Construction Work (307')	59	62	62	No
24704 Via Valmonte	Grading	Nearest Construction Work (135')	73	76	72	Yes (76 dBA L10)
		Typical Construction Work (370')	64	67	63	No
	Paving	Nearest Construction Work (135')	71	74	71	No
		Typical Construction Work (370')	63	66	63	No
		Nearest Construction Work (240)	67	70	70	No

[5] This is because it is unlikely that any two or more pieces of construction equipment would generate their maximum noise levels simultaneously.

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	Building Construction - Parking Garage	Typical Construction Work (315')	65	68	68	No
	Building Construction - Residential	Nearest Construction Work (240)	64	67	67	No
		Typical Construction Work (315')	60	63	63	No
24706 Via Valmonte	Grading	Nearest Construction Work (187')	70	73	69	No
		Typical Construction Work (450')	63	66	62	No
	Paving	Nearest Construction Work (187')	69	72	69	No
		Typical Construction Work (450')	61	64	61	No
	Building Construction - Parking Garage	Nearest Construction Work (347')	64	67	67	No
		Typical Construction Work (425')	63	66	65	No
	Building Construction - Residential	Nearest Construction Work (347')	60	63	64	No
		Typical Construction Work (425')	58	61	62	No

Source: Appendix H.

Based upon this analysis, the noise from construction would exceed the City's construction noise significance threshold of 75 dBA at one location; at 24704 Via Valmonte, during grading activities that would occur nearest the project's northwest boundary near the residence. The noise level is estimated to be approximately 76 dBA L_{10} at the residential property line. Noise from construction activities would therefore exceed the City of Torrance threshold of significance for construction noise at this location. The noise impact would be considered significant.

Interior Noise Levels During Construction

Typically, with the windows open, building shells provide approximately 15 dB of noise reduction, while with windows closed, modern residential construction generally provides a minimum of 25 dB attenuation. Thus, the interior noise levels at the nearest residences during the nearest construction work are estimated to be approximately 40 to 58 dBA Leq with windows open and 30 to 48 dBA Leq with windows closed. Noise levels of this magnitude are moderate to relatively low in the context of typical daytime community noise, although it is likely that such noise would be audible at times.

Impact 5.10-2 Project implementation would result in long-term operation-related noise that would not exceed local standards. [Thresholds N-1]

Potential noise impacts from operation of the proposed project include increases in noise from project-related traffic as well as from on-site operational noise (i.e., mechanical equipment, parking structure, rooftop deck activities).

Traffic Noise

The proposed project would generate traffic, primarily along Hawthorne Boulevard and Via Valmonte. Potential noise effects from vehicular traffic were assessed using FHWA's Traffic Noise Model, version 2.5. The model was calibrated using the measured average noise levels shown in Table 5.10-5 and the concurrently counted traffic volumes. The same traffic volumes and vehicle composition ratios counted during the noise measurements were used to calibrate the model and verify the input used in the noise model. The modeled noise levels for the monitoring locations were within two decibels of the measured noise levels. This result confirms the assumptions used in the noise model. Traffic noise modeling data and traffic volume input data is in Appendix H.

Consistent with the Traffic Impact Study provided by KHR Associates (KHR 2019), provided as Appendix J, the modeled traffic scenarios included the Existing (i.e., baseline conditions), Existing plus Project, Cumulative (Year 2019), and Cumulative plus Project traffic volumes and speeds. Noise levels were modeled at representative on-site and off-site noise-sensitive receivers. The receivers, which represent noise-sensitive receivers with the most potential to be impacted by project-related traffic noise. Receivers at ST3, ST4, and R56 represent the existing off-site receivers, and R1 through R55 represent the proposed on-site receivers.

The information provided from this modeling was compared to the noise impact significance criteria in the City's General Plan (i.e., a 65 dBA Ldn noise standard for noise-sensitive land uses) and the FICON thresholds for noise increase (i.e., a 5 dBA increase in an ambient noise environment of less than 60 dBA Ldn, a 3 dBA noise increase in an ambient noise environment of 60–65 dBA Ldn, and a 2 dBA increase in an ambient noise environment of more than 65 dBA Ldn) to assess whether project traffic noise would cause a significant impact and, if so, where.

Off-Site Traffic Noise

The results of the comparisons for nearby existing off-site receivers (as represented by ST-3, ST- 4, and R-56) are presented in Table 15.10-10, *Traffic Noise at Adjacent Noise-Sensitive Receivers (dBA Ldn).*

Table 5.10-10 Traffic Noise at Adjacent Noise-Sensitive Receivers (dBA Ldn)

Receiver	Existing	Existing + Project	Noise Increase (dB)	Cumulative	Cumulative + Project	Noise Increase (dB)
ST3 – Residences east of project site	61	61	0	61	61	0
ST4 - Residence north of project	63	63	0	64	63	-0.1
R56 - Residences northeast of project	66	66	0	66	66	0

Source: Appendix H.

As shown in Table 5.10-10, the modeled existing and cumulative traffic noise levels range from approximately 61 dBA Ldn at receiver ST3 to 66 dBA Ldn at R56, both with and without the proposed project. The incremental increase resulting from project-related traffic would increase the traffic noise levels by less than 1 dBA (0 dBA Ldn when rounded to whole numbers) along the study area roadways. At ST4, the traffic noise level is predicted to decrease by 0.1 dB in the cumulative plus project scenario because the project's buildings would provide additional shielding from traffic noise on Hawthorne Boulevard south of Via Valmonte. The project would not cause an exceedance of City noise standards for transportation noise, and would not result in an audible or measurable increase in traffic noise. Project-related traffic noise impacts would therefore be less than significant.

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On-Site Exterior Traffic Noise

The results of the noise analysis for traffic noise levels at proposed on-site receivers are provided in Table 5.10-11, *Summary of On-Site Future (Cumulative plus Project) Unmitigated Traffic Noise Levels (dBA Ldn)*. On-site noise-sensitive-receiver locations consisted of the building facades of the four residential levels (i.e., levels 2 through 5) of Buildings A, B, and C and the proposed on-site outdoor recreation/pool areas. Based upon information provided by the applicant, each of the residential units would have outdoor open spaces in the form of balconies; however, these spaces are not subject to City of Torrance outdoor noise standards.

As shown in Table 5.10-11, the results of the noise modeling indicate that on-site noise levels at the facades with a direct view of Hawthorne Boulevard would range from 65 to 73 dBA Ldn. Because the project's proposed balconies are not subject to the 65 dB Ldn noise standard, noise mitigation is not required for these exterior areas. The future noise levels at the proposed outdoor common areas (R1 to R13) are predicted to range from 29 to 64 dBA Ldn, and thus would meet the City's exterior noise level criterion. Therefore, the noise impact would be less than significant for the shared (common) exterior areas.

On-Site Interior Traffic Noise

The City and the state require that interior noise levels not exceed a CNEL or Ldn of 45 dBA within the habitable rooms of residences. Typically, with the windows open, building shells provide approximately 15 dB of noise reduction. Therefore, rooms exposed to an exterior Ldn greater than 60 dBA could result in an interior Ldn greater than 45 dB. The State Building Code recognizes this relationship and therefore requires interior noise studies when the exterior noise level is projected to exceed 60 dBA Ldn.

The data shown in Table 5.10-11 indicates that the future noise levels would range up to 73 dBA Ldn at the facades of the on-site residences adjacent to Hawthorne Boulevard. Thus, the unmitigated interior noise level within the habitable rooms of these dwelling units could exceed the 45 dB Ldn or CNEL noise criterion, resulting in a potentially significant impact. As detailed in mitigation measure NO-2, a subsequent interior noise analysis will be required for the units shown in bold in Table 5.10-11. The impact would be less than significant with mitigation. Dwelling units that are oriented such that the doors and windows are interior to the project site (i.e., do not have a direct view of Hawthorne Boulevard) would have traffic noise level exposures of less than 60 dB Ldn.

Table 5.10-11 Summary of On-Site Future (Cumulative plus Project) Unmitigated Traffic Noise Levels (dBA Ldn)

Modeled Receiver #	Floor Level			
	2nd Level	3rd Level	4th Level	5th Level
R1 - Outdoor community area rooftop deck - 1	n/a	60	n/a	n/a
R2 - Outdoor community area rooftop deck - 2	n/a	53	n/a	n/a
R3 - Outdoor area Bldg B	42	n/a	n/a	n/a
R4 - Outdoor area Bldg B west side	40	n/a	n/a	n/a
R5 - Outdoor area Bldg B west side	47	n/a	n/a	n/a
R6 - Outdoor area Bldg A west side	29	n/a	n/a	n/a
R7 - Outdoor area Bldg A west side	29	n/a	n/a	n/a

Table 5.10-11 Summary of On-Site Future (Cumulative plus Project) Unmitigated Traffic Noise Levels (dBA Ldn)

Modeled Receiver #	Floor Level			
	2nd Level	3rd Level	4th Level	5th Level
R8 - Outdoor area Bldg C	33	n/a	n/a	n/a
R9 - Outdoor area Bldg C south side	64	n/a	n/a	n/a
R10 - Outdoor area Bldg C southwest side	60	n/a	n/a	n/a
R11 - Pool / Rec Area at Parking Structure	n/a	n/a	n/a	49
R12 - Pool / Rec Area at Parking Structure	n/a	n/a	n/a	50
R13 - Pool / Rec Area at Parking Structure	n/a	n/a	n/a	52
R14 - Bldg B	**61**	**62**	**62**	**62**
R15 - Bldg B	**65**	**65**	**66**	**66**
R16 - Bldg B	**66**	**67**	**67**	**66**
R17 - Bldg B	**68**	**68**	**68**	**68**
R18 - Bldg B	**69**	**69**	**69**	**69**
R19 - Bldg B	**72**	**72**	**72**	**71**
R20 - Bldg B	**73**	**72**	**72**	**72**
R21 - Bldg B	**73**	**72**	**72**	**72**
R22 - Bldg B	**73**	**73**	**72**	**72**
R23 - Bldg B	57	57	58	**69**
R24 - Bldg B	43	44	49	58
R25 - Bldg B	44	44	48	54
R26 - Bldg B	51	51	56	52
R27 - Bldg B	40	40	42	46
R28 - Bldg B	51	51	52	52
R29 - Bldg B	51	52	52	53
R30 - Bldg B	43	45	45	47
R31 - Bldg B	32	36	36	42
R32 - Bldg B	41	42	43	45
R33 - Bldg B	46	49	49	49
R34 - Bldg B	47	49	52	50
R35 - Bldg A	56	59	**61**	**61**
R36 - Bldg A	49	52	54	56
R37 - Bldg A	45	48	49	52
R38 - Bldg A	35	34	36	37
R39 - Bldg A	38	39	43	43
R40 - Bldg C	**69**	**69**	**69**	**68**
R41 - Bldg C	**73**	**72**	**72**	**72**
R42 - Bldg C	**73**	**73**	**72**	**72**
R43 - Bldg C	**72**	**72**	**72**	**72**
R44 - Bldg C	**73**	**73**	**72**	**72**
R45 - Bldg C	**68**	**68**	**68**	**68**
R46 - Bldg C	51	53	55	55
R47 - Bldg C	**72**	**72**	**72**	**72**
R48 - Bldg C	**63**	**64**	**64**	**64**
R49 - Bldg C	60	**61**	**61**	**61**

Table 5.10-11 Summary of On-Site Future (Cumulative plus Project) Unmitigated Traffic Noise Levels (dBA Ldn)

Modeled Receiver #	Floor Level			
	2nd Level	3rd Level	4th Level	5th Level
R50 - Bldg C	52	52	52	52
R51 - Bldg C	49	52	54	54
R52 - Bldg C	38	40	42	45
R53 - Bldg C	54	54	54	55
R54 - Bldg C	42	45	48	48
R55 - Bldg C	**66**	**67**	**66**	**66**

Source: Appendix H.
Notes: **Bolded** numbers represent building façade locations exceeding 60 dBA Ldn; these units will require subsequent interior noise analysis to verify compliance with the 45 dBA Ldn noise standard for habitable rooms.

Mechanical Noise

Based upon information provided by the applicant and the most recent plan set, exterior heating, ventilation and air conditioning (HVAC) equipment (i.e., the condenser units) will be mounted on the rooftops of Buildings A, B, and C. The HVAC units will consist of small residential condensers—one per unit—on the roofs over the building corridors. HVAC specifications are provided in Appendix H. The two-ton HVAC units used would each have a dimensionless sound power level of 71 dBA (Dudek 2018).[6] The nearest existing residence would be approximately 150 feet north of the nearest bank of HVAC units atop building A.[7] Assuming a sound power level of 71 dBA, the noise level at a distance of 150 feet from one HVAC unit would be approximately 30 dBA at the nearest residential unit. If all 24 of the nearest set of individual banked units were operating simultaneously, the resultant noise level at the nearest existing residence (at 24648 Via Valmonte) would be approximately 44 dBA. The estimated HVAC noise levels at the four adjacent residences to the north and west of the project site are provided in Table 5.10-12, *Summary of HVAC Noise Levels at Adjacent Off-Site Residences (dBA Leq)*. The noise levels would be less than the City of Torrance Region 3 exterior noise ordinance standards of 50 dBA from 7 am to 10 pm and 45 dBA from 10 pm to 7 am. The noise impact would be less than significant.

Interior noise levels would be substantially lower. Typically, with windows open, building shells provide approximately 15 dB of noise reduction, while with windows closed, modern residential construction generally provides a minimum of 25 dB attenuation. Thus, the interior noise level from project-related HVAC noise at the nearest residence is estimated to be approximately 29 dBA with windows open and 19 dBA with windows

[6] Sound power or acoustic power is the rate at which sound energy is emitted, reflected, transmitted or received, per unit time. It is calculated and expressed in watts and as sound power level Lw in decibels It is the power of the sound force on a surface of the medium of propagation of the sound wave. For a sound source, unlike sound pressure (Lp), sound power is neither room-dependent nor distance-dependent. Sound pressure is a measurement at a point in space near the source, while the sound power of a source is the total power emitted by that source in all directions. The relation between sound power and sound pressure utilized for this analysis was the following:

Lp=Lw-20*Log(R)+2.5, where R is the source-receiver distance of interest, in feet—as for a free field above a reflecting plane (Dudek 2018).

[7] Horizontal distance as measured using the project site plan. The actual straight-line distances would be slightly greater because of the differences in vertical elevations. Thus the noise estimates err on the conservative side.

closed. Noise levels of this magnitude are low in the context of typical community noise and under most circumstances would be inaudible because they would be masked by other community noises.

Table 5.10-12 Summary of HVAC Noise Levels at Adjacent Off-Site Residences (dBA Leq)

Receiver Description	HVAC Noise	Applicable Region 3 Daytime Standard (50 dBA Leq) Exceeded?	Applicable Region 3 Nighttime Standard (45 dBA Leq) Exceeded?
Nearest Residential P/L (24648 Via Valmonte)	43.8	No	No
2nd Nearest Residential P/L (24660 Via Valmonte)	40.0	No	No
3rd nearest Residential P/L (24704 Via Valmonte	37.7	No	No
4th nearest Residential P/L (24706 Via Valmonte	35.4	No	No

Source: Appendix H.

Rooftop Deck/Pool Area and Parking Structure Noise

A rooftop deck/pool and spa area (rooftop deck) is proposed as part of the project. The rooftop deck would be on the upper level of the eastern portion of the project's parking structure, located along the south side of the project site. A pool, spa, deck chairs, cabanas, a fire pit, and picnic table/chair sets are proposed. The maximum permitted occupancy of the rooftop deck would be 220 people. The rooftop deck would be conditioned such that no amplified voice, music, live music, or other loud events would be permitted, and the area would be closed at 10 pm.

The distance from the nearest residence's property line (24648 Via Valmonte) to the nearest side of the rooftop deck area is approximately 415 feet, and the distance from the nearest residence to the rooftop deck's acoustic center is approximately 484 feet.[8] The view of the pool deck would be obstructed by the intervening proposed residential structures for the nearest residence.[9]

Based upon reference sound levels from the literature for a raised male voice, 65 dBA at 3.28 feet (Dudek 2018), the resultant noise levels at nearby residential land uses were estimated, as shown in Table 5.10-13. Note that this is a very conservative estimate, as it is highly unlikely that there would be 220 people using the facility at any one time, and that the raised male voices would be sustained for extended periods (i.e., 30 minutes or more during any one-hour period). Additionally, it is anticipated that there would generally be some combination of male and female residents and guests, and the noise levels would be lower for this reason as well (because the typical female voice is of a lower sound power). As summarized in Table 5.10-13, *Summary of Noise Levels from Rooftop Deck at Adjacent Off-Site Residences (dBA Leq)*, the conservative estimate for noise levels for the maximum-use scenario (220 voices) would range from 40 dBA L_{eq} at the nearest residential property line to 42 dBA Leq at the second-nearest residential property line.[10] The input and output data for these results are provided in

[8] The acoustic center is the idealized point from which the energy sum of all activity noise, near and far, would be centered. The acoustic center is derived by taking the square root of the product of the nearest and the farthest distances.

[9] The rooftop pool deck elevation would be approximately 250.4 feet above mean sea level (amsl). The nearest residence's elevation is approximately 230 feet amsl, and the intervening structure (Building B) would have a rooftop elevation of approximately 249.3 feet amsl.

[10] Based upon the relative distances and elevations of the receivers, noise sources and intervening structures, shielding attenuation calculations (Dudek 2018) were performed. The input and output sheets for these calculations are provided in Appendix H. It was

Appendix H. These noise levels would be below the applicable City of Torrance noise standard for activities taking place between the hours of 7 am and 10 pm of 50 dBA L_{eq}. Additionally, based on the ambient noise measurements, these noise levels would be well below typical noise levels in the project area, and thus would not result in a substantial noise increase. Therefore, the noise from on-site activities at the rooftop deck would be less than significant.

Table 5.10-13 Summary of Noise Levels from Rooftop Deck at Adjacent Off-Site Residences (dBA Leq)

Receiver Description	Receiver Distance (feet)	Raised Male Voices (dBA)	Acoustical Shielding[1] (if any)	Resultant (dBA Leq)	Applicable Region 3 Standard (50 dBA2) Exceeded?
Nearest Residential P/L (24648 Via Valmonte)	484	45.0	5.0	40	No
2nd Nearest Residential P/L (24660 Via Valmonte)	654	42.0	0.0	42	No
3rd nearest Residential P/L (24704 Via Valmonte	710	41.3	0.0	41	No
4th nearest Residential P/L (24706 Via Valmonte	711	41.3	0.0	41	No

Source: Appendix H.
Notes: Conservatively assumes a maximum legal occupancy of 220 persons, all males with voices raised simultaneously and continuously.
1 Acoustical shielding calculations provided in Appendix H.
2 Applicable from 7 am to 10 pm. The rooftop deck would be closed outside of these hours.

Potential Acoustical Reverberation Effects

Potential acoustical reverberation effects from the steep slopes located to the south and west of the project site was evaluated as part of this project. In order for a surface to be effective in reflecting sound, the characteristics of the surface are important. Specifically, a good reflecting surface is smooth, hard, and rigid (Caltrans 2013). Ideal reflecting surfaces include glass, metal, polished stone, and smooth walls. The slopes on the south and west sides of the project site are not good reflectors of sound. Based upon a recent soils report, the slope to the south exposes Miocene age Monterey Formation materials that are composed primarily of "interbedded sandstone, siltstone, and diatomaceous siltstone (Dudek 2018). These materials are composed of predominantly silt and clay…". The slope on the west exposes Pleistocene age San Pedro Sand. These materials are composed primarily of massive, uncemented sand and silt.

Examination of the slope further confirms that these soils are not resistant to weathering; the slope face is dissected by multiple small and large gullies. Vegetation is also scattered across the slope face. There is no continuous "plane" conducive to reflecting sound, but rather a very irregular surface where gullies and vegetation will minimize reflection. The gullying is a direct representation of the softness of the materials – water easily infiltrates the surface, as would sound waves.

Because these adjacent slopes are rough and relatively soft, they are more likely to be effective absorbers (rather than reflectors) of sound. Therefore, the potential for the adjacent slopes to reflect project-related noise into the adjacent residential neighborhood is negligible and impacts would be less than significant.

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determined that at the nearest residence, the direct view of the rooftop deck would be blocked by Building B, which would reduce the noise level by 5 decibels. The direct view of the rooftop deck for the other adjacent residences would not be blocked by intervening structures, and no additional noise reduction was claimed at these locations.

Parking Structure Noise

Vehicles

The proposed five-story parking structure would be located along the project's southern boundary. The parking structure would have a solid wall on its southern side and would be partially open to the north, west, and east sides. The distance from the nearest residence to the nearest side of the parking structure is approximately 300 feet, and the distance from the nearest residence to the parking structure's acoustic center is approximately 418 feet. The view of the parking structure would be obstructed by the proposed residential structures for the nearest three residences (24648, 24660, and 24704 Via Valmonte), which would result in additional reduction of noise from the parking structure.[11] At the fourth-nearest residence (24706 Via Valmonte), the view of the parking structure would not be obstructed; however, the distance from the property line at 24706 Via Valmonte to the parking structure would be substantially further, at approximately 706 feet.

Based upon noise measurements conducted at a similar parking structure (five stories, with open sides), noise levels from the proposed facility during peak commute hours (early morning and early evening hours) are anticipated to be approximately 63 dBA L_{eq} at a distance of 30 feet from the open side of the structure, with instantaneous maximum noise levels (L_{max}) of approximately 72 dBA at 30 feet occurring periodically from remote locking system "chirps," horn beeps, etc.[12] (Dudek 2016). As shown in Table 5.10-14, *Summary of Average Noise Levels from Parking Structure at Adjacent Off-Site Residences (dBA L_{eq})*, the estimated noise levels from parking structure noise at the nearest off-site residential uses would range from approximately 28 dBA L_{eq} to approximately 36 dBA L_{eq}. This would be less than the City of Torrance Municipal Code Region 3 noise standards of 50 dBA during daytime hours and 45 dBA during nighttime hours. Therefore, the noise from the parking structure noise would be less than significant.

Table 5.10-14 Summary of Average Noise Levels from Parking Structure at Adjacent Off-Site Residences (dBA L_{eq})

Receiver Description	Receiver Distance (feet)	Unshielded Parking Structure Noise (During Peak Traffic Hours) (dBA L_{eq})	Acoustical Shielding[1] (if any) (dB)	Resultant Parking Structure Noise (During Peak Traffic Hours) (dBA L_{eq})	Applicable Region 3 Nighttime Standard (45 dBA L_{eq}) Exceeded?
Nearest Residential P/L (24648 Via Valmonte)	418	40.1	12.0	28.1	No
2nd Nearest Residential P/L (24660 Via Valmonte)	575	37.3	7.6	29.8	No
3rd nearest Residential P/L (24704 Via Valmonte	642	36.4	6.0	30.4	No

[11] The uppermost parking deck elevation would be approximately 236 feet amsl. The lowest level would be approximately 193 feet amsl. The calculations assumed that the parking noise would emanate from the middle floor, which is approximately 215 feet amsl. This is conservative because the behavior of the average driver is to park as soon as a usable space is available, and therefore most parking structure noise would emanate from the lower floors.

[12] Additional nuisance noises such as overly sensitive, loud car alarms or unusually loud exhaust systems can and do occasionally result in higher noise levels, which can be disruptive. Such nuisances, when they become a frequent occurrence, are within the purview of City of Torrance code enforcement action.

Table 5.10-14 Summary of Average Noise Levels from Parking Structure at Adjacent Off-Site Residences (dBA L_{eq})

Receiver Description	Receiver Distance (feet)	Unshielded Parking Structure Noise (During Peak Traffic Hours) (dBA L_{eq})	Acoustical Shielding[1] (if any) (dB)	Resultant Parking Structure Noise (During Peak Traffic Hours) (dBA L_{eq})	Applicable Region 3 Nighttime Standard (45 dBA L_{eq}) Exceeded?
4th nearest Residential P/L (24706 Via Valmonte	706	35.6	0.0	35.6	No

Source: Appendix H.
Notes: Conservatively assumes a maximum legal occupancy of 220 persons, all males with voices raised simultaneously and continuously.
1 Acoustical shielding calculations provided in Appendix H.

The corresponding maximum noise levels from the proposed parking structure (which, similarly to the data shown in Table 5.10-14 for average noise levels, were derived from the measurements conducted at a similar parking facility) are presented in Table 5.10-15, *Summary of Maximum Noise Levels from Parking Structure at Adjacent Off-Site Residences (dBA L_{max})*. As shown in Table 5.10-15, the very brief L_{max} noise levels would range from approximately 37 to 45 dBA, which would be well below the allowable noise level for noises occurring less than 30 minutes per day or less than 6 minutes per night of 60 dBA (45 dBA+15 dBA) for nighttime noise. Therefore, the noise from parking structure activities would be less than significant.

Table 5.10-15 Summary of Maximum Noise Levels from Parking Structure at Adjacent Off-Site Residences (dBA L_{max})

Receiver Description	Receiver Distance (feet)	Unshielded Parking Structure Noise (During Peak Traffic Hours) (dBA Leq)	Acoustical Shielding[1] (if any) (dB)	Resultant Parking Structure Noise (During Peak Traffic Hours) (dBA L_{max})	Applicable Region 3 Nighttime Standard (60 dBA for short-term/instantaneous noise L_{max}) Exceeded?
Nearest Residential P/L (24648 Via Valmonte)	418	49.1	12.0	37	No
2nd Nearest Residential P/L (24660 Via Valmonte)	575	46.3	7.6	39	No
3rd nearest Residential P/L (24704 Via Valmonte	642	45.4	6.0	39	No
4th nearest Residential P/L (24706 Via Valmonte	706	44.6	0.0	45	No

Source: Appendix H.
1 Acoustical shielding calculations provided in Appendix H. For the residence at 24648 Via Valmonte, calculations indicate higher levels of acoustical shielding, but 12 dB was used as a conservative measure.

Ventilation System

Depending upon the final design of the proposed parking structure, ventilation fans may be necessary. All mechanical equipment would be internal to the garage and would be completely enclosed and sound attenuated. Exterior noise from ventilation system equipment, if needed, would be negligible and less than significant.

Combined Noise Levels, Mechanical Equipment and On-Site Activities.

The combined noise from on-site activities and mechanical equipment noise (summarized in Table 5.10-16, *Summary of Average Noise Levels from Parking Structure at Adjacent Off-Site Residences (dBA Leq)*), would range from approximately 41 to 45 dBA L_{eq}. The highest combined operational noise levels (45.3 dBA L_{eq}) would occur at the nearest residence to the project site, at 24648 Via Valmonte. As shown in Table 5.10-16, the project would not result in an exceedance of the City of Torrance daytime (7 am to 10 pm) noise standard. As described above, the rooftop deck would be conditioned to be closed at 10 pm, and therefore the applicable Region 3 Nighttime Standard of 45 dBA L_{eq} would not be exceeded as all rooftop deck activity would cease during designated nighttime hours. Combined noise levels would be less than significant.

Table 5.10-16 Summary of Average Noise Levels from Parking Structure at Adjacent Off-Site Residences (dBA Leq)

Receiver Description	Parking Structure Noise (dBA Leq)	Pool Deck Noise (dBA Leq)	HVAC Noise (dBA Leq)	Combined Parking Structure, Pool Deck and HVAC Noise (dBA Leq)	Applicable Region 3 Daytime Standard (50 dBA Leq) Exceeded?
Nearest Residential P/L (24648 Via Valmonte)	28.1	39.8	43.8	45.3	No
2nd Nearest Residential P/L (24660 Via Valmonte)	29.8	34.6	40.0	41.4	No
3rd nearest Residential P/L (24704 Via Valmonte	30.4	41.3	37.7	43.1	No
4th nearest Residential P/L (24706 Via Valmonte	35.6	41.3	35.4	43.1	No

Source: Appendix H.

Combined On-Site Operational Noise and Existing Ambient Noise

As previously shown in Table 5.10-16, the combined noise from on-site activities and mechanical equipment noise would range from approximately 41 to 45 dBA L_{eq}. The highest combined operational noise levels (45.3 dBA L_{eq}) would occur at the nearest residence to the project site, at 24648 Via Valmonte (Table 5.10-17, *Combined On-Site Noise Levels and Existing Ambient Noise Levels (dBA Leq)*). An ambient noise measurement was conducted at this location, and the dominant noise source was traffic from Hawthorne Boulevard. The measured ambient noise level was 60.5 dBA L_{eq}. Combining this noise level with the operational noise results in an increase of approximately 0.1 dB (i.e., 60.6 dBA L_{eq}). In the context of community noise, this is not an audible change and would not be a substantial increase. Therefore, the permanent noise increase would be less than significant.

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Table 5.10-17 Combined On-Site Noise Levels and Existing Ambient Noise Levels (dBA Leq)

Receiver Description	Combined Parking Structure, Pool Deck and HVAC Noise (from Table 5.10-16)	Existing Measured Noise Level (from Table 5.10-5)	Combined On-Site Noise Level Plus Existing Noise Level
Nearest Residential P/L (24648 Via Valmonte)	45.3	60.5	60.6

Source: Appendix H.

Substantial Temporarily or Periodic Increase in Ambient Noise

As discussed under Impact 5.10-1, noise levels from construction activities would generate temporary noise levels ranging from approximately 55 dBA to 73 dBA L_{eq}; noise levels on an L_{10} basis are estimated to range from approximately 58 dBA to 76 dBA L_{10}; and noise levels on an L_{max} basis are estimated to range from approximately 59 dBA to 74 dBA L_{max}. The measured ambient noise levels at the nearest noise-sensitive receiver (ST4) were 60.5 dBA L_{eq}, 63.0 dBA L_{10} and 74.5 dBA L_{max}. Without mitigation, this is considered a substantial increase.

Impact 5.10-3: The project would not create temporary or permanent groundborne vibration and groundborne noise that result in human annoyance. [Threshold N-2]

The project has the potential to result in significant levels of groundborne vibration during construction. Groundborne vibration from construction activities is typically attenuated over short distances. The heavier pieces of construction equipment used at this site could include bulldozers, graders, loaded trucks, water trucks, and pavers. Based on published vibration data, the anticipated construction equipment would generate an RMS vibration level of approximately 87 VdB re 1 micro-inch/second at a distance of 25 feet from the source (FTA 2006). The closest existing residences' property lines are approximately 77 feet or more from the construction area. At this distance and with the anticipated construction equipment, the RMS vibration levels would be approximately 72.3 VdB. This would be less than the recommended threshold of 80 VdB for human response within residential structures. Vibration from construction equipment may be perceptible at times, but the amount of time would be relatively brief as the construction equipment moves around the site. Furthermore, the majority of the construction work would take place well away from the nearest existing residences, and the vibration would be temporary. Therefore, the potential impact from groundborne vibration during construction would be less than significant.

Following construction, the proposed project would not have a potential to create significant levels of groundborne vibration because of the nature of the project (i.e., a multi-family residential development). Operational vibration would be negligible and less than significant.

With regard to potential for structural damage, the vibration levels are presented in terms of inches per second PPV. Based on published vibration data, the anticipated construction equipment would generate vibration levels of approximately 0.089 inches per second PPV at a distance of 25 feet from the source (FTA 2006). At the nearest existing residences, located 77 or more feet away from the nearest heavy construction work, the resultant PPV would be approximately 0.017 inch/second. This level would be less than the recommended threshold of

0.20 inches per second for potential of architectural damage to normal houses with plastered walls and ceilings. Construction vibration impacts would be less than significant.

Impact 5.10-4: The proximity of the project site to an airport would not result in exposure of future residents to airport-related noise. [Threshold N-3]

The project site is located approximately 0.5 mile from Torrance Municipal Airport (Zamperini Field). Based upon the City's General Plan Noise Element, the project site is located approximately 2,200 feet southwest of the airport's 60 dBA CNEL noise contour, and thus noise from aircraft operations would be well below 60 dBA CNEL (Torrance 2010). Additionally, the proposed project is outside of the airport's Planning Boundary/Airport Influence Area (Los Angeles County 2003). The project would not result in people residing or working in the project area being exposed to excessive noise levels from aircraft. This impact would be less than significant. No private airstrips exist in the project vicinity. Therefore, there would be no impact associated with noise from aircraft utilizing a private airstrip.

5.10.4 Cumulative Impacts

Construction Noise and Vibration

Noise from construction of the proposed project and related projects would be localized, thereby potentially affecting areas immediately within 500 feet from the construction site. The nearest existing sensitive/residential uses to the project site that would be subject to cumulative noise impacts are the residential uses located northwest of the project site, as well as the residential and commercial uses located across the street to the east and south of the Project site.

Of the 19 "related projects" contemplated by the Traffic Impact Study (see Appendix J to this DEIR), only one is close enough to the project site to create cumulative impacts when combined with the proposed project. The related project is a proposed 3-story Mixed-Use development that would be located on the northwestern corner of Via Valmonte and Hawthorne Boulevard. At this time, the development application is currently under review, and no project schedule has been established. Since the timing of the construction activities for this related project cannot be defined and is beyond the control of the City, any quantitative analysis that assumes multiple, concurrent construction projects would be entirely speculative.

Thus, even with proposed mitigation measures, if nearby related projects were to be constructed concurrently with the proposed project, significant cumulative construction noise impacts could result. However, those noise levels would be intermittent, temporary and would cease at the end of the construction phase, and would comply with time restrictions and other relevant provisions in the City's noise ordinances. Noise associated with cumulative construction activities would be reduced to the degree reasonably and technically feasible through proposed mitigation measures for each individual project and compliance with the City's noise ordinances. As such, based on the relative distance of potential construction activities in conjunction with proposed project-related construction noise, cumulative construction noise impacts would be less than significant.

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Mobile-Source Noise

The cumulative traffic noise levels would not increase by a noticeable amount (+3 dB) along the roadways analyzed. Therefore, significant cumulative increases in traffic noise levels would not occur, and impacts would be less than cumulatively considerable.

Stationary-Source Noise

Unlike transportation noise sources, whose effects can extend well beyond the limits of the project site, stationary-source noise generated by the project is limited to noise impacts to noise-sensitive receptors in relatively close proximity to the project site. Cumulative noise levels from the combined noise from on-site activities and mechanical equipment noise would range from approximately 41 to 45 dBA L_{eq}. Consequently, operational noise associated with cumulative residential projects would not be cumulatively considerable and would not result in a significant cumulative noise impact.

5.10.5 Existing Regulations and Standard Conditions

- Municipal Code
  - Chapter 6: Noise Regulation, Article 2. Section 46.2.6 Machinery, Equipment, Fans and Air Conditioning.
  - Chapter 6, Article 3, Section 46.3.1. Construction of Buildings and Projects
  - Chapter 6, Article 7, Section 46.7.1. General Noise Regulations.
  - Chapter 6, Article 7, Section 46.7.2. Noise Limits

- City of Torrance General Plan Noise Element
  - Policy N.1.1
  - Policy N.1.4
  - Policy N.2.3
  - Policy N.3.1

5.10.6 Level of Significance Before Mitigation

Upon implementation of regulatory requirements and standard conditions of approval, the following impacts would be less than significant: 5.10-3 and 5.10.4.

Without mitigation, the following impacts would be **potentially significant**:

- Impact 5.10-1 Construction activities would result in a significant temporary noise increases in the vicinity of the proposed project.

- Impact 5.10-2 Unmitigated interior noise level within the habitable rooms of residences adjacent to Hawthorn Boulevard could exceed the 45 dB L_{dn} or CNEL noise criterion.

5.10.7 Mitigation Measures

Impact 5.10-1

NO-1 The following measures shall be incorporated into the project contract specification to reduce construction noise impacts to a level below significance:

1 Prior to commencement of construction activities involving heavy equipment, temporary construction noise barriers shall be constructed in the locations shown in Figure 5.10-1, *Temporary Construction Noise Barriers*, of this DEIR. The noise barriers shall be a minimum of six feet in height, must have a surface density of at least four pounds per square foot, and be free of openings and cracks (with the exception of expansion joints gaps and other construction techniques, which could create an opening or crack).

2 Ensure that all noise-producing project equipment and vehicles using internal combustion engines are equipped with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features that are in good operating condition and meet or exceed that original factory specification. Ensure that mobile or fixed "package" equipment (e.g., arc-welders, air compressors) are equipped with shrouds and noise control features that are readily available for that type of equipment.

3 Through contract specification the applicant and/or his contractors, shall ensure that all mobile or fixed noise-producing equipment used on the Project that are regulated for noise output by a local, state, or federal agency complies with such regulation while in the course of Project activity.

4 Implement construction noise reduction methods such as shutting off idling equipment and maximizing the distance between construction equipment staging areas and adjacent residences where feasible.

5 Material stockpiles and mobile equipment staging, parking, and maintenance areas shall be located as far as practicable from noise-sensitive receptors.

6 Establish and enforce construction site and access road speed limits of 15 miles per hour during the construction period.

7 Ensure that the use of noise-producing signals, including horns, whistles, alarms, and bells, be for safety warning purposes only.

8 Ensure that project-related public address or music systems are not audible at any adjacent receptor.

9 The on-site construction supervisor shall have the responsibility and authority to receive and resolve noise complaints. A clear appeal process to the owner will be established prior

to construction commencement that will allow for resolution of noise problems that cannot be immediately solved by the site supervisor.

Impact 5.10-2

NO-2 To comply with the City and State's 45 dBA Ldn/CNEL interior noise standard, the dwelling units so designated in Table 5.10-11 (in **bolded** numbers) and depicted in Figure 7of the Noise Analysis Technical Report for the Solana Torrance Project will most likely require mechanical ventilation system or air conditioning system and possibly sound-rated windows. Prior to issuance of building permits, an interior noise analysis shall be required for those dwelling units identified in Table 5.10-11. Additionally, an interior noise analysis shall be required for residential units that are adjacent to elevators and other mechanical equipment, to ensure compliance with the City and state's 45 dBA Ldn/CNEL interior noise standard.

5.10.8 Level of Significance After Mitigation

Impact 5.10-1

With implementation of MM NO-1, the construction noise level would be reduced to 65 dBA or less, as shown in Table 5.10-18, *Construction Noise Model Results Summary with Mitigation*, and Figure 5.10-1, *Temporary Construction Noise Barriers*, below. The construction noise levels would not exceed the City of Torrance threshold of significance for construction noise and would not represent a substantial noise increase above levels existing without the project. Noise impacts would be less than significant with mitigation incorporated.

Table 5.10-18 Construction Noise Model Results Summary with Mitigation

Residence	Construction Phase	Construction Noise at Receiver Distances (dBA)				
		Nearest or Typical Construction Work Location Distance (feet)	Leq	L10	Lmax	75 dBA Significance Threshold Exceeded?
24660 Via Valmonte	Grading	Nearest Construction Work (177')	56	59	56	No
		Typical Construction Work (410')	53	56	52	No
	Paving	Nearest Construction Work (177')	55	58	55	No
		Typical Construction Work (410')	52	55	52	No
	Building Construction - Parking Garage	Nearest Construction Work (200')	55	58	57	No
		Typical Construction Work (307')	56	59	58	No
	Building Construction - Residential	Nearest Construction Work (200')	51	54	55	No
		Typical Construction Work (307')	49	52	52	No
24704 Via Valmonte	Grading	Nearest Construction Work (135')	61	64	60	No
		Typical Construction Work (370')	54	57	53	No
	Paving	Nearest Construction Work (135')	59	62	59	No
		Typical Construction Work (370')	53	56	53	No
	Building Construction - Parking Garage	Nearest Construction Work (240)	55	58	58	No
		Typical Construction Work (315')	55	58	58	No

Table 5.10-18 Construction Noise Model Results Summary with Mitigation

Residence	Construction Phase	Construction Noise at Receiver Distances (dBA)				
		Nearest or Typical Construction Work Location Distance (feet)	Leq	L10	Lmax	75 dBA Significance Threshold Exceeded?
	Building Construction - Residential	Nearest Construction Work (240)	52	55	55	No
		Typical Construction Work (315')	50	53	53	No
24706 Via Valmonte	Grading	Nearest Construction Work (187')	58	61	57	No
		Typical Construction Work (450')	53	56	52	No
	Paving	Nearest Construction Work (187')	57	60	57	No
		Typical Construction Work (450')	51	54	51	No
	Building Construction - Parking Garage	Nearest Construction Work (347')	52	55	55	No
		Typical Construction Work (425')	53	56	55	No
	Building Construction - Residential	Nearest Construction Work (347')	48	51	52	No
		Typical Construction Work (425')	48	51	52	No

Source: Appendix H.

Impact 5.10-2

With implementation of MM NO-2, the project's interior habitable spaces (living rooms, sleeping rooms, etc.) would have noise levels that would be in verified compliance with City and state 45 dBA Ldn/CNEL interior noise standard. Noise impacts would be less than significant with mitigation incorporated.

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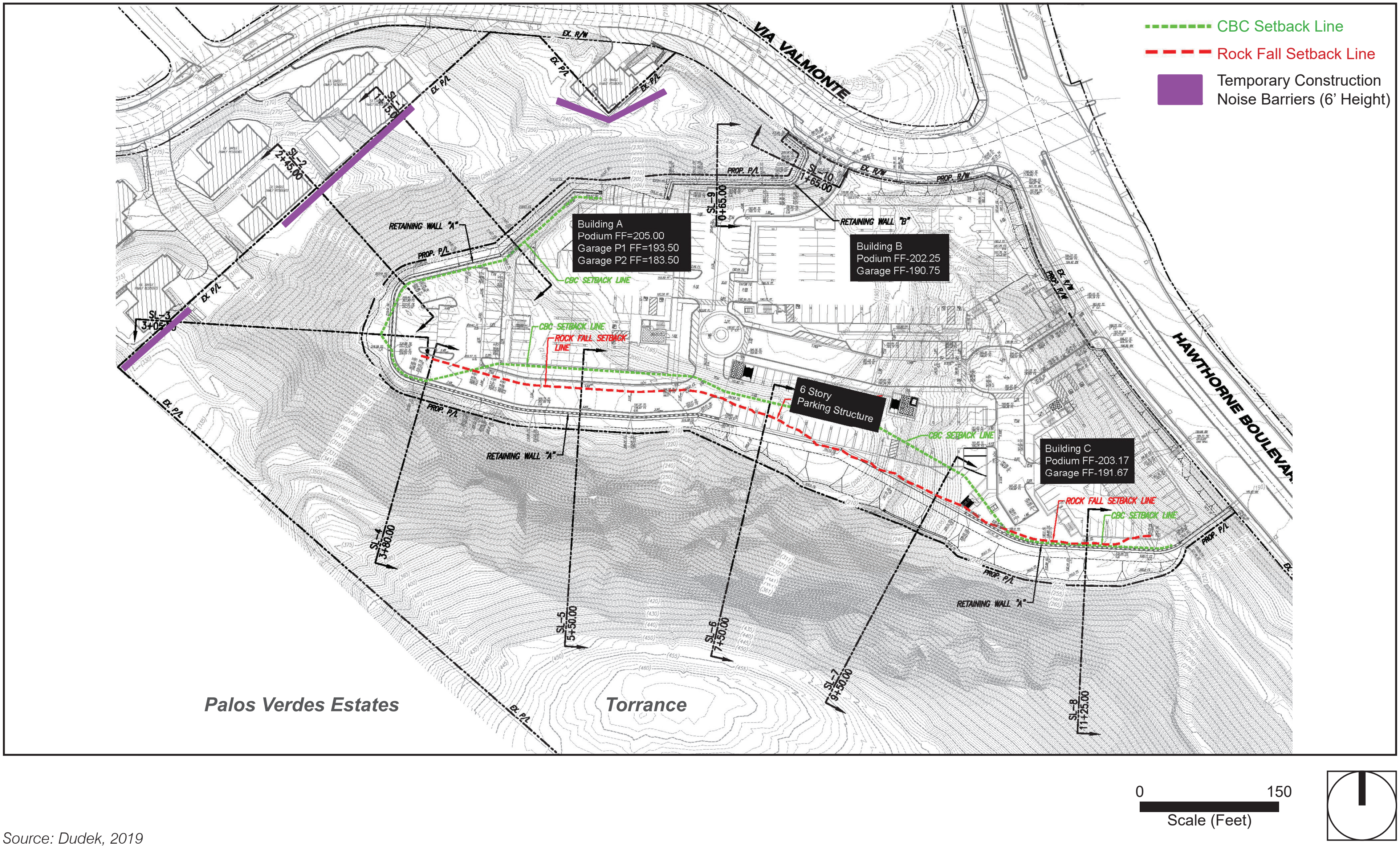
Figure 5.10-1 - Temporary Construction Noise Barriers



Source: Dudek, 2019

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