5.11 NOISE

This section of the Draft Environmental Impact Report (DEIR) evaluates the potential for implementation of the proposed La Puerta School Site Specific Plan (Specific Plan) to result in noise and vibration impacts to sensitive receptors in the vicinity of the Project Area. This chapter describes the fundamentals of sound, regulatory framework, existing noise conditions, identifies criteria used to determine impact significance, and identifies noise and vibration mitigation measures for potentially significant impacts. Noise modeling data is included as Appendix H to this DEIR.

5.11.1 Environmental Setting

5.11.1.1 REGULATORY BACKGROUND

Noise is defined as unwanted sound and is known to have several adverse effects on people, including hearing loss, speech and sleep interference, physiological responses, and annoyance. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness." The following are brief definitions of terminology used in this section.

Technical Terminology

- **Sound.** A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale.
- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Equivalent Continuous Noise Level (L_{eq}); also called the Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.
- **Statistical Sound Level (L_n).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and

this is often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."

- **Day-Night Sound Level (Ldn or DNL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 pm to 7:00 am.

- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added from 7:00 pm to 10:00 pm and 10 dB from 10:00 pm to 7:00 am. For general community/environmental noise, CNEL and L_{dn} values rarely differ by more than 1 dB (with the CNEL being only slightly more restrictive, that is, higher than the L_{dn} value). As a matter of practice, L_{dn} and CNEL values are interchangeable and are treated as equivalent in this assessment.

- **Sensitive Receptor.** Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

- **Peak Particle Velocity (PPV).** The peak rate of speed at which soil particles move (e.g., inches per second) due to ground vibration.

- **Vibration Decibel (VdB).** A unitless measure of vibration, expressed on a logarithmic scale and with respect to a defined reference vibration velocity. In the U.S., the standard reference velocity is 1 micro-inch per second (1x10-6 in/sec).

Sound Fundamentals

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

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

Sound Measurement

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

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

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

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

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

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing

body tensions, and thereby affecting blood pressure, functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA could result in permanent hearing damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. Table 5.11-1 shows typical noise levels from familiar noise sources.

Table 5.11-1 Typical Noise Levels

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

Source: Caltrans 2013.

Vibration Fundamentals

Vibration is an oscillating motion in the earth. Like noise, vibration is transmitted in waves, but in this case through the earth or solid objects. Unlike noise, vibration is typically of a frequency that is felt rather than heard. Vibration amplitudes are usually described in terms of either the peak particle velocity (PPV) or the root mean square (RMS) velocity. PPV is the maximum instantaneous peak of the vibration signal, and RMS is the

square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage and RMS (typically expressed in VdB) for potential annoyance. The units for PPV are normally inches per second (in/sec). Typically, groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration.

The way in which vibration is transmitted through the earth is called propagation. As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level striking a given point is reduced with the distance from the energy source. This geometric spreading loss, when presented in the RMS scale (VdB), is inversely proportional to the square of the distance. For example, the energy from vibration would be one-fourth as strong if the distance from the source is doubled. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

5.11.1.2 REGULATORY BACKGROUND

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, and municipalities in the state have established standards and ordinances to control noise.

Federal

There are no federal regulations that are directly relevant to the Specific Plan.

State

General Plan Guidelines

The State of California, through its General Plan Guidelines, discusses how ambient noise should influence land use and development decisions and includes a table of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable uses at different noise levels expressed in CNEL. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design. By comparison, a normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements. Local municipalities adopt these compatibility standards as part of their General Plan and modify them as appropriate for their local environmental setting. The City of Claremont standards are discussed below.

California Building Code

The California Building Code (CBC) is Title 24 of the California Code of Regulations. CBC Part 2, Volume 1, Chapter 12, Section 1206.4, Allowable Interior Noise Levels, requires that interior noise levels attributable to exterior sources not exceed 45 dBA in any habitable room. The noise metric is evaluated as either the day-night average sound level (L_{dn}) or the community noise equivalent level (CNEL), whichever is consistent with the noise element of the local general plan.

Residential structures within the noise contours identified above require an acoustical analysis showing that the structure has been designed to limit intruding noise in the prescribed allowable levels. To comply with these regulations, applicants of new residential projects are required to submit an acoustical report in areas where noise and land use compatibility are a concern. The report is required to analyze exterior noise sources affecting the proposed dwelling site, predicted noise spectra at the exterior of the proposed dwelling structure considering present and future land usage, basis for the prediction (measured or obtained from published data), noise attenuation measures to be applied, and an analysis of the noise insulation effectiveness of the proposed construction showing that the prescribed interior noise level requirements are met. If interior allowable noise levels are met by requiring that windows be inoperable or closed, the design for the structure must also specify the means that will be employed to provide ventilation and cooling, if necessary, to provide a habitable interior environment.

The State of California's noise insulation standards for nonresidential uses are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 11, California Green Building Standards Code (CALGreen). CALGreen noise standards are applied to new or renovation construction projects in California to control interior noise levels resulting from exterior noise sources. Proposed projects may use either the prescriptive method (Section 5.507.4.1) or the performance method (5.507.4.2) to show compliance. Under the prescriptive method, a project must demonstrate transmission loss ratings for the wall and roof-ceiling assemblies and exterior windows when located within a noise environment of 65 dBA CNEL or higher. Under the performance method, a project must demonstrate that interior noise levels do not exceed 50 dBA $L_{eq(1hr)}$.

Local

City of Claremont General Plan

The Public Safety and Noise Element of the City of Claremont General Plan includes noise goals and policies that aim to abate community noise and preserve high quality of life for Claremont residences. The relevant noise goals and policies are listed below:

Goal 6-11: Work with other agencies to minimize the impact of transportation-related noise, including noise associated with freeways, rail lines, and airports.

- **Policy 6-11.2.** Encourage existing City vehicles and equipment to the extent practical to reduce or eliminate unnecessary noise.
- **Policy 6-11.3.** Participate with federal. state. and local government agencies in the development and implementation of noise abatement programs.
- **Policy 6-11.4.** Support the efforts of local property owners and residents to reduce noise impacts associated with the 10 and 210 Freeways.
- **Policy 6-11.3.** Participate with federal. state. and local government agencies in the development and implementation of noise abatement programs.

Goal 6-12: Minimize the impact of excessive noise levels throughout the community, and adopt appropriate noise level requirements for all land uses.

- **Policy 6-12.1.** Use noise contour maps and noise/ land use compatibility criteria in planning and development decisions.
- **Policy 6-12.2.** Develop standards and encourage private property owners to locate, screen, and/or buffer equipment in order to reduce noise impacts on surrounding areas.
- **Policy 6-12.3.** Minimize noise from property maintenance equipment, construction activities and other non-transportation noise sources by enforcing designated construction and maintenance hours.

The City has adopted their own noise and land use compatibility guidelines used for planning new land uses. The City finds residential noise and land uses of particular importance; an exterior noise level of 65 Ldn is considered the maximum acceptable level. The Claremont General Plan noise and land use compatibility guidelines are shown in Table 5.11-2.

Table 5.11-2 Claremont Noise and Land Use Guidelines

Land Uses	Maximum CNEL or Ldn (dBA) Exterior[1]
Residential: Hillside, Rural, Very Low, Low, Low Medium	65
Residential: Medium	65/70[1]
Residential: High	70[1]
Commercial and Office: Professional Commercial Neighborhood Limited Major Highway Freeway	70
Commercial and Office: Professional Office	70
Business Park	75
Public/Institution: Schools	65
Public/Institution: All others	70
Open Space: Active Open Space	70
Open Space: Passive Open Space	70/65[2]

Source: Claremont 2020.
Notes: CNEL = Community Noise Equivalent Level; Ldn = Day-Night Sound Level
[1] Maximum exterior noise levels up to 70 dB CNEL are allowed for Multiple-family housing.
[2] Where quiet is a basis required for the land use.
[3] Regarding aircraft-related noise, the maximum acceptable exposure for new residential development is 60 dB CNEL.

City of Claremont Municipal Code

Stationary Noise

Chapter 16.154, Environmental Protective Standards, provides exterior standards for all Zone 1 (entire territory of the City of Claremont) single, double, and multiple family residential properties. Table 5.11-3 summarizes allowable noise levels at the receiving property lines of residences. Per Section 16.154.020, Noise and Vibration Standards, the noise standards also apply to schools, hospitals or similar health care institutions, churches and libraries while they are in use.

Table 5.11-3 City of Claremont Exterior Noise Standards

Zone 1	Time Period	Exterior Noise Level, dBA			
		L_{25}[1]	L_{16}[2]	L_8[3]	L_{max}[4]
Residential Daytime	7:00 am to 10:00 pm	60	65	74	75
Residential Nighttime	10:00 pm to 7:00 am	55	60	69	70

Source: City of Claremont Municipal Code, Section 16.154.020 Noise and Vibration Standards
[1] Basic Noise Level for a cumulative period of more than 15 minutes in any hour (L_{25}); or
[2] Basic Noise Level plus 5 dBA for a cumulative period of more than 10 minutes in any hour (L_{16}); or
[3] Basic Noise Level plus 14 dBA for a cumulative period of more than 5 minutes in any hour (L_8); or
[4] Basic Noise Level plus 15 dBA at any time (L_{max}).

Construction

Under Section 16.154.020, Noise and Vibration Standards, the following are exempt from the provisions of the municipal code:

- Noise sources associated with or vibration created by construction, repair, remodeling, or grading of any real property provided said activities do not take place between the hours of 7:00 am and 8:00 pm on weekdays and Saturdays, excluding national holidays.
- Noise levels on residential properties do not exceed 65 dBA for a cumulative period of more than 15 minutes in any hour, 70 dBA for a cumulative period of more than 10 minutes in any hour, 79 dBA for a cumulative period of more than 5 minutes in any one hour or 80 dBA at any time. Construction may occur on Sundays provided they do not exceed the daytime and nighttime exterior noise standards summarized in Table 5.11-3 above.
- Any vibration created does not endanger the public health, welfare, and safety.
- Noise sources associated with the maintenance of real property provided said activities are approved by the Director and take place between the hours of 7:00 am and 8:00 pm on any day except Sunday, or between the hours of 9:00 am and 8:00 pm on Sunday.

Vibration

Per Section 16.154.020(J), Noise and Vibration Standards, the ground vibration is limited to no greater than 0.05 inches/second (in/sec) RMS vertical velocity, which is equivalent to 94 VdB.

5.11.1.3 EXISTING CONDITIONS

The existing noise environment is predominately characterized by traffic noise from surrounding roadways and noise from sport-related activity at La Puerta Sports Park to the west. Single-family homes are located to the north, east, and south of the project site. La Puerta Sports Park is adjacent to the west of the project site. According to the future (Year 2025) noise level contours from the Claremont General Plan Public Safety and Noise Element[1], the Project Area is outside the 60 dBA CNEL noise contour.

Sensitive Receptors

Certain land uses, such as residences, schools, and hospitals, are particularly sensitive to noise and vibration. Sensitive noise receptors include residences, senior housing, schools, places of worship, and recreational areas. These uses are regarded as sensitive because they are where citizens most frequently engage in activities which are likely to be disturbed by noise, such as reading, studying, sleeping, resting, working from home, or otherwise engaging in quiet or passive recreation. Commercial and industrial uses are not particularly sensitive to noise. However, nonresidential structures are still analyzed for potential vibration impacts, such as architectural damage to a structure due to construction or demolition activities in close proximity. The nearest noise-sensitive receptors to the project are the single-family homes surrounding the project site and La Puerta Sports Park to the west. The nearest off-site structure that could be susceptible to potential vibration damage are the residential buildings north, east, and south of the Project Area.

5.11.2 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.

5.11.2.1 CONSTRUCTION NOISE THRESHOLDS

As defined by the Section 16.154.020, Noise and Vibration Standards, of the Claremont Municipal Code, a construction noise impact would occur if:

[1] Presented as Figure 6-8 (Future Noise Contours) to represent current conditions from Chapter 6, Public Safety and Noise Element, of the City's General Plan.

- Project-related construction activities occur outside of the hours of 7:00 am to 8:00 pm on weekdays and Saturdays or a national holiday

- Noise levels measured on residential properties exceed 65 dBA for a cumulative period of more than 15 minutes in any one hour, 70 dBA for a cumulative period of more than 10 minutes in any one hour, 79 dBA for a cumulative period of more than 5 minutes in any one hour or 80 dBA at any time.

5.11.2.2 TRANSPORTATION NOISE THRESHOLDS

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas. Most people can detect changes in sound levels of approximately 3 dBA under normal, quiet conditions, and changes of 1 to 3 dBA are detectable under quiet, controlled conditions. Changes of less than 1 dBA are usually indiscernible. A change of 5 dBA is readily discernible to most people in an exterior environment. Note that a doubling of traffic flows (i.e., 10,000 vehicles per day to 20,000 per day) would be needed to create a 3 dBA CNEL increase in traffic-generated noise levels. Based on this, the following thresholds of significance similar to those recommended by the Federal Aviation Administration, are used to assess traffic noise impacts at sensitive receptor locations. A significant impact would occur if traffic noise increase would exceed:

- 1.5 dBA in ambient noise environments of 65 dBA CNEL and higher;
- 3 dBA in ambient noise environments of 60 to 65 dBA CNEL; or
- 5 dBA in ambient noise environments of less than 60 dBA CNEL.

5.11.2.3 STATIONARY NOISE THRESHOLDS

As discussed above in Section 5.11.1.2, Regulatory Background, the City's Noise Ordinance establishes exterior noise standards at receiving residential Zone I property lines as well as schools, hospitals or similar health care institutions, churches, and libraries. These standards are used to determine impact significance.

5.11.2.4 VIBRATION THRESHOLDS

Vibration Annoyance

Per Section 16.154.020(J), Noise and Vibration Standards, of the Claremont Municipal Code, the ground vibration is limited to no greater than 0.05 inches/second (in/sec) RMS vertical velocity, which is used to determine impact significance.

Architectural Damage

The City of Claremont does not have specific limits for vibration-induced architectural damage related to construction activities. The Federal Transit Administration (FTA) provides criteria for acceptable levels of groundborne vibration for various types of buildings. Therefore, FTA criteria are used in this analysis to determine impact significance. Table 5.11-4 summarizes the thresholds below.

Table 5.11-4 Groundborne Vibration Criteria: Architectural Damage

	Building Category	PPV (in/sec)
I.	Reinforced concrete, steel, or timber (no plaster)	0.5
II.	Engineered concrete and masonry (no plaster)	0.3
III.	Non-engineered timber and masonry buildings	0.2
IV.	Buildings extremely susceptible to vibration damage	0.12

Source: FTA 2018.
Notes: PPV = peak particle velocity; in/sec = incher per second

5.11.3 Environmental Impacts

5.11.3.1 METHODOLOGY

This noise evaluation conducted for this DEIR was prepared in accordance with the requirements of CEQA to determine if development accommodated by the Specific Plan would result in significant construction and operational impacts at nearby sensitive receptors.

Due to the *California Building Industry Association v. Bay Area Air Quality Management District*, 62 Cal. 4th 369 (No. S 213478) ruling issued December 17, 2015, noise compatibility for on-site sensitive receptors is generally no longer the purview of the CEQA. As a result, while the noise from existing sources is taken into account as part of the baseline, the direct effects of exterior noise from nearby noise sources relative to land use compatibility of a future project is typically no longer a required topic for impact evaluation under CEQA. Generally, no determination of significance is required with the exception of certain school projects, projects affected by airport noise, and projects that would exacerbate existing conditions (i.e., projects that would have a significant operational impact).

However, the City requires projects to be designed to achieve the interior noise standards of the California Building Code for residential uses per California Building Code (CBC), Part 2, Volume 1, Chapter 12, Section 1207.11.2, which require exterior-to-interior noise insulation sufficient to achieve interior noise levels of 45 dBA CNEL prior to the issuance of a building permit. However, no significance determination is required for the noise and land use compatibility of the proposed future uses.

Construction noise modeling was conducted using the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM). Traffic noise increases were estimated using average daily traffic (ADT) along study roadway segments provided by EPD Solutions.[2] Noise impacts from nontransportation, stationary noise sources are based on the noise limits of the Claremont Municipal Code. Vibration annoyance impacts are also assessed using the vibration threshold given in the Claremont Municipal Code. Vibration damage impacts are assessed based on FTA building damage criteria.

[2] Traffic noise increase = 10*Log(existing plus project average daily traffic volumes/existing average daily traffic volumes); Cumulative increase = 10*Log(future plus project average daily traffic volumes/existing average daily traffic volumes).

The following impact analysis addresses thresholds of significance for which the Notice of Preparation disclosed potentially significant impacts. The applicable thresholds are identified in brackets after the impact statement.

5.11.3.2 IMPACT ANALYSIS

Impact 5.11-1: Construction activities associated with development accommodated by the Specific Plan would result in temporary noise increase in ambient noise levels in the vicinity of the Project Area. [Threshold N-1]

Impact Analysis: Two types of short-term noise impacts could occur during construction: (1) mobile-source noise from transport of workers, material deliveries, and debris and soil haul and (2) stationary-source noise from use of construction equipment. Development accommodated by the Specific Plan is anticipated to be constructed over a period of 15 months, from June 2023 to August 2025. Per Section 16.154.020, Noise and Vibration Standards, in the Claremont Municipal Code, project-related construction activity will be limited to the hours of 7:00 am to 8:00 pm on weekdays and Saturdays. Construction is prohibited on Sundays.

Construction Vehicles

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

Construction generates temporary worker and vendor trips, and the number of trips vary by activity phase. Construction vehicles would generate up to 340 daily vendor and worker during overlapping utility trenching, building construction, and paving, based CalEEMod outputs. Development of the Project Area would generate a maximum of 75 daily haul truck trips during overlapping asphalt demolition debris and rough grading soil haul. This increase in haul trucks and construction vehicles trips would result in a temporary noise increase of 3.2 dBA CNEL when compared to existing average daily trips ranging from 307 to 1,850 (EPD 2022), along nearby roadway segments (see Existing no Project ADT in Table 5.11-6 below) in the Project Area vicinity. Temporary construction trip noise increases would be less than 5 dBA CNEL in an existing environment less than 60 dBA CNEL. Additionally, once construction is completed, construction related vehicle trips would cease. Therefore, noise impacts related to temporary construction vehicle trips would be less than significant.

Construction Noise

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

Heavy equipment, such as a dozer or a loader, can have maximum, short-duration noise levels of up to 85 dBA at 50 feet. However, overall noise emissions vary considerably, depending on the specific construction activity performed at any given moment. Noise attenuation due to distance, the number and type of equipment, and the load and power requirements to accomplish tasks at each construction phase would result in different noise levels from construction activities at a given receptor. Since noise from construction equipment is intermittent and diminishes at a rate of at least 6 dBA per doubling of distance (conservatively ignoring other attenuation effects from air absorption, ground effects, and shielding effects), the average noise levels at noise-sensitive receptors could vary considerably, because mobile construction equipment would move around the project site with different loads and power requirements.

Construction phase activity information provided by the project applicant was used to estimate construction noise using the FHWA RCNM. The average noise produced during each construction activity phase is determined by combining the L_{eq} contributions from the three loudest pieces of construction equipment, while accounting for the ongoing time variations of noise emissions (commonly referred to as the usage factor). Construction noise from activity that occurs throughout the entire site and uses mobile equipment such as rough and fine grading is calculated at spatially averaged distances (i.e., from the acoustical center of the general construction site to the property line of the nearest noise sensitive receptors) because the area around the center of construction activities best represents the potential average construction-related noise levels at the various sensitive receptors. For building construction and paving attenuated noise levels are calculated by measuring the distance from the center of the nearest proposed row of buildings and new neighborhood streets to the nearest sensitive receptor property line. Lastly, utility trenching and architectural coating is assumed to occur near and around the project site and is assumed could occur within 100 feet of surrounding sensitive receptors. The associated, aggregate sound levels—grouped by construction activity—are summarized in Table 5.11-5. RCNM modeling input and output worksheets are included in Appendix H.

Table 5.11-5 Project-Related Construction Noise at Sensitive Receptors

Construction Activity Phase	Noise Level at Sensitive Receptors, dBA L_{eq}				
	RCNM Reference Noise Level	Residences to north	Residences to east at 450 feet	Residences to south	La Puerta Sports Park to west
Distance in feet	*50*	*150*	*270*	*525*	*180*
Asphalt Demolition	81	71	66	61	70
Asphalt Demolition and Rough Grading	83	73	68	62	72
Distance in feet	*50*	*390*	*360*	*320*	*330*
Rough Grading	83	65	66	67	66
Rough Grading and Fine Grading	85	67	68	69	69
Fine Grading	84	67	67	68	68
Distance in feet	*50*	*100*	*100*	*100*	*100*
Utilities Trenching	81	74	74	74	74
Architectural Coating	74	68	68	68	68
Distance in feet	*50*	*110*	*100*	*120*	*100*
Building Construction and Paving	86	79	80	78	80
Maximum dBA L_{eq}	86	79	80	78	80

Notes: Calculations performed with the FHWA's RCNM software are included in Appendix H.
Distances measured from the construction site acoustical center to sensitive receptor property line. Noise levels rounded up the nearest whole number.

As shown in Table 5.11-5, construction related noise levels range from 61 to 80 80 dBA L_{eq} at the nearest sensitive receptors. There may be instances where noise-sensitive receptors would be exposed to higher levels of noise from construction equipment operation. However, these moments would be sporadic and limited during the asphalt demolition, grading, and building construction phases of construction; primarily when large construction equipment passes by. Moreover, exposure time from such pass-bys would be brief, and the maximum noise levels at the residential property line and adjacent La Puerta Sports Park would lessen as the passing piece of construction equipment moves farther away.

The project applicant and construction contractor would be required to comply with Section 16.154.020, Noise and Vibration Standards, of the Claremont Municipal Code, which limits construction activities between the hours of 7:00 am and 8:00 pm, provided that noise levels on residential properties, do not exceed 60 dBA for a cumulative period of more than 15 minutes in any one hour, 65 dBA for a cumulative period of more than 10 minutes in any one hour, 74 dBA for a cumulative period of more than 5 minutes in any one hour or 75 dBA at any time.

Although construction activities would generally be restricted to the least noise-sensitive portions of the day, they could potentially exceed the construction noise level limits set by the City. Therefore, without mitigation, project-related construction noise impacts to the surrounding residences and adjacent La Puerta Sports Park would be significant. However, with implementation of Mitigation Measures N-1 and N-2, impacts due to construction noise would be reduced to less than significant.

Impact 5.11-2 Implementation of the Specific Plan would not result in long-term operation-related noise that would exceed local standards. [Threshold N-1]

Impact Analysis: Following is a discussion of the potential operational-noise impacts resulting from stationary and mobile sources that would be generated by uses accommodated by the Specific Plan.

Stationary Noise

Noise generated from residential development accommodated by the Specific Plan would consist mostly of people talking, which is consistent and compatible with existing surrounding residential uses.

Heating, ventilation, and air conditioning (HVAC) systems would be installed; it is assumed that these will be located on the ground next to each residential unit. HVAC noise is a steady state noise source, and therefore, noise levels do not vary. Typical HVAC equipment generates noise levels ranging up to 72 dBA at distance of 3 feet. The nearest proposed single-family home (as accommodated by the Specific Plan) to an existing residential property line is approximately 15 to the south, near the southwestern end of the Project Area (see Figure 3-2, *Conceptual Site Plan*). At this distance, noise levels from an HVAC unit would attenuate to approximately 58 dBA. This would potentially exceed the City's daytime and nighttime exterior noise standard of 60 and 55 dBA L_{25}, respectively. However, as a part of development that would be accommodated by the Specific Plan and as outlined in Chapter 2, Land Use Regulations, of the Specific Plan, a six-foot CMU (concrete masonry unit) wall would be constructed along the entire southern end of the Project Area. A six-foot wall would attenuate noise levels by at least 5 dBA where the line of sight is broken between the noise source and receiver. Therefore, the noise level at the nearest sensitive noise receptor property line would attenuate to 53 dBA with installation of the wall and HVAC noise would not exceed the City's daytime and nighttime exterior noise standard of 60 and 55 dBA L_{25}, respectively.

Therefore, impacts would be less than significant.

Traffic Noise

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas. Most people can detect changes in sound levels of approximately 3 dBA under normal, quiet conditions, and changes of 1 to 3 dBA are detectable under quiet, controlled conditions. Changes of less than 1 dBA are usually indiscernible. A change of 5 dBA is readily discernible to most people in an exterior environment. Based on this, the following thresholds of significance, similar to those recommended by the Federal Aviation Administration, are used to assess traffic noise impacts at sensitive receptor locations. As discussed in Section 5.11.2, *Thresholds of Significance*, a significant impact would occur if the traffic noise increase would exceed:

- 1.5 dBA for ambient noise environments of 65 dBA CNEL and higher.
- 3 dBA for ambient noise environments of 60 to 64 dBa CNEL.
- 5 dBA for ambient noise environments of less than 60 dBA CNEL.

As identified in in Section 5.11.1.3 *Existing Conditions*, the Project Area is outside the 60 dBA CNEL noise contour. Therefore, a significant traffic noise impact would occur if a traffic noise increases by greater than 5

dBA is calculated. Table 5.11-6 summarizes project-related traffic-noise increases by segment, calculated using traffic volumes provided by EPD Solutions. As shown in Table 5.11-6, project-related noise increases would be 1.8 dBA CNEL along Miramar Avenue, 3.8 dBA CNEL along Forbes Avenue, and less than 1.5 dBA CNEL along Indian Hill Boulevard. This would not exceed the established thresholds for the current ambient noise environment (60 dBA CNEL). Therefore, impacts would be less than significant. Cumulative traffic noise impacts are discussed in Section 5.11.5, *Cumulative Impacts*.

Table 5.11-6 Project-Related Traffic Noise Increases

	Average Daily Traffic Volumes (ADT)				dBA CNEL	
Roadway Segment	Existing no Project	Existing with Project	Future 2024 without Project	Future 2024 with Project	Project Noise Increase	Cumulative Noise Increase
Indian Hill Boulevard between Armstrong Drive and Mt. Carmel Drive	1,850	1,850	1,993	1,993	0.0	0.3
Miramar Avenue between Forbes Avenue and Mills Avenue	307	460	331	484	1.8	2.0
Forbes Avenue between Baseline Road and Miramar Avenue	323	782	348	807	3.8	4.0

Source: See Appendix H. Based on traffic volumes provided by EPD Solutions.

Impact 5.11-3: Development accommodated by the Specific Plan would create short-term groundborne vibration. [Threshold N-2]

Impact Analysis: The following impact analysis describes the potential groundborne vibration impacts from the construction phases of development accommodated by the Specific Plan.

Construction Vibration

Potential vibration impacts associated with development projects are usually related to the use of heavy construction equipment during the demolition and grading phases of construction. Construction can generate varying degrees of ground vibration depending on the construction procedures and equipment. Construction equipment generates vibration that spreads through the ground and diminishes with distance from the source. The effect on buildings in the vicinity of the construction site varies depending on soil type, ground strata, and receptor-building construction. The effects from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels. Vibration from construction activities rarely reaches the levels that can damage structures. Pile driving, which can generate strong vibrations, is not proposed.

Vibration Annoyance

The City of Claremont has established a vibration perceptibility threshold of 0.05 inches/second (in/sec) RMS vertical velocity, which is equivalent to 94 VdB, as discussed in Section 5.11.1.2, *Regulatory Background*. Table 5.11-7 shows VdB levels at a reference distance of 25 feet and attenuated levels at the nearest sensitive receptors. As shown in Table 5.11-7, vibration decibels would attenuate to 60 VdB or less. Therefore, impacts would be less than significant.

Table 5.11-7 Vibration Levels for Typical Construction Equipment (VdB)

Construction Activity Phase	Levels in VdB				
	FTA Reference Level at 25 feet	Residences to north at 360 feet	Residences to east at 380 feet	Residences to south at 330 feet	Public Restrooms of the La Puerta Sports Park to the west at 330 feet
Clam Shovel	94	59	59	60	60
Vibratory Roller	94	59	59	60	60
Hoe Ram	87	52	52	53	53
Large Bulldozer	87	52	52	53	53
Caisson Drilling	87	52	52	53	53
Loaded Trucks	86	51	51	52	52
Jackhammer	79	44	44	45	45
Small Bulldozer	58	23	23	24	24

Source: FTA 2018. Calculations included in Appendix H.
Notes: Distances measured from the acoustical center of construction site to sensitive receptor property line. Vibration levels rounded up the nearest whole number.

Architectural Damage

The FTA criteria for architectural damage varies based on the building category. The applicable FTA threshold for residential uses is 0.20 in/sec PPV. At a distance greater than approximately 25 feet, vibration levels would be less than the 0.20 in/sec PPV threshold.

Table 5.11-8 summarizes vibration levels at the various receptors. The nearest existing residential structures to proposed paving (for use of vibratory roller) are approximately 30 feet south of the Project Area (see Figure 3-2, *Conceptual Site Plan*) and the nearest grading activities would occur within 10 feet of a residential structure to the south.

Table 5.11-8 Vibration Levels for Typical Construction Equipment (in/sec PPV)

Equipment	Vibration Levels (in/sec, PPV)			
	Reference levels at 25 feet	Residences to south at 30 feet	Residences to south at 10 feet	Residences at 50 feet or greater
Vibratory Roller	0.21	0.160	NA	≤ 0.074
Hoe Ram	0.089	0.068	NA	≤ 0.031
Large Bulldozer	0.089	0.068	0.352	≤ 0.031
Caisson Drilling	0.089	0.068	NA	≤ 0.031
Loaded Trucks	0.076	0.058	0.300	≤ 0.027
Jackhammer	0.035	0.027	0.138	≤ 0.012
Small Bulldozer	0.003	0.002	0.012	≤ 0.001

Source: FTA 2018. Calculations included in Appendix H.
Notes: NA = Not applicable. Equipment is not used within noted distance.
[1] As measured from the nearest edge of construction site to structure/building facade.

As shown in Table 5.11-8, vibration levels due to paving would attenuate to 0.16 in/sec PPV and would not result in a significant impact. However, grading with heavy equipment would occur within 10 feet and vibration levels could reach 0.352 in/sec PPV and exceed the 0.20 in/sec PPV FTA thresholds. Therefore, impacts would be potentially significant. However, with implementation of Mitigation Measures N-3 impacts due to

construction vibration would be reduced to less than significant. All other surrounding structures to the north, east and west are at least 50 feet from the Project Area boundary and vibration levels would attenuate to less than 0.20 in/sec PPV.

Operational Vibration

Significant sources of operational vibration are associated with heavy industrial uses or railroad operations, for example. The Specific Plan would allow the development of single-family homes, which would not create or cause any significant vibration impacts due to project operations. Residential homes of the type permitted by the Specific Plan typically do not have equipment or uses that would generate substantial vibrations. Therefore, impacts would be less than significant.

Impact 5.11-4: The proximity of the Project Area to an airport would not result in exposure of future resident or workers to airport-related noise. [Threshold N-3]

Impact Analysis: The nearest airports to the Project Area are the Cable Airport and Ontario International Airport. Cable Airport is approximately 1.82 miles to the southeast, and Ontario International Airport is approximately 7.72 miles southeast. As shown in Figure 6-5 (Cable Airport Safety Zones) of the Claremont General Plan Public Safety and Noise Element, the Project Area is not within the Cable Airport land use plan. Due to the distance, the Project Area is outside the area covered by the Land Use Compatibility Plan of the Ontario International Airport (OIA-IAC 2018), indicating that implementation of the Specific Plan would not expose future residents or workers to excessive noise from the airport. No impact would occur.

5.11.4 Cumulative Impacts

Operational

As identified in in Section 5.11.1.3, *Existing Conditions*, the Project Area is outside the 60 dBA CNEL noise contour. Therefore, a significant traffic noise impact would occur if a traffic noise increased by greater than 5 dBA is calculated.

There are two roadway segments that would experience a cumulative traffic noise increase greater than 1.5 dBA: Miramar Avenue between Forbes Avenue and Mills Avenue and Forbes Avenue between Baseline Road and Miramar Avenue. However, according to the future (Year 2025) noise level contours from the Claremont General Plan Public Safety and Noise Element, the Project Area is outside the 60 dBA CNEL. A significant cumulative traffic noise increase would occur if a significant cumulative increase is identified and the Specific Plan's contribution to the cumulative increase (Cumulative Plus Project conditions) was calculated to be 1 dBA or greater. As shown in Table 5.11-6, *Project-Related Traffic Noise Increases*, the cumulative increase calculated would not exceed 5 dBA CNEL in an existing ambient less than 60 dBA CNEL. Therefore, cumulative traffic noise impacts would be less than significant.

Construction

The Project Area is surrounded by existing residential developments to the north, east, and south, and La Puerta Sports Park to the west (see Figure 3-2, *Conceptual Site Plan*). Based on the Figure 7, Location of Cumulative Projects, in the Traffic Impact Analysis (Appendix I), there are eleven projects surrounding the project site and in the City of Claremont included in the Project Completion (Year 2024) Baseline (EPD 2022). Specific construction projects and their buildout schedule from these cumulative projects in the City are unknown currently, and therefore speculative. Although some construction noise could overlap during periods of construction from the buildout of these projects in the City, the nearest construction activity (for any phase) associated with development accommodated by the Specific Plan is more than 4,000 feet away from the nearest cumulative project (senior low-income housing). Because construction noise attenuates at a high rate of 6 dBA per doubling of distance from the noise source, the contribution from the future projects being developed in the City would not be cumulatively significant. Therefore, cumulative construction noise levels would be less than significant.

5.11.5 Level of Significance Before Mitigation

Upon implementation of regulatory requirements, the following impact would be less than significant: 5.13-2.

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

- **Impact 5.13-1** Project-related construction noise could exceed the established construction noise standards under Section 16.154.020 of the Claremont Municipal Code
- **Impact 5.13-3** Grading activities near the edge of the Project Area could generate excessive vibration levels at nearby residential structures.

5.11.6 Mitigation Measures

Impact 5.13-1

NOI-1 Prior to the issuance of demolition and grading permits, the project applicant shall conduct a construction noise analysis once the final construction equipment list that will be used for demolition, grading, paving and building construction activities is determined. The construction noise analysis shall be submitted to the City of Claremont Community Development staff for review and approval. If the analysis determines that demolition and grading activities would exceed the City's construction noise standards, as outlined in Subsection 16.154.020.F.4 of the City of Claremont's Municipal Code, then specific measures to attenuate the noise impact and meet the City's noise standards shall be outlined in the construction-noise analysis, reviewed and approved by the City, and implemented by the project applicant. Due to the sensitive nature of the La Puerta Sports Park adjacent to the west and surrounding residential uses near the project site, potential noise-reduction measures to be implemented may include a temporary noise barrier along the western and/or southern boundary of the construction site. The actual height and material of the noise barrier(s), as

well as any other type of noise-reduction measure(s) to be implemented, shall be determined by the specific construction noise analyses and designed so as to achieve the aforementioned noise standards. Additionally, the final measures shall be placed on the cover sheet of all demolition and grading plans and shall be discussed at the pre-demolition and pre-grading meetings. The noise-reduction measures to be implemented herein are in addition to the measures outlined in Mitigation Measure N-2.

NOI-2 Prior to the issuance of demolition and grading permits, the following noise-reduction measures shall be implemented by the construction contractor through the duration of the construction phase. The measures shall be placed on the cover sheet of all demolition and grading plans and shall be discussed at the pre-demolition and -grade meetings. The noise-reduction measures to be implemented herein are in addition to the measures outlined in Mitigation Measure N-1.

- Construction activities shall comply with all requirements of the City's Noise Ordinance (Subsection 16.154.020.F.4, Noise and Vibration Standards, Exemptions, of the City of Claremont Municipal Code), as well as the following:
- Restrict construction activities to daily operation between 7:00 am to 8:00 pm Monday through Friday and 8:00 am to 6:00 pm on Saturdays. There shall be no work on Sundays and federal holidays.
- Noise levels, as measured on residential properties, do not exceed 65 dBA for a cumulative period of more than 15 minutes in any hour, 70 dBA for a cumulative period of more than 10 minutes in any hour, and 79 dBA for a cumulative period of more than 10 minutes in any hour, or 80 dBA at any time.
- A construction site notice shall be posted near the construction site access point or in an area that is clearly visible to the public. The notice shall include the following: job site address; permit number, name, and phone number of the contractor and owner; dates and duration of construction activities; construction hours allowed; and the City and construction contractor phone numbers where noise complaints can be reported and logged. If a credible complaint is received regarding construction noise levels at nearby sensitive uses (e.g., residential properties, La Puerta Sports Park), the complaint shall be investigated by the City. If this initial investigation indicates a potential violation of the City's noise standards, the City shall retain a noise monitoring professional – at the project applicant's sole expense – to monitor construction noise levels periodically for two days (as soon as reasonable following the day the complaint is received) to ensure that the construction activities are being conducted in accordance with the noise standards outlined in Subsection 16.154.020.F.4 of the City of Claremont Municipal Code.
- Ensure that all construction equipment is monitored and properly maintained in accordance with the manufacturer's recommendations to minimize noise.

- Fit all construction equipment with properly-operating mufflers, air intake silencers, and engine shrouds, no less effective than as originally equipped by the manufacturer, to minimize noise emissions.
- If construction equipment is equipped with back-up alarm shut offs, switch off back-up alarms and replace with human spotters, as feasible.
- Stationary equipment (such as generators and air compressors) and equipment maintenance and staging areas shall be located as far from existing noise-sensitive land uses, as feasible.
- To the extent feasible, use acoustic enclosures, shields, or shrouds for stationary equipment such as compressors and pumps.
- Shut off generators when generators are not needed and limit unnecessary engine idling to the extent feasible.
- Coordinate deliveries to reduce the potential of trucks waiting to unload and idling for long periods of time.
- Grade surface irregularities on construction sites to prevent potholes from causing vehicular noise.
- Minimize the use of impact devices such as jackhammers, pavement breakers, and hoe rams. Where possible, use concrete crushers or pavement saws rather than hoe rams for tasks such as concrete or asphalt demolition and removal.

Impact 5.13-3

Implementation of the Specific Plan could result in the generation of excessive groundborne vibration in the vicinity of the Project Area during the grading activities. Implementation of Mitigation Measure N-3 would reduce levels to a less than significant level.

NOI-3 The construction contractor shall ensure that grading and earthwork activities within 15 feet of adjacent residential structures shall be conducted with off-road equipment that is limited to 100 horsepower or less.

5.11.7 Level of Significance After Mitigation

The mitigation measures identified above would reduce potential impacts associated with noise to a level that is less than significant. Therefore, no significant unavoidable adverse impacts relating to noise remain.

5.11.8 References

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