

5. Environmental Analysis

5.10 NOISE

This section of the Draft Environmental Impact Report (DEIR) evaluates the potential for implementation of the McKinley Elementary School Campus Master Plan (Proposed Project) to result in noise impacts. This section discusses the fundamentals of sound; examines federal, state, and local noise guidelines, policies, and standards; characterizes existing noise levels in the Proposed Project's area; evaluates potential noise and vibration impacts associated with the Proposed Project; and provides mitigation to reduce noise impacts at sensitive receptor locations. Noise modeling worksheets are included in Appendix J of this DEIR.

A California Environmental Quality Act (CEQA) scoping meeting was conducted on January 31, 2023, where verbal comments were received in response to the Initial Study/Notice of Preparation (IS/NOP) regarding the potential noise impacts that would result from the Proposed Project. In addition, written comments were received regarding the potential impacts related to noise during construction on the McKinley Elementary School (McKinley ES) campus. The IS/NOP described that the District would seek a permit from the City of Santa Monica to allow for early construction start time to minimize conflicts with school DOPU times. As a result of comments received, this is no longer being considered. Comments received regarding noise are considered in this section. The IS/NOP and all scoping comment letters are included as Appendices B and C of this document.

5.10.1 Environmental Setting

5.10.1.1 NOISE AND VIBRATION FUNDAMENTALS

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." Based on these known adverse effects of noise, the federal government, the State of California, and many local governments have established criteria to protect public health and safety and to prevent disruption of certain human activities.

The following are brief definitions of terminology used in this chapter:

- **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.

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- **Equivalent Continuous Noise Level (L_{eq}); also called the Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.
- **Statistical Sound Level (L_n).** The sound level that is exceeded “n” percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the “median sound level.” The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the “intrusive sound level.” The L_{90} is the sound level exceeded 90 percent of the time and is often considered the “effective background level” or “residual noise level.”
- **Day-Night Sound Level (L_{dn} or DNL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.
- **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 p.m. to 10:00 p.m. and 10 dB from 10:00 p.m. to 7:00 a.m. 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.

Sound Fundamentals

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

The human ear is not equally sensitive to all frequencies. Sound waves below 16 Hz are not heard at all and are “felt” more as a vibration. Similarly, while people with extremely sensitive hearing can hear sounds as high as

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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.

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Sound Measurement

Sound intensity 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.

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Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, an artificial dBA penalty increase is added to quiet time (nighttime) 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 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. A sound level of 190 dBA will rupture the eardrum and permanently damage the inner ear.

Vibration Fundamentals

Vibration is an oscillatory motion through a solid medium, such as the ground or a building. Vibration is normally associated with activities stemming from operations of railroads or vibration-intensive stationary sources but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers.

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

As with airborne sound, annoyance with vibrational energy is a subjective measure, depending on the level of activity and the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Persons accustomed to elevated ambient vibration levels, such as in an urban environment, may tolerate higher vibration levels. Table 5.10-1, *Human Reaction to Typical Vibration Levels*, displays the human response and the effects on buildings resulting from continuous vibration in terms of various levels of peak particle velocity (PPV).

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Table 5.10-1 Human Reaction to Typical Vibration Levels

Vibration Level Peak Particle Velocity	Human Reaction	Effect on Buildings
0.006–0.019 in/sec	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08 in/sec	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10 in/sec	Level at which continuous vibration begins to annoy people	Virtually no risk of “architectural” (i.e., not structural) damage to normal buildings
0.20 in/sec	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 in/sec	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

Source: Caltrans 2013.

5.10.1.2 REGULATORY BACKGROUND

State, and local laws, regulations, plans, or guidelines related to noise that are applicable to the Proposed Project are summarized in this section.

State

California Building Code

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, specifically Part 11, California Green Building Standards Code (CALGreen). CALGreen noise standards are applied to new or renovation construction projects in California to control interior noise levels resulting from exterior noise sources. Proposed projects may use either the prescriptive method (Section 5.507.4.1) or the performance method (Section 5.507.4.2) to show compliance. Under the prescriptive method, a project 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 $L_{eq}(1hr)$.

California State Land Use Compatibility Guidelines for Noise

The State of California has adopted State General Plan Guidelines designed to ensure that proposed land uses are compatible with the predicted future noise environment. At different exterior noise levels, individual land uses are identified as “clearly acceptable,” “normally acceptable,” “normally unacceptable,” or “clearly unacceptable.” 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 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. The City of Santa

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Monica has adopted noise and land use compatibility standards in the General Plan Noise Element, which are discussed under local regulations.

Local

City of Santa Monica General Plan

The City's General Plan is primarily a policy document that sets goals concerning the community and gives direction to growth and development. In addition, it outlines the programs that were developed to accomplish the goals and policies of the General Plan.

Noise Element

The Noise Element provides guidance for comprehensive local programs to control and abate excessive noise and to protect residents from adverse noise impacts. The element provides information on the existing and projected noise environment and includes goals, objectives, policies and implementation programs to ensure an acceptable noise environment. The element also identifies criteria to be used by decision makers in evaluating the noise implications of proposed projects.

The City of Santa Monica has adopted noise and land use compatibility standards, which are summarized in Table 5.10-2, *Land Use and Noise Compatibility Matrix*.

Table 5.10-2 Land Use and Noise Compatibility Matrix

Proposed Land Use Categories		Compatible Land Use Zones CNEL						
Categories	Uses	<55	55-60	60-65	65-70	70-75	75-80	>80
Residential	Single Family, Duplex, Multiple Family	A	A	B	B	C	D	D
	Mobile Home	A	A	B	C	C	D	D
Commercial Regional, District	Hotel, Motel, Transient Lodging	A	A	B	B	C	C	D
Commercial Regional, Village District, Special	Commercial Retail, Bank, Restaurant, Movie Theatre	A	A	A	A	B	B	C
Commercial Industrial Institutional	Office Building, Research and Development, Professional Offices, City Office Building	A	A	A	B	B	C	D
Commercial Recreation Institutional Civic Center	Amphitheatre, Concert Hall Auditorium, Meeting Hall	B	B	C	C	D	D	D
Commercial Recreation	Children's Amusement Park, Miniature Golf Course, Go-Cart Track, Equestrian Center, Sports Club	A	A	A	B	B	D	D
Commercial General, Special Industrial, Institutional	Automobile Service Station, Auto Dealership, Manufacturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B
Institutional General	Hospital, Church, Library, School Classroom, Day Care	A	A	B	C	C	D	D

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Table 5.10-2 Land Use and Noise Compatibility Matrix

Proposed Land Use Categories		Compatible Land Use Zones						
Categories	Uses	CNEL						
Open Space	Parks	<55	55-60	60-65	65-70	70-75	75-80	>80
	Golf Course, Cemeteries, Nature Centers, Wildlife Reserves, Wildlife Habitat	A	A	A	B	C	D	D
Agriculture	Agriculture	A	A	A	A	A	A	A

Source: Santa Monica General Plan 1992.

Zone A: **Clearly Compatible** Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

Zone B: **Compatible with Mitigation** New construction or development should be undertaken only after detailed noise analysis of the noise reduction requirements are made and need noise insulation feature in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice. Note that residential uses are prohibited with Airport CNEL greater than 65.

Zone C: **Normally Incompatible** New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.

Zone D: **Clearly Incompatible** New construction or development should generally not be undertaken.

The City of Santa Monica has adopted policies in support of: Goal N1, reducing noise where unacceptable to acceptable noise levels; Goal N2, protect and maintain those areas having acceptable noise environments; and Goal N3, provide sufficient information concerning the community noise levels so that noise can be objectively considered in land use planning decisions. The following policies are relevant to the Proposed Project:

- **Policy 2.** Incorporate noise considerations into land use planning decisions (as they apply to finished projects, not construction actions). These measures will be achieved through the following programs:
 - Establish acceptable limits of noise for various land uses throughout the community. Zoning changes should be consistent with the compatibility of the projected noise environment.
 - Ensure acceptable noise levels near schools, hospitals, convalescent homes, and other noise sensitive area.
 - Encourage acoustical mitigation design in new construction.
- **Policy 3.** Develop measures to control non-transportation noise impacts.
 - Adopt a revised Community Noise Ordinance to mitigate noise conflicts.
 - Improve enforcement of required noise mitigation measures in building design.
 - Establish and maintain coordination among the city agencies involved in noise abatement.
- **Policy 4.** The City shall develop measures to control construction noise impacts. The following shall be considered:
 - Clearly state the permitted hours of construction and expressly prohibit construction on Sunday.

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- Consider exempting the resident/builders in single family zones from the Sunday construction and maintenance ban provided such construction is limited to the hours specified in the Noise Ordinance or meets the noise limits set in the Noise Ordinance.
- During the environmental review of all projects, determine the proximity of the site to the established residential areas. If the project will involve pile driving, nighttime truck hauling, blasting, 24-hour pumping, or any other very high noise equipment, the environmental review shall include a construction noise alternative analysis. From this analysis specific mitigation measures shall be developed to mitigate potential noise impacts. This may include but not be limited to:
 - Requirements to use quieter albeit costlier construction techniques.
 - Notification of residences (homeowner and renters) of time, duration, and location of construction
 - Relocation of residents to hotels during noisy construction period.
 - Developer reimbursement to City for 24-hour on-site inspection to verify compliance with required mitigation.
 - Limit hours of operation equipment 15 dB above the noise ordinance to the hours of 10:00 a.m. to 4:00 p.m.
- The selection of the above measures should be determined on a project-by-project basis depending on type of equipment used and the proximity to established residential areas.

Santa Monica Municipal Code

The City of Santa Monica has established exterior noise standards to limit excessive noise from stationary sources. These standards are found in the Santa Monica Municipal Code (SMMC), Section 4.12.060, Exterior Noise Standards, and are summarized in Table 5.10-3, *Santa Monica Exterior Noise Standards*. The following noise exemptions from Section 4.12.030, Exemptions, are applicable to the Proposed Project:

- Activities conducted on public or private school grounds, including, but not limited to, school athletic and school entertainment events;
- Activities conducted on public property that is generally open to the public, including, but not limited to, streets, sidewalks, alleys, parkways, parks, and beaches.

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Table 5.10-3 Santa Monica Exterior Noise Standards

Noise Zone	Days	Time Interval	Allowable Leq, dBA	
			15-minute continuous level (L ₂₅)	5-minute continuous level (L ₅)
I	Monday through Friday	10:00 p.m. to 7:00 a.m.	50	55
		7:00 a.m. to 10:00 p.m.	60	65
	Saturday and Sunday	10:00 p.m. to 8:00 a.m.	50	55
		8:00 a.m. to 10:00 p.m.	60	65
II	All days of the week	10:00 p.m. to 7:00 a.m.	60	65
		7:00 a.m. to 10:00 p.m.	65	70
III	Any day	Anytime	70	75

Notes: Noise Zone I: All property in a residential district established by Santa Monica Municipal Code. The Santa Monica Pier shall be excluded from this noise zone.
Noise Zone II: All property in a nonresidential district established by Santa Monica Municipal Code.
Noise Zone III: All property in the industrial conservation district as established by Santa Monica Municipal Code.

In addition, for each Noise Zone, the allowable exterior equivalent noise level shall be reduced by 5 dBA for impulsive or simple tone noise or for noises consisting of speech or music. If the ambient noise level exceeds the allowable exterior noise level standard, the ambient noise level shall be the standard. No person shall create any noise or allow the creation of any noise that causes the equivalent noise level to exceed the noise standards or a maximum instantaneous (L_{max}) A-weighted, slow sound pressure level to exceed the noise standard plus 20 dBA for any period of time.

Construction Noise

Section 4.12.110 of the SMMC sets restrictions on demolition, excavation, grading, spray painting, construction, maintenance, or repair of buildings. The SMMC states that no person shall engage in any construction activity:

- Before 8:00 a.m. or after 6:00 p.m. on Monday through Friday, except that construction activities conducted by employees of the City of Santa Monica or public utilities while conducting duties associated with their employment shall not occur before 7:00 a.m. or after 6:00 p.m. on Monday through Friday.
- Before 9:00 a.m. or after 5:00 p.m. on Saturday.
- All day on Sunday.
- All day on New Year's Day, Martin Luther King's Birthday, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, as those holidays have been established by the United States of America.

Construction activity shall not exceed the noise standards summarized in Table 5.10-3 by 20 dBA L_{eq} or 40 dBA L_{max}. Any construction that exceeds these noise standards shall occur between the hours of 10:00 am and 3:00 pm, Monday through Friday. Prior to the issuance of a building permit, all development projects located within 500 feet of any residential development or other noise-sensitive land uses must submit a list of equipment and activities required during construction. In particular, this list shall include the following:

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- Construction equipment to be used, such as pile drivers, jackhammers, pavement breakers, or similar equipment.
- Construction activities such as 24-hour pumping, excavation ,or demolition.
- A list of measures that will be implemented to minimize noise impacts on nearby residential uses.

Section 4.12.120, Postage of Construction Signage, of the SMMC states that there shall be displayed at sites where work activities requiring a City permit are being conducted, a sign in English and Spanish reading substantially as follows: “Attention All Employees and Subcontractors. Santa Monica construction/demolition work times are: Monday through Friday, eight A.M. until six P.M.; Saturday nine A.M. until five P.M.; Sundays and holidays, no work permitted.” In addition, the sign shall indicate the City telephone numbers where violations of this section can be reported, the location of the job site, and the permit number issued authorizing the work. Signs required by this section shall be continually placed prominently at the primary entrance to the worksite so that they are clearly visible to the public and to all employees, contractors, subcontractors and all other persons performing work at the site, so long as activity covered by this section is occurring. Each sign required to be displayed pursuant to this section shall be obtained from the Building and Safety Division. The Building and Safety Division shall charge for each sign a fee equal to the City’s cost of printing the sign.

Section 4.12.130, Location, Screening and Noise Measurements of Mechanical Equipment, states that all development project applications must demonstrate compliance with or contain the following information:

- A list of all permanent mechanical equipment to be placed outdoors and all permanent mechanical equipment to be placed indoors which may be heard outdoors. All such equipment shall require a noise analysis to demonstrate compliance with Section 4.12.060 prior to the issuance of a building permit for the development project.
- Mechanical equipment shall not be located on the side of any building which is adjacent to a residential building on the adjoining lot unless it can be shown that the noise will comply with the requirements of Section 4.12.060. Roof locations may be used when the mechanical equipment is installed within a noise attenuating structure.
- Final approval of the location of any mechanical equipment will require a noise test to demonstrate compliance with Section 4.12.060. Equipment for the test shall be provided by the owner or contractor and the test shall be conducted by the owner or contractor. A copy of noise test results on mechanical equipment shall be submitted to the Community Noise Officer for review to ensure that noise levels do not exceed maximum allowable levels for the applicable noise zone.

Vibration

Section 4.12.070, Vibration, of the SMMC states that any ground vibration that is perceptible without instruments at any point on any property shall be unlawful. The perception threshold shall be presumed to be more than 0.05 inch per second root-mean-square (RMS) velocity. Vibration perceptibility pertains to the human response and is also known as vibration annoyance. However, vibration caused by construction activity, moving vehicles, trains, and aircraft are exempt.

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5.10.1.3 EXISTING CONDITIONS

Existing Noise Environment

The Proposed Project's Site is in a predominantly urbanized mixed-use residential area in Santa Monica, directly adjacent to Santa Monica Boulevard. The McKinley ES campus is located in a Noise Zone II, under Section 4.12.050, *Designated Noise Zones*, of the SMMC. Properties located in Noise Zone II include all nonresidential properties, as described in Table 5.10-3 above.

Noise within the Proposed Project's Site is associated with the existing on-site school uses, including outdoor student activity, circulation-related noise (during DOPU times), and property maintenance. Noise around the Proposed Project's Site is dominated by traffic noise along Santa Monica Boulevard and other local roadways. Noise generated by surrounding residential and urbanized uses, including health care facilities (Providence St. John's Health Center) and associated intermittent ambulance noise, also contribute to the overall noise environment.

Sensitive Receptors

Certain land uses are particularly sensitive to noise and vibration, including residences, hospitals, 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 that are likely to be disturbed by noise, such as reading, studying, sleeping, resting, or quiet or passive recreation. Commercial and industrial uses are not particularly sensitive to noise but may still be evaluated in terms of vibration damage.

Students would remain on campus during construction activities. Therefore, on-site students and staff would be subject to temporary construction and are considered on-site noise receptors. The Proposed Project's Site is surrounded by single-family and multifamily homes to the north, east, and west. The closest sensitive residential receptors—as measured from the edge of the Proposed Project's Site—are approximately 20 feet to the southwest across 23rd Court (alley) and approximately 60 feet to the northeast across Chelsea Avenue. St. John Hospital medical facilities are approximately 70 feet southeast of the Proposed Project's Site across Santa Monica Boulevard. Further to the southwest at approximately 220 feet is the Providence Saint John's Health Center, which is considered a sensitive receptor.

Ambient Noise Monitoring

To determine baseline noise levels at different environments in the Proposed Project's area, ambient noise monitoring was conducted by PlaceWorks in May of 2022. Four short-term (15-minute) measurement locations were selected in coordination with the District and conducted around the Proposed Project's Site. All measurements were conducted Thursday, May 26, 2022, during regular school hours.

The primary noise source at all measurement locations is traffic noise, primarily from Santa Monica Boulevard, a heavily traveled road. School and general urban and residential activity (such as conversations on playgrounds, dogs, car doors shutting, etc.) also contributed to the overall noise environment. Meteorological conditions during the measurement period were favorable for outdoor sound measurements and were noted to be representative of the typical conditions for the season. Generally, conditions included clear skies with

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temperatures varying between 65 to 69 degrees Fahrenheit (°F), with winds ranging between 4 and 10 miles per hour (mph). The sound level meter was equipped with a windscreen during all measurements.

The short-term sound level meter (Larson Davis LxT) used for noise monitoring satisfies the American National Standards Institute (ANSI) standard for Type 1 instrumentation. The short-term sound level meter was set to “slow” response and “A” weighting (dBA). The meter was calibrated prior to and after the monitoring period. All measurements were at least 5 feet above the ground and away from reflective surfaces. Short-term measurement locations are described below and shown on Figure 5.10-1, *Approximate Noise Monitoring Locations*, and results are summarized in Table 5.10-4, *Short-Term Noise Measurement Summary*.

- **Short-Term Location 1 (ST-1)** was next to 1325 23rd Court (residence). The measurement location was approximately 20 feet west of the nearest school property line. A 15-minute noise measurement began at 12:32 pm on Thursday, May 26, 2022. The noise environment is characterized primarily by school children playing and conversing at McKinley Elementary School. Noise levels generally ranged from 50 dBA to 55 dBA.
- **Short-Term Location 2 (ST-2)** was next to 2415 Arizona Avenue (residence). The measurement location was approximately 20 feet north of the nearest westbound travel lane centerline. A 15-minute noise measurement began at 11:45 am on Thursday, May 26, 2022. The noise environment is characterized primarily by traffic noise from Arizona Avenue. Traffic noise levels generally ranged from 58 dBA to 65 dBA.
- **Short-Term Location 3 (ST-3)** was along Chelsea Avenue at the intersection of Chelsea Avenue and Chelsea Place, approximately 25 feet east of the nearest northbound travel lane centerline. A 15-minute noise measurement began at 12:52 pm on Thursday, May 26, 2022. The noise environment is characterized primarily by traffic noise from Chelsea Avenue. Traffic noise levels generally ranged from 51 dBA to 60 dBA.
- **Short-Term Location 4 (ST-4)** was next to 1252 24th Street (residence). The measurement location was approximately 20 feet west of the nearest southbound travel lane centerline. A 15-minute noise measurement began at 12:09 pm on Thursday, May 26, 2022. The noise environment is characterized primarily by voices coming from the playground at McKinley Elementary School. Noise levels generally ranged from 45 dBA to 65 dBA.

Table 5.10-4 Short-Term Noise Measurement Summary

Monitoring Location	Description	15-minute Noise Level, dBA						
		Leq	L _{max}	L _{min}	L ₂	L ₈	L ₂₅	L ₅₀
ST-1	Next to 1325 23rd Court (residence) 05/26/2022, 12:32 pm	57.7	75.5	49.9	54.9	56.0	59.5	64.7
ST-2	Next to 2415 Arizona Avenue (residence) 05/26/2022, 11:45 am	62.1	76.1	49.6	58.9	62.4	66.1	69.6
ST-3	At the intersection of Chelsea Avenue and Chelsea Place 05/26/2022, 12:52 pm	58.9	72.8	49.5	54.7	58.9	63.6	66.8
ST-4	Next to 1252 24th Street (residence). 05/26/2022, 12:09 pm	55.7	69.9	45.1	51.4	54.2	59.9	65.0

Figure 5.10-1 - Approximate Noise Monitoring Locations



— Project Boundary
● **ST-X** Short-Term Noise Measurement Locations (4)

Source: Nearmap, 2022

0 200
Scale (Feet)



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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 IS/NOP, included as Appendix B to this DEIR, substantiates that the impacts associated with the following thresholds would be less than significant; therefore, this impact will not be further addressed in this DEIR:

- Threshold N-3

5.10.2.1 STATIONARY NOISE THRESHOLDS

As discussed above in *Regulatory Background*, the City's exterior noise standards for stationary sources are established in Section 4.12.060 of the SMMC (see Table 5.10-3). These standards are used as thresholds of significance for stationary noise sources associated with the Proposed Project.

5.10.2.2 CONSTRUCTION NOISE THRESHOLDS

The City of Santa Monica has prohibited hours for construction activities and has quantified construction noise limits. The SMMC states that construction noise shall not exceed either 20 dBA L_{eq} or 40 dBA L_{max} above the daytime residential exterior noise standard of 60 dBA L_{25} (see Table 5.10-3). Table 5.10-5, *Santa Monica Construction Noise Standards*, shows the allowable construction noise standards with application of the 20 dBA and 40 dBA penalties added to Table 5.10-3, *Santa Monica Exterior Noise Standards*.

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Table 5.10-5 Santa Monica Construction Noise Standards

Noise Zone	Days	Time Interval	Level in dBA	
			L _{eq}	L _{max}
I	Monday - Friday	10:00 p.m. to 7:00 a.m.	70	90
		7:00 a.m. to 10:00 p.m.	80	100
	Saturday and Sunday	10:00 p.m. to 8:00 a.m.	70	90
		8:00 a.m. to 10:00 p.m.	80	100
II	All days of the week	10:00 p.m. to 7:00 a.m.	80	100
		7:00 a.m. to 10:00 p.m.	85	105
III	Any day	Anytime	90	110

Notes: Noise Zone I: All property in a residential district established by Santa Monica Municipal Code. The Santa Monica Pier shall be excluded from this noise zone.
Noise Zone II: All property in a nonresidential district established by Santa Monica Municipal Code.
Noise Zone III: All property in the industrial conservation district as established by Santa Monica Municipal Code.

5.10.2.3 TRANSPORTATION NOISE THRESHOLDS

A project will normally have a significant effect on the environment related to traffic noise if it would 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.

Implementation of the Proposed Project would result in the addition of 10 parking spaces to accommodate existing student and staff parking needs. It is anticipated that the Proposed Project would not result in an increase in students or faculty. In addition, primary access to the school site would remain via Chelsea Avenue. Therefore, traffic noise impacts are discussed qualitatively.

5.10.2.4 VIBRATION THRESHOLDS

The City of Santa Monica does not have quantified limits for vibration damage. The Federal Transit Administration (FTA) provides acceptable groundborne vibration criteria for various types of buildings, which are used in this analysis to determine impact significance. Structures amplify groundborne vibration, and wood-frame buildings, such as typical residential structures, are more affected by ground vibration than heavier, engineered buildings. The FTA vibration criteria are summarized by building category in Table 5.10-6, *Groundborne Vibration Criteria: Architectural Damage*.

Table 5.10-6 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.
PPV = peak particle velocity

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5.10.2.5 THE PROPOSED PROJECT'S DESIGN FEATURES

The Proposed Project would include features that would reduce noise:

- **PDF N-1.** During construction activities in proximity to sensitive receptors, a sound wall will be provided along Chelsea Avenue and a portion of Arizona Avenue during various phases of construction to attenuate construction noise.

5.10.3 Environmental Impacts

The following impact analysis addresses thresholds of significance for which the Initial Study/Notice of Preparation 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 existing established standards. Operational activities would not result in permanent or temporary increase in ambient noise levels in excess of existing established standards. [Threshold N-1]

Construction

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. Existing sensitive receptors on-site and surrounding the Proposed Project's Site would be exposed to elevated ambient noise levels from the Proposed Project-related construction activity. The Proposed Project's construction is anticipated to be completed within four years over three phases. The school would remain operational throughout all construction activities. As described in the Section 3, *Project Description*, Phase 1 is anticipated to begin in the summer of 2023, Phase 2 in the summer of 2025, and Phase 3 in the summer of 2028. The amount of construction noise experienced over this duration would vary greatly, depending on the phase and type of construction activities undertaken at that time.

The construction for Phase 1 would occur over approximately 18 months and include grading and excavation, trenching for site utilities and irrigation, building construction, architectural coatings, driveway and walkway construction, landscaping, and parking lot improvements. The construction for Phases 2 and 3 is anticipated to occur over approximately 18 months and 21 months, respectively. As described above in PDF N-1, the District would ensure that temporary sound walls are in place when construction activities would occur near off-site sensitive receptors off Chelsea Avenue and Arizona Avenue.

The SMMC Section 4.12.110(a) limits the hours of construction to between 8:00 am and 6:00 pm on weekdays and 9:00 am to 5:00 pm on Saturday, and prohibits construction on Sundays and holidays. The District would be required to follow the daytime construction noise standards, as shown in Table 5.10-5.

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Construction Vehicles

The transport of construction workers and materials to and from the Proposed Project's Site would incrementally increase noise levels along site access roadways. Individual construction vehicle pass-by trips may create momentary noise levels of up to 85 dBA (L_{max}) at 50 feet from the vehicle, but these occurrences would generally be infrequent and short lived. A maximum of worker and vendor trips would occur during Phase 2 and Phase 3. Approximately 46 daily worker and vendor trips would be generated during overlapping building and asphalt demolition, debris haul, and site preparation. A maximum of 6 daily haul truck trips would be generated during Phase 1 building and asphalt debris haul over a 33-workday period. Site access would be primarily along Santa Monica Boulevard and Chelsea Avenue. The lowest existing average daily traffic on these road segments is 1,754 along Chelsea Avenue (Fehr & Peers 2021). The addition of construction trips and haul trips would result in a temporary noise increase of less than 0.2 dBA CNEL, which would not be substantial or permanent. Therefore, construction-vehicle noise impacts would be considered **less than significant**, and no mitigation measures are necessary.

Construction Equipment

Noise generated by on-site operating 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 stage of construction involves different kinds of equipment and has distinct noise characteristics. Noise levels from construction activities are typically dominated by the loudest equipment. The dominant equipment noise source is typically the engine, although work-piece noise (such as dropping of materials) can also be noticeable. During construction activities in proximity to sensitive receptors, a sound wall will be provided along Chelsea Avenue and a portion of Arizona Avenue during various phases of construction to attenuate construction noise.

The noise produced at each construction stage is determined by combining the L_{eq} contributions from each piece of equipment used at a given time, while accounting for the ongoing time-variations of noise emissions. 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 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 site with different loads and power requirements.

Construction Noise Impacts: Off-Campus Receptors

As stated previously, the Proposed Project is assumed to be completed within three developmental phases with each phase concentrating in different areas throughout the Proposed Project's Site. Phase 1, 2 and 3 all have the same activity phases (e.g., site preparation, demolition, grading) and same construction equipment mix based on CalEEMod modeling output defaults. Therefore, the modeled construction noise levels are consistent through all three developmental phases. Average noise levels from the Proposed Project-related construction

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activities are calculated by modeling the three loudest pieces of equipment associated with the activity phase closest to the surrounding sensitive receptors, regardless which phase it is in, because as stated above, repeated activities in Phases 1, 2, and 3 have the same equipment mix. All site preparation, grading, and fine grading activities occur throughout the Proposed Project's Site. Thus, average noise levels associated with phases that employ mobile equipment (e.g., site preparation, rough grading, and fine grading) were measured from the acoustic center of these activities and on average would be approximately within 150 feet from the nearest sensitive receptors to the north, east, south and west of the Proposed Project's Site. Building and asphalt demolition activity is measured from the center of proposed demolition to the nearest receptors. Similarly, construction noise from paving activities is modeled from the center of proposed parking areas, which are the closest to sensitive receptors. Construction equipment for building construction and architectural coating is modeled from the edge of the proposed building to the nearest sensitive receptors. Lastly, utility trenching and landscaping finishing typically occur along the edge of projects. Therefore, it is assumed that it could occur within 100 feet from the nearest sensitive receptors to the north and south across Arizona Boulevard and Santa Monica Boulevard, respectively, and within 50 feet from receptors across 23rd Court and Chelsea Avenue.

The Proposed Project's expected construction equipment mix was categorized by construction activity using the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM). The associated, aggregate sound levels—grouped by construction activity—are summarized in Table 5.10-7, *Project-Related Construction Noise Levels, dBA L_{eq}*. RCNM modeling input and output worksheets are included in Appendix J.

Construction activities would not exceed the SMMC daytime construction noise limit of 80 dBA L_{eq} during weekdays and weekends (see Table 5.10-5). Even though construction noise would not exceed established thresholds, PDF-N-1 would be implemented, which requires the District to ensure that temporary sound walls are in place when construction activities would occur nearest to off-site sensitive receptors (off Chelsea Avenue and Arizona Avenue). The sound wall should be built with materials that would provide a minimum 5 dBA reduction to help alleviate the noise levels that reach the FTA criterion peak limit for the residences to the west across 23rd Court. As a rule of thumb, any material weighing 20 kg/m² (4 lbs./ft²) or more has a transmission loss of at least 20 dBA. Such material would be adequate for a noise reduction of at least 10 dBA due to diffraction. Note that a weight of 20 kg/m² can be attained by lighter and thicker, or heavier and thinner materials. The greater the density of the material, the thinner the material may be. Transmission loss also depends on the stiffness of the barrier material and frequency of the source. (FHWA 2017). Therefore, construction-equipment noise impacts at off-campus sensitive receptors are considered **less than significant**.

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Table 5.10-7 Proposed Project-Related Construction Noise, dBA L_{eq}

Construction Activity Phase	RCNM Reference Noise Level	Nearest Off-Site Receptors			
		Residences to the North	Residences to the East	Medical Offices to the South	Residence to the West
<i>Distance in feet</i>	50	100	100	150	60
Building and Asphalt Demo	81	75	75	71	79
<i>Distance in feet</i>	50	150	150	150	150
Site Preparation	79	69	69	69	69
Rough Grading	85	75	75	75	75
Fine Grading	85	75	75	75	75
<i>Distance in feet</i>	50	85	100	210	65
Building Construction	83	78	76	70	80
Architectural Coating	74	69	68	61	71
<i>Distance in feet</i>	50	255	90	500	60
Paving	79	65	74	59	77
<i>Distance in feet</i>	50	100	50	100	50
Utility Trenching	77	71	77	71	77
Finish and Landscaping	77	71	77	71	77
Maximum dBA L_{eq}		78	77	75	80
Exceeds L_{eq} Threshold?		No	No	No	No

Notes: Calculations performed with the FHWA RCNM software are included in Appendix J.

As shown in Table 5.10-8, *Proposed Project Related Construction Noise, dBA L_{max}* , Proposed Project-related construction noise would not exceed any of the SMMC L_{max} construction noise thresholds at surrounding sensitive receptors. Therefore, maximum construction noise levels (L_{max}) would be **less than significant**.

Table 5.10-8 Proposed Project-Related Construction Noise, dBA L_{max}

Construction Activity Phase	RCNM Reference Noise Level	Nearest Off-Site Receptors			
		Residences to the North	Residences to the East	Medical Offices to the South	Residence to the West
<i>Distance in feet</i>	50	100	100	150	60
Building and Asphalt Demo	81	75	75	71	79
<i>Distance in feet</i>	50	150	150	150	150
Site Preparation	80	70	70	70	70
Rough Grading	85	75	75	75	75
Fine Grading	85	75	75	75	75
<i>Distance in feet</i>	50	85	100	210	65
Building Construction	84	79	78	72	82
Architectural Coating	78	73	72	66	76
<i>Distance in feet</i>	50	255	90	500	60
Paving	80	66	75	60	78
<i>Distance in feet</i>	50	100	50	100	50

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Table 5.10-8 Proposed Project-Related Construction Noise, dBA L_{max}

Construction Activity Phase	RCNM Reference Noise Level	Nearest Off-Site Receptors			
		Residences to the North	Residences to the East	Medical Offices to the South	Residence to the West
Utility Trenching	81	75	81	75	81
Finish and Landscaping	81	75	81	75	81
Maximum dBA L_{max}		79	81	75	82
Exceeds L_{max} Threshold?		No	No	No	No

Notes: Calculations performed with the FHWA RCNM software are included in Appendix J.

Construction Noise Impacts: On-Campus Receptors

During the Proposed Project's construction, students would remain on campus in the existing facilities. Therefore, students would potentially be exposed to construction activity noise during school hours. Typical exterior-to-interior noise attenuation for standard building construction is 25 dBA with windows closed. As shown in Table 5.10-6, construction could generate exterior noise levels of up to 85 dBA L_{eq} at 50 feet. Construction activities would generally occur within 25 to 50 feet of operational classrooms. At 25 feet, noise levels would attenuate to 91 dBA L_{eq}. Therefore, interior noise levels could reach up to 66 dBA L_{eq} with windows closed. Construction could substantially increase interior noise levels, which would disturb the learning environment; the speech interference level at a distance of 12 feet with a normal to raised voice is 55 dBA to 60 dBA (ToolBox 2005). However, as explained below, incorporating **Mitigation Measure N-1**, impacts would be reduced to **less than significant**.

Stationary Noise

Mechanical Equipment/HVAC

Heating, ventilation, and air conditioning (HVAC) systems would be installed at the two new proposed buildings. The nearest sensitive receptors to the proposed portable classrooms are approximately 77 feet to the north from the new two-story building for T-K/kindergarten and elementary classrooms to be developed during Phase 3. Typical HVAC equipment generates noise levels up to 72 dBA at distance of 3 feet. At 77 feet, noise levels would attenuate to 44 dBA or less and would not exceed the City's exterior nighttime and daytime noise standard of 50 and 60 dBA, respectively, for residential zones. Therefore, operational noise impacts related to stationary noise sources would be **less than significant**.

Outdoor Recreation

The Proposed Project would result in the reconfiguration of outdoor playfield and hardcourts. The Proposed Project would not result in an increase in students, and the school's hours of operation would not change. Outdoor activities during school hours and after school (through permit) would not change. The Proposed Project does not propose any outdoor amplification, such as a public address system. Therefore, the reconfiguration of the outdoor playfields and hardcourts would not substantially increase noise levels above existing conditions. In addition, per Section 4.12.030, Exemptions, of the SMMC, activities conducted on public

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or private school grounds are exempt from the SMMC exterior noise standards. Therefore, noise impacts resulting from outdoor recreation during operation would be **less than significant**.

Traffic Noise

The Proposed Project would not result in an increase in students and staff. The Proposed Project would result in a net increase of 10 parking spaces to accommodate existing student and staff parking needs. The proposed circulation changes would reconfigure DOPU, and the school would continue to be accessed primarily via Chelsea Avenue. Additionally, the Proposed Project would develop a dedicated DOPU lane within the Proposed Project's Site's boundary, compared to existing conditions where DOPU activity occurs on the curb of Chelsea Avenue. Thus, the Proposed Project would increase the distance of these activities from off-site sensitive receptors, thereby reducing the noise levels slightly over existing conditions for DOPU activities. There are no planned roadway improvements associated with the Proposed Project, and the distribution of existing trips would not be significantly altered. The Proposed Project would not result in a significant change in long-term traffic volumes. Therefore, traffic noise increases during operation of the Proposed Project would be **less than significant**.

Impact 5.10-2: Temporary construction activities would potentially create excessive groundborne vibration and groundborne noise at sensitive receptors. [Threshold N-2]

Potential vibration impacts associated with development projects are usually related to the use of heavy construction equipment during the demolition and grading phases. Construction can generate varying degrees of ground vibration, depending on the construction procedures and equipment. The effect on buildings in the vicinity 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.

Construction Vibration Impacts: Off-Site Receptors

For reference, a peak particle velocity of 0.2 in/sec PPV is used as the limit for nonengineered timber and masonry buildings (which would apply to the surrounding residential structures) (FTA 2018). Table 5.10-9, *Vibration Impact Levels for Typical Construction Equipment*, shows vibration levels for typical construction equipment at a reference distance of 25 feet and at the nearest sensitive-receptor buildings in either direction of the Proposed Project's Site. As shown in Table 5.10-9, construction vibration could exceed the threshold of 0.2 in/sec PPV at a distance of 25 feet. At distances greater than 25 feet vibration levels would be less than 0.2 in/sec PPV. Because vibration damage is measured in instantaneous peak particle velocity, distances are measured from the edge of the Proposed Project's Site to the nearest building façade. The nearest building structure to construction activity, as measured from the edge of the Proposed Project's Site, are residences 20 feet to the west. At that distance, vibration associated with paving and use of a vibratory roller could reach up to 0.293 in/sec PPV. Therefore, vibrational impacts would be potentially significant. As explained below, with implementation of **Mitigation Measure N-2**, vibration impacts would be reduced to **less than significant**.

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Table 5.10-9 Vibration Impact Levels for Typical Construction Equipment

Equipment	in/sec PPV				
	Reference levels at 25 feet	Residences 85 feet North	Residences 60 feet East	Medical Offices 75 feet South	Residences 20 feet West
Vibratory Roller	0.21	0.033	0.056	0.040	0.293
Static Roller	0.05	0.008	0.013	0.010	0.070
Large Bulldozer	0.089	0.014	0.024	0.017	0.124
Caisson Drilling	0.089	0.014	0.024	0.017	0.124
Loaded Trucks	0.076	0.012	0.020	0.015	0.106
Jackhammer	0.035	0.006	0.009	0.007	0.049
Small Bulldozer	0.003	0.000	0.001	0.001	0.004

Sources: FTA 2018; New Zealand Transport Agency 2012.

Note: Distances measured from the edge of construction site to the nearest receptor building façade.

Construction Vibration Impacts: On-Campus Historical Receptors

The Proposed Project's Site includes on-site historical resources (see Figure 3-6) that would be susceptible to vibration impacts. The FTA vibration damage criterion for historical structures is 0.12 in/sec PPV, which this analysis uses as the limit to identify impact significance. However, all construction equipment that is anticipated to be used within 25 feet of these historical resources would generate vibration levels similar to those identified in Table 5.10-9 and would not involve the use of a vibratory roller. Therefore, vibration levels would be less than 0.12 in/sec PPV at the historical structural facades. Impacts would be less than significant.

5.10.4 Mitigation Measures

Impact 5.10-1

N-1 The Santa Monica-Malibu Unified School District construction contract bid shall require the chosen construction contractor(s) to prepare a Construction Noise Control Plan. The details of the Construction Noise Control Plan shall be included as part of the permit application drawing set and as part of the construction drawing set. The Construction Noise Control Plan shall include but not be limited to:

- During the entire active construction period, equipment and trucks used for Project construction shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, acoustically attenuating shields or shrouds).
- The District shall require the contractor to use impact tools (e.g., jack hammers and hoe rams) that are hydraulically or electrically powered wherever such alternatives are available. Where the use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used along with external noise jackets on the tools.

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- During the entire active construction period, stationary noise sources shall be located as far from sensitive receptors as possible, and they shall be muffled and enclosed within temporary sheds, insulation barriers, or other measures.
- During the entire active construction period, noisy operations shall be combined so that they occur in the same time period because the total noise level produced would not be significantly greater than the level produced if the operations were performed separately (and the noise would be of shorter duration).
- Signs shall be posted at the job site entrance(s), within the on-site construction zones, and along queueing lanes (if any) to reinforce the prohibition of unnecessary engine idling. All other equipment shall be turned off if not in use for more than 5 minutes.
- During the entire active construction period and to the extent feasible, the use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only. The construction manager shall use smart back-up alarms, which automatically adjust the alarm level based on the background noise level or switch off back-up alarms and replace with human spotters in compliance with all safety requirements and laws.
- For on-site receptors, erect a fence with sound blankets at least 8 feet tall in the immediate proximity between the construction perimeter and active classrooms to block the line of sight during school hours. The blanketed fence shall not have any gaps between blankets or between the blankets and the ground.

Impact 5.10-2

N-2 Vibratory compaction that is within 25 feet of any surrounding residential structure shall use a static roller in lieu of a vibratory roller. Specifically, use of a static roller is predicted to generate vibration levels of approximately 0.05 in/sec PPV at a distance of 25 feet (New Zealand Transport Agency 2012). At a distance greater than 25 feet, a vibratory roller would no longer exceed 0.20 in/sec PPV.

5.10.5 Level of Significance After Mitigation

Impact 5.10-1

With the implementation of **Mitigation Measure N-1**, noise from construction at the nearby impacted classrooms with active learning would be reduced to a less than significant impact. Implementation of **Mitigation Measure N-1** would reduce noise levels by at least 6 dBA with the use of the best available noise control techniques, specifically the use of proper engine mufflers. A study prepared for the US Department of Transportation found that in cases where a particular piece of equipment either does not have or has a very poor muffler, the application of a good muffler will reduce the overall noise by 6 to 12 dBA (Toth 1979). The construction equipment modeled is assumed to not have any mufflers or sound-attenuating devices installed. Thus, with the 6 dBA reduction in noise levels from mufflers, on-site receptors would face noise levels of

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60 dBA at 25 feet. With the implementation of a sound blanket between the line of site of the construction area and the nearest active classroom, there would be at least 12 dBA additional reduction in noise (Netwall 2023). This would reduce impacts to on-site active classrooms below the threshold for speech disturbance—55 dBA to 60 dBA—and therefore not disturb the learning environment.

Impact 5.10-2

With the implementation of **Mitigation Measure N-2**, vibration impacts from construction at nearby sensitive receptors would be reduced to a less than significant impact. Using a static roller in lieu of a vibratory roller at the edge of the Proposed Project's Site closest to the sensitive receptors 20 feet to the west would reduce vibration to about 0.07 in/sec PPV compared to 0.293 in/sec PPV. Impacts would be less than the FTA criterion of 0.2 in/sec PPV for nonengineered timber and masonry buildings (i.e., the surrounding residential structures).

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

5.10.6 Cumulative Impacts

If construction of the Proposed Project were to overlap with cumulative projects in the vicinity, construction noise could result in a significant cumulative construction noise impact. Typically, if there are no planned and approved projects within 500 feet of the Proposed Project, there is no cumulative construction noise impact. Construction noise is greatly reduced at distances of 500 feet or more in an urban and built-out environment.

There are two planned and approved projects within 500 feet of the Proposed Project's Site at 1328 22nd Street and 2121 Santa Monica Boulevard. The planned and approved projects are approximately 220 feet and 450 feet, respectively, from the nearest sensitive receptors to both the Proposed Project and planned and approved projects. As described above, the closest sensitive residential receptors—as measured from the edge of the Proposed Project's Site—are approximately 20 feet to the southwest across 23rd Court (alley) and approximately 60 feet to the northeast across Chelsea Avenue. Table 5.10-10, *Cumulative Construction Noise Levels*, estimates the cumulative construction noise at the nearest noise sensitive receptors with a reasonable assumption that construction noise associated with the planned and approved projects could reach up to 85 dBA at 50 feet.

Based on the noise levels in Table 5.10-10 and the attenuation from distances between the Proposed Project, 1328 22nd Street, 2121 Santa Monica Boulevard, and the nearest receptors, it is calculated that the cumulative construction noise increase would be 1 dBA at the nearest sensitive receptors. For reference, an increase of 3 dBA is considered the minimum increase required for the human ear to detect under normal, quiet conditions. Therefore, an increase of 1 dBA **would not be considered cumulatively significant**.

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Table 5.10-10 Cumulative Construction Noise Levels

Nearest Receptors	Project- Related Construction Noise Levels (L1)	Approved Project at 1328 22nd Street (L2)	Approved Project at 1328 22nd Street (L3)	Cumulative Construction Noise Level ¹	Cumulative Construction Noise Increase dBA Leq
Residences west of Proposed Project	80 dBA	70 dBA	63 dBA	81 dBA ²	1 dBA

Notes: Decibels are rounded to the nearest whole number.

¹ Formula for cumulative construction noise: $L1+L2+L3 = 10 \cdot \log_{10}(10^{L1/10} + 10^{L2/10} + 10^{L3/10})$.

² $10 \cdot \log_{10}(10^{80.0} + 10^{70.0} + 10^{63.0}) = 81$ dBA.

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