

**Noise Analysis for  
Cottonwood Apartments in  
Moreno Valley, CA**



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WJK Commercial Development

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February 27, 2026

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## 1.0 INTRODUCTION

WJK Commercial Development Co. proposes to build a new Type-VB Multi-Family Development consisting of 23 two-story buildings each containing 8-plex building units with a total of 184 units on 9.39 acres of land. This development will provide 337 surface parking spaces provided on a parcel located in the City of Moreno Valley, California. The subject of this proposal is the development of an apartment complex composing a total of 171,760 square-feet (project). The project site is approximately 406,329 square feet or 9.4 acres. The project site consists of one parcel with the following Assessor Parcel Number (APN): 0479-140-022 and falls within the City of Moreno Valley, Riverside County jurisdiction.

The current zoning of the property is Corridor Mixed Use (COMU). The general plan land use designation is also Corridor Mixed Use (COMU). An apartment complex or multi-family residential is permitted in the COMU Zoning District. The project site is bordered by Cottonwood Avenue to the south. To the north, west, and east of the site are single-family residential dwellings while the property to the south is commercial land.

The purpose of this technical noise analysis is to analyze the potential noise impacts associated with construction and operation of the proposed multi-family development project. This study describes the existing noise conditions at the proposed project site, the regulatory setting, and the potential impacts of the proposed project. Sources of information used for the preparation of this technical study included data from the City of Moreno Valley Municipal Code (Code) and City of Moreno Valley General Plan. Table 1 provides a summary of potential project impacts.

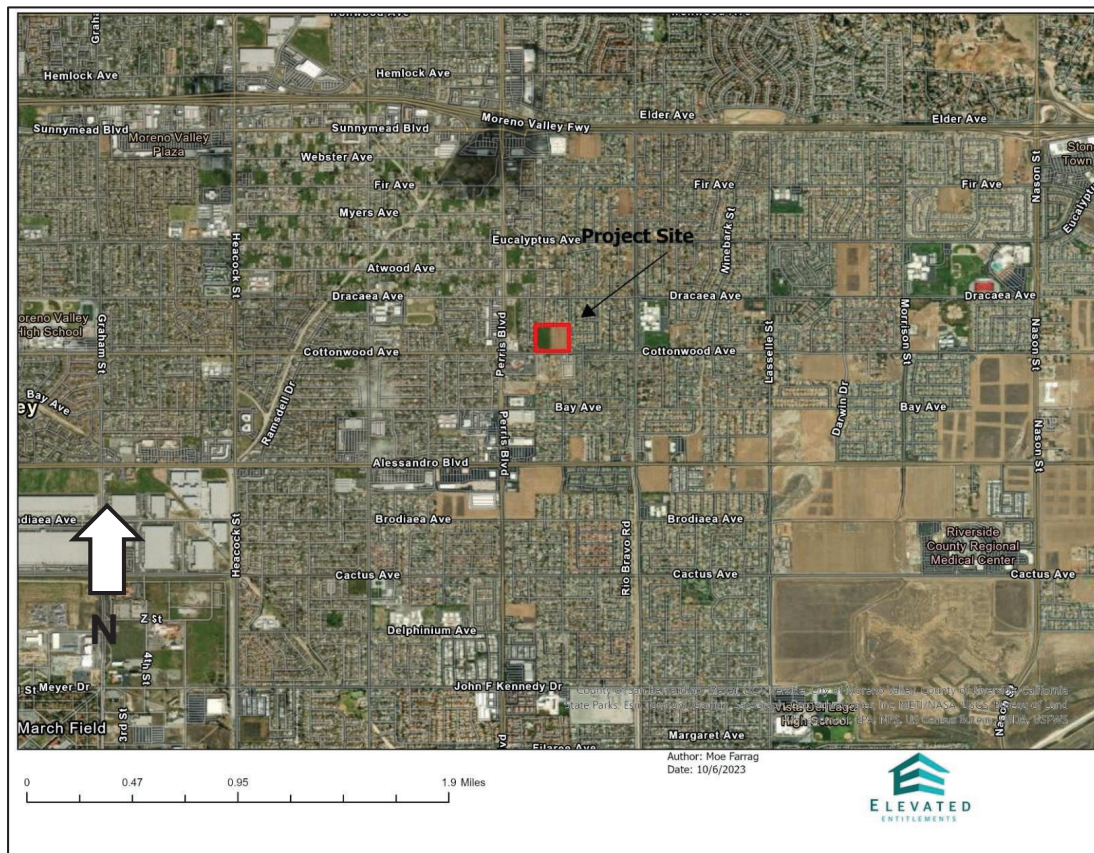
**Table 1 Summary of Impacts**

Impact Statement	Level of Significance
Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Less than Significant Impact with Mitigation
Would the project result in generation of excessive groundborne vibration or groundborne noise levels?	Less than Significant Impact with Mitigation
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, would the project expose people residing or working in the project area to excessive noise levels?	No Impact

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Figure 1 Project Vicinity Map

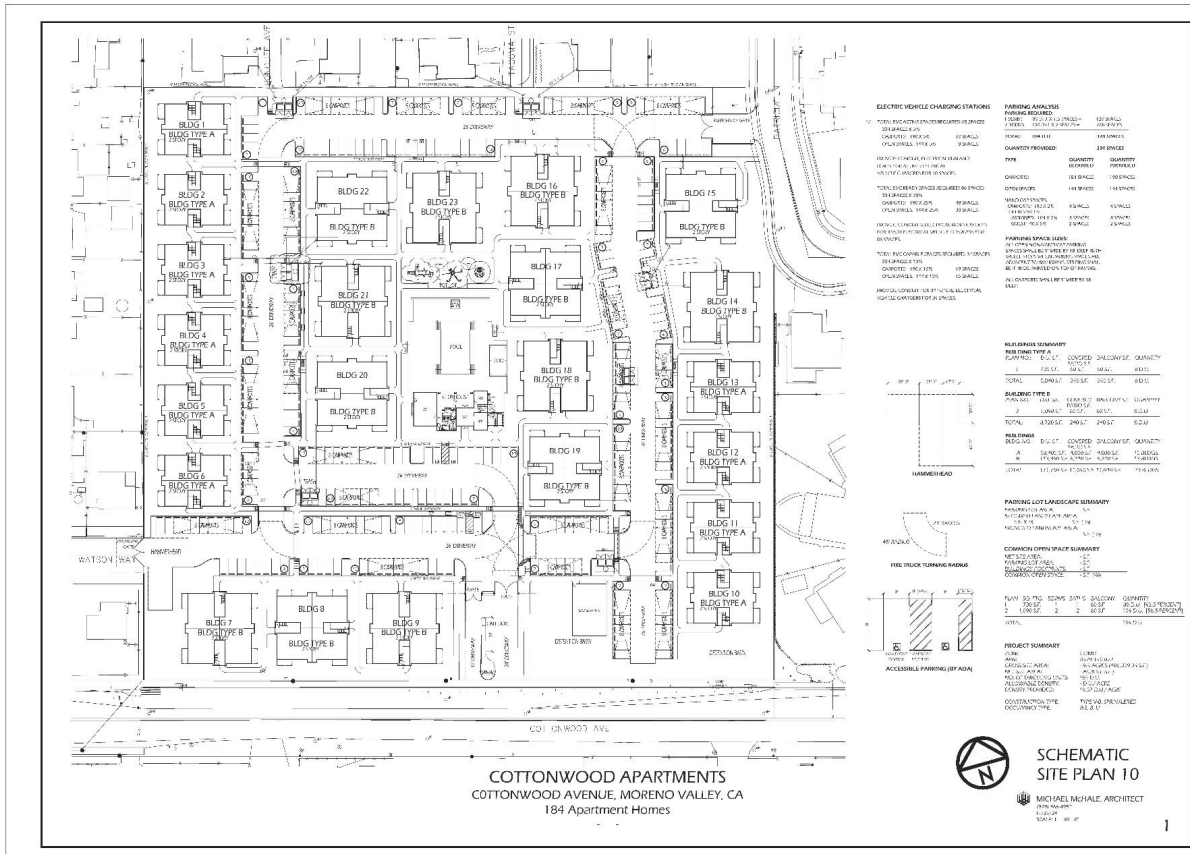




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**Figure 3 Conceptual Site Plan**



**ELECTRIC VEHICLE CHARGING STATIONS**

TOTAL BLDG CHARGING STATIONS REQUIRED: 20 SPACES  
 CHARGING STATIONS PROVIDED: 20 SPACES  
 OVERALL: 0 SPACES

**PARKING ANALYSIS**

TOTAL REQUIRED: 120 SPACES  
 TOTAL PROVIDED: 120 SPACES  
 OVERALL: 0 SPACES

**PARKING SPACE SUMMARY**

TYPE	QUANTITY	COMMENTS
TYPE A	100	100 SPACES
TYPE B	20	20 SPACES
TOTAL	120	120 SPACES

**RELATIONS SUMMARY**

RELATION TYPE	RELATION	COULDED	DISCOUNT	QUANTITY
TYPE A	TYPE A	100	0	100
TYPE B	TYPE B	20	0	20
TOTAL	TOTAL	120	0	120

**PARKING LOT LANDSCAPE SUMMARY**

RELATION	RELATION	COULDED	DISCOUNT	QUANTITY
TYPE A	TYPE A	100	0	100
TYPE B	TYPE B	20	0	20
TOTAL	TOTAL	120	0	120

**COMMON OPEN SPACE SUMMARY**

RELATION	RELATION	COULDED	DISCOUNT	QUANTITY
TYPE A	TYPE A	100	0	100
TYPE B	TYPE B	20	0	20
TOTAL	TOTAL	120	0	120

**PROJECT SUMMARY**

RELATION	RELATION	COULDED	DISCOUNT	QUANTITY
TYPE A	TYPE A	100	0	100
TYPE B	TYPE B	20	0	20
TOTAL	TOTAL	120	0	120

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## 2.0 TERMINOLOGY AND FUNDAMENTALS OF ENVIRONMENTAL ACOUSTICS

Acoustics is defined as the science of sound, including the generation, transmission, and effects of sound waves, both audible and inaudible. Noise defined as “unwanted sound”, may be generated when it interferes with normal activities, when it causes physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A – weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. The range of human hearing is from 0 dBA (the threshold of hearing) to about 140 dBA which is the threshold of pain. Table 2 presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within  $\pm 1$  dBA. The data is then imported into computer sound models. These computer models are used to predict environmental noise levels from sources such as roadways and airports over a given area using equal sound level contours. The accuracy of the predicted models depends upon the distance the receptor is from the noise source and natural attenuation caused by structures and other sound barriers. The closer to the noise source, the greater the model's accuracy ( $\pm 1-2$  dBA).

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**Table 2: Noise Levels and Subjective Loudness to Human Ear**

Common Outdoor Activities	Common Indoor Activities	A – Weighted Sound Level dBA	Subjective Loudness	Effects of Noise
Threshold of Pain		140	Intolerable or Deafening	Hearing Loss
Near Jet Engine		130		
		120		
Jet Fly-Over at 300m (1000 ft)	Rock Band	110		
Loud Auto Horn		100	Very Noisy	Speech Interference
Gas Lawn Mower at 1m (3 ft)		90		
Diesel Truck at 15m (50 ft), at 80 km/hr (50 mph)	Flood Blender at 1m (3 ft)	80	Loud	
Noisy Urban Area, Daytime	Vacuum Cleaner at 3m (10 ft)	70		
Heavy Traffic at 90m (300 ft)	Normal Speech at 1m (3 ft)	60	Moderate	Sleep Disturbance
Quiet Urban Daytime	Business Office Large	50		
Quiet Urban Nighttime	Theater, Large Conference Room (Background)	40	Faint	No Effect
Quiet Suburban Nighttime	Library	30		
Quiet Rural Nighttime	Bedroom at Night, Concert Hall (Background)	20		
	Broadcast/Recording Studio	10	Very Faint	
Lowest threshold of human hearing	Lowest threshold of human hearing	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

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The human ear can detect a range of intensities, as such, the logarithmic scale (a scale based on multiples of 10) is used to measure intensity. Each interval of ten (dB) is perceived by the human ear as twice as loud. Most common sounds vary between 40 dBA (normal conversation) to 100 dBA (gas lawn mowers) as depicted in Table 2.

Environmental noise descriptors are typically based on average values rather than instantaneous noise levels. The commonly used metric is the equivalent sound level (Leq). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A – weighted decibels (dBA). The Leq represents a steady-state sound that contains the same total energy as a time-varying signal over a given sample period (typically 1 hour). It is widely used to characterize the “energy average” noise levels in a given environment.

Peak hour or equivalent noise levels, while informative, do not fully describe a noise environment. Noise levels lower than those of peak hour, may still be disruptive, especially during periods quiet is most desirable, such as evening and nighttime (sleeping) hours. To address this, the Community Noise Equivalent (CNEL) is used to composite a 24-hour noise metric. CNEL represents a weighted average sound intensity, adjusted for time of day, over a 24-hour period. Time-of-day adjustments involve adding 5 decibels to the dBA Leq sound levels during the evening (7:00 pm to 10:00 pm) and 10 decibels during the nighttime (10:00 pm to 7:00 am) to account for the heightened sensitivity to noise during these periods. The City of Moreno Valley uses the 24-hour CNEL to assess land use compatibility with transportation-related noise sources.

The Day/Night Average Sound Level (Ldn) is similar in essence as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period. The measurement of any sound level requires language used specifically for the measurement of acoustic conditions. Table 3 below defines technical terms that are used in this document.

## **2.1 SOUND PROPAGATION**

As sound propagates over a distance, it changes in level and frequency content. Based on guidelines from the US Department of Transportation, Federal Highway Administration (FHWA), Office of Environment and Planning, Noise and Air Quality Branch, the way noise reduces with distance depends on the following factors.

### **2.1.1 GEOMETRIC SPREADING**

Sound emitted from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern, with the sound level attenuating (or decreasing) by 6 dB for each doubling of distance from the source. Highways, made up of many small noise sources along a defined path, act as a line source, which approximates the cumulative effect of several point sources. Noise from a line source propagates in a cylindrical pattern, which can cause the sound levels to attenuate at a rate of 3 dB for each doubling of distance from the line source.

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### **2.1.2 GROUND ABSORPTION**

The propagation path of noise from a highway to a receiver typically occurs close to the ground. The level of noise is further influenced by ground absorption and the cancellation of reflected sound waves. This combined attenuation is often expressed in terms of a reduction per doubling of distance, which remains sufficiently accurate for distances of less than 200 ft.

For acoustically hard surfaces, such as parking lots or bodies of water, no additional ground attenuation is assumed due to the sound being reflected by these surfaces instead of being absorbed. In contrast, for acoustically absorptive or soft surfaces, such as dirt, grass, or scattered vegetation, an excess ground attenuation of 1.5 dB per doubling of distance is typically assumed. When combined with cylindrical spreading, the overall rate of noise reduction from a line source is approximately 4.5 dB per doubling of distance. (4)

### **2.1.3 SHIELDING**

Large objects or barriers located between a noise source and a receiver can significantly attenuate noise levels at the receiver. The extent of this attenuation depends on the size of the object and the frequency content of the noise source. Shielding provided by trees and similar vegetation typically results in a perceived attenuation of noise levels for nearby residents. However, for vegetation to achieve a substantial or noticeable reduction in noise, it must be at least 15 feet in height, 100 feet wide, and dense enough to completely obstruct the line-of-sight between the source and the receiver. Such vegetation may reduce noise levels up to 5 dBA. The Federal Highway Administration (FHWA) does not consider the planting of vegetation to be a noise abatement measure.

### **2.1.4 REFLECTION**

Field research conducted by the FHWA finds that reflection from barriers and buildings do not substantially increase noise levels. Theoretically, if all the noise striking a structure was reflected back to a given receiving point, the increase would be limited to 3 dBA. In addition, not all the acoustic energy is reflected back to the same point. The energy would be scattered, some going over the structure, some reflected back to other points other than the given receiver, and the rest blocked by intervening structures. Furthermore, some of the reflected energy is lost due to the increased path that the noise must travel. FHWA measurements of reflective increases in traffic noise have not shown an increase of greater than 1-2 dBA, which is not perceptible to the average human ear.

## **2.2 VIBRATION**

Groundborne vibration of concern in environmental analysis consists of the oscillatory waves that move from a source through the ground to adjacent structures. The number of cycles per

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second of oscillation makes up the vibration frequency, described in terms of Hz. The frequency of a vibrating object describes how rapidly it oscillates. The normal frequency range of most ground borne vibrations that can be felt by the human body starts from a low frequency of less than 1 Hz and goes to a high of about 200 Hz (Crocker 2007).

While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings, such as from nearby construction activities, may cause windows, items on shelves, and pictures on walls to rattle. Vibration of building components can also take the form of an audible low-frequency rumbling noise, referred to as groundborne noise. Groundborne noise is usually only a problem when the originating vibration spectrum is dominated by frequencies in the upper end of the range (60 to 200 Hz), or when foundations or utilities, such as sewer and water pipes, physically connect to the structure and the vibration source (FTA 2018). The primary concern from vibration is that it can be intrusive to building occupants and vibration-sensitive land uses. Additionally, severe vibrations have the potential to cause damage to surrounding structures.

Vibration energy spreads out as it travels through the ground, causing the vibration level to diminish with distance away from the source. High-frequency vibrations diminish much more rapidly than low frequencies, so low frequencies tend to dominate the spectrum at large distances from the source. Discontinuities in the soil strata can also cause diffractions or channeling effects that affect the propagation of vibration over long distances. When a building is affected by vibration, a ground-to-foundation coupling loss will usually reduce the overall vibration level. However, under rare circumstances, the ground-to-foundation coupling may actually amplify vibration level due to structural resonances of the floors and walls.

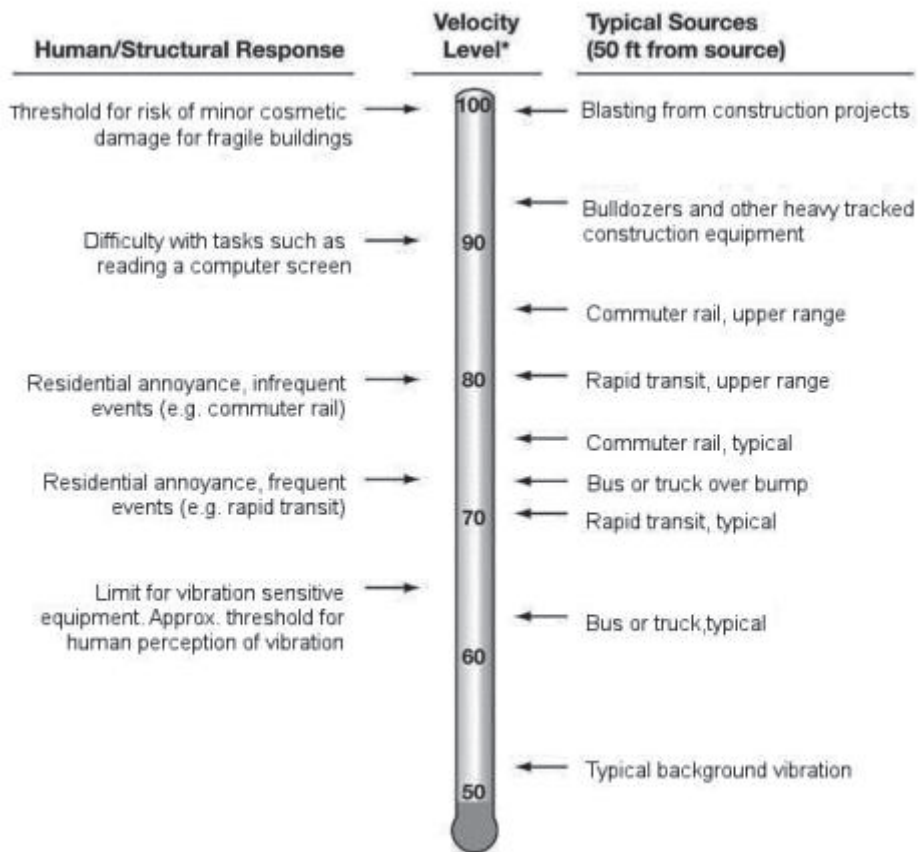
There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings but is not always suitable for evaluating human response (annoyance) due to the delay for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root of mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal.

The background vibration-velocity level in residential areas is generally 50 VdB. Groundborne vibration is normally perceptible to humans at approximately 65 Vdb. For most people, a vibration-velocity of 75 Vdb is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general

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threshold where minor damage can occur in fragile buildings. Figure 4 illustrates common vibration sounds and the human and structural response to groundborne vibration.

**Figure 4 Levels of Groundborne Vibration**



\* RMS Vibration Velocity Level in VdB relative to  $10^{-6}$  inches/second

Source: Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual.

**Table 3 Definition of Acoustical Terms**

<b>Terms</b>	<b>Definitions</b>
dB, Decibel	Unit of measurement of sound level
dBA, decibel A-Weighted	A unit of measurement of sound level corrected to the A-weighted scale, as defined in ANSI S1.4-1971 (R1976), using a reference level of 20 micropascals (0.00002 Newtons per square meter).
A – Weighted Scale	A sound measurement scale, which corrects the pressures of individual frequencies according to human sensitivities. The scale is based upon the fact that the region of highest sensitivity for the average ear is between 2,000 and 4,000 Hz. Sound levels are measured on a logarithmic scale in decibels, dB. The universal measure for environmental sound is the A-weighted sound level, dBA.
Hz, Hertz	Unit of measurement of frequency, numerically equal to cycles per second.
Loudness	A listener’s perception of sound pressure incident in his ear.
L01, L10, L50, L90	The A-weighted noise levels that are exceeded 1 %, 10 %, 50 %, and 90 % of the time during the measurement period.
Leq, Equivalent Noise Level	Also called the equivalent continuous noise level. It is the continuous sound level that is equivalent, in terms of noise energy content, to the actual fluctuating noise existing at the location over a given period, usually one hour. Leq is usually measured in hourly intervals over long periods in order to develop 24-hour noise levels.
CNEL, Community Noise Equivalent Level	CNEL is a measure of the cumulative noise exposure in the community, with greater weights applied to evening and night time periods. This noise descriptor is the equivalent noise level over a 24-hour period mathematically weighted during the evening and night when residents are more sensitive to intrusive noise. The evening period is from 7:00 p.m. to 10:00 p.m.; and morning period is from 10:00 p.m. to 7:00 a.m. In order to account for increased human sensitivity at night, the CNEL level adds to the evening levels (7 p.m. to 10 p.m.) a weighting factor of five (5) and ten (10) dB to the morning levels (10 p.m. to 7 a.m.).
Ldn, Day/Night Noise Level	The same as CNEL except that the evening time period is not considered separately, but instead it is included as part of the daytime period. Measurements of both CNEL and Ldn in the same residential environments reveal that CNEL is usually slightly higher (by less than 1 dB) than Ldn due to the evening factor weighting.
Lmin, Lmax	The minimum and maximum A-weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

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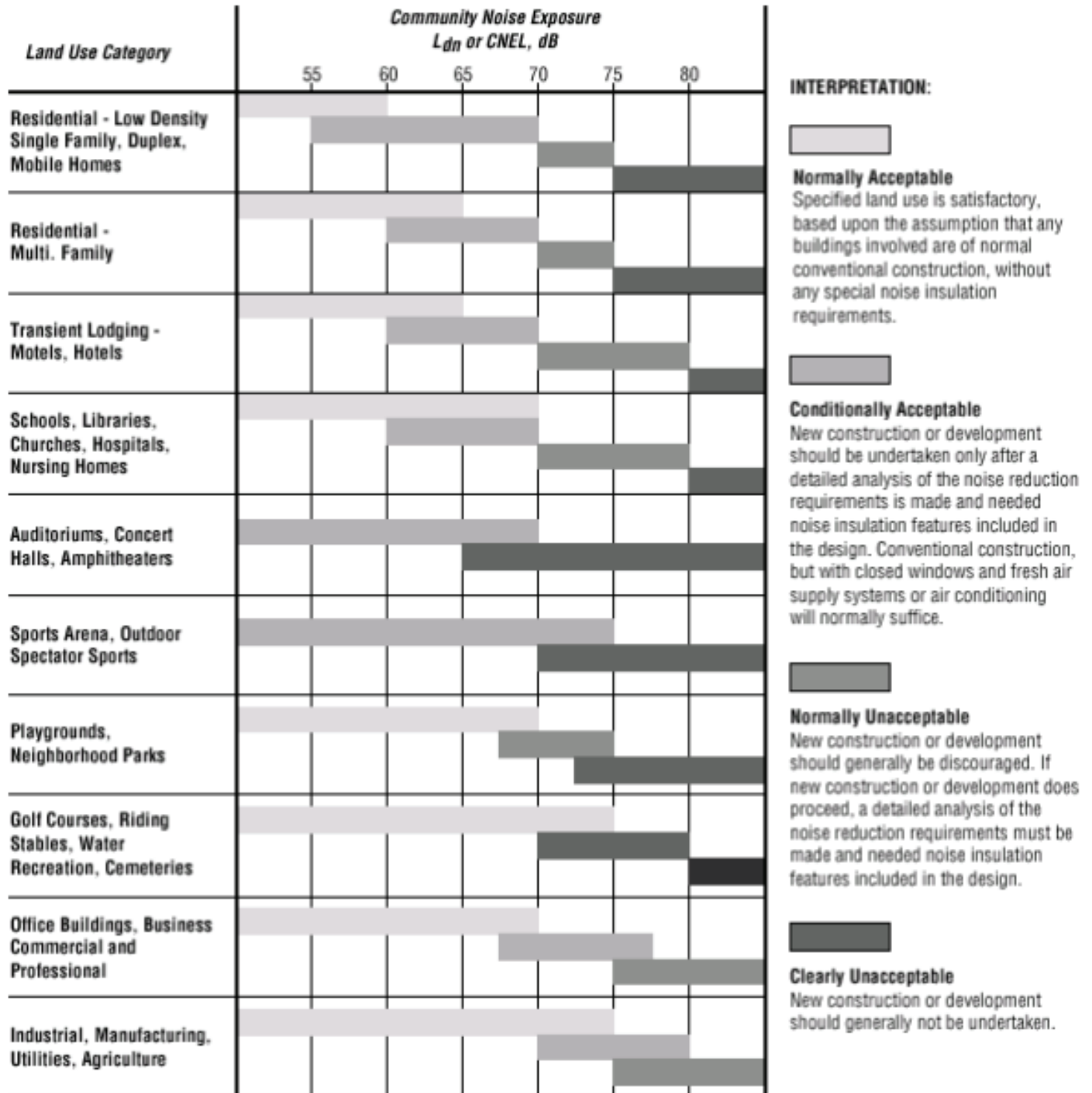
## **3.0 REGULATORY SETTING**

### **3.1 CITY OF MORENO VALLEY GENERAL PLAN**

The proposed project is located within the City of Moreno Valley, which adheres to the 2006 General Plan and the upcoming 2040 General Plan. According to the City of Moreno Valley's 2006 General Plan, the proposed project includes a Zone Change from Residential 10 (R10) to Residential 20 (R20) and a corresponding General Plan Amendment to change the land use designation from R10 to R20. However, the City of Moreno Valley 2040 General Plan is approved prior to approval, the project would not require the proposed project to conduct a zone change, as the project's underlying zoning is consistent with the 2040 General Plan.

The City of Moreno Valley has adopted a Noise Element in its 2040 General Plan, which outlines goals, policies, and actions to proactively address sources of noise in Moreno Valley, protect against excessive noise, and support the social and economic vitality of the community. The City of Moreno Valley has adopted a Safety Hazards Element (Chapter 6) in its 2006 General Plan which outlines the noise background, fundamentals, community response, and considerations for planning and design. While the General Plan provides guiding information on noise, it does not specify land use criteria to assess the impacts associated with off-site transportation-related noise. Therefore, for this analysis, off-site transportation noise criteria are derived from the standards outlined in the Office of Planning & Research (OPR) General Plan Guidelines. The OPR land use/noise compatibility standards are used by many California jurisdictions and define the maximum noise levels allowable for new developments impacted by transportation noise sources. These criteria identify the criteria for multi-family residential land uses such as the Proposed Project, as shown in Figure 5 below. When the unmitigated exterior noise levels are below 60 dBA CNEL Project land use is considered normally acceptable. With exterior noise levels ranging from 60 to 70 dBA CNEL, multi-family residential land uses are considered conditionally acceptable. Noise levels exceeding 70 dBA CNEL are considered normally unacceptable. For conditionally acceptable land use, new construction or development should only proceed after a detailed analysis of the necessary noise reduction requirements are made, and required noise insulation features are included in the proposed design. Conventional construction with closed windows along with fresh air supply systems or air conditioning will normally suffice to meet these requirements. For normally unacceptable land uses, new construction or development should generally be discouraged. However, if development proceeds, a detailed analysis of the noise reduction requirements must be made and required noise insulation features integrated into the proposed design.

Figure 5 Land Use Noise Compatibility Criteria



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In addition, the 2006 General Plan contains the following noise policies related to the Proposed Project to achieve *acceptable levels of protection from natural and man-made hazards to life, health, and property*:

6.3.1 The following uses shall require mitigation to reduce noise exposure where current or future exterior noise levels exceed 20 CNEL above the desired interior noise level. Single and multiple family residential buildings shall achieve an interior noise level of 45 CNEL or less. Such buildings shall include sound-insulating windows, walls, roofs and ventilation systems. Sound barriers shall also be installed (e.g. masonry walls or walls with berms) between single-family residences and major roadways.

6.3.2 Discourage residential uses where current or projected exterior noise due to aircraft over flights will exceed 65 CNEL.

6.3.5 Enforce the California Administrative Code, Title 24 noise insulation standards for new multi-family housing developments, motels and hotels.

6.4.1 Site, landscape and architectural design features shall be encouraged to mitigate noise impacts for new developments, with a preference for noise barriers that avoid freeway sound barrier walls.

6.5.2 Construction activities shall be operated in a manner that limits noise impacts on surrounding uses.

The 2040 General Plan contains the following noise policies related to the Proposed Project to achieve design for a pleasant, healthy sound environment conducive to living and working and ensure that noise does not have a substantial, adverse effect on the quality of life in the community.

N.1-1: Protect occupants of existing and new buildings from exposure to excessive noise, particularly adjacent to freeways, major roadways, the railroad, and within areas of aircraft overflight.

N.1-3: Apply the community noise compatibility standards (Table N-1) to all new development and major redevelopment projects outside the noise and safety compatibility zones established in the March Air Reserve Base/ Inland Port Airport Land Use Compatibility (ALUC) Plan in order to protect against the adverse effects of noise exposure. Projects within the noise and safety compatibility zones are subject to the standards contained in the ALUC Plan.

N.1-4: Require a noise study and/or mitigation measures if applicable for all projects that would expose people to noise levels greater than the “normally acceptable” standard and for any other projects that are likely to generate noise in excess of these standards.

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N.1-5: Noise impacts should be controlled at the noise source where feasible, as opposed to at receptor end with measures to buffer, dampen, or actively cancel noise sources. Site design, building orientation, building design, hours of operation, and other techniques, for new developments deemed to be noise generators shall be used to control noise sources.

N.1-6: Require noise buffering, dampening, or active cancellation, on rooftop or other outdoor mechanical equipment located near residences, parks, and other noise sensitive land uses.

N.1-7: Developers shall reduce the noise impacts on new development through appropriate means (e.g. double-paned or soundproof windows, setbacks, berming, and screening). Noise attenuation methods should avoid the use of visible sound walls where possible.

N.2-1: Use the development review process to proactively identify and address potential noise compatibility issues.

N.2-3: Limit the potential noise impacts of construction activities on surrounding land uses through noise regulations in the Municipal Code that address allowed days and hours of construction, types of work, construction equipment, and sound attenuation devices.

Based on the City of Moreno Valley General Plan Policies for multi-family residential land use, this noise study has been prepared to satisfy the conditionally acceptable OPR land use/noise compatibility criteria with exterior noise levels ranging from 60 to 70 dBA CNEL and the 45 dBA CNEL interior noise level standard identified in Figure 5.

### **3.2 CITY OF MORENO VALLEY NOISE ORDINANCE**

Section 8.14.040(E) of the City's Municipal Code states that grading and equipment operations shall only be completed between the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday, excluding holidays and from 8:00 a.m. to 4:00 p.m. on Saturday.

Section 11.80.030(C) of the City's Municipal Code establishes limits on non-impulsive noise where no person shall maintain, create, operate, or cause noise on private property to exceed the noise standards shown in Table 4. The standards are applicable for each land use category when measured at 200 ft from the property line of the source of the noise if the noise occurs on privately owned property. If the sound occurs on public right-of-way, public space, or other publicly owned property the measurement shall occur from the source of the sound. Noise levels that exceed the noise standards in Table 4 shall be deemed to be a noise disturbance. For the purposes of this analysis, the Cottonwood Village Moreno Valley project is considered as a residential land use.

**Table 4 Noise Standards**

Residential		Commercial	
Daytime <sup>1</sup>	Nighttime <sup>2</sup>	Daytime <sup>1</sup>	Nighttime <sup>2</sup>
60 dBA	55 dBA	65 dBA	60 dBA

Source: Section 11.80.030© of the City of Moreno Valley Municipal Code.

<sup>1</sup> Daytime means 8:00 a.m. to 10 p.m.

<sup>2</sup> Nighttime means 10:01 p.m. to 7:59 a.m.

dBA = A-weighted decibels

L<sub>ed</sub> = equivalent continuous sound level

Section 11.80.030(D)(7) of the City's Municipal Code limits construction and demolition activities to between the hours of 7:00 a.m. and 8:00 p.m. every day. No person shall operate or allow the operation of any tools or equipment used in construction, drilling, repair, or alteration or demolition work outside of these hours to prevent noise disturbances.

Section 9.10.170 of the Municipal Code prohibits vibration that can be felt at or beyond the property line. However, construction activity is exempt from Section 9.10.170 pursuant to Section 9.10.030, which states that temporary construction, maintenance, or demolition activities between the hours of 7:00 a.m. and 7:00 p.m. are exempt from the provisions of Chapter 9.10 (Performance Standards) of the City Municipal Code. Section 9.10.170 only pertains to vibrations and does not exempt noise. Project construction will be limited to 8 hours per week, during the weekdays 5 days per week between the hours of 7:00 am – 8:00 pm. As the project site is undeveloped and vacant, there will be no demolition activities associated with the project.

### **3.3 STATE STANDARDS AND REGULATIONS**

The California Environmental Quality Act (CEQA) requires each local government to perform noise studies and implement a noise element as part of their general plan. CEQA also provides standard guidelines and implementation for local jurisdictions to follow, guiding each jurisdiction to establish its own thresholds in accordance with these guidelines.

In addition, the State of California's noise insulation standards for residential units are established in the California Code of Regulations (CCR), Title 24, Building Standards Administrative Code, Chapter 12, Section 1206. These standards apply to new constructions containing dwelling or sleeping units, such as residential buildings and hotels or motels, and are designed to control interior noise levels from external sources. For new buildings, the maximum allowable interior noise level in habitable rooms is 45 dBA CNEL.

### **3.4 FEDERAL STANDARDS AND REGULATIONS**

Federal regulations safeguard the hearing of workers exposed to occupational noise, enforced by OSHA (e.g. 29 CFR 1919.120). For example, it is unlawful for employees to be exposed to noise

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levels more than 115 dBA for more than 15 minutes during any working day. The USEPA has developed guidelines on recommended maximum noise levels to protect public health and welfare (U.S. EPA, 1978). The USEPA identifies a 24-hour exposure level of 70 dBA as the level of environmental noise which will prevent any measurable hearing loss over a lifetime. Likewise, levels of 55 dBA outdoors and 45 dBA indoors are identified as activity interference and annoyance (USEPA, 1978).

### **3.5 AFFECTED NOISE ENVIRONMENT**

Some land uses are recognized as being more sensitive than others to noise levels and vibration. Residences, motels and hotels, schools, libraries, houses of worship, hospitals, nursing homes, auditoriums, parks, and outdoor recreation areas are generally more sensitive to noise and vibration than are industrial land uses. Existing land uses surrounding the project site include commercial and a house of worship to the south, and single-family residential to the North, east, and west.

The primary noise source affecting sensitive receptors (single-family residences) in the area are mobile traffic sources generated by street traffic and commercial noise from businesses south of the project site. Sources of noise from vehicles including tire squealing, car engine acceleration during pass-bys and truck engines or backup warnings during deliveries may also affect sensitive receptors to the north, east and west of the project site.

The existing ambient noise environment in the project area is described in the City of Moreno Valley General Plan Noise Element. The project site is bounded by Cottonwood Ave and existing noise contours are represented below in Table 5: Existing Noise Contours. Roadway noise levels at 100 feet from the centerline of Cottonwood Avenue between Perris Blvd. to Kitching St. are 50 - 65 CNEL, which is normally acceptable near residential uses. According to the City of Moreno Valley General Plan Noise Element, multi-family uses are normally unacceptable in areas where the ambient noise levels exceed 70 dB CNEL.

**Table 5 Existing Noise Contours**

<b>Roadway</b>	<b>Segment</b>	<b>CNEL @ 100' from Centerline</b>
Cottonwood Avenue	Perris Blvd Avenue to Kitching St	50-65
<i>* Data source: City of Moreno Valley General Plan 2006</i>		

Source: Urban Crossroads – Cottonwood Village Noise Impact Analysis

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## **4.0 ENVIRONMENTAL SETTING**

### **4.1 SENSITIVE RECEPTORS**

The proposed project has the potential to impact sensitive receptors, including single-family residences, located to the north, south, west, southeast, and east of the project site. Although single-family residences are situated to the north, east, and west of the project site, it is important to highlight that they are within 100 feet. As such, the potential impact of project-related noise and ground-borne vibration on these residences should also be considered.

To assess the potential noise impact on the surrounding land uses, the City of Moreno Valley Municipal Code establishes noise standards for various types of land uses, including residential areas, schools, hospitals, churches, and parks. The plan states that residential uses are generally unacceptable in areas where the ambient noise level exceeds 70 dB CNEL. However, residential uses may be conditionally acceptable in areas where the ambient noise level ranges between 65-70 dB CNEL. Noise-sensitive land uses such as schools, libraries, churches, hospitals, and nursing homes require acoustical studies within areas exceeding 70 dB CNEL.

Project-related noise sources could potentially come from on-site parking that serves as passenger loading/unloading, rooftop HVAC systems, and traffic from vehicles ingressing/egressing from the project site. The project proposes central HVAC systems on the roof, screened by a 6' mansard wall to block from public view and provide noise attenuation to surrounding uses. Typical noise levels from a central HVAC system produces 55 to 75 decibels at the source (1 meter). These levels would be less than significant at the sensitive receptors due to the change in elevation along with the mansard wall and distance to noise source.

No other significant noise sources, such as public outdoor PA systems, were noted on the conceptual site plan. The on-site parking is primarily located off the north side of the parcel connecting to Bencliff Ave and Tacoma St. The parking areas will be otherwise buffer from the sensitive uses by the apartments as the majority of the parking will be on the interior of the site. In addition, the residential properties that are located north, south, southwest, west, and east of the project site are approximately 100 feet away respectively. Therefore, the noise levels from the parking lot will diminish rapidly with the buffer between the proposed apartments and the residential property lines across the project site.

#### **4.1.1 PROPOSED CONSTRUCTION/DEMOLITION NOISE**

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Figure 6 shows the construction noise source locations in relation to the nearby sensitive receiver locations. To prevent high levels of construction noise from impacting noise-sensitive land uses, Section 11.80.939 (D)(7), of the City of Moreno Valley Municipal Code limits construction activities from 7:00 a.m. to 8:00 p.m.

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**Construction Noise Levels**

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers, and portable generators that when combined can reach high levels of noise. Construction equipment is expected to be utilized during the following stages: Site Preparation, Grading, Building Construction, Paving, and Architectural Coating.

**Construction Reference Noise Levels**

To describe peak construction noise activities, this construction noise analysis was prepared using reference noise level measurements published in the Update of Noise Database for Prediction of Noise on Construction and Open Sites by the Department for Environment, Food and Rural Affairs (DEFRA). The DEFRA database provides the most recent and comprehensive source of reference construction noise levels. Table 6 provides a summary of the DEFRA construction reference noise level measurements expressed in hourly average dBA Leq using the estimated FHWA Roadway Construction Noise Model (RCNM) usage factors to describe the typical construction activities for each stage of Project construction.

**Figure 6 Construction Noise Receiver Locations**



**Table 6 Construction Reference Noise Measurements**

<b>Construction Stage</b>	<b>Reference Construction Activity<sup>1</sup></b>	<b>Reference Noise Level @ 50 Feet (dBA L<sub>eq</sub>)<sup>1</sup></b>	<b>Highest Reference Noise Level (dBA L<sub>eq</sub>)</b>
Site Preparation	Crawler Tractors	77	77
	Hauling Trucks	71	
	Rubber Tired Dozers	71	
Grading	Graders	79	79
	Excavators	64	
	Compactors	67	
Building Construction	Cranes	67	72
	Tractors	72	
	Welders	65	
Paving	Pavers	70	70
	Paving Equipment	69	
	Rollers	69	
Architectural Coating	Cranes	67	67
	Air Compressors	67	
	Generator Sets	67	

<sup>1</sup> Update of Noise Database for Prediction of Noise on Construction and Open Sites by the Department for Environment, Food and Rural Affairs (DEFRA) expressed in hourly average L<sub>eq</sub> based on estimated usage factors from the FHWA Roadway Construction Noise Model (RCNM).

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#### 4.1.2 CONSTRUCTION NOISE ANALYSIS

Using the reference construction equipment noise levels and the CalEEMod construction equipment assumptions, provided in Table 7, calculations of the Project construction noise level impacts at the nearby sensitive receiver locations were completed. To assess the worst-case construction noise levels, the Project construction noise analysis relies on the highest noise level impacts when the equipment with the highest reference noise level is operating at the closest point from the edge of primary construction activity (Project site boundary) to each receiver location. As shown on Table 9, the highest construction noise levels are expected to range from 58.24 to 92.98 dBA Leq at the nearest receiver locations. These values were determined by referencing the typical outdoor construction noise levels, from the United States Environmental Protection Agency, Noise from Construction Equipment and Operations, as shown in Table 8.

**Table 7 Construction Equipment**

Construction Phase	Equipment
<b>Site Preparation</b>	Rubber Tired Dozers
	Tractor/Loaders/Backhoes
<b>Grading</b>	Excavator
	Graders
	Rubber Tired Dozers
	Tractor/Loaders/Backhoes
<b>Building Construction:</b>	Cranes
	Forklifts
	Generator Sets
	Tractor/Loaders/Backhoes
	Welders
<b>Paving:</b>	Pavers
	Paving Equipment
	Rollers
<b>Architectural Coating:</b>	Air Compressors

Source: CalEEMod Version 2022.1.1.37

The construction noise analysis presents a conservative approach with the highest noise-level producing equipment for each stage of Project construction operating at the closest point from primary construction activity to the nearby sensitive receiver locations. While this scenario overstates the actual noise levels expected during typical construction activities, it ensures a comprehensive evaluation of potential impacts.

**Table 8 Typical Outdoor Construction Noise Levels**

Construction Phase	Noise Levels at 50 Feet with Mufflers (dBA Leq) <sup>1</sup>	Noise Levels at 60 Feet with Mufflers (dBA Leq) <sup>1</sup>	Noise Levels at 100 Feet with Mufflers (dBA Leq) <sup>1</sup>	Noise Levels at 200 Feet with Mufflers (dBA Leq) <sup>1</sup>
Ground Clearing	74	72	68	62
Excavation, Grading	78	76	72	66
Foundations	69	67	63	57
Structural	75	73	69	63
Finishing	78	76	72	66

Source: United States Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment and Home Appliances, PB 206717, 1971.

Notes:

- Noise source reduced by 8 dB to account for the noise shielding from the 8-foot-high wall on the west side

**Table 9 Construction Equipment Noise Level Summary**

Receiver Location <sup>1</sup>	Construction Noise Levels (dBA Leq)					
	Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Highest Levels <sup>2</sup>
R1	58.24	73.24	66.24	64.24	59.99	73.24
R2	71.96	86.96	79.96	77.96	73.71	86.96
R3	77.98	92.98	85.98	83.98	79.93	92.98
R4	75.68	90.68	83.68	81.68	77.43	90.68

<sup>1</sup> Receiver locations are shown in Figure 6

<sup>2</sup> Construction noise level calculation based on distance from the construction activity, which is measured from the Project site boundary to the nearest receiver locations.

To evaluate whether the Project will generate potentially significant short-term noise levels at nearest receiver locations, a construction-related daytime noise level threshold of 80 dBA Leq is used as a reasonable threshold to assess the daytime construction noise level impacts. The construction noise analysis shows that the R1 receiver location will satisfy the reasonable daytime 80 dBA Leq significance threshold during Project construction activities as shown on Table 9. Although some scenarios in Table 9 show that construction noise might exceed the 80 dBA Leq significance threshold, these situations are unlikely to occur under normal construction conditions and are expected to overestimate the noise levels that will actually be experienced by the receivers.

**Table 10 Construction Noise Level Compliance**

Receiver Location <sup>1</sup>	Construction Noise Levels (dBA Leq)		
	Highest Construction Noise Levels <sup>2</sup>	Threshold <sup>3</sup>	Threshold Exceeded? <sup>4</sup>
R1	75.98 (97 feet)	80	No
R2	86.69 (20 feet)	80	Yes
R3	96.42 (6 feet)	80	Yes
R4	90.68 (13 feet)	80	Yes

<sup>1</sup>Noise receiver locations are shown on Figure 13-2.

<sup>2</sup>Highest construction noise level calculations based on distance from the construction noise source activity to the nearest receiver locations. Calculations based on CalEEMod estimates

<sup>3</sup>Construction noise level thresholds as established by the FTA.

<sup>4</sup>Do the estimated Project construction noise levels exceed the construction noise level threshold?

Therefore, the noise impacts due to Project construction noise would be mitigated to less than significant levels with implementation of the following mitigation measures:

**Mitigation Measures**

**NOISE- 1:** The Project contractor shall use power construction equipment with state-of-the-art noise shielding and muffling devices. (Approximately 3 dBA of estimated reduction)

**NOISE- 2:** A construction site notice shall be provided that includes the job site address, permit number, name and phone number of the contractor and owner or owner’s agent, hours of construction allowed by code, and City telephone numbers where violations can be reported. The notice shall be posted and maintained at the construction site prior to the start of construction and displayed in a location that is readily visible to the public.

**4.1.3 GROUNDBORN VIBRATION**

The construction vibration analysis shall utilize the methodology described in the Transit Noise and Vibration Impact Assessment Manual prepared by the Federal Transit Administration (FTA, September 2018). Vibrations associated with construction can be estimated based on the typical vibration levels associated with construction equipment anticipated to operate onsite, as shown in Table 11, Vibration Sources for Construction Equipment. Once the anticipated vibration level from the equipment that would operate onsite is calculated at the nearest sensitive use, the level will be compared to the vibration damage threshold, as shown in Table 12, Construction Vibration Damage Criteria.

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**Table 11 Vibration Source Levels for Construction Equipment**

Equipment		PPV at 25 ft, in/sec	Approximate Lv <sup>1</sup> at 25 ft
Pile Drive (Impact)	upper range	1.518	112
	typical	0.644	104
Pile Driver (sonic)	upper range	0.734	105
	typical	0.17	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.21	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

**Source:** Transit Noise and Vibration Impact Assessment Manual, prepared by FTA, September 2018, Table 7-4 Vibration Source Levels for Construction Equipment

1. RMS velocity in decibels, VdB re 1 micro-in/sec

**Table 12 Construction Vibration Damage Criteria**

Building / Structural Category	PPV, in/sec	Approximate L <sub>v</sub> <sup>1</sup>
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

**Source:** Transit Noise and Vibration Impact Assessment Manual, prepared by FTA, September 2018, Table 7-5  
Construction Vibration Damage Criteria

1. RMS velocity in decibels, VdB re 1 micro-in/sec

The vibration significance threshold shall be 0.2 inches per second peak particle velocity (PPV), as Table 12 indicates for Type III - Non-engineered timber and masonry buildings. The following formula from the Transit Noise and Vibration Impact Assessment Manual will be utilized to calculate the Vibration impacts.

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

**Where :**

**PPV<sub>equip</sub>** = the peak particle velocity of the equipment adjusted for distance, in/sec

**PPV<sub>ref</sub>** = the source reference vibration level at 25 ft, in/sec

**D**=distance from the equipment to the receiver

As the nearest residential home, Receiver 3, is approximately 6 feet from the property line, this analysis utilized the calculation below to determine the source reference vibration level at 25 ft, in/sec (PPV<sub>ref</sub>) with the threshold value of 0.2 PPV and a distance of 3 feet. The following calculation indicates that the PPV<sub>ref</sub> would be 0.024 PPV. This limits the equipment to small bulldozers or hand demolition, as shown below.

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

$$0.2 = PPV_{\text{ref}} \times (25/6)^{1.5}$$

$$PPV_{\text{ref}} \times X = 0.024$$

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As analyzed below, the project shall not use any excessive construction equipment that has a PPV rating greater than 0.024 PPV within 8 feet of the nearest sensitive use. This was calculated by utilizing the next most impactful construction equipment (Jackhammer at 0.035 PPV) to determine the minimum distance at which this equipment could be utilized while not exceeding the Construction Vibration Damage Criteria of 0.2 PPV at the aforementioned Class III sensitive use.

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

$$0.2 = 0.035 \times (25/D)^{1.5}$$

$$D = 7.8 \text{ feet} \approx 8 \text{ feet}$$

Therefore, with the implementation of Mitigation Measure **NOISE - 3**, impacts from construction related groundborne vibration will be less than significant.

#### **Mitigation Measures**

**NOISE- 3:** Within 2 feet of the property line, construction equipment shall not utilize construction equipment that exceeds PPV at 25 ft, in/sec of 0.035.

#### **4.1.4 OPERATIONAL NOISE IMPACTS**

On-site stationery-source (operational) noise would include general conversation, loading and unloading activities (residents entering/exiting property & maintenance of communal facilities), landscape maintenance, expected trash enclosure activity, pool/spa, tot lot, BBQ area, Clubhouse, and the HVAC equipment. The City of Moreno Valley Municipal Code included in Chapter 11.80 *Noise Regulation*, provides performance standards and noise control guidelines for determining and mitigating non-transportation or stationery-source noise impacts from operations at private properties as shown on Table 4 above.

Activities that typically occur in parking lots can generate noise levels of between 49 dBA (tire squeals) and 74 dBA (car alarms) at 50 feet from the noise source. The proposed project has the potential to impact sensitive receptors, including single-family residences, located to the north, south, southwest, west, east, and a house of worship to the south of the project site. Overall, due to the proximity of the project to single-family homes impacts can be less than significant with mitigation.

#### **Mitigation Measures**

**NOISE- 4:** No idling signs shall be posted along the perimeter wall/fence.

**NOISE- 5:** To reduce noise transmission, 6-foot tall CMU (Concrete Masonry Unit) block wall will be installed along the property boundary. These walls will act as a physical barrier to attenuate noise, helping to minimize sound impacts on nearby noise-sensitive areas.

## 5.0 TRAFFIC NOISE METHODS AND PROCEDURES

The following section outlines the methods and procedures used to estimate and analyze the future traffic noise environment. Consistent with the City of Moreno Valley General Plan Policies for multi-family residential land use, all transportation related noise levels are presented in terms of the 24-hour CNEL's.

### 5.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The estimated roadway noise impacts from vehicular traffic were calculated using the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- 3.2. The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period.

### 5.2 ON-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

The on-site roadway parameters including the ADT volumes used for this analysis are presented on Table 13. Based on the City of Moreno Valley General Plan Environmental Impact Report, Cottonwood Avenue is classified as a 4-lane Divided Minor Arterial. To predict the future on-site noise environment at the Project site, the City of Moreno Valley General Plan Environmental Impact Report Daily Capacity Volumes were used.

**Table 13 On-Site Roadway Parameters**

Roadway	Lanes	Classification	Design Capacity (ADT)	Speed (MPH)	Default Ground Type
Cottonwood Ave.	2	Minor Arterial	30,000	45	Hard soil

The traffic volumes shown on Table 14 reflect future long-range traffic conditions needed to assess the future on-site traffic noise environment and to identify potential mitigation measures (if any) that address the worst-case future conditions. For the purposes of this analysis, hard soil ground types were used to analyze the on-site traffic noise impacts for the Project study area as was the default and recommended setting of the FHWA Traffic Noise Prediction Mode. Table 10 presents the time-of-day vehicle splits by vehicle type, and Table 15 presents the total traffic flow distributions (vehicle mixes) used for this analysis. The vehicle mix provides the hourly distribution

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percentages of automobile, medium trucks, and heavy trucks for input into the FHWA Model based on roadway types.

**Table 14 Time of Day Vehicle Splits**

Roadway	Time of Day Splits <sup>1</sup>			Total of Time of Day Splits
	Daytime	Evening	Nighttime	
Autos	77.50%	12.90%	9.60%	100%
Medium Trucks	84.80%	4.90%	10.30%	100%
Heavy Trucks	86.50%	2.70%	10.80%	100%

<sup>1</sup> Daytime means 8:00 a.m. to 10 p.m.

“Daytime” = 7:00 a.m. to 7:00 p.m.; “Evening” = 7:00 p.m. to 10:00 p.m.; “Nighttime” = 10:00 p.m. to 7:00 a.m.

**Table 15 Distribution of Traffic Flow by Vehicle Type (VEHICLE MIX)**

Roadway	Total % Traffic Flow <sup>1</sup>			Total
	Autos	Medium Trucks	Heavy Trucks	
All Roadways <sup>1</sup>	97.42%	1.84%	0.74%	100%

<sup>1</sup> Typical Southern California vehicle mix

### **5.3 EXTERIOR NOISE ASSESSMENT**

To assess exterior noise levels at the proposed residential use, the future noise levels were modeled based on the buildout traffic volume of 30,000 ADT, consistent with the desired capacity volume for a minor arterial as described in the City’s General Plan Circulation Element. Due to the project design, the nearest receptors would be the Single-Family Residences to the southwest, located approximately 68 ft from the Cottonwood Avenue centerline. The exterior noise levels at the closest residences to Cottonwood Avenue were modeled to be 73.1 dBA CNEL without any barriers.

As specified above, Policy 6.3.1 of the General Plan, requires mitigation measures for all projects where current or future exterior noise levels exceed 20 CNEL above the desired interior noise level. To reduce the noise levels to meet these criteria a minimum 6 ft noise barrier would be required at the project’s boundary along Cottonwood Avenue to shield receptors Single-Family Residences to the Southeast and Southwest. The results of the on-site exterior noise model runs are shown in Appendix A and Table 16.

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The single-family home on the southwest corner of the project site is exposed on the east and south end with no noise attenuating design. The proposed project scope of work includes a concrete masonry unit (CMU) block wall running along the permitted of the property as shown in Figure 3. CMU walls, depending on their construction and thickness, can provide substantial sound insulation. A typical 8-inch-thick CMU wall can block between 40-50 decibels (dB) of sound transmission (CMHA, 2012). The implementation of the proposed project’s CMU block wall would mitigate noise levels to “Normally Acceptable.” Additionally, currently, the exterior noise levels at the single family residence to the southwest of the project site are “Normally Unacceptable” as described in the *Land Use Compatibility for Criteria* level shown in Figure 5.

**Table 16 Exterior Noise Levels**

<b>Receiver Location</b>	<b>Roadway</b>	<b>Unmitigated Noise Level (dBA CNEL)</b>	<b>Unmitigated Land Use Compatibility</b>	<b>Mitigated Noise Level (dBA CNEL)</b>	<b>Mitigated land Use Compatibility</b>
Single Family Residence - Southeast	Cottonwood Ave.	76.3	Normally Unacceptable	60.9	Normally Acceptable
Single Family Residence - Southwest	Cottonwood Ave.	73.1	Normally Unacceptable	61.5	Normally Acceptable

## **5.4 INTERIOR NOISE**

As discussed above, the exterior noise levels at the nearest residential receptors were modeled and shown to be below the “Normally Acceptable” threshold of 65 dBA CNEL, as outlined in the *Land Use Compatibility for Criteria* with the implementation of noise mitigation measures. Given that the exterior noise mitigation measures would bring the respective noise levels at the property boundary to acceptable levels, the interior noise levels within the residential units are expected to be below the normally acceptable threshold.

In addition, this analysis relies on the City of Moreno Valley 45 dBA CNEL interior limit for new construction. The interior noise level is determined by the difference between the predicted exterior noise level at the building façade and the noise reduction provided by the structure. Standard building construction typically provides a Noise Reduction (NR) of approximately 12 dBA with windows open and a minimum of 25 dBA with windows closed. In addition, fresh air circulation will be provided, which would provide a NR up to 20 dBA. Any sound leaks, cracks, and openings within window assembly can significantly reduce its ability to attenuate noise. However, the project’s design will comply with the California Energy Code and California Building Code requirements, ensuring interior noise levels remain acceptable.

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## 6.0 CONCLUSION

The proposed project involves both construction and operational noise sources that could potentially impact the surrounding sensitive receptors, including single-family residences. However, the project noise levels are expected to comply with the City of Moreno Valley Municipal Code and guidelines of the General Plan. During the construction phase, noise levels will vary based on the equipment and activity location, but the construction activity will comply with the City's permissible hours. Proper mitigation measures will be implemented to minimize construction noise such as using noise shielding and muffling devices and providing a construction site notice.

The operational noise sources include general conversation, loading and unloading activities (residents entering/exiting property & maintenance of communal facilities), landscape maintenance, expected trash enclosure activity, pool/spa, tot lot, BBQ area, Clubhouse, and HVAC equipment. These activities can generate noise levels ranging from 49 dBA to 74 dBA at 50 feet from the source. However, with proper mitigation measures, the project's impact on the nearby homes can be less than significant. The mitigation measures include using the quietest available equipment, and installing 6 feet CMU block walls to reduce potential noise propagation towards these sensitive residential areas.

Overall, the conclusions and recommendations presented in the report are based on the most up-to-date information available and consider the potential noise impacts of both the construction and operational phases of the project. It is recommended that the applicant implement the suggested mitigation measures to minimize the project's impact on the surrounding sensitive receptors, including single-family residences, and comply with the City's noise standards.

## 7.0 MITIGATION MEASURES

**NOISE - 1:** The Project contractor shall use power construction equipment with state-of-the-art noise shielding and muffling devices. (Approximately 3 dBA of estimated reduction)

**NOISE - 2:** A construction site notice shall be provided that includes the job site address, permit number, name and phone number of the contractor and owner or owner's agent, hours of construction allowed by code, and City telephone numbers where violations can be reported. The notice shall be posted and maintained at the construction site prior to the start of construction and displayed in a location that is readily visible to the public.

**NOISE - 3:** Within 2 feet of the property line, construction equipment shall not utilize construction equipment that exceeds PPV at 25 ft, in/sec of 0.035.

**NOISE - 4:** No idling signs shall be posted along the perimeter wall/fence

**NOISE - 5:** To reduce noise transmission, 6-foot-tall CMU (Concrete Masonry Unit) block wall will be installed along the property boundary. These walls will act as a physical barrier to attenuate noise, helping to minimize sound impacts on nearby noise-sensitive areas

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## **8.0 REFERENCES**

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