
Appendix G:

Noise Impact Analysis Report

THIS PAGE INTENTIONALLY LEFT BLANK



La Sierra Alhambra Residential Project

Noise Impact Analysis Report

City of Riverside, Riverside County, California

PREPARED FOR:

MLC Holdings, Inc.

5 Peters Canyon Road, Suite 310
Irvine, California 92606

Contact: Louisa Feletto

PREPARED BY:

FirstCarbon Solutions

967 Kendall Drive, #A-537
San Bernardino, CA 92407
714.508.4100

Contact: Philip Ault, Director of Noise and Air Quality

February 26, 2025

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

Acronyms and Abbreviations	v
1 - Introduction	1
1.1 - Purpose of Analysis and Study Objectives	1
1.2 - Project Summary	1
2 - Noise and Vibration Fundamentals	9
2.1 - Characteristics of Noise	9
2.2 - Characteristics of Groundborne Vibration and Noise	14
3 - Regulatory Setting	19
3.1 - Federal Regulations	19
3.2 - State Regulations	21
3.3 - Local Regulations	22
4 - Existing Noise Conditions	27
4.1 - Ambient Noise	27
5 - Thresholds of Significance and Impact Analysis	29
5.1 - Thresholds of Significance	29
5.2 - Substantial Noise Increase in Excess of Standards	29
5.3 - Groundborne Vibration/Noise Levels	33
5.4 - Noise Levels from Airport Activity	34

Appendix A: Noise Modeling Data

Tables

Table 1: Sound Terminology	11
Table 2: Typical Construction Equipment Maximum Noise Levels, L_{max}	13
Table 3: Vibration Levels of Construction Equipment	15
Table 4: Summary of EPA Recommended Noise Levels to Protect Public Welfare	19
Table 5: Federal Transit Administration Construction Vibration Impact Criteria	20
Table 6: Federal Transit Administration Construction Noise Impact Criteria	20
Table 7: Noise/Land Use Compatibility Criteria	23
Table 8: Existing Ambient Noise Levels on the Project Site	27

Exhibits

Exhibit 1: Regional Vicinity	3
Exhibit 2: Local Vicinity Map	5
Exhibit 3: Site Plan	7

THIS PAGE INTENTIONALLY LEFT BLANK

ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
ADT	Average Daily Traffic
APN	Assessor's Parcel Number
Caltrans	California Department of Transportation
CBC	California Building Standards Code
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
DNL	Day-Night Level
EPA	United States Environmental Protection Agency
FCS	FirstCarbon Solutions
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
L _{dn}	day/night average sound level
L _{eq}	equivalent sound level
L _{max}	maximum noise level
L _{min}	minimum noise level
LV	vibration velocity in decibels
MM	Mitigation Measure
PEIR	Program Environmental Impact Report
PPV	peak particle velocity
rms	root mean square
USGS	United States Geological Survey
VdB	vibration in decibels

THIS PAGE INTENTIONALLY LEFT BLANK

1 - INTRODUCTION

1.1 - Purpose of Analysis and Study Objectives

This Noise Impact Analysis has been prepared by FirstCarbon Solutions (FCS) to determine the off-site and on-site noise impacts associated with the proposed La Sierra Alhambra Residential Project (proposed project). The following is provided in this report:

- A description of the study area, project site, and proposed project.
- Information regarding the fundamentals of noise and vibration.
- A description of the local noise and vibration guidelines and standards.
- A description of the existing noise environment.
- An analysis of the potential short-term construction-related noise and vibration impacts from the proposed project.
- An analysis of long-term operations-related noise and vibration impacts from the proposed project.

1.2 - Project Summary

1.2.1 - Site Location

The approximately 9.88-acre project site is located on the southern corner of La Sierra Avenue and Alhambra Avenue, in the City of Riverside (City), California (Exhibit 1 and Exhibit 2).¹ The project site is identified as Assessor's Parcel Numbers (APNs) 149-052-004, -009, -011, -012, -013, and -014. The project site is currently occupied by several residential structures which would be demolished prior to development. The project site is bounded by La Sierra Avenue, Loma Vista Middle School, and single-family residences to the east; single-family residences and Francisco Place to the south; single-family residences and Alhambra Avenue to the west; and single-family residences and Alhambra Avenue to the north. The La Sierra Hills are approximately 0.23 mile to the west. The project site is located within the *Riverside West* United States Geological Survey (USGS) 7.5-minute Topographic Quadrangle Map, Township 3 South, Range 6 West (Latitude: 33° 56' 26" North; Longitude: 117° 30' 3" West).

The project site currently contains several trees that will be removed prior to development. The project site also contains three existing single-family residences with associated structures and an in-

¹ This acreage includes 9.51 acres of disturbance area and 0.36 acre to be dedicated to the City of Riverside.

ground swimming pool.² These residences would be demolished before the development of the proposed project.

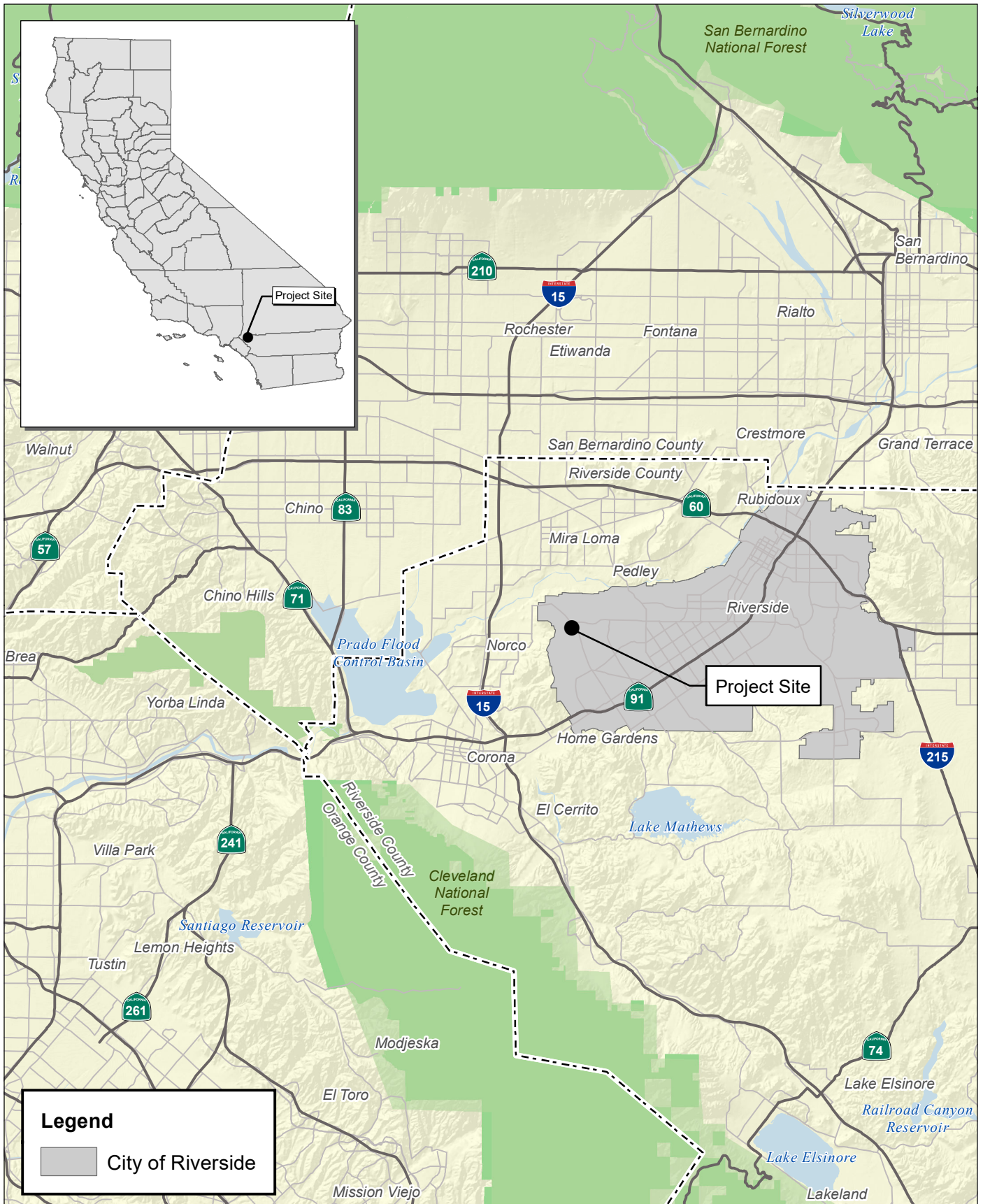
Project Description

Development Summary

MLC Holdings, LLC (project applicant) proposes the construction of 56 single-family residences consisting of 52 two-story residences on 45-foot by 79-foot minimum lots and four single-story residences on estate-sized parcels a minimum of 20,000 square feet in size (Exhibit 3). The proposed project encompasses approximately 9.88 acres, in addition to approximately 0.36 acre of roadway and frontage improvements. Residences would range between approximately 2,000 square feet to 2,500 square feet. The estate-sized parcels would be intended to support animal keeping while providing a smooth transition from the existing horse-keeping lots across Alhambra Avenue. The proposed project would include private roadways, common space and amenity areas, landscaping, and pedestrian walkways throughout the site.

Each of the 56 units would include a 2-car garage, as well as a private driveway with a 2-car capacity. The proposed project would also include 69 parallel parking spaces along private streets, which would result in 293 total parking spaces within the site.

² These residences are located at 6204 La Sierra Avenue, 6244 La Sierra Avenue, and 6251 Alhambra Avenue.



Source: Census 2000 Data, The California Spatial Information Library (CaSIL).

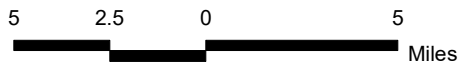


Exhibit 1 Regional Location Map

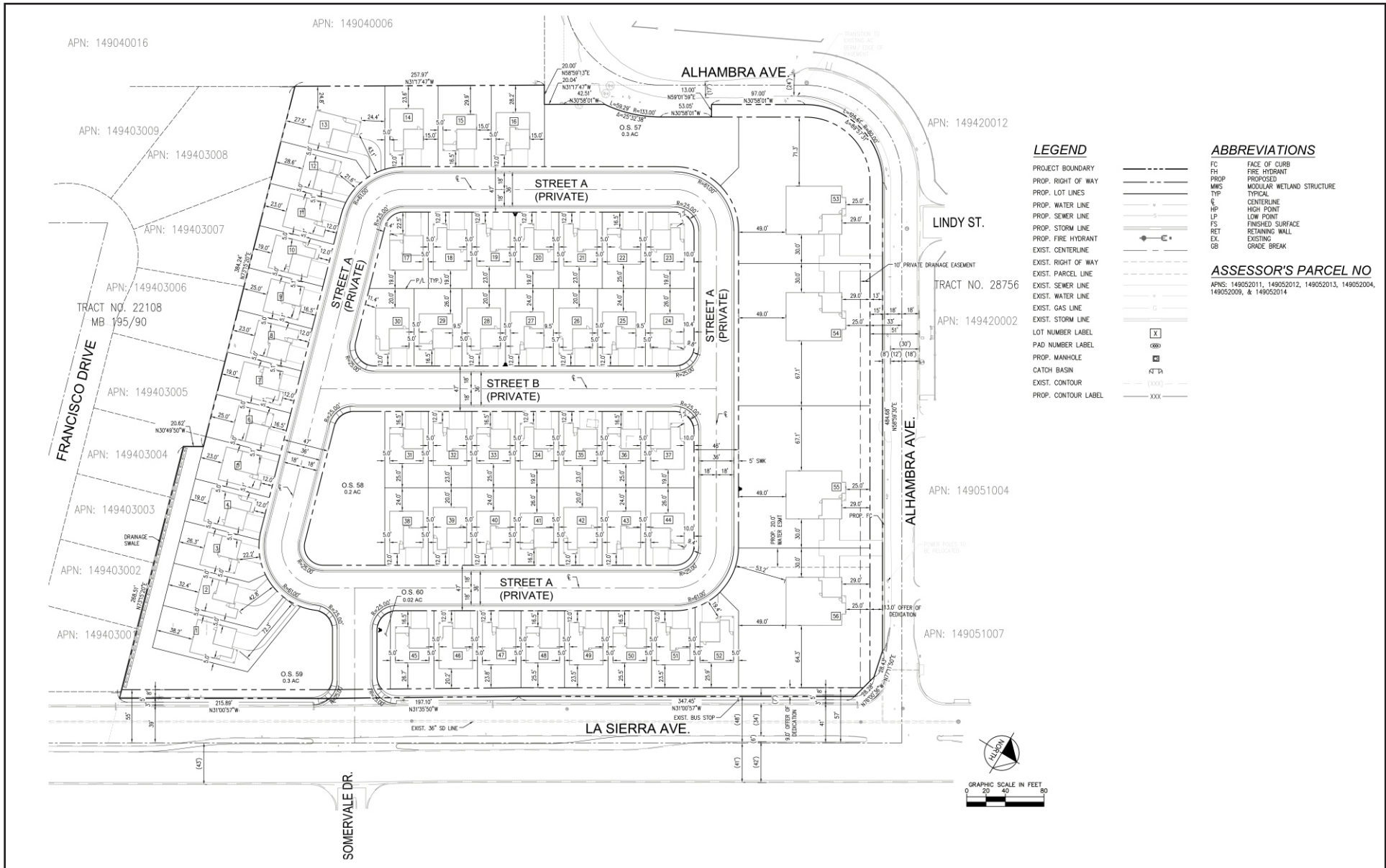
THIS PAGE INTENTIONALLY LEFT BLANK



Source: Bing Aerial Imagery. Kimley-Horn, 01/10/2025.



THIS PAGE INTENTIONALLY LEFT BLANK



LEGEND

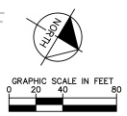
- PROJECT BOUNDARY
- PROP. RIGHT OF WAY
- PROP. LOT LINES
- PROP. WATER LINE
- PROP. SEWER LINE
- PROP. STORM LINE
- PROP. FIRE HYDRANT
- EXIST. CENTERLINE
- EXIST. RIGHT OF WAY
- EXIST. PARCEL LINE
- EXIST. SEWER LINE
- EXIST. WATER LINE
- EXIST. GAS LINE
- EXIST. STORM LINE
- LOT NUMBER LABEL
- PAD NUMBER LABEL
- PROP. MANHOLE
- CATCH BASIN
- EXIST. CONTOUR
- PROP. CONTOUR LABEL

ABBREVIATIONS

- FC FACE OF CURB
- FH FIRE HYDRANT
- PROP. PROPOSED
- MWS MODULAR WETLAND STRUCTURE
- TYP. TYPICAL
- C CENTERLINE
- HP HIGH POINT
- LP LOW POINT
- FS FINISHED SURFACE
- RET. RETAINING WALL
- EX. EXISTING
- GB GRADE BREAK

ASSESSOR'S PARCEL NO

APNs: 149052011, 149052012, 149052013, 149052004, 149052009, & 149052014



Source: Kimley Horn, June 2024.



49400042 • 02/2025 | 3_site_plan.cdr

**Exhibit 3
Site Plan**

MLC HOLDINGS, INC.
LA SIERRA ALHAMBRA RESIDENTIAL PROJECT
NOISE IMPACT ANALYSIS REPORT

THIS PAGE INTENTIONALLY LEFT BLANK

2 - NOISE AND VIBRATION FUNDAMENTALS

2.1 - Characteristics of Noise

Noise is generally defined as unwanted or objectionable sound. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm, or when it has adverse effects on health. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment. Noise effects can be caused by pitch or loudness. *Pitch* is the number of complete vibrations or cycles per second of a wave that result in the range of tone from high to low; higher-pitched sounds are louder to humans than lower-pitched sounds. *Loudness* is the intensity or amplitude of sound.

Sound is produced by the vibration of sound pressure waves in the air. Sound pressure levels are used to measure the intensity of sound and are described in terms of decibels. The decibel (dB) is a logarithmic unit, which expresses the ratio of the sound pressure level being measured to a standard reference level. The 0 point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Changes of 3 dB or less are only perceptible in laboratory environments. Audible increases in noise levels generally refer to a change of 3 dB or more, as this level has been found to be barely perceptible to the human ear in outdoor environments. Only audible changes in existing ambient or background noise levels are considered potentially significant.

The human ear is not equally sensitive to all frequencies within the audible sound spectrum, so sound pressure level measurements can be weighted to better represent frequency-based sensitivity of average healthy human hearing. One such specific “filtering” of sound is called “A-weighting.” A-weighted decibels (dBA) approximate the subjective response of the human ear to a 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 that are audible to the human ear. Because decibels are logarithmic units, they cannot be added or subtracted by ordinary arithmetic means. For example, if one noise source produces a noise level of 70 dB, the addition of another noise source with the same noise level would not produce 140 dB; rather, they would combine to produce a noise level of 73 dB.

As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level. Noise levels diminish or attenuate as distance from the source increases based on an inverse square rule, depending on how the noise source is physically configured. Noise levels from a single-point source, such as a single piece of construction equipment at ground level, attenuate at a rate of 6 dB for each doubling of distance (between the single-point source of noise and the noise-sensitive receptor of concern). Heavily traveled roads with few gaps in traffic behave as continuous line sources and attenuate roughly at a rate of 3 dB per doubling of distance (dBA/DD).

2.1.1 - Noise Descriptors

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and Community Noise Equivalent Level (CNEL) or the day/night average sound level (L_{dn}) based on dBA. CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally exchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels denoted by L_{max} for short-term noise impacts. L_{max} reflects peak operating conditions and addresses the annoying aspects of intermittent noise.

2.1.2 - Noise Propagation

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source, as well as ground absorption, atmospheric conditions (wind, temperature gradients, and humidity) and refraction, and shielding by natural and manmade features. Sound from point sources, such as an air conditioning condenser, a piece of construction equipment, or an idling truck, radiates uniformly outward as it travels away from the source in a spherical pattern.

The attenuation or sound drop-off rate is dependent on the conditions of the land between the noise source and receiver. To account for this ground-effect attenuation (absorption), two types of site conditions are commonly used in noise models: soft-site and hard-site conditions. Soft-site conditions account for the sound propagation loss over natural surfaces, such as normal earth and ground vegetation. For point sources, a drop-off rate of 7.5 dBA/DD is typically observed over soft ground with landscaping, as compared with a 6 dBA/DD drop-off rate over hard ground, such as asphalt, concrete, stone, and very hard packed earth. For line sources, such as traffic noise on a roadway, a 4.5 dBA/DD is typically observed for soft-site conditions, compared to the 3 dBA/DD drop-off rate for hard-site conditions. Table 1 briefly defines the measurement descriptors and other sound terminology used in this section.

Table 1: Sound Terminology

Term	Definition
Sound	A vibratory disturbance created by a vibrating object which, when transmitted by pressure waves through a medium such as air, can be detected by a receiving mechanism such as the human ear or a microphone.
Noise	Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
Ambient Noise	The composite of noise from all sources near and far in a given environment.
Decibel (dB)	A unitless measure of sound on a logarithmic scale which represents the squared ratio of sound pressure amplitude to a reference sound pressure. The reference pressure is 20 micropascals, representing the threshold of human hearing (0 dB).
A-weighted Decibel (dBA)	An overall frequency-weighted sound level that approximates the frequency response of the human ear.
Equivalent Noise Level (L_{eq})	The average sound energy occurring over a specified time period. In effect, L_{eq} is the steady-state sound level that in a stated period would contain the same acoustical energy as the time-varying sound that actually occurs during the same period.
Maximum and Minimum Noise Levels (L_{max} and L_{min})	The maximum or minimum instantaneous sound level measured during a measurement period.
Day-Night Level (DNL or L_{dn})	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m. (nighttime).
Community Noise Equivalent Level (CNEL)	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the A-weighted sound levels occurring between 7:00 p.m. and 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m. (nighttime).
Source: Data compiled by FirstCarbon Solutions (FCS). 2025.	

2.1.3 - Traffic Noise

The level of traffic noise depends on the three primary factors: (1) the volume of the traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of traffic. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher speeds, and greater number of trucks. Vehicle noise is a combination of the noise produced by the engine, exhaust, and tires. Because of the logarithmic nature of noise levels, a doubling of the traffic volume (assuming that the speed and truck mix do not change) results in a noise level increase of 3 dBA. Based on the Federal Highway Administration (FHWA) community noise assessment criteria, this change is “barely perceptible.” For reference, a doubling of perceived noise levels would require an increase of approximately 10 dBA. The truck mix on a given roadway also has an effect on community noise levels. As the number of heavy trucks increases and becomes a larger percentage of the vehicle mix, adjacent noise levels increase.

2.1.4 - Stationary Noise

A stationary noise producer is any entity in a fixed location that emits noise. Examples of stationary noise sources include machinery, engines, energy production, and other mechanical or powered equipment and activities such as loading and unloading or public assembly that may occur at commercial, industrial, manufacturing, or institutional facilities. Furthermore, while noise generated by the use of motor vehicles over public roads is preempted from local regulation, the use of these vehicles is considered a stationary noise source when operated on private property, such as at a construction site, a truck terminal, or warehousing facility.

The effects of stationary noise depend on factors such as characteristics of the equipment and operations, distance and pathway between the generator and receptor, and weather. Stationary noise sources may be regulated at the point of manufacture (e.g., equipment or engines) with limitations on the hours of operation or with provision of intervening structures, barriers, or topography.

Construction activities are a common source of stationary noise. Construction-period noise levels are higher than background ambient noise levels but eventually cease once construction is complete. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on each construction site and, therefore, would change the noise levels as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table 2 shows typical noise levels of construction equipment as measured at a distance of 50 feet from the operating equipment.

Table 2: Typical Construction Equipment Maximum Noise Levels, L_{max}

Type of Equipment	Impact Device? (Yes/No)	Specification Maximum Sound Levels for Analysis (dBA at 50 feet)
Impact Pile Driver	Yes	95
Auger Drill Rig	No	85
Vibratory Pile Driver	No	95
Jackhammers	Yes	85
Pneumatic Tools	No	85
Pumps	No	77
Scrapers	No	85
Cranes	No	85
Portable Generators	No	82
Rollers	No	85
Bulldozers	No	85
Tractors	No	84
Front-end Loaders	No	80
Backhoe	No	80
Excavators	No	85
Graders	No	85
Air Compressors	No	80
Dump Truck	No	84
Concrete Mixer Truck	No	85
Pickup Truck	No	55
Notes: dBA = A-weighted decibel Source: Federal Highway Administration (FHWA). 2006. Highway Construction Noise Handbook.		

2.1.5 - Noise from Multiple Sources

Because sound pressure levels in decibels are based on a logarithmic scale, they cannot be added or subtracted in the usual arithmetical way. Therefore, sound pressure levels in decibels are logarithmically added on an energy summation basis. In other words, adding a new noise source to an existing noise source, both producing noise at the same level, will not double the noise level. Instead, if the difference between two noise sources is 10 dBA or more, the louder noise source will

dominate and the resultant noise level will be equal to the noise level of the louder source. In general, if the difference between two noise sources is 0–1 dBA, the resultant noise level will be 3 dBA higher than the louder noise source, or both sources if they are equal. If the difference between two noise sources is 2–3 dBA, the resultant noise level will be 2 dBA above the louder noise source. If the difference between two noise sources is 4–10 dBA, the resultant noise level will be 1 dBA higher than the louder noise source.

2.2 - Characteristics of Groundborne Vibration and Noise

Groundborne vibration consists of rapidly fluctuating motion through a solid medium, specifically the ground, which has an average motion of zero and in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. The effects of groundborne vibration typically only cause a nuisance to people, but in extreme cases, excessive groundborne vibration has the potential to cause structural damage to buildings. Although groundborne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Groundborne noise is an effect of groundborne vibration and only exists indoors since it radiates from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude, such as the maximum instantaneous peak in the vibration's velocity, which is known as the peak particle velocity (PPV), or the root mean square (rms) amplitude of the vibration velocity. Because of the typically small amplitudes of vibrations, vibration velocity is often expressed in decibels—denoted as LV—and is based on the reference quantity of 1 microinch per second. To distinguish these vibration levels referenced in decibels from noise levels referenced in decibels, the unit is written as “VdB.”

Although groundborne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. When assessing annoyance from groundborne vibration, vibration is typically expressed as rms velocity in units of decibels of 1 microinch per second, with the unit written in VdB. Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. Human perception of vibration starts at levels as low as 67 VdB. Annoyance due to vibration in residential settings starts at approximately 70 VdB.

Off-site sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible groundborne noise or vibration. Construction activities, such as blasting, pile driving, and operating heavy earthmoving equipment, are common sources of groundborne vibration. Construction vibration impacts on building structures are generally assessed in terms of PPV. Typical vibration source levels from construction equipment are shown in Table 3.

Table 3: Vibration Levels of Construction Equipment

Construction Equipment	PPV at 25 feet (inches/second)	rms Velocity in Decibels (VdB) at 25 feet
Water Trucks	0.001	57
Scraper	0.002	58
Bulldozer–small	0.003	58
Jackhammer	0.035	79
Concrete Mixer	0.046	81
Concrete Pump	0.046	81
Paver	0.046	81
Pickup Truck	0.046	81
Auger Drill Rig	0.051	82
Backhoe	0.051	82
Crane (Mobile)	0.051	82
Excavator	0.051	82
Grader	0.051	82
Loader	0.051	82
Loaded Trucks	0.076	86
Bulldozer–large	0.089	87
Caisson drilling	0.089	87
Vibratory Roller–small	0.101	88
Compactor	0.138	90
Clam shovel drop	0.202	94
Vibratory Roller–large	0.210	94
Pile Driver (typical impact)	0.644	104
Pile Driver (upper-range impact)	1.518	112

Notes:
PPV = peak particle velocity
Source: Compilation of scientific and academic literature, generated by the Federal Transit Administration (FTA) and Federal Highway Administration (FHWA).

The propagation of groundborne vibration is not as simple to model as airborne noise. This is because noise in the air travels through a relatively uniform medium, while groundborne vibrations

travel through earth, which may contain significant geological differences. Factors that influence groundborne vibration include:

- **Vibration source:** Type of activity or equipment, such as impact or mobile, and depth of vibration source.
- **Vibration path:** Soil type, rock layers, soil layering, depth to water table, and frost depth.
- **Vibration receiver:** Foundation type, building construction, and acoustical absorption.

Among these factors that influence groundborne vibration, there are significant differences in the vibration characteristics when the source is underground compared to when the source is at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of groundborne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth of bedrock. Vibration propagation is more efficient in stiff clay soils than in loose sandy soils, and shallow rock seems to concentrate the vibration energy close to the surface and can result in groundborne vibration problems at large distances from the source. Factors such as layering of the soil and depth to the water table can have significant effects on the propagation of groundborne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils.

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil type, but it has been shown to be effective enough for screening purposes in order to identify potential vibration impacts that may need to be studied through actual field tests. The vibration level (calculated below as "PPV") at a distance from a point source can generally be calculated using the vibration reference equation:

$$PPV = PPV_{ref} * (25/D)^n \text{ (in/sec)}$$

Where:

- PPV_{ref} = reference measurement at 25 feet from vibration source
- D = distance from equipment to property line
- n = vibration attenuation rate through ground

According to Section 7 of the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual, an “n” value of 1.5 is recommended to calculate vibration propagation through typical soil conditions.³

³ Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.

THIS PAGE INTENTIONALLY LEFT BLANK

3 - REGULATORY SETTING

3.1 - Federal Regulations

3.1.1 - United States Environmental Protection Agency

In 1972, Congress enacted the Noise Control Act.⁴ This act authorized the United States Environmental Protection Agency (EPA) to publish descriptive data on the effects of noise and establish levels of sound “requisite to protect the public welfare with an adequate margin of safety.” These levels are separated into health (hearing loss levels) and welfare (annoyance levels) categories, as shown in Table 4. The EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

For protection against hearing loss, 96 percent of the population would be protected if sound levels were less than or equal to an $L_{eq(24)}$ of 70 dBA. The EPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet distance in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels are below 55 dBA and 45 dBA, respectively.

Table 4: Summary of EPA Recommended Noise Levels to Protect Public Welfare

Effect	Level	Area
Hearing loss	$L_{eq(24)} \leq 70$ dB	All areas
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas, farms, and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq(24)} \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas.
	$L_{eq(24)} \leq 45$ dB	Other indoor areas with human activities such as schools, etc.
<p>Notes: dB = decibel L_{eq} = equivalent sound level L_{dn} = day/night average sound level (24) signifies an L_{eq} duration of 24 hours. Source: United States Environmental Protection Agency (EPA). 1978. Protective Noise Levels, EPA 550/9-79-100.</p>		

⁴ GovInfo. 2024. Noise Control Act of 1972. Website: <https://www.govinfo.gov/content/pkg/COMPS-888/pdf/COMPS-888.pdf>. Accessed December 12, 2024.

3.1.2 - Federal Transit Administration

The FTA has established industry-accepted standards for vibration impact criteria and impact assessment. These guidelines are published in its Transit Noise and Vibration Impact Assessment Manual.⁵ The FTA guidelines include thresholds for construction vibration impacts for various structural categories as shown in Table 5.

Table 5: Federal Transit Administration Construction Vibration Impact Criteria

Building Category	PPV (in/sec)	Approximate VdB
I. Reinforced Concrete, Steel, or Timber (no plaster)	0.5	102
II. Engineered Concrete and Masonry (no plaster)	0.3	98
III. Nonengineered Timber and Masonry Buildings	0.2	94
IV. Buildings Extremely Susceptible to Vibration Damage	0.12	90
Notes: in/sec = inches per second PPV = peak particle velocity rms = root mean square VdB = vibration measured as rms velocity in decibels of 1 microinch per second Source: Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.		

In addition, the FTA has identified construction noise thresholds in the Transit Noise and Vibration Impact Assessment Manual, which limit daytime construction noise to 80 dBA L_{eq} at residential land uses, 85 dBA L_{eq} at commercial uses, and 90 dBA L_{eq} at industrial land uses.

The FTA has also established criteria for the assessment of construction noise impacts. The FTA's day and nighttime criteria are shown in Table 6. To be discussed later, the City has adopted these criteria for assessment of the proposed project's construction noise impacts. According to the FTA, exceedances of these criteria may result in adverse community reaction.

Table 6: Federal Transit Administration Construction Noise Impact Criteria

Land Use	L_{eq} equipment (8hr) ^A	
	Day	Night
Residential	80	70
Commercial	85	85
Industrial	90	90
Notes:		

⁵ Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.

Land Use	Leq equipment (8hr) ^A	
	Day	Night
<p>$L_{eq \text{ equipment (8hr)}}$ = equipment noise level in L_{eq} over an 8-hour time period. The analysis assumes that the L_{eq} over this time period would be approximately equal to the L_{eq} over a single construction workday, from start to finish of that day's activities. Source: Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. Detailed Analysis Construction Noise Criteria. September.</p>		

3.2 - State Regulations

3.2.1 - California General Plan Guidelines

Established in 1973, the California Department of Health Services Office of Noise Control was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the Land Use Compatibility for Community Noise Environments Matrix, which allows the local jurisdiction to delineate compatibility of sensitive uses with various incremental levels of noise.⁶

Government Code Section 65302 mandates that the legislative body of each county and city in California adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise/land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable. The proposed project is also subject to review under the State of California Environmental Quality Act (CEQA). Appendix G of the CEQA Guidelines provides recommended standards for noise land use compatibility.

3.2.2 - California Building Standards Code

The State of California has established noise insulation standards for new hotels, motels, apartment houses, and dwellings (other than single-family detached housing). These requirements are provided in the 2022 California Building Standards Code (CBC) (California Code of Regulations [CCR] Title 24). As provided in the CBC, the noise insulation standards set forth an interior standard of 45 dBA CNEL as measured from within the structure's interior. Title 24 standards are typically enforced by local jurisdictions through the building permit application process.

3.2.3 - Assembly Bill 1307

Assembly Bill (AB) 1307 went into effect January 1, 2024. This bill clarifies that "for residential projects, the effects of noise generated by project occupants and their guests on human beings is not

⁶ California Department of Health Services Office of Noise Control. 1976. Land Use Compatibility for Community Noise Environments Matrix.

a significant effect on the environment.” Therefore, this analysis does not address potential noise impacts from future occupants and their guests on sensitive receptors in the project vicinity.

3.3 - Local Regulations

The project site is located in the City of Riverside. The City addresses noise in the City of Riverside General Plan (2015) and in the City of Riverside Municipal Code (Municipal Code).

3.3.1 - City of Riverside General Plan

The City of Riverside addresses noise planning guidance in the Noise Element of the General Plan.⁷ The objective of the General Plan’s Noise Element is to minimize the exposure of new residential developments, schools, hospitals, and similar noise-sensitive uses to excessive or unhealthy noise levels to the greatest extent possible. The following applicable goals and policies to the proposed project are summarized below:

Policies

Objective N-1 Minimize noise levels from point sources throughout the community and, wherever possible, mitigate the effects of noise to provide a safe and healthful environment.

- N-1.1** Continue to enforce noise abatement and control measures particularly within residential neighborhoods.
- N-1.2** Require the inclusion of noise-reducing design features in development consistent with standards in Figure N-10 (Noise/Land Use Compatibility Criteria table below), Title 24 California Code of Regulations and Title 7 of the Municipal Code.
- N-1.3** Enforce the City of Riverside Noise Control Code to ensure that stationary noise emanating from construction activities, private developments/residences and special events are minimized.
- N-1.5** Avoid locating noise-sensitive land uses in existing and anticipated noise-impacted areas.

Objective N-4 Minimize ground transportation-related noise impacts.

Policies

- N-4.1** Ensure that noise impacts generated by vehicular sources are minimized through the use of noise reduction features (e.g., earthen berms, landscaped walls, lowered streets, improved technology).



⁷ City of Riverside, 2018. Riverside General Plan 2025. February.

Table 7 (figure N-10 in the General Plan) depicts the noise compatibility criteria established by the City.

Table 7: Noise/Land Use Compatibility Criteria

Land Use Category	Exterior Noise Exposure L _{dn}						
	55	60	65	70	75	80	85
Single-family Residential	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable
Infill Single-family Residential	Normally Acceptable	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable
Commercial Motels, Hotels, Transient Lodging	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Normally Unacceptable	Conditionally Unacceptable
Schools, Libraries, Churches, Hospitals, Nursing Homes	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Normally Unacceptable	Conditionally Unacceptable
Amphitheaters, Concert Hall, Auditorium, Meeting Hall	Conditionally Acceptable	Conditionally Acceptable	Conditionally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable
Sports Arenas, Outdoor Spectator Sports	Conditionally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Conditionally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable
Playgrounds, Neighborhoods, Parks	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable
Golf Course, Riding Stables, Water Rec., Cemeteries	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Unacceptable	Normally Unacceptable	Conditionally Unacceptable	Conditionally Unacceptable
Office Building, Business Commercial, Professional	Normally Acceptable	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Normally Unacceptable	Conditionally Unacceptable
Industrial, Manufacturing Utilities, Agriculture	Normally Acceptable	Normally Acceptable	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Conditionally Unacceptable	Conditionally Unacceptable
Freeway Adjacent Commercial, Office, and Industrial Uses	Normally Acceptable	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Conditionally Unacceptable

Notes: Residential components of Mixed-use developments are subject to the Multi-family Residential Noise Standards unless otherwise allowed in conjunction with Policy N-2.2.

-  Normally Acceptable
-  Conditionally Acceptable
-  Normally Unacceptable
-  Conditionally Unacceptable

City of Riverside General Plan Recirculated PEIR Mitigation Measures

The City's General Plan Recirculated PEIR⁸ includes the mitigation measures that are applicable to development projects in the City. The following mitigation measures are applicable to the proposed project.

- MM Noise 4** To mitigate for temporary noise from construction activities to existing sensitive receptors when a variance is granted related to construction times, additional measures shall be applied by the City, to the extent feasible, to reduce noise impacts to sensitive receptors. Additional measures could include, but are not limited to locating work at night away from sensitive receptors, limiting the duration of work needing to be completed under the variance, and ensuring construction equipment is properly fitted and maintained with mufflers.

3.3.2 - City of Riverside Municipal Code

The Municipal Code) establishes the following applicable standards related to noise.⁹ The table below depicts the noise compatibility criteria established by the City Noise Element.

Exterior Sound Level Limits (Section 7.25.010)

The City's performance standard for exterior sound levels limits noise at residential properties to 55 dBA L_{eq} from 7:00 a.m. to 10:00 p.m. and 45 dBA L_{eq} from 10:00 p.m. to 7:00 a.m. Furthermore, it is unlawful for any person to create noise, when measured at an affected residential property line, which causes the sound level to exceed:

1. The exterior noise standard of the applicable land use category, up to 5 dBA, for a cumulative period of more than 30 minutes in any hour; or
2. The exterior noise standard of the applicable land use category, plus 5 dBA for a cumulative period of more than 15 minutes in any hour; or
3. The exterior noise standard of the applicable land use category, plus 10 dBA for a cumulative period of more than 5 minutes in any hour; or
4. The exterior noise standard of the applicable land use category, plus 15 dBA for a cumulative period of more than 1 minute in any hour; or
5. The exterior noise standard of the applicable land use category, plus 20 dBA or the maximum measured ambient noise level, for any period of time.

⁸ City of Riverside. 2007. Recirculated Draft Program Environmental Impact Report, City of Riverside General Plan 2025 Program. July.

⁹ City of Riverside Muni Code. 2024. Title 7-Noise Control. Website: https://library.municode.com/ca/riverside/codes/code_of_ordinances?nodeId=PTIICOOR_TIT7NOCO. Accessed February 11, 2025.

According to the City's exterior noise standard, if the measured ambient noise level exceeds that permissible within any of the first four noise limit categories, the allowable noise exposure standard shall be increased in 5 dBA increments in each category as appropriate to encompass the ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

Interior Sound Level Limits (Section 7.30.015)

Interior noise levels in residential dwellings are limited to 45 dBA L_{eq} from 7:00 a.m. to 10:00 p.m. and to 35 dBA L_{eq} from 10:00 p.m. to 7:00 a.m. Furthermore, it is unlawful for any person to create noise, when measured on any residential property, which causes the sound level to exceed:

1. The noise standard, up to 5 dBA, for a cumulative period of more than 5 minutes in any hour; or
2. The noise standard plus 5 dBA for a cumulative period of more than 1 minute in any hour; or
3. The noise standard plus 10 dBA for any period of time.

In the event the ambient noise level exceeds the noise limit categories above, the cumulative period applicable to said category shall be increased to reflect the ambient noise level.

General Noise Regulations (Section 7.35.010)

Other applicable standards pertain to noise levels generated by project-related construction and loading and unloading activities. According to the City's noise ordinances, operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, grading, or demolition work between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between 5:00 p.m. and 8:00 a.m. on Saturdays, or at any time on Sunday or federal holidays is prohibited.

THIS PAGE INTENTIONALLY LEFT BLANK

4 - EXISTING NOISE CONDITIONS

4.1 - Ambient Noise

The project site is surrounded by single-family homes to the north, east, and west and La Sierra Avenue to the south.

Short-term noise monitoring was conducted by Vista Environmental between 11:09 a.m. and 11:43 a.m. on Tuesday, January 30, 2024.¹⁰ The noise measurements were taken during the midday hours, as the midday hours typically have the highest daytime noise levels in urban environments. It should be noted that peak noise hours often vary slightly from peak traffic hours, as peak noise hours more closely align with high volume traffic that is still free flowing, while peak traffic hours often result in slower vehicle speeds due to the volume of traffic on the roadway. The short-term existing noise measurement results are summarized in Table 8.

Table 8: Existing Ambient Noise Levels on the Project Site

Site ID #	Description	Primary Noise Sources	L _{eq}	L _{max}
ST-1	Located near the northwest corner of the project site, approximately 30 feet east of Alhambra Avenue centerline.	Vehicles on La Sierra Avenue (650 feet to the east)	49.3	70.3
ST-2	Located on the east side of the project site, approximately 50 feet west of La Sierra Avenue centerline.	Vehicles on La Sierra Avenue	67.9	79.0

Notes:

L_{eq} = equivalent sound level

L_{max} = maximum noise level

Source: Vista Environmental. 2024. Due Diligence Noise and Vibration Assessment for the Proposed La Sierra & Alhambra Residential Project. February 4.

¹⁰ Vista Environmental. 2024. Due Diligence Noise and Vibration Assessment for the Proposed La Sierra & Alhambra Residential Project. February 4.

THIS PAGE INTENTIONALLY LEFT BLANK

5 - THRESHOLDS OF SIGNIFICANCE AND IMPACT ANALYSIS

5.1 - Thresholds of Significance

According to CEQA Guidelines Appendix G, to determine whether impacts related to noise and vibration are significant environmental effects, the following questions are analyzed and evaluated.

Would the proposed plan:

- a) Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
- b) Generate excessive groundborne vibration or groundborne noise levels?
- c) 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?

5.2 - Substantial Noise Increase in Excess of Standards

This analysis is based, in part, on the Due Diligence Noise and Vibration Assessment for the Proposed La Sierra and Alhambra Residential Project by Vista Environmental on February 4, 2024.¹¹

5.2.1 - Construction Noise Impacts

A significant impact would occur if implementation of the proposed project would expose persons working or residing at the project site or in the project vicinity to noise levels in excess of established standards.

Municipal Code Section 7.35.020(G) exempts all construction-related noise from permitted construction activities that take place between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and 8:00 a.m. and 5:00 p.m. on Saturdays. Section 7.35.020(G) also prohibits all construction activities on Sundays and federal holidays.

While the City does not establish noise level thresholds for temporary construction activities, this analysis uses the noise limits established by the FTA to identify the potential for impacts due to

¹¹ Vista Environmental. 2024. Due Diligence Noise and Vibration Assessment for the Proposed La Sierra & Alhambra Residential Project. February 4.

substantial temporary construction noise. The FTA identifies construction noise limits in the Transit Noise and Vibration Impact Assessment Manual.¹⁹ During daytime hours, a significant temporary increase would be an increase in excess of the average daily noise levels of 80 dBA L_{eq} as measured at a receiving residential land use.

Construction-related Traffic Noise

Noise impacts from construction activities associated with the proposed project would be a function of the noise generated by construction equipment, equipment location, sensitivity of nearby land uses, and the timing and duration of the construction activities. One type of short-term noise impact that could occur during project construction would result from the increase in traffic flow on local streets associated with the transport of workers, equipment, and materials to and from the project site. The transport of workers and construction equipment and materials to the project site would incrementally increase noise levels on access roads leading to the site. Because workers and construction equipment would use existing routes, noise from passing trucks would be similar to existing vehicle-generated noise on these local roadways. Typically, a doubling of the Average Daily Traffic (ADT) hourly volumes on a roadway segment is required in order to result in an increase of 3 dBA in traffic noise levels; which, as discussed in the characteristics of noise discussion above, is the lowest change that can be perceptible to the human ear in outdoor environments.

According to the Focused Traffic Analysis prepared by Urban Crossroads,¹² documented existing trips on La Sierra Avenue are 12,800 ADT trips while reasonable worst-case daily construction trips for the proposed project would range up to 500 trips per day.¹³ Therefore, project-related construction trips would not double the daily traffic volumes along any roadway segment in the project vicinity and, as a result, would cause a less than 3 dBA increase in traffic noise levels. For this reason, short-term intermittent noise from construction trips would not be expected to result in a perceptible increase in hourly- or daily-average traffic noise levels in the project vicinity. Therefore, short-term construction-related noise impacts associated with the transportation of workers and equipment to the project site would be **less than significant**.

Construction Equipment Operational Noise

The second type of short-term noise impact is related to noise generated during construction on the project site. Construction is completed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site and, therefore, the noise levels surrounding the site as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings. Impact equipment, such as impact pile drivers, are not expected to be used during

¹² Urban Crossroads. 2025. La Sierra Residential Focused Traffic Analysis. February 4.

¹³ Based on the default CalEEMod runs prepared for the project.

construction of this project. This Noise Impact Analysis focuses on analyzing the loudest phase of construction and demonstrates that impacts would be reduced to less than significant.

The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery and compacting equipment, such as bulldozers, draglines, backhoes, front loaders, roller compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings.

Construction of the proposed project is expected to require the use of a variety of equipment, the loudest being a grader, excavator, and bulldozer, all of which generate maximum reference noise levels of 85 dBA L_{max} at 50 feet.

A conservative but reasonable assumption is that this equipment would operate simultaneously and continuously over at least a 1-hour period in the vicinity of the closest existing sensitive receptors but would move linearly over the project site as they perform their earthmoving operations, spending a relatively short amount of time adjacent to any one receptor. A characteristic of sound is that each doubling of sound sources with equal strength increases a sound level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, a reasonable worst-case combined noise level during this phase of construction would be 90 dBA L_{max} at a distance of 50 feet from the acoustic center of a construction area. The acoustical center reference is used because construction equipment must operate at some distance from one another on a project site, and the combined noise level as measured at a point equidistant from the sources (acoustic center) would be the worst-case maximum noise level. These operations would be expected to result in a reasonable worst-case hourly average of 86 dBA L_{eq} at a distance of 50 feet from the acoustic center of a construction area. These worst-case construction noise levels would only occur during the site preparation phase of development.

The closest noise-sensitive receptor to the proposed project site is a single-family home located south of the project site. This closest receptor would be located approximately 50 feet from the nearest acoustic center of construction activity where multiple pieces of heavy construction equipment would potentially operate simultaneously at the project site. At this distance and assuming minimal shielding from the existing 6-foot concrete block wall on the southern side of the project site, reasonable worst-case construction noise levels could range up to approximately 79 dBA L_{eq} at the façade of the nearest sensitive receptor. The noise calculation sheets are provided in Appendix A.

The calculated worst-case construction noise levels do not exceed the FTA's 80 dBA L_{eq} threshold as measured at the nearest residential receptors. Furthermore, the proposed project would comply with the City's standard permissible hours for construction (7:00 a.m. and 7:00 p.m. on weekdays and 8:00 a.m. and 5:00 p.m. on Saturdays), which would ensure that construction noise would not result in a substantial increase in nighttime noise levels in the project vicinity. In addition, the proposed project must also comply with MM Noise 4 of the City of Riverside General Plan Recirculated PEIR, which would ensure construction noise impacts are further reduced. Therefore, temporary or periodic noise

impacts from construction activities associated with implementation of the proposed project would be **less than significant**.

5.2.2 - Mobile Source Operational Noise Impacts

A significant impact would occur if project-generated traffic would result in a substantial increase in ambient noise levels compared with those that would exist without the proposed project. Typically, a doubling of the hourly or daily average traffic volumes on a roadway segment is required in order to result in an increase of 3 dBA in traffic noise levels, which, as discussed in the characteristics of noise discussion above, is the lowest change that can be perceptible to the human ear in outdoor environments. Therefore, for the purposes of this analysis, a doubling of the existing ADT volumes would result in a substantial permanent increase in traffic noise levels.

Operation of the proposed project is anticipated to create noise from generation of additional vehicle trips onto La Sierra Avenue. According to the La Sierra Residential Focused Traffic Analysis, prepared by Urban Crossroads, dated February 4, 2025, the proposed project is anticipated to generate 514 two-way trip-ends per day, with 38 AM peak-hour trips, 38 midday PM peak-hours trips, and 51 PM peak-hour trips. La Sierra Avenue in the vicinity of the project site currently has 12,800 average daily trips. As such, the proposed project would increase the traffic on La Sierra Avenue by a maximum of 4 percent.

Therefore, project trips would not result in a doubling of trips on access roadway segments in the project vicinity. In fact, the project's net increase of 514 average daily trips would result in a less than 1 dBA increase in existing traffic noise levels. Therefore, implementation of the proposed project would not result in a substantial increase in traffic noise levels compared with traffic noise levels existing without the proposed project, and project traffic noise impact would be **less than significant**.

5.2.3 - Stationary Source Operational Noise Impacts

A significant impact would occur if operational noise levels generated by stationary noise sources at the project site would exceed the following exterior noise levels as measured at residential properties in the project vicinity:

- 55 dBA L_{eq} between the hours of 7:00 a.m. and 10:00 p.m.; or
- 45 dBA L_{eq} between the hours of 10:00 p.m. and 7:00 a.m.

Furthermore, a significant impact would also occur if the proposed project resulted in noise levels in excess of 45 dBA L_{eq} from 7:00 a.m. to 10:00 p.m. or in excess of 35 dBA L_{eq} from 10:00 p.m. to 7:00 a.m., as measured in the interior of receiving residences in the project vicinity.

The primary new stationary noise source associated with implementation of the proposed project would be new mechanical ventilation system operations associated with the proposed residential uses. Potential impacts associated with this new noise source are analyzed below.

Mechanical Ventilation Equipment

Implementation of the proposed project would include operation of new mechanical ventilation equipment. At the time of this analysis, details were not available pertaining to proposed mechanical ventilation systems for the proposed project; therefore, a reference noise level for typical mechanical ventilation systems was used. Noise levels from typical residential mechanical ventilation equipment range up to approximately 70 dBA L_{eq} at a distance of 3 feet.

Proposed mechanical ventilation equipment could be located as close as approximately 60 feet from the nearest off-site receptor, a single-family residential home on the southern border of the project site. At this distance, and assuming minimal shielding for the existing 6-foot high concrete block wall, noise generated by mechanical ventilation equipment would attenuate to below 31 dBA L_{eq} at the nearest off-site residential receptors. The calculation spreadsheet with detailed modeling assumptions is included in Appendix A.

These project reasonable worst-case stationary source operational noise levels would not exceed the City most restrictive exterior nighttime noise limit of 45 dBA L_{eq} , as measured at the nearest residential receptor. In addition, they would clearly also not exceed the City's most restrictive interior noise level threshold of 35 dBA L_{eq} as measured at the interior of the nearest residential receptor. Therefore, the proposed project's mechanical ventilation equipment operations would not generate a substantial permanent increase in ambient noise levels in the project vicinity in excess of standards established in the local general plan or noise ordinance, and the impact of noise produced by project-related mechanical ventilation equipment operations to off-site sensitive receptors would be **less than significant**.

5.3 - Groundborne Vibration/Noise Levels

This section analyzes both construction and operational groundborne vibration and noise impacts. Groundborne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. Vibrating objects in contact with the ground radiate vibration waves through various soil and rock strata to the foundations of nearby buildings. Groundborne noise is generated when vibrating building components radiate sound, or noise generated by groundborne vibration. In general, if groundborne vibration levels do not exceed levels considered to be perceptible, then groundborne noise levels would not be perceptible in most interior environments. Therefore, this analysis focuses on determining exceedances of groundborne vibration levels.

A significant impact would occur if the proposed project would generate groundborne vibration or groundborne noise levels in excess of established standards. The City has not adopted criteria for groundborne vibration impacts. Therefore, for purposes of this analysis, the FTA's vibration impact criteria are utilized. The FTA has established industry accepted standards for vibration impact criteria

and impact assessment. These guidelines are published in its Transit Noise and Vibration Impact Assessment Manual.¹⁴

5.3.1 - Short-term Construction Vibration Impacts

Of the variety of equipment used during construction, the small vibratory rollers anticipated to be used in the site preparation phase of construction would produce the greatest groundborne vibration levels. Small vibratory rollers produce groundborne vibration levels ranging up to 0.101 in/sec PPV at 25 feet from the operating equipment.

The closest off-site structure is a single-family home located along the southern border of the project site, approximately 50 feet from the nearest construction footprint where a small vibratory roller would potentially operate. At this distance, groundborne vibration levels could range up to 0.03 in/sec PPV from operation of a small vibratory roller. This is well below the FTA's Construction Vibration Impact Criteria of 0.2 in/sec PPV for buildings of this type (structures of nonengineered timber construction). Therefore, potential construction vibration impacts to this off-site structure would be less than significant.

Therefore, construction of the proposed project would not generate excessive groundborne vibration levels, and the impact of groundborne vibration levels on off-site receptors would be **less than significant**.

5.3.2 - Operational Vibration Impacts

Implementation of the proposed project would not include any permanent sources that would expose persons in the project vicinity to groundborne vibration levels that could be noticeable without instruments at the lot line of the project. In addition, there are no existing significant permanent sources of groundborne vibration in the project vicinity. Therefore, project operations would not generate excessive groundborne vibration levels or expose proposed uses to excessive groundborne vibration levels, and groundborne vibration impacts would be **less than significant**.

5.4 - Noise Levels from Airport Activity

A significant impact would occur if the proposed project would expose people residing or working in the project area to excessive noise levels for a project located within the vicinity of a private airstrip or an Airport Land Use Compatibility Plan, or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport.

The nearest airport to the project site is Riverside Municipal Airport, located approximately 2.8 miles east of the project site. Because of the distance from and orientation of the airport runways, the project site is located well outside of the 65 dBA CNEL airport noise contours. While aircraft noise is occasionally audible on the project site from aircraft flyovers, aircraft noise associated with nearby

¹⁴ Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.

airport activity would not expose people residing or working near the project site to excessive noise levels. Therefore, implementation of the proposed project would not expose persons residing or working in the project vicinity to noise levels from airport activity that would be in excess of normally acceptable standards for residential land use development, and there would be **no project impact** associated with airport noise.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix A:

Noise Modeling Data

THIS PAGE INTENTIONALLY LEFT BLANK

Mobile Construction Activity Noise Calculation

Receptor: Receiving residential property line		Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements									
No.	Equipment Description	Reference (dBA) 50 ft	Quantity	Usage factor[1]	Distance to Receptor	Ground Effect[2]	Shielding (dBA)[3]	Calculated (dBA)		Energy	
		Lmax						Lmax	Leq		
1	Grader	85	1	40	50	1	3	82.0	78.0	63395727.7	
2	Excavator	85	1	40	100	1	3	76.0	69.0	7924465.962	
3	Dozer	85	1	40	100	1	3	76.0	69.0	7924465.962	
4	Front End Loader	80	1	40	100	1	3	71.0	64.0	2505936.168	
5	Backhoe	80	1	40	100	1	3	71.0	64.0	2505936.168	
6											
7											
8											
9											
10											
							Lmax[4]	82	Leq	79	

Notes:

- [1] Percentage of time activity occurs each hour
- [2] Soft ground terrain between project site and receptor
- [3] Shielding due to terrain or structures
- [4] Calculated Lmax is the Loudest value.

