

# **Noise and Vibration Technical Study for the Temescal Canyon Road Residential Project**

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**Riverside County, California**

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**LIST OF ACRONYMS AND ABBREVIATIONS**

<b>Term</b>	<b>Definition</b>
ADT	Average Daily Traffic
ANSI	American National Standards Institute
CALGreen	California Green Building Standards Code
Caltrans	California Department of Transportation
CBC	California Building Code
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
County	County of Riverside
dB	decibels
dBA	A-weighted decibels
DNL	Day-Night Average Noise Level
ECORP	ECORP Consulting, Inc.
FHWA	Federal Highway Administration
FICON	Federal Interagency Committee on Noise
FTA	Federal Transit Administration
Hz	Hertz
In/sec	Inches per Second
$L_{dn}$	Day-Night Average Noise Level
$L_{eq}$	Equivalent Noise Level
$L_{max}$	the maximum A-weighted noise level during the measurement period
$L_{min}$	the minimum A-weighted noise level during the measurement period
LT	Long-term
N/A	Not Applicable
OSHA	Occupational Safety and Health Administration
PPV	Peak Particle Velocity
Project	Temescal Canyon Road Residential Project
RMS	Root Mean Square
SLM	Sound Level Meter
ST	Short-term
STC	Sound Transmission Class
TWA	Time-weighted Average
VdB	Vibration Velocity Level

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## **1.0 INTRODUCTION**

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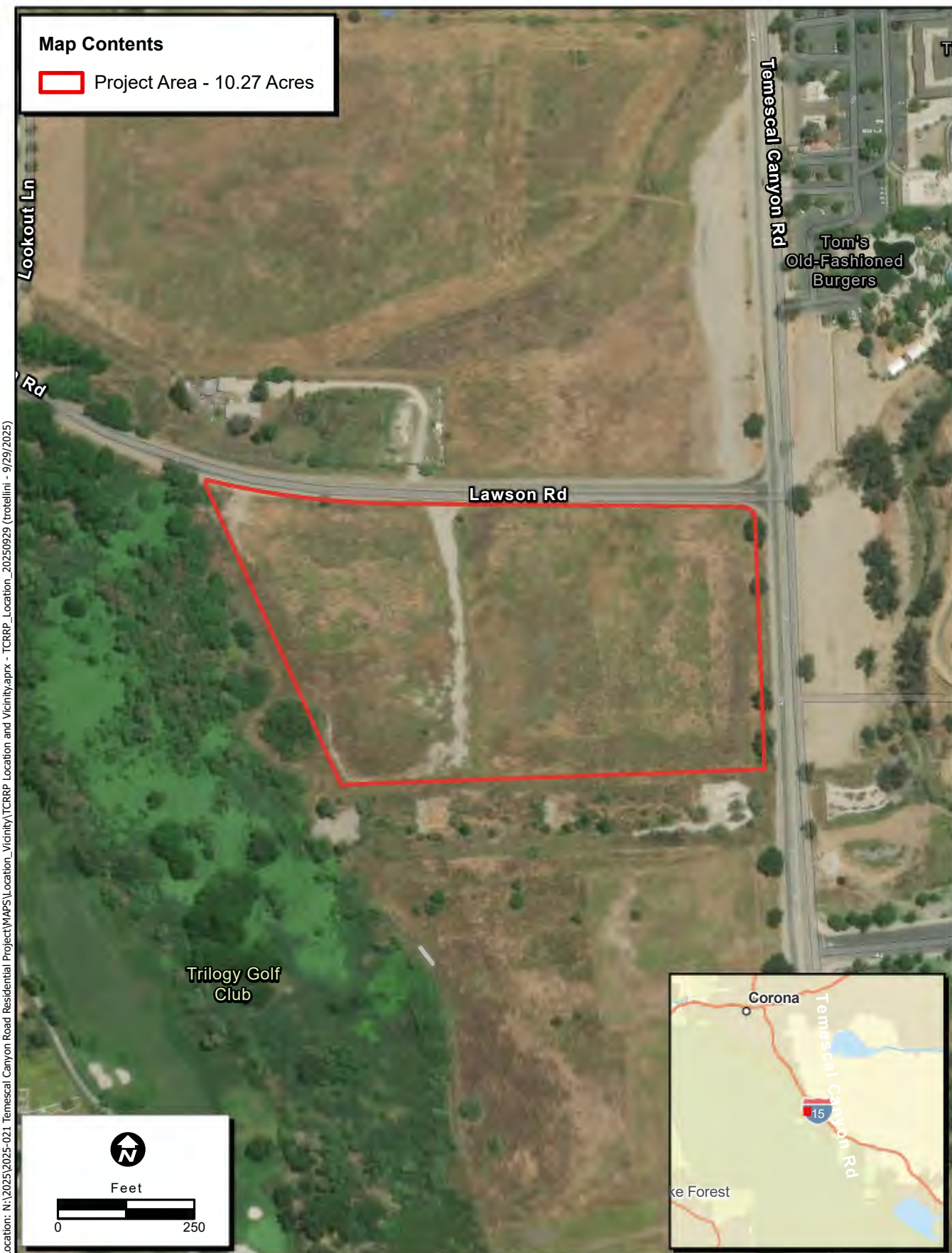
This Noise and Vibration Technical Study (Noise Study) has been prepared for the Temescal Canyon Road Residential Project (Proposed Project or Project). The Noise Study establishes existing baseline conditions through field noise measurements and evaluates the potential for future noise and groundborne vibration levels associated with the Project at surrounding sensitive receptors during the construction and operational phases. Predicted Project-generated noise levels are then compared to the applicable noise standards identified in the County of Riverside General Plan Noise Element and the County Municipal Code.

### **1.1 Project Description and Location**

The Project Site is located on an approximately 9.94-acre vacant parcel identified by Assessor Parcel Number 290-190-005 and is situated at the southwest corner of Lawson Road and Temescal Canyon Road in unincorporated Riverside County, California. The Project proposes to construct 85 single-family residential units with floor areas ranging from approximately 1,702 to 2,119 gross square feet (gsf), consisting of the following plans:

- 30 units – Plan 1 (~1,702 gsf, 3 bedrooms + loft or optional 4th bedroom, 2.5 baths)
- 27 units – Plan 2 (~1,975 gsf, 4 bedrooms + loft, 2.5 baths)
- 28 units – Plan 3 (~2,119 gsf, up to 5 bedrooms, 3.5 baths)

The Project also would construct new internal residential streets and associated infrastructure. As shown in Figure 1, the Project Site is currently undeveloped, characterized by relatively flat terrain, and bounded by Lawson Road to the north, Temescal Canyon Road to the east, Trilogy Golf Course to the west, and undeveloped land to the south.



**Figure 1. Project Location**

## **2.0 ENVIRONMENTAL NOISE AND GROUNDBORNE VIBRATION ANALYSIS**

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### **2.1 Fundamentals of Noise and Environmental Sound**

Sound is the propagation of pressure fluctuations through an acoustic medium, most commonly air. These fluctuations are characterized by frequency, expressed in hertz (Hz), and amplitude, which corresponds to intensity or loudness. When such sound is unwanted or interferes with human activity, it is classified as noise. Noise sources may be point sources, such as stationary mechanical equipment, or line sources, such as roadways and rail. A point source radiates sound spherically, with levels decreasing at least 6 dB per doubling of distance in free-field conditions, while a line source spreads cylindrically, with levels decreasing at least 3 dB per doubling of distance. In environmental acoustics, the source–path–receiver framework is used to describe how sound is generated at the source, transmitted along a path, and ultimately perceived at the receiver.

#### **2.1.1 Decibels Scale and Addition**

The decibel (dB) scale is logarithmic rather than linear, therefore sound levels cannot be added or subtracted arithmetically. Because the human ear does not perceive all frequencies equally, sound is often measured using an A-weighted scale (dBA), which emphasizes the mid-range frequencies where human hearing is most sensitive and de-emphasizes very low or very high frequencies to which human hearing is less sensitive. On this scale, a 10-dBA increase represents a tenfold increase in acoustic energy and is generally perceived as twice as loud. For example, 70 dBA is perceived as twice as loud as 60 dBA and half as loud as 80 dBA. When two sources of equal loudness are combined, the total level increases by about 3 dBA (e.g., two lawn mowers operating side by side at 65 dBA each would produce a combined level of 68 dBA, not 130 dBA).

#### **2.1.2 Noise Descriptors**

Several noise descriptors have been developed to analyze and quantify community noise and its potential effects on people. Because environmental noise fluctuates over time, noise descriptors account for both the total acoustical energy content of the noise and the time of day when the noise occurs, which influences how noise is experienced by people. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise include the Equivalent Noise Level ( $L_{eq}$ ) as well as the Day-Night Average Noise Level ( $L_{dn}$ ) and Community Noise Equivalent Level (CNEL). Typical noise levels associated with common noise sources are depicted in Figure 2.

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
<u>Jet Fly-over at 300m (1000 ft)</u>	<b>110</b>	<u>Rock Band</u>
<u>Gas Lawn Mower at 1 m (3 ft)</u>	<b>100</b>	
<u>Diesel Truck at 15 m (50 ft), at 80 km (50 mph)</u>	<b>90</b>	<u>Food Blender at 1 m (3 ft)</u>
<u>Noisy Urban Area, Daytime</u>	<b>80</b>	<u>Garbage Disposal at 1 m (3 ft)</u>
<u>Gas Lawn Mower, 30 m (100 ft)</u>	<b>70</b>	<u>Vacuum Cleaner at 3 m (10 ft)</u>
<u>Commercial Area</u>		<u>Normal Speech at 1 m (3 ft)</u>
<u>Heavy Traffic at 90 m (300 ft)</u>	<b>60</b>	<u>Large Business Office</u>
<u>Quiet Urban Daytime</u>	<b>50</b>	<u>Dishwasher Next Room</u>
<u>Quiet Urban Nighttime</u>	<b>40</b>	<u>Theater, Large Conference Room (Background)</u>
<u>Quiet Suburban Nighttime</u>		<u>Library</u>
<u>Quiet Rural Nighttime</u>	<b>30</b>	<u>Bedroom at Night,</u>
	<b>20</b>	<u>Concert Hall (Background)</u>
	<b>10</b>	<u>Broadcast/Recording Studio</u>
<u>Lowest Threshold of Human Hearing</u>	<b>0</b>	<u>Lowest Threshold of Human Hearing</u>

Source: California Department of Transportation (Caltrans) 2020a

**Figure 2. Common Noise Levels**



Table 2-1 provides a list of other common acoustical descriptors.

<b>Table 2-1. Common Acoustical Terms and Descriptors</b>	
<b>Descriptor</b>	<b>Definition</b>
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micropascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micropascals (or 20 micronewtons per square meter), where 1 pascal is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micropascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level (dBA)	The sound pressure level in decibels is measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level ( $L_{eq}$ )	The average acoustic energy content of noise for a stated period of time. Thus, the $L_{eq}$ of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
$L_{max}$ , $L_{min}$	The maximum and minimum A-weighted noise level during the measurement period.
$L_n$ ( $L_{01}$ , $L_{10}$ , $L_{50}$ , $L_{90}$ )	The A-weighted noise levels exceeded n-th percentage (e.g., 1%, 10%, 50%, 90%) of the time during the measurement period.
Day-Night Average Noise Level ( $L_{dn}$ or DNL)	A 24-hour average $L_{eq}$ with a 10 dBA "penalty" added to measured noise levels during the hours of 10:00 p.m. to 7:00 a.m. to account for nighttime noise sensitivity. The logarithmic effect of these additions is that a 60 dBA 24-hour $L_{eq}$ would result in a measurement of 66.4 dBA $L_{dn}$ .
Community Noise Equivalent Level (CNEL)	A 24-hour average $L_{eq}$ with a 5 dBA "penalty" during the hours of 7:00 p.m. to 10:00 p.m. and a 10 dBA "penalty" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for evening and nighttime noise sensitivity, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour $L_{eq}$ would result in a measurement of 66.7 dBA CNEL.
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 on its amplitude, duration, frequency, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.

The A-weighted decibel sound level scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events.

### **2.1.3 Sound Propagation and Attenuation**

Noise can be generated by a number of sources, including mobile sources such as automobiles, trucks and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Stationary noise sources are considered point sources and the acoustic energy propagates uniformly outward in a spherical pattern, and the sound level attenuates at a rate of approximately 6 dBA per doubling of distance from the source (Federal Highway Administration [FHWA] 2017a). Sound from a line source, such as a highway, propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound from line sources attenuate at a rate of approximately 3 dBA for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics (FHWA 2017a). No additional attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, and therefore, some models can account for additional ground-attenuation. For soft surfaces, an additional 1.5 dBA attenuation per doubling of distance is considered a reasonable assumption.

In addition to ground absorption, sound can also be attenuated by intervening structures; generally, a single row of detached buildings between the receptor and the noise source reduces the noise level by about 5 dBA (FHWA 2006), while a solid wall or berm generally reduces noise levels by 5 to 10 dBA (FHWA 2017b). Under favorable conditions noise barriers can reduce noise levels by up to 15 dBA. To achieve the most potent noise-reducing effect, a noise enclosure/barrier must physically fit in the available space, must completely break the "line of sight" between the noise source and the receptors, must be free of degrading holes or gaps, and must not be flanked by nearby reflective surfaces. Noise barriers are most effective when they are large enough to fully block the line of sight to the noise source and extend sufficiently in both length and height to minimize sound diffraction around the barrier. The limiting factor for a noise barrier is not the component of noise transmitted through the material, but rather the amount of noise flanking around and over the barrier. In general, barriers contribute to decreasing noise levels only when the structure breaks the line of sight between the source and the receiver.

Construction of older homes in California generally provides an exterior-to-interior noise reduction 20 to 25 dBA with closed windows (California Department of Transportation [Caltrans] 2002). Newer construction methods for residential homes generally provide an exterior-to-interior noise reduction of 30 dBA or more (Harris Miller, Miller & Hanson Inc. 2006). Therefore, an interior noise level of 45 dBA or less can typically be achieved in most homes with windows and doors closed when the exterior noise environment is 65 dBA CNEL or lower, which is the common residential interior noise standard.

Additional noise reduction can be achieved with the incorporation of an adequate forced air mechanical ventilation system in each residential building, and standard thermal-pane residential windows/doors with a minimum rating of Sound Transmission Class (STC) 28. In exterior noise environments greater than 65

dB(A) CNEL, a combination of forced-air mechanical ventilation and sound-rated construction methods is often required to meet the interior noise standards.

Achieving the required exterior-to-interior noise standards is feasible in environments below 75 dB(A) CNEL through proper wall construction consistent with California Building Code methods, the selection of appropriate windows and doors, and the incorporation of forced air mechanical ventilation systems.

#### **2.1.4 Human Response to Noise**

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL or  $L_{dn}$  is below 60 dB(A), moderate in the 60 to 70 dB(A) range, and high above 70 dB(A). Examples of low daytime levels are isolated, natural settings with noise levels as low as 20 dB(A) and quiet, suburban, residential streets with noise levels around 40 dB(A). Noise levels above 45 dB(A) at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dB(A)) and commercial locations (typically 60 dB(A)). People may consider louder environments adverse, but most will accept the higher levels associated with noisier urban residential or residential-commercial areas (60 to 75 dB(A)) or dense urban or industrial areas (65 to 80 dB(A)). Human perception of changes in noise levels can be summarized as follows:

- Except in carefully controlled laboratory experiments, a change of 1 dB(A) cannot be perceived by humans.
- Outside of the laboratory, a 3-dB(A) change is considered a just-perceivable difference.
- A change in level of at least 5 dB(A) is required before any noticeable change in community response would be expected. An increase of 5 dB(A) is typically considered substantial.
- A 10-dB(A) change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

#### **2.1.5 Effects of Noise on People**

##### **2.1.5.1 Hearing Loss**

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Temporary hearing loss can result from excessive exposures to noise, with normal hearing returning after a period of quiet. A person who is exposed to ongoing elevated noise levels can eventually experience permanent hearing loss. Induced hearing loss can

also be due to a single event such as an explosion. The Occupational Safety and Health Administration (OSHA) has established a noise exposure standard to protect workers from the risk of hearing loss due to long-term exposure. The permissible exposure limit is a time-weighted average (TWA) of 90 dBA over an 8-hour workday. OSHA also sets a maximum allowable peak noise level of 140 dBA. For noise levels above 90 dBA, the allowable daily exposure time decreases as the noise level increases.

### **2.1.5.2 Annoyance**

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes of annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The  $L_{dn}$  as a measure of noise has been found to provide a valid correlation between noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources.

## **2.2 Fundamentals of Environmental Groundborne Vibration**

### **2.2.1 Vibration Sources and Characteristics**

Sources of groundborne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or manmade causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions).

FTA vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the Peak Particle Velocity (PPV); another is the Root Mean Square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

PPV is generally accepted as the most appropriate descriptor for evaluating the potential for building damage. For human response, however, an average vibration amplitude is more appropriate because it takes time for the human body to respond to the excitation (the human body responds to an average vibration amplitude, not a peak amplitude). Because the average particle velocity over time is zero, the RMS amplitude is typically used to assess human response. The RMS value is the average of the amplitude squared over time, typically over a 1-second period.

Table 2-2 displays the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in the table should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations can cause secondary effects such as the rattling of windows, doors, or stacked dishes. The rattling sound can give rise to vibration complaints, even though there is little risk of actual structural damage. In high-noise environments, where groundborne vibration approach

perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Groundborne vibration can be a concern in instances where buildings shake, and substantial rumblings occur. However, it is unusual for vibration from typical urban sources such as buses and heavy trucks to be perceptible. For instance, heavy-duty trucks generally generate groundborne vibration velocity levels of 0.006 PPV at 50 feet under typical circumstances, which as identified in Table 2-2 is considered very unlikely to cause damage to buildings of any type. Common sources for groundborne vibration are planes, trains, and construction activities, such as earthmoving, which requires the use of heavy-duty earth moving equipment.

<b>Table 2-2. Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels</b>			
<b>Peak Particle Velocity (inches/second)</b>	<b>Approximate Vibration Velocity Level (VdB)</b>	<b>Human Reaction</b>	<b>Effect on Buildings</b>
0.006–0.019	64–74	Range of threshold of perception	Vibrations unlikely to cause damage of any type
0.08	87	Vibrations readily perceptible	Threshold at which there is a risk of architectural damage to extremely fragile historic buildings, ruins, ancient monuments
0.10	92	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities	Threshold at which there is a risk of architectural damage to fragile buildings. Virtually no risk of architectural damage to normal buildings
0.25	94	Vibrations may begin to annoy people in buildings	Threshold at which there is a risk of architectural damage to historic and some old buildings
0.30	96	Vibrations may begin to feel severe to people in buildings	Threshold at which there is a risk of architectural damage to older residential structures
0.50	103	Vibrations considered unpleasant by people subjected to continuous vibrations	Threshold at which there is a risk of architectural damage to new residential structures and Modern industrial/commercial buildings

Source: California Department of Transportation 2020b

### 3.0 EXISTING ENVIRONMENTAL NOISE SETTING

#### 3.1 Existing Ambient Noise Environment

Noise monitoring was performed using a Larson Davis LxT SE and a Soft dB Piccolo II sound level meter (SLM), which meet American National Standards Institute (ANSI) requirements for Type 1 and Type 2 instrumentation, respectively. The SLMs were set to 'slow' response and dBA weighting. The SLMs were calibrated before and after the monitoring period using a Larson Davis CAL200 Class I calibrator. All SLMs were placed at least 5 feet above ground level, 5 feet away from reflective surfaces, and fitted with a windscreen. Meteorological conditions during the survey were favorable for noise monitoring with temperatures of 63 degrees Fahrenheit, clear skies, and average wind speeds of less than 2 miles per hour.

To establish existing conditions, ECORP Consulting, Inc (ECORP) staff conducted an ambient noise monitoring survey Wednesday, January 29 through Thursday, January 30, 2025. The noise survey consisted of one short-term (15-minute) measurement and one long-term (24-hour) measurement. Short-term noise measurement location (ST -1) was next to the nearest residential receptor along Lawson Road and long-term noise measurement location (LT-1) was placed next to the Project Site, along Temescal Canyon Road. The long-term measurement was used to establish the existing CNEL. The primary source of noise in the vicinity of the Project Area is mobile noise generated by traffic on Temescal Canyon Road and Lawson Road. Measurement locations are illustrated in Figure 3.

<b>Table 3-1. Existing Ambient Noise Measurements</b>						
<b>Location Number</b>	<b>Location</b>	<b>CNEL</b>	<b>L<sub>eq</sub> dBA</b>	<b>L<sub>min</sub> dBA</b>	<b>L<sub>max</sub> dBA</b>	<b>Measurement Time Period</b>
<b>Short-Term Measurement (15-minute)</b>						
ST-1	Next to 24020 Lawson Road (Residence) 1/29/2025	N/A	67.3	42.1	83.5	3:29 p.m. – 3:44 p.m.
<b>Long-Term Measurement (24-hour)</b>						
LT-1	Next to Project Site along Temescal Canyon Road. 1/29/2025 – 1/30/2025	80.5	75.1	38.0	102.5	3:00 p.m. - 3:00 p.m.

Notes: dBA = A-weighted decibels; N/A = Not Applicable



**Figure 3. Approximate Noise Monitoring Locations**

## **3.2 Noise-Sensitive Land Uses**

Noise-sensitive land uses generally include receptors where noise exposure could result in adverse risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as historic sites, hotels, schools, health care centers, libraries, churches, senior homes, recreational areas, and cemeteries are also commonly considered sensitive to increases in exterior noise levels. The nearest noise-sensitive land use to the Project Site is a single-family residential receptor located directly north of the Project Site boundary across Lawson Road. Additional residential receptors are located further east, northwest, and southwest of the Project Site.

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## **4.0 REGULATORY FRAMEWORK**

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### **4.1 Federal**

#### **4.1.1 Federal Transit Administration**

The Federal Transit Administration (FTA) provides a guidance manual that contains procedures for predicting and assessing noise and vibration impacts of proposed transit projects. This manual acknowledges that noise and vibration are among the primary concerns of the surrounding communities. Project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the surrounding land use. The FTA provides guidelines that are typically considered applicable criteria for construction noise assessments in a California Environmental Quality Act (CEQA) analysis in the absence of local construction noise standards. The FTA identifies a daytime exterior construction noise level of 80 dBA  $L_{eq}$  for residential land uses.

#### **4.1.2 Federal Interagency Committee on Noise (FICON)**

The Federal Interagency Committee on Noise (FICON). The FICON studies assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The 2000 FICON findings provide guidance as to the significance of changes in ambient noise levels due to transportation noise sources. FICON recommendations are based on studies that relate aircraft and traffic noise levels to the percentage of people highly annoyed by the noise. FICON guidance considers a transportation noise source a substantial increase over existing conditions if:

- The existing ambient noise levels at noise-sensitive land uses are less than 60 dBA CNEL and the project results in a 5 dBA CNEL or greater increase;
- The existing noise levels are between 60 to 65 dBA CNEL and the project results in a 3 dBA CNEL increase or greater; or
- The existing noise levels exceed 65 dBA CNEL and the project results in a 1.5 dBA CNEL increase or greater.

## **4.2 State**

### **4.2.1 California Building Code**

The State of California provides a minimum standard for building design through Title 24, Part 2, of the California Code of Regulations, commonly referred to as the California Building Code (CBC). The CBC is updated every three years. It is generally adopted on a jurisdiction-by-jurisdiction basis, subject to further modification based on local conditions.

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

### **4.2.2 California Department of Transportation**

In 2020, Caltrans published the Transportation and Construction Vibration Manual (2020b). The manual provides general guidance on vibration issues associated with the construction and operation of projects concerning human perception and structural damage. Table 2-2 above presents recommendations for levels of vibration that could result in damage to structures exposed to continuous vibration.

## **4.3 Local**

### **4.3.1 County of Riverside General Plan Noise Element**

The Project Site is located within unincorporated Riverside County and therefore would potentially affect receptors within the County from onsite and offsite sources. The County Noise Element of the General Plan is a comprehensive program for including noise management in the planning process, providing a tool for planners to use in achieving and maintaining land uses that are compatible with existing and future environmental noise levels. The Noise Element identifies noise-sensitive land uses and noise sources and defines areas of noise impact for the purpose of developing programs to ensure that residents, and other noise-sensitive land uses in Riverside County will be protected from excessive noise.

The Noise Element of the County of Riverside's General Plan addresses noise-related issues within the community. This section contains goals and policies that are intended to protect noise-sensitive uses from excessive noise levels. The following policies are applicable to the Proposed Project:

- N 1.1:** Protect noise-sensitive land uses from high levels of noise by restricting noise-producing land uses from these areas. If the noise-producing land use cannot be relocated, then noise buffers such as setbacks, landscaping, or block walls shall be used.

**N 1.2:** Guide noise-tolerant land uses into areas irrevocably committed to land uses that are noise-producing, such as transportation corridors or within the projected noise contours of any adjacent airports.

**N 1.3:** Consider the following uses noise-sensitive and discourage these uses in areas in excess of 65 CNEL:

- Schools
- Hospitals
- Rest Homes
- Long Term Care Facilities
- Mental Care Facilities
- Residential Uses
- Libraries
- Passive Recreation Uses
- Places of Worship

According to the State of California Office of Planning and Research General Plan Guidelines, an acoustical study may be required in cases where these noise-sensitive land uses are located in an area of 60 CNEL or greater. Any land use that is exposed to levels higher than 65 CNEL will require noise attenuation measures.

Areas around airports may have different noise standards than those cited above. Each Area Plan affected by a public-use airport includes one or more Airport Influence Areas, one for each airport. The applicable noise compatibility criteria are fully set forth in Appendix L-1 [of the General Plan] and summarized in the Policy Area section of the affected Area Plan.

**N 1.4:** Determine if existing land uses will present noise compatibility issues with proposed projects by undertaking site surveys.

**N 1.5:** Prevent and mitigate the adverse impacts of excessive noise exposure on the residents, employees, visitors, and noise-sensitive uses of Riverside County.

**N 1.7:** Require proposed land uses, affected by unacceptably high noise levels, to have an acoustical specialist prepare a study of the noise problems and recommend structural and site design features that will adequately mitigate the noise problem.

**N 2.3:** Mitigate exterior and interior noises to the levels listed in Table N-2 [see Table 4-1] to the extent feasible, for stationary sources:

<b>Table 4-1. Stationary Source Land Use Noise Standards<sup>1</sup> (Residential)</b>		
<b>Time</b>	<b>Interior Standards</b>	<b>Exterior Standards</b>
10:00 p.m. to 7:00 a.m.	40 L <sub>eq</sub> (10 minute)	45 L <sub>eq</sub> (10 minute)

<b>Table 4-1. Stationary Source Land Use Noise Standards<sup>1</sup> (Residential)</b>		
<b>Time</b>	<b>Interior Standards</b>	<b>Exterior Standards</b>
7:00 a.m. to 10:00 p.m.	55 L <sub>eq</sub> (10 minute)	65 L <sub>eq</sub> (10 minute)

Notes: <sup>1</sup>These are only preferred standards; final decision will be made by the Riverside County Planning Department and Office of Public Health.

Source: County of Riverside Noise Element, December 2015

- N 4.1:** Prohibit facility-related noise received by any sensitive use from exceeding the following worst-case noise levels:
  - a. 45 dBA-10-minute L<sub>eq</sub> between 10:00 p.m. and 7:00 a.m.
  - b. 65 dBA-10-minute L<sub>eq</sub> between 7:00 a.m. and 10:00 p.m.
- N 4.2:** Develop measures to control non-transportation noise impacts.
- N 4.3:** Ensure any use determined to be a potential generator of significant stationary noise impacts be properly analyzed and ensure that the recommended mitigation measures are implemented.
- N 4.5:** Encourage major stationary noise-generating sources throughout the County of Riverside to install additional noise buffering or reduction mechanisms within their facilities to reduce noise generation levels to the lowest extent practicable prior to the renewal of conditional use permits or business license or prior to the approval and/or issuance of new conditional use permits for said facilities.
- N 12.1:** Utilize natural barrier such as hills, berms, boulders, and dense vegetation to assist in noise reduction.
- N 13.1:** Minimize the impacts of construction noise on adjacent uses within acceptable practices.
- N 13.2:** Ensure that construction activities are regulated to establish hours of operation in order to prevent and/or mitigate the generation of excessive or adverse noise impacts on surrounding areas.
- N 13.4:** Require that all construction equipment utilizes noise reduction features (e.g., mufflers and engine shrouds) that are no less effective than those originally installed by the manufacturer.
- N 14.4:** Consider and, when necessary, to lower noise to acceptable limits, require noise barriers and landscaped berms.
- N 14.8:** Review all development applications for consistency with the standards and policies of the Noise Element of the General Plan.
- N 16.2:** Consider the following land uses sensitive to vibration:

- Hospitals
- Residential areas
- Concert halls
- Libraries
- Sensitive research operations
- Schools
- Offices

**N 19.5:** Require new developments that have the potential to generate significant noise impacts to inform impacted users on the effects of these impacts during the environmental review process.

A discussion of Project consistency with the noise and land use compatibility standards in the County's General Plan Noise Element is provided in Appendix A for informational purposes.

#### **4.3.2 County of Riverside Municipal Code**

The County of Riverside regulations with respect to noise are also included in Title 9, *Public Peace, Morals, and Welfare*, Chapter 9.52, Noise Regulation, of the County's Code of Ordinances. Specifically, Section 9.52.020 exempts construction noise from private projects located within one-quarter of a mile from an inhabited dwelling provided that:

- Construction does not occur between the hours of 6:00 p.m. to 6:00 a.m. during the months of June through September, and
- Construction does not occur between the hours of 6:00 p.m. to 7:00 a.m. during the months of October through May

Additionally, Section 9.52.040, states that no person shall create any sound, or allow the creation of any sound, on any property that causes the exterior sound level on any other occupied property to exceed 55 dBA  $L_{max}$  between 7:00 a.m. to 10:00 p.m. (daytime) and 45 dBA  $L_{max}$  between 10:00 p.m. to 7:00 a.m. (nighttime) at all designated residential land uses by the General Plan.

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## 5.0 IMPACT ASSESSMENT

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### 5.1 Thresholds of Significance

The impact analysis provided below is based on the following California Environmental Quality Act Guidelines Appendix G thresholds of significance. The Project would result in a significant noise-related impact if it would result in the:

- 1) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- 2) Generation of excessive groundborne vibration or groundborne noise levels.
- 3) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

For the purposes of this analysis, Project construction noise is compared to the exempt hours established by the County and the FTA daytime construction noise criterion of 80 dBA  $L_{eq}$ . Project-related traffic noise increases are assessed against the FICON criteria. Project-related stationary noise is assessed and compared against the County's daytime and nighttime residential exterior noise standards of 55 and 45 dBA  $L_{max}$ , respectively.

The County does not regulate vibrations associated with construction. Therefore, the FTA construction vibration criterion of 0.2 inches per second (in/sec) peak particle velocity (PPV) for non-engineered timber and masonry buildings (applicable to residential structures) is used to assess the potential for architectural damage at the nearest off-site structures.

### 5.2 Methodology

This noise and vibration analysis is based on empirical observations and noise prediction modeling. Project construction equipment mix and phasing was generated using the California Emissions Estimator Model (CalEEMod). Noise levels generated by the construction equipment mix was then modeled using Federal Highway Administration's Roadway Construction Noise Model (FHWA 2006). On-site stationary noise sources associated with the Project were evaluated using reference noise measurements collected by ECORP and adjusted for distance to estimate noise levels at the nearest receptor. Project-related traffic noise increases were modeled using the Federal Highway Administration's RD-77-108 Traffic Noise Model (FHWA-RD-77-108) with data provided by TJW Engineering, Inc, including existing average daily traffic (ADT) volumes and Project daily trip generation (TJW Engineering, 2025). Other traffic model inputs such as speed, vehicle mix, and traffic distribution by day, evening, and night periods were based on the Riverside County General Plan, Noise Appendix I, required traffic noise modeling parameters. Groundborne vibration from construction activities was evaluated using reference levels published by the FTA.

## **5.3 Impact Analysis**

### **5.3.1 Would the Project Result in Short-Term Construction-Generated Noise in Excess of City Standards?**

#### **5.3.1.1 Construction Noise Analysis**

Construction noise typically occurs intermittently and varies depending on several factors, including the phase of construction (e.g., site preparation, excavation, paving), the type and number of equipment in use, equipment load and operating conditions, the distance to receptors, and the duration and timing of activity.

Project-related construction noise would primarily result from the operation of off-road equipment during onsite activities and from construction vehicle traffic on surrounding roadways. Construction equipment, including earth movers, pile drivers, and portable generators, can temporarily increase ambient noise levels. Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Other sources of construction noise would be random incidents, lasting seconds or generally less than one minute (e.g., dropping large pieces of equipment or hydraulic movement of machinery lifts).

In *King & Gardiner Farms, LLC v. County of Kern* (2020), the Fifth District Court of Appeal held that reliance solely on an absolute noise threshold was inadequate under CEQA because it failed to consider increases over existing ambient conditions and, therefore, did not provide a “complete picture” of the potential noise impacts. As such, Project-related construction noise levels were logarithmically combined with the existing noise environment.

#### **5.3.1.2 Project-Related Construction Noise**

As previously described, Section 9.52.020 of the County Code states that construction activities within one quarter mile of an inhabited dwelling must occur between 6:00 a.m. and 6:00 p.m. from June through September, and between 7:00 a.m. and 6:00 p.m. from October through May. Construction within these hours is exempt from the County’s noise ordinance. In order to remain compliant with the County’s regulations, construction activities would be required to operate within the allowable hours of construction.

Construction noise levels were modeled using the top three loudest pieces of equipment per construction phase, and by measuring the distance from the acoustical center of the Project Site to the nearest noise-sensitive receptor. This is in accordance with FTA guidance, which evaluates construction noise at sensitive receptors based on the distance from the acoustical center of the Project Site. This is because construction equipment is mobile and operates at various locations throughout the Project Site. The nearest residential receptor is approximately 550 feet north from the Project’s acoustical center, across Lawson Road. Average short-term construction noise levels at the nearest receptor for each phase of construction are presented in Table 5-1.

<b>Table 5-1. Average Construction Noise Levels at Nearest Receptors (dBA L<sub>eq</sub>)</b>					
<b>Construction Phase</b>	<b>Ambient Noise Level</b>	<b>Exterior Construction Noise Level Nearest Land Use</b>	<b>Existing Ambient Noise + Exterior Construction Noise Levels</b>	<b>FTA Construction Noise Standard</b>	<b>Exceeds Standards?</b>
<b>Residential Land Use</b>					
Site Preparation	67.3 <sup>1</sup>	64.0	69.0	80	No
Grading		63.7	68.9	80	No
Building Construction		63.1	68.7	80	No
Paving		65.0	69.3	80	No
Painting		52.9	67.5	80	No

Notes: dBA = A-weighted decibels.

<sup>1</sup> Ambient noise level in the residential land use area was estimated using the recorded L<sub>eq</sub> at Short-Term Measurement Location 1 as identified in Table 3-1. This location is the most representative of the noise environment at the residential area located north of the Project Site.

Source: Construction noise levels were calculated by ECORP Consulting, Inc. using the FHWA Roadway Noise Construction Model (FHWA 2006). Refer to Appendix B for Model Data Outputs.

As shown in Table 5-1, the Project’s contribution of construction noise combined with the ambient noise environment would not exceed the FTA’s daytime construction noise standard of 80 dBA L<sub>eq</sub> at the nearest residence during any phase of construction.

The next closest noise-sensitive residential receptor is located approximately 950 feet east of the Proposed Project across Temescal Canyon Road. Thus, further receptors would be exposed to even lower temporary construction noise levels than shown in Table 5-1.

**5.3.1.3 Offsite Construction Worker Trips**

Project construction would result in a temporary increase in traffic from worker and vendor trips on adjacent roadways. CalEEMod was also used to estimate the number of construction-related trips during construction activities. Based on CalEEMod outputs, the maximum number of construction trips traveling to and from the Project Site would be up to 41 daily trips (31 construction worker trips and 10 vendor trips) during a single construction phase.

The Project Site would be accessible via Lawson Road and Temescal Canyon Road. The Canyon Traffic Report prepared by TJW Engineering (2025), provided data for two study roadway segments: Temescal Canyon Road, north of Lawson Road, and Temescal Canyon Road between Lawson Road and Squaw Mountain Road. According to the Canyon Traffic Report, the existing ADT along these study roadway segments are 19,870 and 19,511, respectively. The Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol (2013) states that a doubling of traffic volumes on a roadway would result in a 3 dBA increase. The Project would not result in a doubling of existing traffic volumes along access roadways. The Project’s contribution of up to 41 temporary daily construction trips would result in less than 0.1 dBA

CNEL increase, which would be negligible. Additionally, construction-related trips are temporary and would cease upon completion of construction.

### **5.3.2 Would the Project Result in a Substantial Permanent Increase in Ambient Noise Levels in Excess of City Standards during Operations?**

#### **5.3.2.1 Operational Offsite Traffic Noise**

The Project is anticipated to generate 802 daily trips with varying distribution along Temescal Canyon Road and Lawson Road. However, this analysis conservatively assumes that all project-generated trips occur along each of the study roadway segments. The Canyon Traffic Report identified two study roadway segments: Temescal Canyon Road, north of Lawson Road and Temescal Canyon Road between Lawson Road and Squaw Mountain Road. As mentioned above, the existing ADT along these study roadway segments are 19,870 and 19,511, respectively.

To estimate traffic noise increases attributable to the Project, *existing no project* and *existing plus project* (existing ADT plus 802 daily trips) ADT volumes were modeled using the FHWA-RD-77-108 Traffic Noise Model, with inputs including speed, vehicle mix, and traffic distribution by day, evening, and night periods. Traffic model inputs for speed, vehicle mix, and traffic distribution were based on the Riverside County General Plan, Noise Appendix I, required traffic noise modeling parameters.

As discussed in Section 4.1.2 of this Noise Study, FICON criteria establish that in existing noise environments above 65 dBA CNEL, a traffic noise increase of 1.5 dBA CNEL or greater is considered significant. As shown in Table 3-1, the existing CNEL measured along Temescal Canyon Road was 80.5 dBA. Modeling results indicate that traffic from the Project would increase roadway noise levels by 0.2 dBA CNEL. Therefore, the Project would not exceed the FICON significance threshold. All modeling inputs and results are provided in Appendix B of this report.

#### **5.3.2.2 On-site Stationary Noise**

The Project proposes to construct 85 single-family residential units. The main noise source generated from the proposed residential development would be mechanical equipment, such as heating, ventilation, and air conditioning (HVAC) units. Reference field noise measurements conducted by ECORP, mechanical HVAC equipment generates noise levels of less than 45 dBA at a distance of 20 feet. The nearest sensitive receptor to the Project Site is an existing single-family home located approximately 120 feet to the north (as measured from the Project Site boundary, not center), across Lawson Road. At this distance, HVAC-related noise would attenuate to approximately 31.4 dBA, assuming standard point source attenuation (a reduction of 6 dBA per doubling of distance). Therefore, the HVAC noise from the Project would not exceed the County's exterior residential daytime and nighttime noise standards of 55 dBA 45 dBA, respectively.

### 5.3.3 Would the Project Expose Structures to Substantial Groundborne Vibration during Construction?

Increases in groundborne vibration levels attributable to the Project would be primarily associated with short-term construction-related activities. Construction on the Project Site would have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and the operations involved. Groundborne vibration generated by construction equipment spreads through the ground and diminishes in magnitude with distance from the source. Excessive construction-related vibration is normally associated with impact equipment such as impact pile drivers, jackhammers, and heavy-duty construction equipment (e.g., large dozers and other earth moving machinery). However, impact pile driving is not anticipated for the construction of the proposed 85 single-family residential units.

The County does not regulate or have a numeric threshold for construction-related vibration. Therefore, the FTA construction vibration criterion of 0.2 in/sec PPV for non-engineered timber and masonry buildings is used to assess potential architectural damage to surrounding structures. The nearest structure to the Project Site is a single-family home approximately 120 feet north of the Project Site boundary, across Lawson Road. Table 5-2 presents FTA reference vibration levels at 25 feet, along with attenuated levels at the nearest off-site structure located 120 feet away.

<b>Table 5-2. Construction Vibration Levels at Nearest Receptor</b>			
	<b>Vibration Levels in in/sec PPV</b>		
<b>Construction Vibration Levels at Nearest Receptor</b>	<b>Construction Vibration Levels at Nearest Receptor</b>	<b>Construction Vibration Levels at Nearest Receptor</b>	<b>Construction Vibration Levels at Nearest Receptor</b>
Vibratory Roller	0.21	0.020	No
Clam Shovel	0.202	0.019	No
Hoe Ram/ Large Bulldozer/ Caisson Drilling	0.089	0.008	No
Loaded Trucks	0.089	0.008	No
Jackhammer	0.089	0.008	No
Small Bulldozer	0.076	0.007	No

Notes: PPV = Peak particle velocity; In/sec = Inches per second  
<sup>1</sup>FTA vibration attenuation equation = [PPV<sub>equip</sub> = PPV<sub>ref</sub> x (25/D)<sup>1.5</sup>].

Source: FTA 2018.

As shown in Table 5-2, vibration from onsite construction activities would not exceed 0.2 in/sec PPV at the nearest off-site structure. Therefore, the Project would not generate excessive vibration to offsite receptors. Vibration attenuation calculations are found in Appendix B.

#### **5.3.4 Would the Project Expose Structures to Substantial Groundborne Vibration during Operations?**

The Project involves the construction and operation of single-family residential units and does not include the types of stationary equipment (e.g., chillers, crushers) typically associated with certain industrial operations that can generate substantial groundborne vibration. The Project also does not involve rail operations, blasting, or other activities that could generate substantial groundborne vibration. Therefore, the Project would not generate excessive groundborne vibration.

#### **5.3.5 Would the Project Expose People Residing or Working on the Project Site to Excessive Airport Noise?**

The Project Site is located approximately 10.5 miles southeast of the Corona Municipal Airport. It is located outside all noise-level contour boundaries for the Corona Municipal Airport (County of Riverside 2018). Therefore, the Proposed Project would not expose people working or residing on the Project Site to excessive airport noise.

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## **LIST OF APPENDICES**

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Appendix A – Project Land Use Compatibility Discussion

Appendix B – Technical Analysis Appendix

Project Land Use Compatibility Discussion

## **Appendix A: Noise and Land Use Compatibility Discussion**

As a result of the California Supreme Court decision in *California Building Industry Association v. Bay Area Air Quality Management District* (62 Cal.4th 369, No. S213478, December 17, 2015), the CEQA process generally does not require evaluation of the environment's impact on a project. While the development of new sensitive land uses near existing noise sources could expose future residents to elevated noise levels, CEQA focuses on the Proposed Project's effects on the environment, not the environment's effects on the Project. Therefore, this noise and land use compatibility discussion is provided for informational purposes.

Table N-1 of the County's General Plan Noise Element establishes community noise exposure standards in terms of dBA CNEL by land use category. These standards are applicable to new projects and function as a tool to gauge the compatibility of new land uses relative to existing noise levels. Existing noise environments are classified as "normally acceptable," "conditionally acceptable," "normally unacceptable," or "clearly unacceptable" depending on the land use category. The Proposed Project would be considered a new residential land use under the umbrella of residential-low density single family, duplex, mobile homes, and multi-family. According to the General Plan Noise Element the following are the applicable residential community exposure standards:

1. Normally Acceptable, 50 to 60 dBA CNEL: Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
2. Conditionally Acceptable, 60 to 70 dBA CNEL: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment will seem noisy.
3. Normally Unacceptable, 70 to 75 dBA CNEL: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.
4. Clearly Unacceptable, 75 to 85 dBA CNEL: New construction or development should generally not be undertaken. Constructor costs to make the indoor environment would be prohibitive and the outdoor environment would not be usable.

A long-term noise measurement conducted on the Project Site from January 29 to January 30, 2025, identified an ambient noise level of 80.5 dBA CNEL, as shown in Table 3-1. This measurement was taken approximately 32 feet from the centerline of nearest southbound travel lane along Temescal Canyon Road (east of the Project Site boundary). The distance to the nearest proposed homes on the Project Site from the roadway (Temescal Canyon Road) centerline is 44 feet. At that distance noise levels would attenuate to 79.1 dBA CNEL. The distance to the furthest proposed homes from the main roadway is approximately 820 feet. At that distance noise levels would attenuate to 66.4 dBA CNEL. The Project Site's land use compatibility

would vary between “Conditionally Acceptable” to “Clearly Unacceptable” depending on the proposed residential units set back from the major roadway.<sup>1</sup>

To improve land use compatibility and reduce potential noise exposure for future residents, project design should incorporate noise attenuation strategies consistent with the County’s General Plan policy. General noise reduction strategies include the installation of sound walls, which can reduce traffic noise levels by 5 to 10 dBA, depending on height, materials, and design.<sup>2</sup> Additionally, arranging the site layout to place non-sensitive uses (e.g., parking lots, access roads, or open space) between roadways and residential units provides additional noise attenuation due to distance. Where feasible, orienting buildings so that non-habitable facades face the roadway can help shield private outdoor and indoor spaces. Implementing building construction techniques such as enhanced wall assemblies, higher sound-rated windows, and mechanical ventilation systems to allow for closed-window conditions would also help ensure interior noise levels meet County and State standards.

As stated in the General Plan Noise Element, many land uses emit noise above state-mandated acceptable levels. Noise emitted from these uses must be mitigated to acceptable indoor and outdoor levels in order for more noise-sensitive land uses to be located nearby. The County’s General Plan contains policies requiring design features and/or mitigation measures to minimize noise impacts and ensure compliance with the Land Use Compatibility for Community Noise Exposure standards. These policies include:

**General Plan Policy N1.7.** Requires proposed land uses, affected by unacceptably high noise levels, to have an acoustical specialist prepare a study of the noise problems and recommend structural and site design features that will adequately mitigate the noise problem.

**General Plan Policy N2.2.** Require a qualified acoustical specialist to prepare acoustical studies for proposed noise-sensitive projects within noise impacted areas to mitigate existing noise.

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<sup>1</sup> Line noise source attenuation formula:  $L_p(R2) = L_p(R1) - 10 \cdot \log_{10}(R2/R1)$ .

<sup>2</sup> FHWA

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## **APPENDIX B**

Technical Analysis Appendix

Roadway Construction Noise Model (RCNM), Version 1.1

Report date 9/25/2025

Case Descr Temescal Canyon Road Residential Project: 01 Site Preparation

---- Receptor #1 ----

Baselines (dBA)

Description Land Use	Daytime	Evening	Night
Receptor at Residential	60	55	50

Equipment

Description	Impact Device	Usage(%)	Spec	Actual	Receptor	Estimated
			Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Tractor	No	40	40	84	550	0
Tractor	No	40	40	84	550	0
Tractor	No	40	40	84	550	0

Results

Equipment	Calculated (dBA)			Noise Limits (dBA)				
	*Lmax	Leq	Day Lmax	Evening		Night		
				Lmax	Leq	Lmax	Leq	
Tractor	63.2	59.2	N/A	N/A	N/A	N/A	N/A	
Tractor	63.2	59.2	N/A	N/A	N/A	N/A	N/A	
Tractor	63.2	59.2	N/A	N/A	N/A	N/A	N/A	
Total	63.2	64	N/A	N/A	N/A	N/A	N/A	

\*Calculated Lmax is the Loudest value.

Noise Limit Exceedance (dBA)

	Day		Evening		Night	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM), Version 1.1

Report date 9/25/2025

Case Descr Temescal Canyon Road Residential Project: 05 Painting

---- Receptor #1 ----

Baselines (dBA)

Description Land Use	Daytime	Evening	Night
Receptor at Residential	60	55	50

Equipment

Description	Impact Device	Usage(%)	Spec	Actual	Receptor	Estimated
			Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Grader	No	40	40	85	550	0
Dozer	No	40	40		81.7 550	0
Tractor	No	40	40	84	550	0

Results

Equipment	Calculated (dBA)			Noise Limits (dBA)			
	*Lmax	Leq	Day	Evening			Night
			Lmax	Leq	Lmax	Leq	Lmax
Grader	64.2	60.2	N/A	N/A	N/A	N/A	N/A
Dozer	60.8	56.9	N/A	N/A	N/A	N/A	N/A
Tractor	63.2	59.2	N/A	N/A	N/A	N/A	N/A
Total	64.2	63.7	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

Noise Limit Exceedance (dBA)

	Day		Evening		Night	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date 9/25/2025

Case Descr Temescal Canyon Road Residential Project: 02 Grading

---- Receptor #1 ----

Baselines (dBA)

Description Land Use	Daytime	Evening	Night
Receptor at Residential	60	55	50

Equipment

Description	Impact Device	Usage(%)	Spec	Actual	Receptor	Estimated
			Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Generator	No	50		80.6	550	0
Tractor	No	40	84		550	0
Gradall	No	40		83.4	550	0

Results

Equipment	Calculated (dBA)			Noise Limits (dBA)				
	*Lmax	Leq	Day Lmax	Evening		Night		
				Leq	Lmax	Leq	Lmax	
Generator	59.8	56.8	N/A	N/A	N/A	N/A	N/A	
Tractor	63.2	59.2	N/A	N/A	N/A	N/A	N/A	
Gradall	62.6	58.6	N/A	N/A	N/A	N/A	N/A	
Total	63.2	63.1	N/A	N/A	N/A	N/A	N/A	

\*Calculated Lmax is the Loudest value.

Noise Limit Exceedance (dBA)

	Day		Evening		Night	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM), Version 1.1

Report date 9/25/2025

Case Descr Temescal Canyon Road Residential Project: 04 Paving

---- Receptor #1 ----

Baselines (dBA)

Description Land Use	Daytime	Evening	Night
Receptor at Residential	60	55	50

Equipment

Description	Impact Device	Usage(%)	Spec	Actual	Receptor	Estimated
			Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Paver	No	50		77.2	550	0
Pavement Scarafier	No	20		89.5	550	0
Pavement Scarafier	No	20		89.5	550	0

Results

Equipment	Calculated (dBA)			Noise Limits (dBA)			
	*Lmax	Leq	Day	Evening			Night
			Lmax	Leq	Lmax	Leq	Lmax
Paver	56.4	53.4	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	68.7	61.7	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	68.7	61.7	N/A	N/A	N/A	N/A	N/A
Total	68.7	65	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

Noise Limit Exceedance (dBA)

	Day		Evening		Night	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM), Version 1.1

Report date 9/25/2025

Case Descr Temescal Canyon Road Residential Project: 05 Painting

---- Receptor #1 ----

Baselines (dBA)

Description Land Use	Daytime	Evening	Night
Receptor at Residential	60	55	50

Equipment

Description	Impact Device	Usage(%)	Spec	Actual	Receptor	Estimated
			Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Compressor (air)	No	40		77.7	550	0

Results

Equipment	Calculated (dBA)			Noise Limits (dBA)			
	*Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax
Compressor (air)	56.8	52.9	N/A	N/A	N/A	N/A	N/A
Total	56.8	52.9	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

Noise Limit Exceedance (dBA)

	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

## Temescal Canyon - Vibration Damage Attenuation Calculations

Levels, PPV (in/sec)

FTA Vibration Reference		
	Level at 25 feet	Receptor to North
<i>Distance in feet</i>		<i>120</i>
Vibratory Roller	0.21	0.020
Clam shovel	0.202	0.019
Hoe Ram	0.089	0.008
Large Bulldozer	0.089	0.008
Caisson Drilling	0.089	0.008
Loaded Trucks	0.076	0.007
Jackhammer	0.035	0.003
Small Bulldozer	0.003	0.000

Federal Highway RD 77-108 Traffic Noise Model

Existing

Roadway	Segment	Traffic Model Inputs												Traffic Model Ouputs					
														100 feet			Distance to CNEL Contour		
		ADT	Posted Speed Limit	Grade	% Autos	% Med Trucks	% Heavy Trucks	% Daytime	% Evening	% Night	Number of Lanes	Site Condition	Distance to Reciever	L <sub>eq-24hr</sub>	L <sub>dn</sub>	CNEL	70 dBA	65 dBA	60 dBA
Temescal Canyon Road	North of Lawson Road	19,870	40	0.0%	92.0%	3.0%	5.0%	73.3%	13.1%	13.6%	4	Hard	50	69.0	72.4	73.0	99	313	989
Temescal Canyon Road	Lawson Road to Squaw Mountain Road	19,511	40	0.0%	92.0%	3.0%	5.0%	73.3%	13.1%	13.6%	4	Hard	50	68.9	72.4	72.9	97	307	971

Federal Highway RD 77-108 Traffic Noise Model

Existing Plus Project

Roadway	Segment	Traffic Model Inputs												Traffic Model Ouputs					
														100 feet			Distance to CNEL Contour		
		ADT	Posted Speed Limit	Grade	% Autos	% Med Trucks	% Heavy Trucks	% Daytime	% Evening	% Night	Number of Lanes	Site Condition	Distance to Reciever	L <sub>eq-24hr</sub>	L <sub>dn</sub>	CNEL	70 dBA	65 dBA	60 dBA
Temescal Canyon Road	North of Lawson Road	20,672	40	0.0%	92.0%	3.0%	5.0%	73.3%	13.1%	13.6%	4	Hard	50	69.1	72.6	73.1	103	325	1029
Temescal Canyon Road	Lawson Road to Squaw Mountain Road	20,313	40	0.0%	92.0%	3.0%	5.0%	73.3%	13.1%	13.6%	4	Hard	50	69.1	72.5	73.1	101	320	1011

## Traffic Noise Increase Calculations

		ADT			Existing	Existing Plus Project	dBa CNEL Increase
		Existing	Project	Existing Plus Project	CNEL	CNEL	
Temescal Canyon Road	North of Lawson Road	19,870	802	20,672	72.96	73.13	0.2
Temescal Canyon Road	Lawson Road to Squaw Mountain Road	19,511	802	20,313	72.88	73.06	0.2

**Long-Term 24-Hour Noise Measurement Field Data Sheet**

Recorded By: <i>C. Ziminshi</i>	Date: <i>1/29/25 - 1/30/25</i>
Site Number: <i>LT-1</i>	Job Number: <i>2025-021</i>
Start Time: <i>3:00 1/29/25</i>	End Time: <i>3:00 1/30/25</i>
Location/Address: <i>Onsite, along Temescal canyon road</i>	
Primary Noise Source: <i>Temescal canyon Road - Traffic</i>	
Secondary Noise Source: <i>Distant Lawson Rd. traffic, distant RR crossing 3 distant heavy equipment to N/S</i>	

Equipment						
Category	Type	Vendor	Model	Serial No.	Cert. Date	Note
Sound	Sound Level Meter	Larson Davis	LxT SE	0006133	10/01/2024	✓
	Microphone	Larson Davis	377B02	346688	10/01/2024	✓
	Preamp	Larson Davis	PRMLxT1L	069947	09/30/2024	✓
	Calibrator	Larson Davis	CAL200	17325	10/03/2024	✓

Calibration Data	
Offset Before Measurement Period	Offset After Measurement Period
Calibration Time: <i>2:21 PM 1/29</i>	Calibration Time: <i>3:10 PM 1/30</i>
Calibration Offset (+): <i>-0.03</i>	Calibration Offset (+): <i>+0.01</i>

Weather Data				
Est.	Sky Conditions: <i>Clear</i>			
	Avg Wind Speed (mph)	Max Wind Speed	Temperature ° F	Humidity %
	<i>1.6</i>	<i>4.2</i>	<i>63°</i>	<i>94%</i>

CNEL/Ldn	Additional Field Notes

Manual Traffic Counts (15 minutes in both directions) <i>1/30/25 2:30 PM - 2:45 PM</i>		
Roadway Segment: <i>Temescal Canyon Rd, from Lawson Rd. to Squaw Mtn. Rd.</i>		
Autos	Medium Duty (2 axle 6 tires)	Heavy Duty (3+ axle)
<i>216</i>	<i>4</i>	<i>22</i>

Photo(s) of Measurement Location



**Short-Term 15-Minute Noise Measurement Field Data Sheet**

Recorded By: <i>C. Uminski</i>	Date: <i>1/30/25</i>
Site Number: <del>ST-2</del> <i>ST-1</i>	Job Number: <i>2025-021</i>
Start Time: <i>3:29 PM</i>	End Time: <i>3:44 PM</i>
Location/Address: <i>24020 Lawson Rd.</i>	
Primary Noise Source: <i>Lawson Rd. Traffic</i>	
Secondary Noise Source: <i>Temescal Canyon Rd. Traffic</i>	

Equipment						
Category	Type	Vendor	Model	Serial No.	Cert. Date	Note
Sound	Sound Level Meter	Larson Davis	LxT SE	0006133	10/01/2024	✓
	Microphone	Larson Davis	377B02	346688	10/01/2024	✓
	Preamp	Larson Davis	PRMLxT1L	069947	09/30/2024	✓
	Calibrator	Larson Davis	CAL200	17325	10/03/2024	✓

Calibration Data	
Offset Before Measurement Period	Offset After Measurement Period
Calibration Time: <i>3:21 PM 1/30</i>	Calibration Time: <i>3:47 PM 1/30</i>
Calibration Offset (+-): <i>+0.10</i>	Calibration Offset (+-): <i>-0.01</i>

Weather Data				
Est.	Sky Conditions: <i>Clear</i>			
	Avg Wind Speed (mph)	Max Wind Speed	Temperature ° F	Humidity %
	<i>0.9</i>	<i>1.7</i>	<i>65°</i>	<i>60%</i>

Noise Meter Data Outputs (dBA)			
Leq	Lmin	Lmax	Ln
<i>63.7</i>	<i>42.1</i>	<i>83.5</i>	

Manual Traffic Counts (15 minutes in both directions)		
Roadway Segment:		
Autos	Medium Duty (2 axle 6 tires)	Heavy Duty (3+ axle)
<i>34</i>	<i>3</i>	<i>2</i>

Photo(s) of Measurement Location



Long-term Measurement Location 1 (LT-1)  
Temescal Canyon Road, south of Lawson Road  
January 29 - 30th, 2025

