PACIFIC EMERALD TRACT 37904 SFR PROJECT
NOISE IMPACT STUDY
City of Perris

PACIFIC EMERALD TRACT 37904
SINGLE FAMILY RESIDENTIAL PROJECT
NOISE IMPACT STUDY
City of Perris, California

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

The purpose of this report is to review potential noise impacts and noise/land use compatibility for the proposed Pacific Emerald Tract 37904 Single Family Residential Development Project. This report also provides preliminary recommendations for building design and floor/wall/ceiling assemblies to meet the State of California and City of Perris interior noise standards.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- Identification of the regulatory setting and applicable noise standards
- Analysis of the existing noise environment
- Analysis of the project's operational noise impacts
- Analysis of the project's construction noise and vibration impact to adjacent sensitive receptors
- Summary of recommended mitigation measures and project design features to reduce noise level impacts.

1.2 Site Location

The proposed Pacific Emerald Tract 37904 Single Family Residential Development project site is located at the northeast corner of McPherson Road and Mountain Avenue, in the City of Perris, California. The project site is located approximately 1,530 feet above sea level and the topography is relatively uneven.

The project is located in Planning Area – 7 of the City of Perris General Plan Land Use Designation Map and is zoned for R-6000 Single Family Residential in the City of Perris Zoning Map and in the City of Perris General Plan Land Use Designation Map.

The primary sources of ambient noise at the project site include roadway noise from Mountain Avenue and McPherson Road as well as typical residential neighborhood noise from the existing residential homes surrounding the project site.

The project site location map is provided in Exhibit A.

1.3 Project Description

The proposed project consists of constructing and operating 201 dwelling units of age restricted (55+) senior adult detached housing on 40.40 acres. As part of the project design, six (6) foot noise barrier walls will be constructed along the property lines of the project site, shielding backyards from Mountain Avenue and McPherson Road. The project would provide half-width frontage improvements to McPherson Road, Mountain Avenue, and David Jones Road.

The site plan used for this analysis, provided by PACIFIC COMMUNITY BUILDER, INC., is illustrated in Exhibit B.

1.4 Recommended Mitigations Measures (MM)

The following recommended mitigation measures are provided to help ensure the project's construction and operational noise levels do not adversely impact the adjacent noise sensitive land uses:

MM-1 Obtain a construction work permit from the City of Perris prior to starting construction.

MM-2 The project shall post a sign in a readily visible location at the project site. All notices and signs shall indicate the dates and duration of construction activities, as well as provide a telephone number where residents can enquire about the construction process and register complaints to a designated construction noise disturbance coordinator.

MM-3 The project shall ensure all contractors implement construction best management practices to reduce construction noise levels. Best management practices would include the following:

- All construction equipment shall be equipped with muffles and other suitable noise attenuation devices (e.g., engine shields).
- Grading and construction contractors shall use quieter equipment as opposed to noisier equipment (such as rubber-tired equipment rather than track equipment), to the maximum extent feasible.

- If feasible, electric hook-ups shall be provided to avoid the use of generators. If electric service is determined to be infeasible for the site, only whisper-quiet generators shall be used (i.e., inverter generators capable of providing variable load.

- Use electric air compressors and similar power tools rather than diesel equipment, where feasible.

- Locate staging area, generators and stationary construction equipment as far from the adjacent residential homes as feasible.

- Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 5 minutes.

MM-4 The project shall build the proposed CMU block perimeter walls during the early phases of construction to help shield adjacent homes from construction noise.

MM-5 No impact pile driving activities shall be permitted on the project site during construction. If impact pile driving is required, a follow-up noise and vibration impact assessment shall be conducted and vibration monitoring program should be performed, prior to start of any pile driving activity.

1.5 Recommended Project Design Features (DF)

The following recommended project design features include standard rules and requirements, best practices and recognized design guidelines for reducing noise levels. Design features are assumed to be part of the conditions of the project and integrated into its design.

Operational Design Features

DF-1 A six (6) foot noise barrier wall will be provided to shield all habitable backyard areas facing exterior roadways and adjacent properties. The designed noise screening will only be accomplished if the barrier's weight is at least 3.5 pounds per square foot of face area without decorative cutouts or line-of-site openings between the shielded areas and the project site. All

gaps (except for weep holes) should be filled with grout or caulking to avoid flanking.

Noise control barrier may be constructed using one, or any combination of the following materials:

- Masonry block;
- Stucco veneer over wood framing (or foam core), or 1-inch thick tongue and groove wood of sufficient weight per square foot;
- Transparent glass (3/8-inch-thick), acrylic, polycarbonate, or other transparent material with sufficient weight per square foot.

DF-2 The project will be required to incorporate building construction techniques that achieve the minimum interior noise standard of 45 dBA CNEL for all residential units.

DF-3 For proper acoustical performance, all exterior windows, doors, and sliding glass doors shall have a positive seal and leaks/cracks must be kept to a minimum.

Construction Design Features

DF-5 Construction-related noise activities shall comply with the requirements set forth in the City of Perris Municipal Code Chapter 7.34:

1. It is unlawful for any person between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on a legal holiday, with the exception of Columbus Day and Washington's birthday, or on Sundays to erect, construct, demolish, excavate, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise. Construction activity shall not exceed 80 dBA in residential zones in the city.

2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used within the report.

2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic, or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines it loudness. The loudness of sound increases or decreases, as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter (N/m2), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels and abbreviated dB.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two (2) sounds of equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase.

If two (2) sounds differ by approximately 10 dB the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, (A-weighted scale) and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud[1]. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway), would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant, while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels. Following are the most commonly used noise descriptors along with brief definitions.

A-Weighted Sound Level

The sound pressure level in decibels as measured on a sound level meter using the A-weighted 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 response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level

The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

[1] Source: U.S. DOT Federal Highway Administration. Dec. 2011. Highway Traffic Noise: Analysis and Abatement Guidance.

Community Noise Equivalent Level (CNEL)

The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB)

A unit for measuring the amplitude of a 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, which is 20 micro-pascals.

dB(A)

A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ)

The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time varying noise level. The energy average noise level during the sample period.

Habitable Room

Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms, and similar spaces.

L(n)

The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 is the sound level exceeded 10 percent of the sample time. Similarly L50, L90 and L99, etc.

Noise

Any unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area

Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels

See L(n).

Sound Level (Noise Level)

The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

Sound Level Meter

An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL)

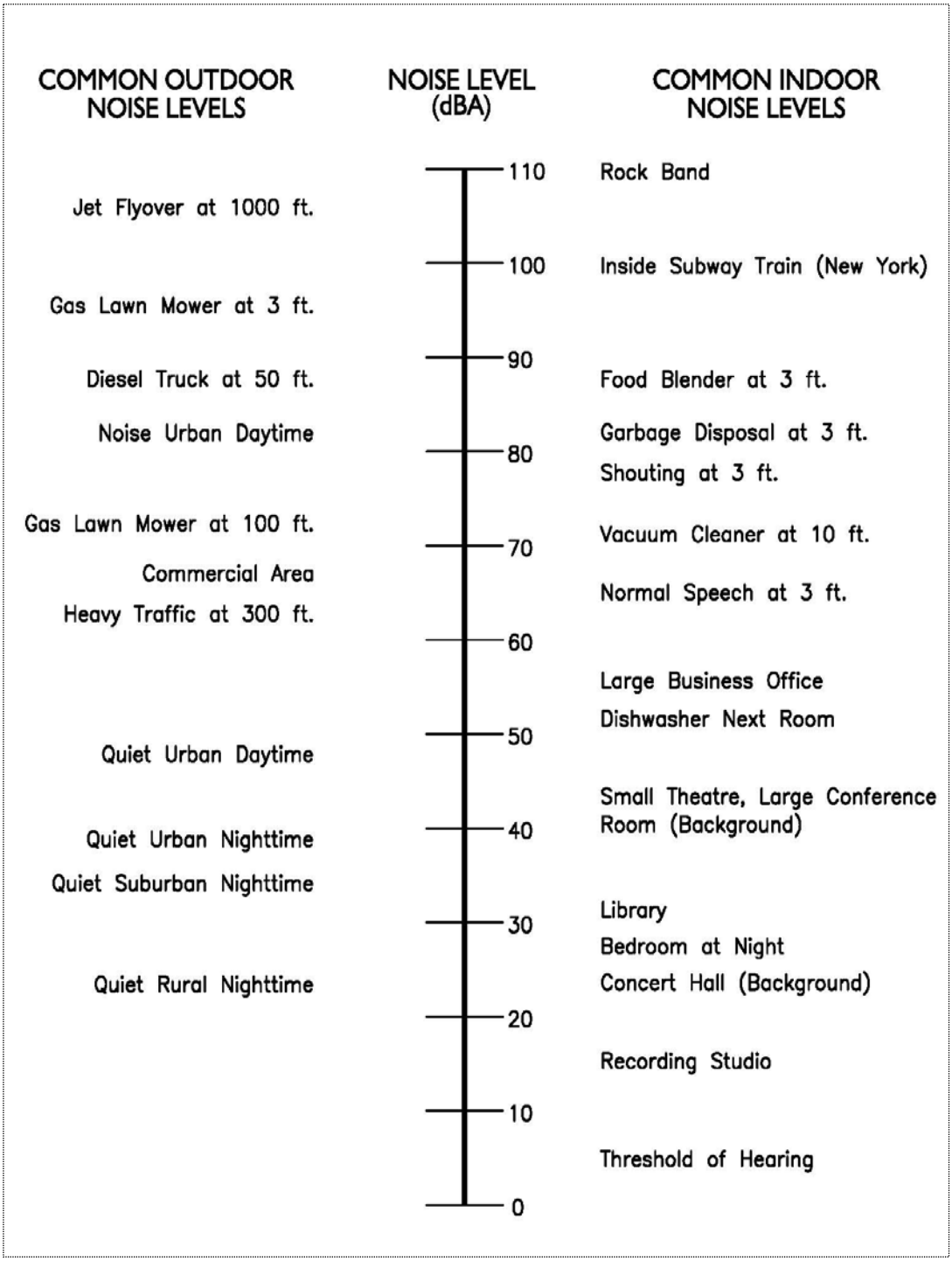
The dBA level which, if it lasted for one (1) second, would produce the same A-weighted sound energy as the actual event.

2.7 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at an additional rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 3 dB per doubling of distance for a line source and 6.0 dB per doubling of distance for a point source.

Figure 1
Typical Sound Levels from Indoor and Outdoor Noise Sources[2]



[2] Source: AASHSTO. 1993. Guide on Evaluation and Abatement of Traffic Noise

2.8 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne 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. Ground-borne noise is an effect of ground-borne vibration and only exists indoors since it is produced from noise radiated 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.

PPV

Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS

Known as the root mean squared (RMS) can be used to denote vibration amplitude.

VdB

A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

2.9 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor 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 ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

2.10 Vibration Propagation

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 wavefront, 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 wavefront. 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 wavefront. 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 but 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.

2.11 Construction Related Vibration Level Prediction

Operational activities are separated into two different categories. The vibration can be transient or continuous in nature. Each category can result in varying degrees of ground vibration, depending on the equipment used on the site. Operation of equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings in the vicinity of the project area site respond to these vibrations with varying results ranging from no perceptible effects at the low levels to slight damage at the highest levels. The thresholds from Caltrans Transportation and Construction Induced Vibration Guidance Manual in the table below provide general guidelines as to the maximum vibration limits for when vibration becomes potentially annoying.

Table 1
Vibration Annoyance Potential Criteria

Human Response	PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.90	0.10
Severe	2.00	0.40

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

The Caltrans Transportation and Construction Induced Vibration Guidance Manual provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts. The table below provides general vibration damage potential thresholds:

Table 2
Vibration Damage Potential Threshold Criteria

Structure and Condition	PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings ruin ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

Soil conditions have an impact on how vibration propagates through the ground. The Caltrans Transportation and Construction Induced Vibration Guidance Manual provides suggested "n" values based on soil class. The table below outlines the manual's suggested values and description.

Table 3
Suggested "n" Values Based on Soil Classes

Soil Class	Description of Soil Material	Suggested Value of "n"
I	Weak or soft soils: loose soils, dry or partially saturated peat and muck, mud, loose beach sand, and dune sand.	1.4
II	Most sands, sandy clays, silty clays, gravel, silts, weathered rock.	1.3
III	Hard soils: densely compacted sand, dry consolidated clay, consolidated glacial till, some exposed rock.	1.1
IV	Hard, component rock: bedrock, freshly exposed hard rock.	1.0

3.0 Regulatory Setting

The proposed project is located in the City of Perris and noise regulations are imposed by state and local government agencies. The applicable noise regulations are discussed below.

3.1 State of California Noise Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) 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." The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as a 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.

Noise insulation design standards for residences have been established by the State of California Uniform Building Code (UBC) Chapter 12, Division II and by the Title 24 noise insulation standards of the California Administrative Code. The City is required by the State Housing Law to adopt these State codes as minimum performance standards. The City may enact stricter noise standards throughout the city or on a case-by-case basis if deemed necessary. In brief, the Title 24 noise standards require the following for allowable interior noise levels:

1. Interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

3.2 City of Perris Noise Regulations

The City of Perris outlines their noise regulations and standards within the General Plan, Noise Element and the Municipal Code, Chapter 7.34, Noise Control.

For purposes of this analysis, the City of Perris's noise element is used to evaluate the project's noise/land use compatibility and ensure the project is consistent with the established plans, policies and programs for noise control within the City. The Perris General Plan Noise Element and Municipal Code Noise Control are provided in Appendix A.

3.2.1 Noise/Land Use Compatibility

The City of Perris Noise Element establishes planning criteria for determining a development's noise/land use compatibility based on the community noise equivalent level (CNEL). Table 4 summarizes the City's Noise/Land Use Compatibility guidelines for land uses applicable to this project:

Table 4
Noise/Land Use Compatibility Guidelines

Land Use	Noise Limit (dBA CNEL)			
	Clearly Compatible	Normally Compatible	Normally Incompatible	Clearly Incompatible
Residential - Single Family	<60	60-65	65-75	>75

The City of Perris defines the noise compatibility categories as follows:

Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after detailed analysis of the noise reduction requirements are made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice.

Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis

of noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable: New construction or development should generally not be undertaken.

3.2.2 Municipal Code Noise Standards

Table 5 shows the City of Perris's Residential Noise Standards, as established in the Municipal Code, Chapter 7.34, Noise Control. The noise standards shown in Table 5 shall apply to residential properties, unless otherwise specifically identified by the Municipal Code.

Table 5
City of Perris Residential Noise Standards

Location	Time Period	Noise Standard
Exterior	Daytime (7am - 10pm)	60 dBA
	Nighttime (10pm – 7am)	60 dBA
Interior	Daytime (7am - 10pm)	45 dBA
	Nighttime (10pm – 7am)	45 dBA

3.2.3 Construction Noise Regulation:

The City of Perris Municipal Code Chapter 7.34 - Noise Control, exempts the noise associated with construction and demolition activity noise:

1. It is unlawful for any person between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on a legal holiday, with the exception of Columbus Day and Washington's birthday, or on Sundays to erect, construct, demolish, excavate, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise. Construction activity shall not exceed 80 dBA in residential zones in the city.

2. Section 18-63 of the Municipal Code, "Enumeration of Prohibited Noises" provides an exemption for noise from construction and repair work as long as these activities are limited to between the hours of 7:00 AM and 6:00 PM on weekdays.

4.0 Study Method and Procedures

The following section describes the measurement procedures, measurement locations, and noise modeling procedures and assumptions used in the noise analysis.

4.1 Measurement Procedures and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

RK conducted the sound level measurements in accordance with Caltrans technical noise specifications. All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

A Piccolo-II Type 2 integrating-averaging level meter was used to conduct both short-term (10-minute) noise measurements at the project site and property boundaries.

The Leq, Lmin, Lmax, L2, L8, L25, and L50 statistical data were recorded over the measurement time period intervals and the information was utilized to define the noise characteristics for the project. The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed five (5) feet above the ground for all short-term noise measurements and five (5) feet above ground for long-term noise measurements
- Sound level meters were calibrated before and after each measurement
- Following the calibration of equipment, a windscreen was placed over the microphone
- Frequency weighting was set on "A" and slow response
- Results of the short-term noise measurements were recorded on field data sheets

- During any short-term noise measurements, any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

Appendix B includes photos, field sheets, and measured noise data.

4.2 Traffic Noise Modeling

Traffic noise from vehicular traffic was projected using a version of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the key input parameters. The following outlines the key adjustments made to the computer model for the roadway inputs:

- Roadway classification – (e.g. freeway, major arterial, arterial, secondary, collector, etc.),
- Roadway Active Width – (distance between the center of the outer most travel lanes on each side of the roadway)
- Average Daily Traffic (ADT) Volumes, Travel Speeds, Percentages of automobiles, medium trucks, and heavy trucks
- Roadway grade and angle of view
- Site Conditions (e.g. soft vs. hard)
- Percentage of total ADT which flows each hour throughout a 24-hour period

The following outlines key adjustments to the computer model for the project site parameter inputs:

- Vertical and horizontal distances (Sensitive receptor distance from noise source)
- Noise barrier vertical and horizontal distances (Noise barrier distance from sound source and receptor).
- Traffic noise source spectra
- Topography

Table 6 indicates the roadway parameters utilized for this study.

Table 6
Roadway Parameters

Roadway	Classification[1]	Lanes	Future ADT Year 2030[1]	Speed (MPH)	Site Conditions
Mountain Avenue	Secondary Arterial	4	2,800	25	Hard
McPherson Road	Collector	2	1,700	30	Hard

[1] Source: City of Perris General Plan Circulation Element.

Table 7 and Table 8 indicates the vehicle distribution and truck mix utilized for all roadways in this study area.

Table 7
Vehicle Distribution (Truck Mix) for Arterial Roadways[1,2]

Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	69.5	12.9	9.6	92.00
Medium Trucks	1.44	0.06	1.5	3.00
Heavy Trucks	2.4	0.1	2.5	5.00

[1] Roadway classification and average daily traffic (ADT) volume capacity is based on County of Riverside General Plan.
[2] Vehicle percentages specified are indicated in a memo published by County of Riverside Department of Environmental Health.

Table 8
Vehicle Distribution (Truck Mix) for Collector Roadways[1,2]

Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	73.6	13.6	10.22	97.42
Medium Trucks	0.9	0.04	0.9	1.84
Heavy Trucks	0.35	0.04	0.35	0.74

[1] Roadway classification and average daily traffic (ADT) volume capacity is based on County of Riverside General Plan.
[2] Vehicle percentages specified are indicated in a memo published by County of Riverside Department of Environmental Health.

4.3 Interior Noise Modeling

The interior noise level is the difference between the projected exterior noise level at the structure's façade and the noise reduction provided by the structure itself. Typical building construction will provide a conservative 12 dBA noise level reduction with a "windows open" condition and a very conservative 20 dBA noise level reduction with "windows closed". RK estimated the interior noise level by subtracting the building shell design from the estimated exterior noise level.

The interior noise analysis is based on industry standards for building noise reduction established by the Federal Highway Administration (FHWA), the 2013 Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol (TeNS), the California Office of Noise Control Catalog of STC and IIC Ratings for Wall and Floor/Ceiling Assemblies, and the California Building Standards Code, Title 24.

The TeNS manual shows that the noise reduction due to building exteriors with ordinary sash windows (windows closed) is at least 20 decibels. By providing upgraded STC rated windows, the project design is considered adequate to meet interior noise standards. The building's exterior walls will be constructed per the latest building code insulation requirements and provide occupants with the most protection from exterior noise. Insulated exterior walls, designed per the latest California Building Standards, would provide a minimum of STC 35-40. Windows, on the other hand, are one of the acoustically weakest parts of the structure. Therefore, for a conservative estimate of preliminary interior noise, the building's noise reduction potential is limited to the STC of the windows.

4.4 Construction Noise Modeling

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model, together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, and baseline parameters for the project site. This study evaluates the potential exterior noise impacts during each phase of construction. Noise levels were projected at an average distance of 50 feet for equipment operating over an 8-hour period from to the nearest sensitive receptor property line. While some construction noise activity may occur closer than 50 feet from the property line, noise levels are averaged over an 8-hour period for purposes of assessing impacts.

- Construction phasing and equipment usage assumptions are referenced from Pacific Emerald Tract 37904 SFR Project Air Quality and Greenhouse Gas Analysis, City of Perris, October 2020, by RK Engineering Group.

4.5 Construction Vibration Modeling

The construction vibration assessment is based on the methodology set-forth within the Caltrans Transportation and Construction Induced Vibration Guidance Manual. The vibration impacts from vibratory rollers and compactors, heavy truck loading and bulldozer activity is analyzed. All vibratory activity is analyzed as a continuous and/or frequent event and is required to comply with the applicable guidance thresholds criteria. It is expected that vibration levels will be highest during paving phase. No impact pile driving is expected as part of this project.

Vibratory impacts were calculated from the site area property line to the closest sensitive receptors and structures using the reference vibration levels, soil conditions and the reference equation *PPV= PPV ref (25/D)^n (in/sec)* (from Caltrans Manual) where:

PPV = reference measurement at 25 feet from vibration source
D = distance from equipment to property line
n= vibration attenuation rate through ground (n=1.0 was utilized for this study)

Table 9 shows the Caltrans Vibration Damage Potential Threshold Criteria.

Table 9
Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

Table 10 shows the Caltrans Vibration Annoyance Potential Threshold Criteria.

Table 10
Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.90	0.10
Severe	2.00	0.40

5.0 Existing Noise Environment

The existing noise environment for the project site and surrounding areas has been established based on noise measurement data collected by RK. Noise measurement data indicates that the ambient noise consist of just environmental noise includes noise from leaves rustling and chirping birds, very minimal traffic noise propagating from the adjacent roadways, as well as activities from the surrounding properties are the main sources of ambient noise at the project site and surrounding area.

5.1 Short-Term (10-Minute) Noise Measurement Results

Using a Piccolo-II Type 2 integrating-averaging sound level meter, four (4) 10-minute noise measurements were recorded at the surrounding property lines. Short term noise measurements are conducted during normal daytime hours and considered samples of typical ambient conditions. The Leq, Lmin, Lmax, L2, L8, L25, and L50, statistical data were reported over the 10-minute period. The information was utilized to define the noise characteristics for the project.

The following details and observations are provided for the short-term noise measurements. The results of the short-term (ST) measurements are presented in Table 11.

Table 11
Short-Term Noise Measurement Results[1]

Site No.	Time Started	Leq	Lmax	Lmin	L_2	L_8	L_{25}	L_{50}
ST-1	10:18 AM	42.7	63.0	32.6	50.9	47.6	42.0	37.9
ST-2	10:35 AM	43.4	60.9	31.9	50.8	46.9	42.7	39.7
ST-3	10:51 AM	40.0	61.1	35.8	44.3	41.9	40.2	39.0
ST-4	11:15 AM	49.9	69.4	38.5	59.7	52.0	48.1	45.3

[1] Noise measurements conducted for 10-minute intervals during normal daytime conditions.

ST-1 Measurement was taken at the intersection of the McPherson Rd and Gertrude Ave line and at approximately 660 feet from the Mountain Ave roadway. Ambient noise includes traffic noise from Mountain Ave and McPherson Rd.

ST-2 Measurement was taken along the David Jones Road, approximately 370 feet from the centerline of McPherson Road. Ambient noise includes traffic noise from McPherson Road and overhead airplane noise.

ST-3 Measurement was taken along the eastern property line (near adjacent residential home), approximately 865 feet from the centerline of the Mountain Avenue. Ambient noise includes traffic noise from Mountain Avenue and overhead airplane noise.

ST-4 Measurement was taken along the south side of Mountain Avenue, east of Sunnysands Drive (in front of the Church). Measurement location was approximately 30 feet from the centerline of the Mountain Avenue. Ambient noise includes traffic noise from Mountain Avenue and overhead airplane noise.

Exhibit C shows the noise measurement locations. Appendix B includes photos, field sheets, and measured noise data.

6.0 Operational Noise Impacts

A noise analysis has been performed to determine whether the proposed project would result in a substantial increase in ambient noise levels in the vicinity of the site. Additionally, the noise analysis examines whether the project can meet the City of Perris and State of California requirements for residential exterior and interior noise exposure. The State of California requires that interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

6.1 Project Operational Noise Impacts

The project is consistent with the General Plan Land Use Designation and consists of single-family residential housing. On-site noise would include typical neighborhood noise, such as motor vehicle traffic, HVAC equipment and general human activities. Many project noise sources will be screened behind the proposed six-foot property line walls that will shield backyard areas of the site. Thus, most of the typical on-site outdoor residential activity and HVAC equipment would be screened from the neighboring property's line of sight. As a result, the project is not expected to generate on-site stationary noise that would adversely affect the existing ambient conditions in the vicinity of the site.

The project will also contribute additional traffic to the area which may affect roadway noise levels. Typically, a doubling of traffic volume along a roadway would result in approximately a 3 dBA increase in noise, which is typically considered the threshold of significance for causing a perceptible change. Based on the TIA, the project will not double the amount of traffic volumes on any of the roadways adjacent to the project, including Mountain Avenue, either directly or cumulatively, and therefore the project may be presumed to have a less than significant impact to future roadway noise levels.

Table 12
Future Traffic Noise Impacts

Roadway	Segment	Future ADT Without Project[1]	Project ADT	Future ADT With Project	Significant Impact[2]
Mountain Avenue	McPherson – "A" Street	2,800	859	3,659	NO

[1] Source: Perris Valley General Plan Circulation Element.
[2] A significant increase typically requires a doubling of traffic volume to result in a barely perceptible change of 3 dBA above ambient noise levels.

6.2 Noise/Land Use Compatibility

Traffic noise impacts from Mountain Avenue and McPherson Road are analyzed at the proposed project site and are compared to the City's Noise Standards for determining the project's noise/land use compatibility.

Traffic noise along Mountain Avenue and McPherson Road will be the main sources of noise impacting the project site. The first row of residential lots will be set back approximately 50 feet from the centerline of Mountain Avenue and 40 feet from the centerline of McPherson Road. As previously mentioned, the project is proposing to build a six (6) foot CMU block wall along the property lines facing the external roadways to help reduce noise impacts.

Table 13 indicates the noise level projections to the backyard habitable areas and the facades of the residential units nearest the subject roadways. Future exterior noise levels on the project site range from 46.2 dBA CNEL along the Mountain Avenue and 42.8 dBA CNEL along McPherson Road.

Table 13
Future Exterior Roadway Noise Levels (dBA CNEL)[1]

Roadway	Exterior Façade Study Locations	Noise Level at Facade	Noise/Land Use Compatibility
Mountain Avenue	Backyard/Patio	46.2	Normally Acceptable
	1st Floor Facade	43.0	Normally Acceptable
McPherson Road	Backyard/Patio	42.8	Normally Acceptable
	1st Floor Facade	41.4	Normally Acceptable

[1] Exterior noise levels calculated 5-feet above pad elevation, perpendicular to subject roadway.

Based on the City of Perris General Plan Noise/Land Use Compatibility Guidelines, the project site falls within the Normally Acceptable range for Residential – Single Family development.

The roadway calculation sheets are provided in Appendix C.

6.3 Perris Valley Airport

The Riverside County Airport Land Use Commission governs 16 airports in Riverside County, including the Perris Valley Airport in Perris. In November 2004, the ALUC adopted the Riverside County Airport Land Use Compatibility Plan (ALUCP) Policy Document, which establishes land use, noise and safety policies in the vicinity of airports throughout Riverside County, including compatibility criteria and maps for the influence areas of individual airports. The ALUCP also establishes procedural requirements for compatibility review of development proposals related to the Perris Valley Airport Influence Area.

The Perris Valley Airport is located approximately one and half (1.5) miles to the east of the project site. A noise/land use compatibility assessment has been performed based on the project's location to the Perris Valley Airport. The noise contour maps for the Perris Valley Airport are provided in Exhibit C.

The project is located outside of the 60 dB Ldn noise contour limit; therefore, the exterior noise impact from the airport would be within the allowable limits for residential land uses and the project is considered compatible with the surrounding land use and noise environment. Noise from airport operations are expected to generate a less than significant on the proposed project.

6.4 Future Interior Noise

A preliminary interior noise analysis has been performed for the first row of habitable dwellings facing adjacent roadways using a typical "windows open" and "windows closed" condition. A "windows open" condition assumes 12 dBA of noise attenuation from the exterior noise level. A "windows closed" condition" assumes 20 dBA of noise attenuation from the exterior noise level.

California standard building shell and residential windows are expected to provide adequate attenuation to meet interior noise standards with a window open and windows closed condition.

Table 14 indicates the future interior noise levels along the adjacent roadways.

Table 14
Future Interior Noise Levels (dBA CNEL)[1]

Roadway	Exterior Façade Study Location	Exterior Noise Level at Façade	Required Interior Noise Reduction	Interior Noise Level w/Standard Windows (STC ~ 25)		STC Rating
				"Windows Open" [1]	"Windows Closed" [2]	
Mountain Avenue	1st Floor (All lots along Mountain Ave)	43.0	0.0	31.0	23.0	25
McPherson Road	1st Floor (All lots along McPherson Road)	50.2	5.2	38.2	30.2	25

[1] A minimum of 12 dBA noise reduction is assumed with the "windows open" condition.
[2] A minimum of 20 dBA noise reduction is assumed with the "windows closed" condition.

6.5 Operational Design Features

The following recommendations are provided to help ensure the proposed project meets the City of Perris and State of California requirements for residential interior noise exposure:

1. A six (6) foot noise barrier wall will be provided to shield all habitable backyard areas facing exterior roadways and adjacent properties. The designed noise screening will only be accomplished if the barrier's weight is at least 3.5 pounds per square foot of face area without decorative cutouts or line-of-site openings between the shielded areas and the project site. All gaps (except for weep holes) should be filled with grout or caulking to avoid flanking.

   Noise control barrier may be constructed using one, or any combination of the following materials:

   - Masonry block;
   - Stucco veneer over wood framing (or foam core), or 1-inch thick tongue and groove wood of sufficient weight per square foot;
   - Transparent glass (3/8-inch-thick), acrylic, polycarbonate, or other transparent material with sufficient weight per square foot.

2. The project should incorporate building construction techniques and insulation that is consistent with California Title 24 Building Standards to achieve the minimum interior noise standard of 45 dBA CNEL for all residential units.

3. For proper acoustical performance, all exterior windows, doors, and sliding glass doors should have a positive seal and leaks/cracks must be kept to a minimum.

7.0 Construction Noise and Vibration Impacts

Temporary construction noise and vibration impacts have been assessed from the project site to the surrounding adjacent land uses. The degree of construction noise will vary depending on the type of construction activity taking place and the location of the activity relative to the surrounding properties.

The City of Perris Municipal Code, Section 7.34.060 regulates construction noise within City boundaries. Section 7.34.060 states the following:

- It is unlawful for any person between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on a legal holiday, with the exception of Columbus Day and Washington's birthday, or on Sundays to erect, construct, demolish, excavate, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise. Construction activity shall not exceed 80 dBA in residential zones in the city.

This assessment analyzes potential noise impacts during all expected phases of construction, including; site preparation, grading, building construction, paving, and architectural coating.

Construction phasing and equipment usage assumptions are referenced from the *Pacific Emerald Tract 37904 SFR Project Air Quality and Greenhouse Gas Analysis, City of Perris, October 2020, by RK Engineering Group.*

7.1 Typical Construction Noise Levels

Table 15 shows typical construction noise levels compiled by the Environmental Protection Agency (EPA) for common type construction equipment. Typical construction noise levels are used to estimate potential project construction noise levels at the adjacent sensitive receptors.

Table 15
Typical Construction Noise Levels[1]

Type	Noise Levels (dBA) at 50 Feet
Earth Moving	
Compactors (Rollers)	73 - 76
Front Loaders	73 - 84
Backhoes	73 - 92
Tractors	75 - 95
Scrapers, Graders	78 - 92
Pavers	85 - 87
Trucks	81 - 94
Materials Handling	
Concrete Mixers	72 - 87
Concrete Pumps	81 - 83
Cranes (Movable)	72 - 86
Cranes (Derrick)	85 - 87
Stationary	
Pumps	68 - 71
Generators	71 - 83
Compressors	75 - 86
Impact Equipment	
Pneumatic Wrenches	82 - 87
Jack Hammers, Rock Drills	80 - 99
Pile Drivers (Peak)	95-105
Other	
Vibrators	68 - 82
Saws	71 - 82

[1] Referenced Noise Levels from the Environmental Protection Agency (EPA)

7.2 Construction Noise Impact Analysis

Noise levels are calculated based on an average distance of equipment to the nearest adjacent property. The project's estimated construction noise levels have been calculated using the Federal Highway Administration Roadway Construction Noise Model Version 1.1.

Table 16 show the noise level impacts to the surrounding property lines. Construction noise calculation worksheets are provided in Appendix D.

Table 16
Project Construction Noise Levels

Phase	Equipment	Quantity	Equipment Noise Level at 50ft (dBA Leq)	Combined Noise Level (dBA Leq)
Site Preparation	Rubber Tired Dozers	3	77.7	87.6
	Tractors/Loaders/Backhoes	4	80.0	
Grading	Excavators	2	76.7	88.2
	Graders	1	81.0	
	Rubber Tired Dozers	1	77.7	
	Scrapers	2	79.6	
	Tractors/Loaders/Backhoes	2	80.0	
Building Construction	Cranes	1	72.6	86.3
	Forklifts	3	71.0	
	Generator Sets	1	77.6	
	Tractors/Loaders/Backhoes	3	80.0	
	Welders	1	70.0	
Paving	Pavers	2	74.2	84.7
	Paving Equipment	2	73.0	
	Tractors/Loaders/Backhoes	2	80.0	
Architectural Coating	Air Compressors	1	73.7	73.7
Worst Case Construction Phase Noise Level - Leq (dBA)				88.2
City of Perris Construction Noise Threshold				80
Potential significant impact (yes / no)				Yes

As shown in Table 16, project construction noise levels are expected to be above the recommended 80 dB noise threshold provided by the City of Perris for adverse community reaction at the adjacent residential.

In order to help reduce the construction noise impacts several mitigation measures are recommended to reduce construction noise impacts to the surrounding sensitive land uses:

Construction Mitigation Measures

MM-1 Obtain a construction work permit from the City of Perris prior to starting construction.

MM-2 The project shall post a sign in a readily visible location at the project site. All notices and signs shall indicate the dates and duration of construction activities, as well as provide a telephone number where residents can enquire about the construction process and register complaints to a designated construction noise disturbance coordinator.

MM-3 The project shall ensure all contractors implement construction best management practices to reduce construction noise levels. Best management practices would include the following:

- All construction equipment shall be equipped with muffles and other suitable noise attenuation devices (e.g., engine shields).
- Grading and construction contractors shall use quieter equipment as opposed to noisier equipment (such as rubber-tired equipment rather than track equipment), to the maximum extent feasible.
- If feasible, electric hook-ups shall be provided to avoid the use of generators. If electric service is determined to be infeasible for the site, only whisper-quiet generators shall be used (i.e., inverter generators capable of providing variable load.
- Use electric air compressors and similar power tools rather than diesel equipment, where feasible.
- Locate staging area, generators and stationary construction equipment as far from the adjacent residential homes as feasible.
- Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 5 minutes.

MM-4 The project shall build the proposed CMU block perimeter walls during the early phases of construction to help shield adjacent homes from construction noise.

7.3 Construction Vibration

To determine the vibratory impacts during construction, reference construction equipment vibration levels were utilized and then extrapolated to the façade of the nearest adjacent structures. The nearest sensitive receptors are the residential structures located adjacent to the western property line. All structures surrounding the project site are "new residential structures". No historical or fragile buildings are known to be located within the vicinity of the site.

The construction of the proposed project is not expected to require the use of substantial vibration inducing equipment or activities, such as pile drivers or blasting. The main sources of vibration impacts during construction of the project would be the operation of equipment such as bulldozer activity during demolition, loading trucks during grading and excavation, and vibratory rollers during paving. The construction vibration assessment utilizes the referenced vibration levels and methodology set-forth within the Caltrans Transportation and Construction Induced Vibration Guidance Manual. Table 17 shows the referenced vibration levels.

Table 17
Typical Construction Vibration Levels[1]

Equipment	Peak Particle Velocity (PPV) (inches/second) at 25 feet	Approximate Vibration Level (LV) at 25 feet
Piledriver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Piledriver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydro mill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

Table 18 shows the project's construction-related vibration analysis at the nearest structures to the project construction area. Construction impacts are assessed from the closest area on the project site to the nearest adjacent structure.

Table 18
Construction Vibration Impact Analysis

Construction Activity	Distance to Nearest Structure (ft)	Duration	Calculated Vibration Level - PPV (in/sec)	Damage Potential Level	Annoyance Criteria Level
Large Bulldozer	50	Continuous/Frequent	0.098	Extremely Fragile Buildings, Ruins Ancient Monuments	Barely perceptible
Vibratory Roller	50	Continuous/Frequent	0.098		Barely perceptible
Loaded Trucks	50	Continuous/Frequent	0.035		Barely perceptible

As shown in Table 18, project related construction activity is not expected to cause any potential damage to the nearest structures. The annoyance potential of vibration from construction activities would range from "distinctly perceptible" to "strongly perceptible".

MM-5 No impact pile driving activities shall be permitted on the project site during construction. If impact pile driving is required, a follow-up noise and vibration impact assessment shall be conducted and vibration monitoring program should be performed, prior to start of any pile driving activity.

Construction vibration calculation worksheets are shown in Appendix D.

7.4 Construction Project Design Features

The following project design features will be implemented during construction to help ensure compliance with the required noise standards in the County.

DF-5 Construction-related noise activities shall comply with the requirements set forth in the City of Perris Municipal Code Chapter 7.34:

1. It is unlawful for any person between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on a legal holiday, with the exception of Columbus Day and Washington's birthday, or on Sundays to

erect, construct, demolish, excavate, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise. Construction activity shall not exceed 80 dBA in residential zones in the city.

Exhibits

Exhibit A

Location Map

N

Exhibit B

Site Plan

N

Exhibit C

Noise Monitoring Locations

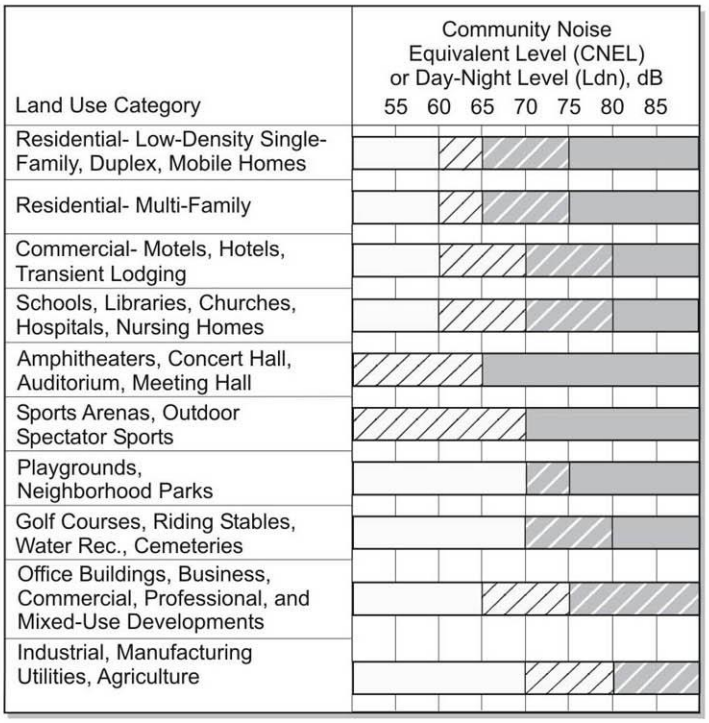
N

Appendices

Appendix A

City of Perris
General Plan Noise Element and
Municipal Code Noise Control

Exhibit N-1: Land Use/Noise Compatibility Guidelines



Nature of the noise environment where the CNEL or Ldn level is:

Below 55 dB
Relatively quiet suburban or urban areas, no arterial streets within 1 block, no freeways within 1/4 mile.

55-65 dB
Most somewhat noisy urban areas, near but not directly adjacent to high volumes of traffic.

65-75 dB
Very noisy urban areas near arterials, freeways or airports.

75+ dB
Extremely noisy urban areas adjacent to freeways or under airport traffic patterns. Hearing damage with constant exposure outdoors.

Normally Acceptable
Specific land use is satisfactory, based on the assumption that any building is of normal conventional construction, without any special noise insulation requirements

Conditionally Acceptable
New construction or development should be undertaken only after a detailed analysis of noise reduction requirements is made and needed noise insulation features included in design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.

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

Clearly Unacceptable
New construction or development should generally not be undertaken.

The Community Noise Equivalent Level (CNEL) and Day-Night Noise Level (Ldn) are measures of the 24-hour noise environment. They represent the constant A-weighted noise level that would be measured if all the sound energy received over the day were averaged. In order to account for the greater sensitivity of people to noise at night, the CNEL weighting includes a 5-decibel penalty on noise between 7:00 p.m. and 10:00 p.m. and a 10-decibel penalty on noise between 10:00 p.m. and 7:00 a.m. of the next day. The Ldn includes only the 10-decibel weighting for late-night noise events. For practical purposes, the two measures are equivalent for typical urban noise environments.

Source: State of California, Department of Health, City of Monterey Park.

Strategy for Action

Goals, Policies and Implementation Measures

Goal I – Land Use Siting

Future land uses compatible with projected noise environments

Policy I.A
The State of California Noise/Land Use Compatibility Criteria shall be used in determining land use compatibility for new development.

Implementation Measures

I.A.1 All new development proposals will be evaluated with respect to the State Noise/Land Use Compatibility Criteria. Placement of noise sensitive uses will be discouraged within any area exposed to exterior noise levels that fall into the "Normally Unacceptable" range and prohibited within areas exposed to "Clearly Unacceptable" noise ranges.

I.A.2 Site plans for new residential development near roadway and train noise sources shall incorporate increased building setbacks and/or provide for sufficient noise barriers for usable exterior yard areas so that the noise exposure in those areas does not exceed the levels considered "Normally Acceptable" in The State of California Noise/Land Use Compatibility Criteria

I.A.3 Acoustical studies shall be prepared for all new development proposals involving noise sensitive land uses, as defined in Section 16.22.020J of the Perris Municipal Code, where such projects are adjacent to roadways and within existing or projected roadway CNEL levels of 60 dBA or greater.

I.A.4 As part of any approvals of noise sensitive projects where reduction of exterior noise to 65 dBA is not reasonably feasible, the City will require the developer to issue disclosure statements to be identified on all real estate transfers associated with the affected property that identifies regular exposure to roadway noise.

I.A.5 No new residential dwellings shall be placed in areas with mitigated or unmitigated exterior noise levels that exceed 70 dBA CNEL.

Goal II – Existing Sensitive Receptors

Roadway improvements compatible with existing with existing noise-sensitive land uses

Policy II.A
Appropriate measures shall be taken in the design phase of future roadway widening projects to minimize impacts on existing sensitive noise receptors.

Implementation Measures

II.A.1 In the design of future roadway widening projects adjacent to existing sensitive land uses, first priority will be given to widening on the opposite side of the street where no sensitive land uses occur.

II.A.2 Use of quieter roadway surface materials, incorporation of solid noise barriers between the sensitive land use and the roadway will be implemented where feasible, to reduce exterior noise levels within adjacent sensitive land uses to a maximum of 60 dBA CNEL.

II.A.3 Where construction of a solid barrier is economically or practically infeasible e.g. along front yards where driveways would prohibit continuation of the wall, retrofitting of homes with noise attenuation features will be implemented to reduce interior noise to 45 dBA CNEL.

II.A.4 Reduction of posted speed limits will be implemented, wherever it can be accomplished without increasing traffic congestion.

II.A.5 Work proactively with Caltrans to facilitate construction of sound barriers and/or retrofit existing noise impacted structures with noise attenuation features, along those segments of I-215 that abut existing noise impacted land uses.

Goal III – Train Noise

Future land uses compatible with noise from rail traffic

Policy III.A
Mitigate existing and future noise impacts resulting from train movement.

Implementation Measures

III.A.1 The City will work proactively with BNSF and Riverside County Transportation Commission to replace aging rail with new continuous welded rail, and to install sound-deadening matting leading to, from, and between the rails where public roads cross tracks in residential areas

III.A.2 Acoustical and vibration studies will be prepared for all new development proposals involving noise sensitive land uses within 500 feet of the BNST railroad tracks. Wherever these studies determine that exterior living areas in the proposed development plan would be exposed to noise levels of 60 dBA or greater, the plans shall incorporate setbacks and/or building design/noise insulation measures to reduce exterior noise levels to no more than 65 dBA and ensure that interior noise levels do not exceed 45 dBA CNEL.

III.A.3 As part of any approvals of noise sensitive projects where reduction of exterior noise to 65 dBA is not reasonably feasible, the City will require the developer to issue disclosure statements that identify regular exposure to train noise. This disclosure shall be issued at the time of initial and all subsequent sales of the affected properties.

III.A.4 No new residential dwellings shall be placed in areas with mitigated or unmitigated exterior exposure to train noise levels in excess of 70 dBA CNEL.

Goal IV – Air Traffic Noise

Future land uses compatible with noise from air traffic

Policy IV.A
Reduce or avoid the existing and potential future impacts from air traffic on new sensitive noise land uses in areas where air traffic noise is 60 dBA CNEL or higher.

Implementation Measures

IV.A.1 As part of any approvals for new sensitive land uses within the 60 dBA CNEL or higher noise contours associated with March Inland Port, and for such new uses within the flight paths associated with the Perris Valley Skydiving Center, the City will require the developer to issue disclosure statements identifying exposure to regular aircraft noise. This disclosure shall be issued at the time of initial and all subsequent sales of the affected properties.

IV.A.2 All new development proposals in the noise contour areas of 60 dBA and above will be evaluated with respect to the State Noise/Land Use Compatibility Criteria.

Goal V – Stationary Source Noise

Future non-residential land uses compatible with noise sensitive land uses

Policy V.A
New large scale commercial or industrial facilities located within 160 feet of sensitive land uses shall mitigate noise impacts to attain an acceptable level as required by the State of California Noise/Land Use Compatibility Criteria.

Implementation Measures

V.A.1 An acoustical impact analysis shall be prepared for new industrial and large scale commercial facilities to be constructed within 160 feet of the property line of any existing noise sensitive land use. This analysis shall document the nature of the commercial or industrial facility as well as all interior or exterior facility operations that would generate exterior noise.
The analysis shall document the placement of any existing or proposed noise-sensitive land uses situated within the 160-foot distance. The analysis shall determine the potential noise levels that could be received at these sensitive land uses and specify specific measures to be employed by the large scale commercial or industrial facility to ensure that these levels do not exceed 60 dBA CNEL at the property line of the adjoining sensitive land use.
No development permits or approval of land use applications shall be issued until the acoustic analysis is received and approved by the City Staff.

CHAPTER 7.34. - NOISE CONTROL

Sec. 7.34.010. - Declaration of policy.

Excessive noise levels are detrimental to the health and safety of individuals. Noise is considered a public nuisance, and the city discourages unnecessary, excessive or annoying noises from all sources. Creating, maintaining, causing, or allowing to be created, caused or maintained, any noise or vibration in a manner prohibited by the provisions of the ordinance codified in this chapter is a public nuisance and shall be punishable as a misdemeanor.

(Code 1972, § 7.34.010; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.020. - Definitions.

(a) *General.* The following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Ambient noise means the all-encompassing noise associated with a given environment usually being composed of sounds from many sources near and far. For the purpose of this chapter, ambient noise level is the level obtained when the noise level is averaged over a period of five minutes without inclusion of noise from isolated identifiable sources at the location and time of day near that at which a comparison is to be made.

Decibel (dB) means an intensity unit which denotes the ratio between two quantities which are proportional to power; the number of decibels corresponding to the ratio is ten times the common logarithm of this ratio.

Sound amplifying equipment means any machine or device for the amplification of the human voice, music or any other sound. The term "sound amplifying equipment" does not include standard vehicle radios when used and heard only by the occupants of the vehicle in which the vehicle radio is installed. The term "sound amplifying equipment," as used in this chapter, does not include warning devices on any vehicle used only for traffic safety purposes and shall not include communications equipment used by public or private utilities when restoring utility service following a public emergency or when doing work required to protect person or property from an imminent exposure to danger.

Sound level (noise level) in decibels is the value of a sound measurement using the "A" weighting network of a sound level meter. Slow response of the sound level meter needle shall be used except where the sound is impulsive or rapidly varying in nature, in which case, fast response shall be used.

Sound level meter means an instrument, including a microphone, an amplifier, an output meter and frequency weighting networks, for the measurement of sound levels, which satisfies the pertinent requirements in American National Standards Institute's specification S1.4-1971 or the most recent revision for type S-2A general purpose sound level meters.

(b) *Supplementary definitions of technical terms.* Definitions of technical terms not defined in this section shall be obtained from the American National Standards Institute's Acoustical Terminology S1-1971 or the most recent revision thereof.

(Code 1972, § 7.34.020; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.030. - Measurement methods.

(a) Sound shall be measured with a sound level meter as defined in section 7.34.020.

(b) Unless otherwise provided, outdoor measurements shall be taken with the microphone located at any point on the property line of the noise source but no closer than five feet from any wall or vertical obstruction and three to five feet above ground level whenever possible.

(c) Unless otherwise provided, indoor measurements shall be taken inside the structure with the microphone located at any point as follows:

(1) No less than three feet above floor level;

(2) No less than five feet from any wall or vertical obstruction; and

(3) Not under common possession and control with the building or portion of the building from which the sound is emanating.

(Code 1972, § 7.34.030; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.040. - Sound amplification.

No person shall amplify sound using sound amplifying equipment contrary to any of the following:

(1) The only amplified sound permitted shall be either music or the human voice, or both.

(2) The volume of amplified sound shall not exceed the noise levels set forth in this subsection when measured outdoors at or beyond the property line of the property from which the sound emanates.

Time Period	Maximum Noise Level
10:01 p.m.—7:00 a.m.	60 dBA
7:01 a.m.—10:00 p.m.	80 dBA

(Code 1972, § 7.34.040; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.050. - General prohibition.

(a) It unlawful for any person to willfully make, cause or suffer, or permit to be made or caused, any loud excessive or offensive noises or sounds which unreasonably disturb the peace and quiet of any residential neighborhood or which are physically annoying to persons of ordinary sensitivity or which are so harsh, prolonged or unnatural or unusual in their use, time or place as to occasion physical discomfort to the inhabitants of the city, or any section thereof. The standards for dBA noise level in section 7.34.040 shall apply to this section. To the extent that the noise created causes the noise level at the property line to exceed the ambient noise level by more than 1.0 decibels, it shall be presumed that the noise being created also is in violation of this section.

(b) The characteristics and conditions which should be considered in determining whether a violation of the provisions of this section exists should include, but not be limited to, the following:

(1) The level of the noise;

(2) Whether the nature of the noise is usual or unusual;

(3) Whether the origin of the noise is natural or unnatural;

(4) The level of the ambient noise;

(5) The proximity of the noise to sleeping facilities;

(6) The nature and zoning of the area from which the noise emanates and the area where it is received;

(7) The time of day or night the noise occurs;

(8) The duration of the noise; and

(9) Whether the noise is recurrent, intermittent or constant.

(Code 1972, § 7.34.050; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.060. - Construction noise.

It is unlawful for any person between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on a legal holiday, with the exception of Columbus Day and Washington's birthday, or on Sundays to erect, construct, demolish, excavate, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise. Construction activity shall not exceed 80 dBA in residential zones in the city.

(Code 1972, § 7.34.060; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.070. - Refuse vehicles and parking lot sweepers.

No person shall operate or permit to be operated a refuse compacting, processing or collection vehicle or parking lot sweeper between the hours of 7:00 p.m. to 7:00 a.m. in any residential area unless a permit has been applied for and granted by the city.

(Code 1972, § 7.34.070; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.080. - Disturbing, excessive, offensive noises; declaration of certain acts constituting.

The following activities, among others, are declared to cause loud, disturbing, excessive or offensive noises in violation of this section and are unlawful, namely:

(1) *Horns, signaling devices, etc.* Unnecessary use or operation of horns, signaling devices or other similar devices on automobiles, motorcycles or any other vehicle.

(2) *Radios, television sets, phonographs, loud speaking amplifiers and similar devices.* The use or operation of any sound production or reproduction device, radio receiving set, musical instrument, drums, phonograph, television set, loudspeakers, sound amplifier, or other similar machine or device for the producing or reproducing of sound, in such a manner as to disturb the peace, quiet or comfort of any reasonable person of normal sensitivity in any area of the city is prohibited. This provision shall not apply to any participant in a licensed parade or to any person who has been otherwise duly authorized by the city to engage in such conduct.

(3) *Animals.*

a. The keeping or maintenance, or the permitting to be kept or maintained, upon any premises owned, occupied or controlled by any person of any animal or animals which by any frequent or long-continued noise shall cause annoyance or discomfort to a reasonable person of normal sensitiveness

in the vicinity.

b. The noise from any such animal or animals that disturbs two or more residents residing in separate residences adjacent to any part of the property on which the subject animal or animals are kept or maintained, or three or more residents residing in separate residences in close proximity to the property on which the subject animal or animals are kept or maintained, shall be prima facie evidence of a violation of this section.

(4) *Hospitals, schools, libraries, rest homes, long-term medical or mental care facilities.* To make loud, disturbing, excessive noises adjacent to a hospital, school, library, rest home or long-term medical or mental care facility, which noise unreasonably interferes with the workings of such institutions or which disturbs or unduly annoys occupants in said institutions.

(5) *Playing of radios on buses and trolleys.* The operation of any radio, phonograph or tape player on an urban transit bus or trolley so as to emit noise that is audible to any other person in the vehicle is prohibited.

(6) *Playing of radios, phonographs and other sound production or reproduction devices in public parks and public parking lots and streets adjacent thereto.* The operation of any radio, phonograph, television set or any other sound production or reproduction device in any public park or any public parking lot, or street adjacent to such park or beach, without the prior written approval of the city manager or the administrator, in such a manner that such radio, phonograph, television set or sound production or reproduction device emits a sound level exceeding those found in the table in section 7.34.040.

(7) *Leaf blowers.*

a. The term "leaf blower" means any portable, hand-held or backpack, engine-powered device with a nozzle that creates a directable airstream which is capable of and intended for moving leaves and light materials.

b. No person shall operate a leaf blower in any residential zoned area between the hours of 7:00 p.m. and 8:00 a.m. on weekdays and 5:00 p.m. and 9:00 a.m. on weekends or on legal holidays.

c. No person may operate any leaf blower at a sound level in excess of 80 decibels measured at a distance of 50 feet or greater from the point of noise origin.

d. Leaf blowers shall be equipped with functional mufflers and an approved sound limiting device required to ensure that the leaf blower is not capable of generating a sound level exceeding any limit prescribed in this section.

(Code 1972, § 7.34.080; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.090. - Burglar alarms.

(a) Audible burglar alarms for structures or motor vehicles are prohibited unless the operation of such burglar alarm can be terminated within 20 minutes of being activated.

(b) Notwithstanding the requirements of this provision, any member of the county sheriff's department, Perris Division, shall have the right to take such steps as may be reasonable and necessary to disconnect any such alarm installed in any building, dwelling or motor vehicle at any time during the period of its activation. On or after 30 days from the effective date of the ordinance codified in this chapter, any building, dwelling or motor vehicle upon which a burglar alarm has been installed shall prominently display the telephone number at which communication may be made with the owner of such building, dwelling or motor vehicle.

(Code 1972, § 7.34.090; Ord. No. 1082, § 2(part), 2000)

Sec. 7.34.100. - Motor vehicles.

(a) Off-highway.

(1) Except as otherwise provided for in this chapter, it shall be unlawful to operate any motor vehicle of any type on any site, other than on a public street or highway as defined in the California Vehicle Code, in any manner so as to cause noise in excess of those noise levels permitted for on-highway motor vehicles as specified in the table for "45-mile-per-hour or less speed limits" contained in section 23130 of the California Vehicle Code and as corrected for distances set forth in subsection (a)(2) of this section.

(2) The maximum noise level as the on-highway vehicle passes may be measured at a distance of other than 50 feet from the centerline of travel, provided the measurement is further adjusted by adding algebraically the application correction as follows:

Distance (feet)	Correction (decibels)
25	−6
28	−5
32	−4
35	−3
40	−2
45	−1
50 (preferred distance)	0
56	+1
63	+2
70	+3
80	+4
90	+5

100	+6

(b) Nothing in this section shall apply to authorized emergency vehicles when being used in emergency situations including the blowing of sirens and/or horns.

(Code 1972, § 7.34.100; Ord. No. 1082, § 2(part), 2000)

Appendix B

Field Data and Photos

Field Sheet

Project: Pacific Emerald Single Family Residential Noise Study **Engineer:** D. Shivaiah

Date: 10/14/2020
JN: 0888-2020-07

Measurement Address: Northeast corner of Mountain Ave and McPherson Road **City:** Perris

Site No.: 1

Sound Level Meter:
Piccolo II
Serial # P0218042101
Serial # P0218092808

Calibrator:
CA114 Sound Calibrator
Serial # 500732

Calibration Record:

	Input, dB/	Reading, dB/	Offset, dB/	Time
1				
2	94.0	93.2	0.8	10:17 AM
3				
4				
5				

Notes:
Temp: 84
Windspeed: 5 MPH
Direction: ENE
Skies: Clear
Camera:
Photo Nos.

Meter Settings:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS ___10____- MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☒ L_N PERCENTILE VALUES

Notes:

Measurement Type:
Long-term
Short-term X

		Start Time	Stop Time	Leq	Lmax	Lmin	L2	L8	L25	L50
Locations	1	10:18 AM	10:28 AM	42.7	63.0	32.6	50.9	47.6	42.0	37.9
		Measurement taken at the intersection of the McPherson Rd and Gertrude Ave line and at approximately 660 feet from the Mountain Ave roadway. Ambient noise includes traffic noise from Mountain Ave and McPherson Rd.								
	2	10:35 AM	10:45 AM	43.4	60.9	31.9	50.8	46.9	42.7	39.7
		Measurement taken along the David Jones Road and approximately 370 feet from the McPherson Road. Ambient noise includes traffic noise from McPherson Road and flight noise.								
	3	10:51 AM	11:01 AM	40.0	61.1	35.8	44.3	41.9	40.2	39.0
		Measurement taken along the eastern property line (near the residential home) and approximately 865 feet from the centerline of the Mountain Avenue. Ambient noise includes traffic noise from Mountain Avenue.								
	4	11:15 AM	11:25 AM	49.9	69.4	38.5	59.7	52.0	48.1	45.3
		Measurement taken along the Mountain Avenue roadway (near the driveway of Apostolic Church) and approximately 30 feet from the centerline of the Mountain Avenue. Ambient noise includes traffic noise from Mountain Avenue.								

RK engineering group, inc.

Field Sheet - ST1 Location Photos

Project: Pacific Emerald Single Family Residential Noise Study	**Engineer:** D. Shivaiah	**Date:**	10/14/2020
		JN:	0888-2020-07
Measurement Address: Northeast corner of Mountain Ave and McPherson Road	**City:** Perris	**Site No.:**	1

RK engineering group, inc.

Field Sheet - ST1 Location Photos

Project: Pacific Emerald Single Family Residential Noise Study	**Engineer:** D. Shivaiah	**Date:**	10/14/2020
		JN:	0888-2020-07
Measurement Address: Northeast corner of Mountain Ave and McPherson Road	**City:** Perris	**Site No.:**	2

RK engineering group, inc.

Field Sheet - ST3 Location Photos

Project: Pacific Emerald Single Family Residential Noise Study	**Engineer:** D. Shivaiah	**Date:**	10/14/2020
		JN:	0888-2020-07
Measurement Address: Northeast corner of Mountain Ave and McPherson Road	**City:** Perris	**Site No.:**	3

RK engineering group, inc.

Field Sheet - ST3 Location Photos

Project: Pacific Emerald Single Family Residential Noise Study	**Engineer:** D. Shivaiah	**Date:**	10/14/2020
		JN:	0888-2020-07
Measurement Address: Northeast corner of Mountain Ave and McPherson Road	**City:** Perris	**Site No.:**	4

RK engineering group, inc.

Appendix C

Roadway Noise Calculation Results

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT: Pacific Emerald Tract 37904 SFR
ROADWAY: Mountain Avenue
LOCATION: Nearest Residential Building Property Line.

JOB #: 0888-2020-07
DATE: 22-Oct-20
ENGINEER: D. Shivaiah

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	2,800
SPEED =	25
PK HR % =	10
NEAR LANE/FAR LANE DIST	56
ROAD ELEVATION =	0.0
GRADE =	0.4 %
PK HR VOL =	280

RECEIVER INPUT DATA

RECEIVER DISTANCE =		60
DIST C/L TO WALL =		50
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		10
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	10	(10 = HARD SITE, 15 = SOFT SITE)
MEDIUM TRUCKS =	10	
HEAVY TRUCKS =	10	

WALL INFORMATION

HTH WALL=	6.0
AMBIENT=	0.0
BARRIER =	1 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.695	0.129	0.096	0.9200
MEDIUM TRUCKS	0.014	0.001	0.015	0.0300
HEAVY TRUCKS	0.024	0.001	0.025	0.0500

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	51.67	- -
MEDIUM TRUCKS	4.0	51.52	- -
HEAVY TRUCKS	8.0	51.52	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	54.1	51.7	50.4	44.3	52.8	53.4
MEDIUM TRUCKS	50.8	31.6	23.9	33.1	39.2	39.3
HEAVY TRUCKS	59.2	42.2	34.4	43.7	49.8	49.8
NOISE LEVELS (dBA)	60.8	52.2	50.5	47.2	54.7	55.1

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	44.8	42.4	41.1	35.1	43.5	44.2
MEDIUM TRUCKS	42.1	22.9	15.1	24.4	30.5	30.5
HEAVY TRUCKS	51.1	34.1	26.4	35.6	41.7	41.8
NOISE LEVELS (dBA)	52.0	43.3	41.7	38.3	45.8	46.2

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	2	6	19	61
LDN	2	6	18	56

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT: Pacific Emerald Tract 37904 SFR
ROADWAY: Mountain Avenue
LOCATION: Nearest Residential Building First Floor Façade

JOB #: 0888-2020-07
DATE: 22-Oct-20
ENGINEER: D. Shivaiah

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	2,800	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	56	
ROAD ELEVATION =	0.0	
GRADE =	0.4	%
PK HR VOL =	5,390	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		81
DIST C/L TO WALL =		110
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		10
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	10	(10 = HARD SITE, 15 = SOFT SITE)
MEDIUM TRUCKS =	10	
HEAVY TRUCKS =	10	

WALL INFORMATION

HTH WALL=	6.0	
AMBIENT=	0.0	
BARRIER =	1	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.695	0.129	0.096	0.9200
MEDIUM TRUCKS	0.014	0.001	0.015	0.0300
HEAVY TRUCKS	0.024	0.001	0.025	0.0500

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	116.50	- -
MEDIUM TRUCKS	4.0	116.45	- -
HEAVY TRUCKS	8.0	116.45	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	63.4	48.2	46.9	40.8	49.2	49.9
MEDIUM TRUCKS	60.1	28.1	20.3	29.5	35.7	35.7
HEAVY TRUCKS	68.5	38.7	30.9	40.1	46.3	46.3
NOISE LEVELS (dBA)	70.1	48.7	47.0	43.7	51.1	51.6

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	54.6	39.4	38.1	32.0	40.4	41.1
MEDIUM TRUCKS	51.5	19.5	11.7	20.9	27.1	27.1
HEAVY TRUCKS	60.3	30.5	22.7	31.9	38.1	38.1
NOISE LEVELS (dBA)	61.5	40.0	38.4	35.0	42.5	43.0

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	1	4	12	37
LDN	1	3	11	33

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	Pacific Emerald Tract 37904 SFR	JOB #:	0888-2020-07
ROADWAY:	McPherson Road	DATE:	22-Oct-20
LOCATION:	Nearest Residential Building Property Line.	ENGINEER:	D. Shivaiah

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	1,700	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	28	
ROAD ELEVATION =	0.0	
GRADE =	0.4	%
PK HR VOL =	170	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		40
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		10
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	10	(10 = HARD SITE, 15 = SOFT SITE)
MEDIUM TRUCKS =	10	
HEAVY TRUCKS =	10	

WALL INFORMATION

HTH WALL=	6.0	
AMBIENT=	0.0	
BARRIER =	1	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.736	0.136	0.102	0.9742
MEDIUM TRUCKS	0.009	0.000	0.009	0.0184
HEAVY TRUCKS	0.004	0.000	0.004	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	47.73	- -
MEDIUM TRUCKS	4.0	47.57	- -
HEAVY TRUCKS	8.0	47.57	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	52.5	50.4	49.0	43.0	51.5	52.1
MEDIUM TRUCKS	46.9	25.7	18.2	26.9	33.1	33.1
HEAVY TRUCKS	49.1	23.7	20.3	25.0	31.2	31.3
NOISE LEVELS (dBA)	54.9	50.4	49.1	43.2	51.6	52.2

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	43.1	41.0	39.6	33.6	42.1	42.7
MEDIUM TRUCKS	38.1	16.9	9.4	18.1	24.3	24.3
HEAVY TRUCKS	41.1	15.8	12.4	17.0	23.2	23.3
NOISE LEVELS (dBA)	45.5	41.0	39.7	33.8	42.2	42.8

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	1	3	8	26
LDN	1	2	7	23

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT: Pacific Emerald Tract 37904 SFR
ROADWAY: McPherson Road
LOCATION: Nearest Residential Building Property Line.

JOB #: 0888-2020-07
DATE: 22-Oct-20
ENGINEER: D. Shivaiah

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	1,700
SPEED =	25
PK HR % =	10
NEAR LANE/FAR LANE DIST	28
ROAD ELEVATION =	0.0
GRADE =	0.4 %
PK HR VOL =	170

RECEIVER INPUT DATA

RECEIVER DISTANCE =		73
DIST C/L TO WALL =		40
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		33
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	10	(10 = HARD SITE, 15 = SOFT SITE)
MEDIUM TRUCKS =	10	
HEAVY TRUCKS =	10	

WALL INFORMATION

HTH WALL=	6.0	
AMBIENT=	0.0	
BARRIER =	1	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.736	0.136	0.102	0.9742
MEDIUM TRUCKS	0.009	0.000	0.009	0.0184
HEAVY TRUCKS	0.004	0.000	0.004	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	70.70	- -
MEDIUM TRUCKS	4.0	70.54	- -
HEAVY TRUCKS	8.0	71.71	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	50.8	48.6	47.3	41.3	49.7	50.4
MEDIUM TRUCKS	45.2	23.9	16.4	25.2	31.4	31.4
HEAVY TRUCKS	47.3	22.0	18.6	23.2	29.4	29.5
NOISE LEVELS (dBA)	53.1	48.7	47.3	41.5	49.8	50.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	41.5	39.3	38.0	32.0	40.4	41.1
MEDIUM TRUCKS	36.7	15.4	7.9	16.7	22.9	22.9
HEAVY TRUCKS	47.3	22.0	18.6	23.2	29.4	29.5
NOISE LEVELS (dBA)	44.1	39.6	38.3	32.4	40.8	41.4

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	1	3	8	26
LDN	1	2	7	22

Appendix D

Construction and Vibration Calculation Results

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/16/2020
Case Description: Pacific Emerald Noise Impact Study

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Site Preparation	Residential	80	80	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	50	0
Tractor	No	40	84		50	0
Dozer	No	40		81.7	50	0
Dozer	No	40		81.7	50	0
Tractor	No	40	84		50	0
Tractor	No	40	84		50	0
Tractor	No	40	84		50	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Dozer		81.7	77.7
Tractor		84	80
Dozer		81.7	77.7
Dozer		81.7	77.7
Tractor		84	80
Tractor		84	80
Tractor		84	80
	Total	84	87.6

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/16/2020
Case Description: Pacific Emerald Noise Impact Study

				---- Receptor #1 ----			
		Baselines (dBA)					
Description	Land Use	Daytime	Evening	Night			
Grading	Residential	80	80	45			

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	50	0
Grader	No	40	85		50	0
Dozer	No	40		81.7	50	0
Scraper	No	40		83.6	50	0
Tractor	No	40	84		50	0
Excavator	No	40		80.7	50	0
Scraper	No	40		83.6	50	0
Tractor	No	40	84		50	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Excavator		80.7	76.7
Grader		85	81
Dozer		81.7	77.7
Scraper		83.6	79.6
Tractor		84	80
Excavator		80.7	76.7
Scraper		83.6	79.6
Tractor		84	80
	Total	85	88.2

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/16/2020
Case Description: Pacific Emerald Noise Impact Study

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Building Construction	Residential	80	80	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	50	0
Pickup Truck	No	40		75	50	0
Generator	No	50		80.6	50	0
Tractor	No	40	84		50	0
Welder / Torch	No	40		74	50	0
Pickup Truck	No	40		75	50	0
Pickup Truck	No	40		75	50	0
Tractor	No	40	84		50	0
Tractor	No	40	84		50	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Crane		80.6	72.6
Pickup Truck		75	71
Generator		80.6	77.6
Tractor		84	80
Welder / Torch		74	70
Pickup Truck		75	71
Pickup Truck		75	71
Tractor		84	80
Tractor		84	80
	Total	84	86.3

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/16/2020
Case Description: Pacific Emerald Noise Impact Study

				---- Receptor #1 ----			
		Baselines (dBA)					
Description	Land Use	Daytime	Evening	Night			
Paving	Residential	80	80	45			

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	50	0
Roller	No	20		80	50	0
Tractor	No	40	84		50	0
Tractor	No	40	84		50	0
Paver	No	50		77.2	50	0
Roller	No	20		80	50	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Paver		77.2	74.2
Roller		80	73
Tractor		84	80
Tractor		84	80
Paver		77.2	74.2
Roller		80	73
	Total	84	84.7

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/16/2020
Case Description: Pacific Emerald Noise Impact Study

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Architectural Coating	Residential	80	80	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	50	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Compressor (air)		77.7	73.7
	Total	77.7	73.7

*Calculated Lmax is the Loudest value.

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Pacific Emerald Tract 37904	JOB #:	0888-2020-07
ACTIVITY:	Vibratory Roller	DATE:	20-Oct-20
LOCATION:	Nearest Structure	ENGINEER:	D. Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

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

PPV =	**0.098 in/sec**

Equipment Type =	1	Vibratory Roller
PPV_{ref} =	0.210	Reference PPV at 25 ft.
D =	50.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Pacific Emerald Tract 37904	JOB #:	0888-2020-07
ACTIVITY:	Vibratory Roller	DATE:	20-Oct-20
LOCATION:	Nearest Structure	ENGINEER:	D. Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

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

PPV =	**0.098 in/sec**

Equipment Type =	1	Vibratory Roller
PPV_{ref} =	0.210	Reference PPV at 25 ft.
D =	50.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Pacific Emerald Tract 37904	JOB #:	0888-2020-07
ACTIVITY:	Loaded Trucks	DATE:	20-Oct-20
LOCATION:	Nearest Structure	ENGINEER:	D. Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

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

PPV =	**0.035 in/sec**

Equipment Type =	4	Loaded Trucks
PPV_{ref} =	0.076	Reference PPV at 25 ft.
D =	50.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

Suggested "n" Values Based on Soil Classes		
Soil Class	**Description of Soil Material**	**Suggested Value of "n"**
I	Weak or soft soils: loose soils, dry or partially saturated peat and muck, mud, loose beach sand, and dune sand.	1.4
II	Most sands, sandy clays, silty clays, gravel, silts, weathered rock.	1.3
III	Hard soils: dense compacted sand, dry consolidated clay, consolidated glacial till, some exposed rock.	1.1
IV	Hard, component rock: bedrock, freshly exposed hard rock.	1.0

Guideline Vibration Damage Potential Threshold Criteria		
Structure and Condition	**Maximum PPV (in/sec)**	
	Transient Sources	**Continuous/Frequent Intermittent Sources**
Extremely fragile historic buildings, ruins ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

Guideline Vibration Annoyance Potential Criteria		
Human Response	**Maximum PPV (in/sec)**	
	Transient Sources	**Continuous/Frequent Intermittent Sources**
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.90	0.10
Severe	2.00	0.40

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans Transportation and Construction-Induced Vibration Guidance Manual, June 2004