Scenic Wonders Development

Noise Study Report
August 2021

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1.0 Introduction

1.1 Description of the Region/Project

This Noise Study Report (NSR) has been prepared for the purpose of identifying potential noise impacts that may result from the Scenic Wonders Project (Project). The proposed Project site is located on a 6.2-acre parcel (APN 006-150-003) at 7548 Henness Circle, Yosemite CA 95389, which is currently vacant and adjacent to the existing Yosemite West Condominiums also used as vacation rentals. The surrounding area consists of rural foothill land with rental homes located to the west and south along existing paved rural roadways. The site is located to the south of the fork of Henness Ridge Road and Henness Circle, at the entrance of the Yosemite West community. Figure 1 shows the site's regional context. Figure 2 shows the Project location respective of the surrounding roadway network.

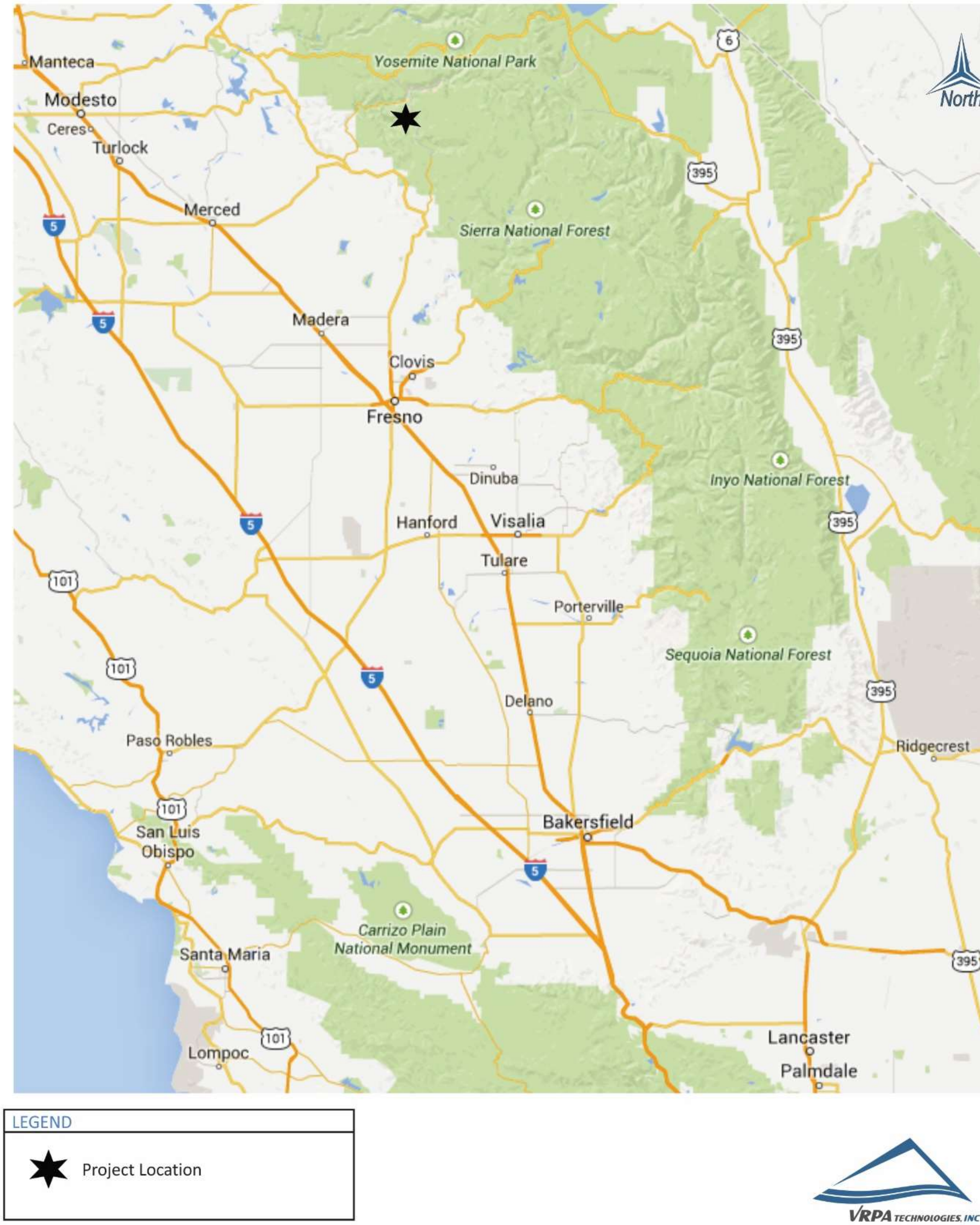
The first phase of development of the site includes the immediate construction of a primary and auxiliary residence used for long term rent. A detached garage structure for storage is included in Phase 1 development. The Auxiliary residence, its septic and water systems are currently under construction. Phased water and septic systems for the Auxiliary and Primary Residences along with the Detached Garage (the proposed commercial laundry is in Phase 2) are to be developed during Phase 1. It will include completion of the existing on-site water well with storage tanks and engineered septic system with secondary treatment for the two residences.

The Phase 2 development proposes 16 additional, economy apartments which will be utilized for staff employed by the applicant. These additional units would include 12 one-bedroom units and four (4) two-bedroom units. Approximately 46 people will reside at the project with phase 2 completion. The density of the project will be approximately 3 dwelling units per gross acre following completion of Phase 2. In comparison, Yosemite West Unit 1 is up to 8 dwelling units per acre (1/4 acre lots with two (2) units each). The project is adjacent to the Yosemite West Condominiums that has a density of approximately 34 units per gross acre. This project will be the lowest density property in the Yosemite West community. In addition, the Project will undergo a General Plan Amendment through Mariposa County. The present General Plan Land Use and Zoning District is Rural Residential and RRZ, respectively. The proposed Land Use and Zoning is Multi-Family Residential/General Commercial and Yosemite West Mixed-Use Zone.

When preparing an NSR, guidelines set by Mariposa County must be followed. In analyzing noise levels, the guidelines and policies in the Noise section of Mariposa County's adopted General Plan was utilized. Unless otherwise stated, all sound levels reported are in A-weighted decibels (dBA). A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to the human ear. Most community noise standards use A-weighting, as it provides a high degree of correlation with human annoyance and health effects.

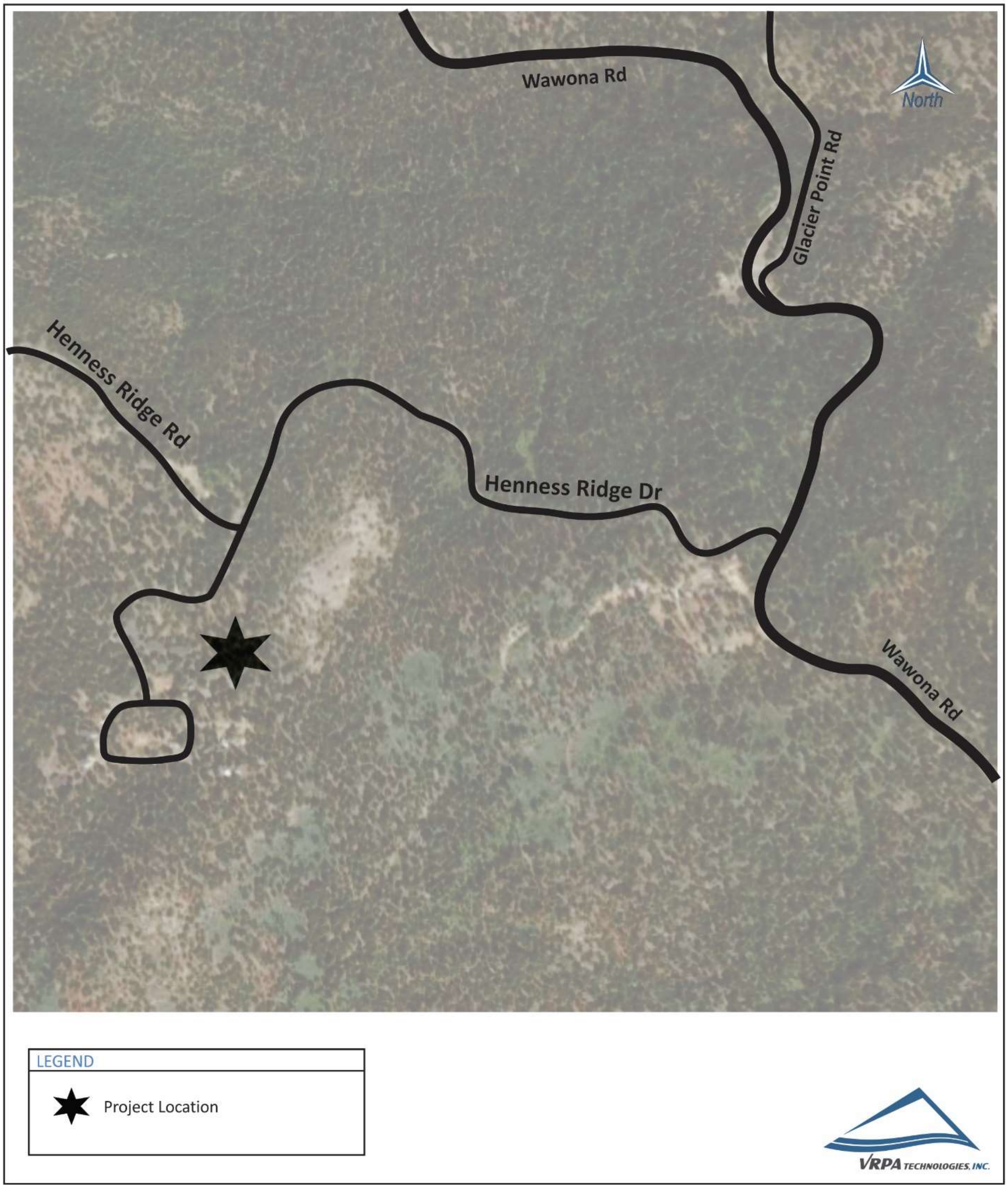
Scenic Wonders Development
Regional Location

Figure 1



Scenic Wonders Development
Project Location

Figure 2



1.2 Sound and the Human Ear

Sound levels are presented on a logarithmic scale to account for the large range of acoustic pressures that the human ear is exposed to and is expressed in units of decibels (dB). A decibel is defined as the ratio between a measured value and a reference value usually corresponding to the lower threshold of human hearing defined as 20 micropascals (μPa). Noise can generally be described as unwanted sound and has been cited as being a health problem, not just in terms of actual physiological damages such as hearing impairment, but also in terms of inhibiting general wellbeing and contributing to stress and annoyance. Long or repeated exposure to sounds at or above 85 dB can cause hearing loss. The louder the sound, the shorter the time period before hearing loss can occur. Sounds of less than 75 dB are unlikely to cause hearing loss even after long exposure.[1]

1.2.1 *A-Weighted Decibels*

Sound pressure level alone is not a reliable indicator of loudness. The frequency, or pitch, of a sound also has a substantial effect on how humans will respond. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear. Human hearing is limited not only in the range of audible frequencies but also in the way it perceives the SPL in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, and it perceives a sound within that range as being more intense than a sound of higher or lower frequency with the same magnitude. To approximate the frequency response of the human ear, a series of SPL adjustments is usually applied to the sound measured by a sound level meter. The adjustments (referred to as a weighting network) are frequency dependent. The A-scale weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-scale, C-scale, D-scale), but these scales are rarely, if ever, used in conjunction with highway traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted dBAs. In environmental noise studies, A-weighted SPLs are commonly referred to as noise levels.

Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance, and habituation to noise over differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment, referred to as the "ambient" environment. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by the hearers. Regarding increases in A-weighted noise level, knowledge of the following relationships will be helpful in understanding this report:

1 Source: National Institute on Deafness and Other Hearing Disorders

1. Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived by humans.
2. Outside of the laboratory, a 3 dB change is considered a just-perceivable difference.
3. A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
4. A 10 dB change is subjectively heard as approximately a doubling in loudness.

1.2.2 *Sound Pressure Levels and Decibels*

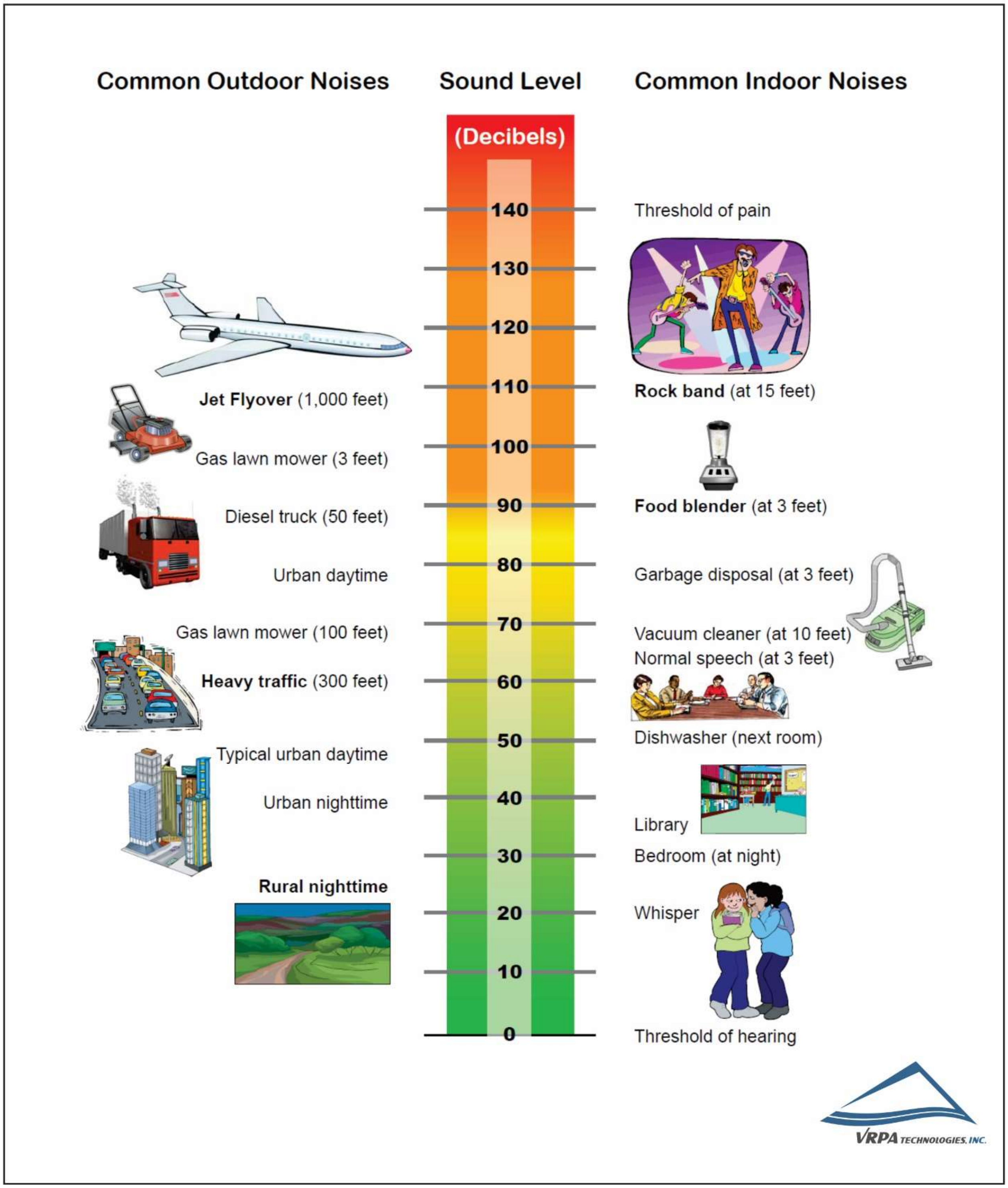
Because of the ability of the human ear to detect a wide range of sound pressure fluctuations, sound pressure levels are expressed in logarithmic units called decibels. The sound pressure level in decibels is calculated by taking the log of the ratio between the actual sound pressure and the reference sound pressure squared. The reference sound pressure is considered the absolute hearing threshold. In addition, because the human ear is not equally sensitive to all sound frequencies, a specific frequency-dependent rating scale was devised to relate noise to human sensitivity. A dBA scale performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. The basis for comparison is the faintest sound audible to the average ear at the frequency of maximum sensitivity. This dBA scale has been chosen by most authorities for purposes of environmental noise regulation. Typical indoor and outdoor noise levels are presented in Figure 3 (Common Environmental Sound Levels).

1.2.3 *Sound, Noise, and Acoustics*

Sound is a disturbance created by a moving or vibrating source in a gaseous or liquid medium or the elastic stage of a solid and is capable of being detected by the hearing organs. Sound may be thought of as the mechanical energy of a vibrating object transmitted by pressure waves through a medium to a hearing organ, such as a human ear. For traffic sound, the medium of concern is air. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired. Sound is actually a process that consists of three components: the sound source, the sound path, and the sound receiver. All three components must be present for sound to exist. Without a source to produce sound, there is no sound. Likewise, without a medium to transmit sound pressure waves, there is also no sound. Finally, sound must be received; a hearing organ, sensor, or object must be present to perceive, register, or be affected by sound or noise. In most situations, there are many different sound sources, paths, and receivers rather than just one of each. Acoustics is the field of science that deals with the production, propagation, reception, effects, and control of sound.

Scenic Wonders Development
Common Environmental Sound Levels

Figure 3



1.2.4 *Frequency and Hertz*

A continuous sound can be 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, like the low notes on a piano, whereas high-frequency sounds are high in pitch, like the high notes on a piano. Frequency is expressed in terms of oscillations, or cycles, per second. Cycles per second are commonly referred to as Hertz (Hz). A frequency of 250 cycles per second is referred to as 250 Hz. High frequencies are sometimes more conveniently expressed in units of kilo-Hertz (kHz), or thousands of Hertz. The extreme range of frequencies that can be heard by the healthiest human ear spans from 16–20 Hz on the low end to about 20,000 Hz (or 20 kHz) on the high end.

1.2.5 *Addition of Decibels*

Because decibels are logarithmic units, sound pressure levels cannot be added or subtracted by ordinary arithmetic means. For example, if one automobile produces an SPL of 70 dBA as it passes an observer, two cars passing simultaneously would not produce 140 dBA; they would, in fact, combine to produce 73 dBA. When two sounds of equal SPL are combined, they will produce a combined SPL 3 dBA greater than the original individual SPL. In other words, sound energy must be doubled to produce a 3 dBA increase. If two sound levels differ by 10 dBA or more, the combined SPL is equal to the higher SPL; in other words, the lower sound level does not increase the higher sound level.

1.3 Characteristics of Sound Propagation and Attenuation

Noise can be generated by a number of sources, including mobile sources such as automobiles, trucks, and airplanes, and stationary sources such as construction sites, machinery, and industrial operations.

Noise generated by mobile sources typically attenuates (is reduced) at a rate between 3.0 and 4.5 dBA per doubling of distance. The rate depends on the ground surface and the number or type of objects between the noise source and the receiver. Hard and flat surfaces, such as concrete or asphalt, have an attenuation rate of 3.0 dBA per doubling of distance. Soft surfaces, such as uneven or vegetated terrain, have an attenuation rate of about 4.5 dBA per doubling of distance.

Noise generated by stationary sources typically attenuates at a rate between 6.0 and about 7.5 dBA per doubling of distance. Sound levels can be reduced by placing barriers between the noise source and the receiver (commonly called the “receptor”). In general, barriers contribute to decreasing noise levels only when the structure breaks the “line of sight” between the source and the receiver. Buildings, concrete walls, and berms can all act as effective noise barriers. Wooden fences or broad areas of dense foliage can also reduce noise, but are less effective than solid barriers.

1.3.1 *Noise Descriptors*

Noise in the daily environment fluctuates over time. Some of the fluctuations are minor; some are substantial. Some noise levels occur in regular patterns; others are random. Some noise levels fluctuate rapidly, others slowly. Some noise levels vary widely; others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following is a list of the noise descriptors most commonly used in traffic noise analysis:

1. **Equivalent Sound Level (Leq) -** Leq represents an average of the sound energy occurring over a specified period. Leq is, in effect, the steady-state sound level that, in a stated period, would contain the same acoustical energy as the time-varying sound that actually occurs during the same period. The one-hour A-weighted equivalent sound level, Leq(h), is the energy average of the A-weighted sound levels occurring during a one-hour period and is the basis for the Noise Abatement Criteria (NAC) used by the California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA).
2. **Percentile-Exceeded Sound Level (Lx) -** Lx represents the sound level exceeded for a given percentage of a specified period. For example, L10 is the sound level exceeded 10 percent of the time, and L90 is the sound level exceeded 90 percent of the time.
3. **Maximum Sound Level (Lmax) -** Lmax is the highest instantaneous sound level measured during a specified period.

1.3.2 *Sound Propagation*

When sound propagates over a distance, it changes in both level and frequency content. The manner in which noise reduces with distance depends on the following factors:

1. Geometric Spreading - 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 (or drops off) at a rate of six dBA for each doubling of distance. Highway noise is not a single, stationary point source of sound. The movement of the vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a line source) rather than a point. This line source results in cylindrical spreading rather than the spherical spreading that results from a point source. The change in sound level from a line source is 3 dBA per doubling of distance.
2. Ground Absorption - Most often, the noise path between the highway and the observer is very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is done for simplification only; for distances of less than 60 m (200 ft), prediction results based on this scheme are sufficiently accurate. For acoustically hard sites (i.e., those sites with a reflective surface, such as a parking lot or a smooth body of water, between the source and the receiver), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface, such

as soft dirt, grass, or scattered bushes and trees, between the source and the receiver), an excess ground attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source and 7.5 dBA per doubling of distance for a point source.

3. Atmospheric Effects - Research by Caltrans and others has shown that atmospheric conditions can have a significant effect on noise levels within 60 m (200 ft) of a highway. Wind has been shown to be the most important meteorological factor within approximately 150 m (500 ft) of the source, whereas vertical air temperature gradients are more important for greater distances. Other factors such as air temperature, humidity, and turbulence also have significant effects. Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lower noise levels. Increased sound levels can also occur as a result of temperature inversion conditions (i.e., increasing temperature with elevation).
4. Shielding by Natural and Human-Made Features - A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by this shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dBA of noise reduction.

1.4 Ground-borne Vibration

Annoyance to humans and damage to buildings are the two ground-borne vibration impacts of general concern. The two measurements corresponding to human annoyance and building damage for evaluating ground-borne vibration are peak particle velocity (PPV) and root-mean square (RMS) velocity. PPV is the maximum instantaneous positive or negative peak of the vibration signal, measured as a distance per time (such as millimeters or inches per second). This measurement has been used historically to evaluate shock-wave type vibrations from actions like blasting, pile driving, and mining activities, and their relationship to building damage. RMS is an average, or smoothed, vibration amplitude, commonly measured over 1-second intervals. It is expressed on a log scale in decibels (VdB) referenced to 0.000001 x 10-6 inch per second and is not to be confused with noise decibels. It is more suitable for addressing human annoyance and characterizing background vibration conditions because it better represents the response time of humans to ground vibration signals.

1.5 Methodology

When preparing an NSR, guidelines set by affected agencies must be followed. Acoustical terminology used for this NSR is documented in Appendix A. In analyzing traffic noise levels, the FHWA Highway Traffic Noise Prediction methodology must be applied. Safety concerns must also be analyzed to determine the need for appropriate mitigation resulting from increased noise due to increased traffic and other evaluations such as the need for noise barriers and other noise abatement improvements. Stationary noise levels were evaluated using Section 2.1.4 of the California Department of Transportation's (Caltrans) Technical Noise Supplement which evaluates the decrease in noise as distance from the noise source increases. Unless otherwise stated, all sound levels reported are in A-weighted decibels (dBA). A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to the human ear. Most community noise standards use A-weighting, as it provides a high degree of correlation with human annoyance and health effects.

1.5.1 *California Environmental Quality Act (CEQA)*

CEQA requires environmental impact reports to evaluate whether and to what extent a proposed project may result in significant effects on the environment. If a project is determined to have a significant noise impact under CEQA, then CEQA dictates that mitigation measures must be incorporated into the project unless such measures are also evaluated and determined to not be feasible. An EIR is also required to evaluate a reasonable range of alternatives to the proposed Project that could feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project. An EIR must also evaluate a "No Project" Alternative. CEQA Guidelines Appendix G suggests the following as potential thresholds for determining whether a project will result in significant impacts on the environment:

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

1.5.2 *Mariposa County*

The Noise Element of Mariposa County's currently adopted General Plan serves as the primary policy statement for the County for implementing policies to maintain and improve the noise environment in the Mariposa County. The Noise Element presents Goals and Objectives relative to planning for the noise environment within the County. Future noise/land use incompatibilities can be avoided or reduced with implementation of the County's noise criteria and standards.

Table 1 shows Mariposa County's maximum allowable noise exposure from Transportation Noise Sources as depicted in Table C-2 of Appendix C (Future Consideration) of the Mariposa County General Plan. Table 2 shows Noise Performance Standards for Non-Transportation Noise Sources.

The information presented in Table 2 comes also comes from Table C-1 of Appendix C (Future Consideration).

Table 1
Maximum Allowable Noise Exposure - Transportation Noise Sources

Noise-Sensitive Land Use	Outdoor Activity Areas	Interior Spaces	
	Ldn/CNEL, dB	Ldn/CNEL, dB	L_{eq}, dB
Residential	60	45	--
Transient lodging	60	45	--
Hospitals, Nursing Homes	60	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls	60	--	40
Office Buildings	--	--	45
Schools, Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	65	--	--

Notes:
(A) Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use. Where it is not practical to mitigate exterior noise levels at patio or balconies of apartment complexes, a common area such as a pool or recreation area may be designated as the outdoor activity area.
(B) As determined for a typical worst-case hour during periods of use.
(C) Where it is not possible to reduce noise in outdoor activity areas to 60 dB Ldn/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB Ldn/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table. In the case of hotel/motel facilities or other transient lodging, outdoor activity areas such as pool areas may not be included in the project design. In these cases, only the interior noise level criterion will apply.
-- = not applicable
Ldn = Day-Night Average Level
CNEL = Community Noise Equivalent Level
dB = Decibles
L_{eq} = Noise Equivalent Level

Table 2
Noise Performance Standards for Non-Transportation Sources

Noise Level Descriptor	Daytime (7:00 a.m. - 10:00 p.m.)	Nighttime (10:00 p.m. - 7:00 a.m.)
Hourly L_{eq}, dB	55	45

Notes:
(A) Each of the noise levels specified above shall be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises (e.g., humming sounds, outdoor speaker systems).

These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings). The County can impose noise level standards that are more restrictive than those specified above based upon determination of existing low ambient noise levels. In rural areas where large lots exist, the exterior noise level standard may be applied at a point 100 feet away from the residence. Industrial, light industrial, commercial and public service facilities which have the potential for producing objectionable noise levels at nearby noise-sensitive uses are dispersed throughout the County. Fixed noise sources that are typically of concern include, but are not limited to the following: HVAC System, Cooling, Towers/Evaporative Condensers, Pump Stations, Lift Stations, Emergency Generators, Boilers, Steam Valves, Steam Turbines, Generators, Fans, Air Compressors, Heavy Equipment, Conveyor Systems, Transformers, Pile Drivers, Grinders, Drill Rigs, Gas or Diesel Motors, Welders, Cutting Equipment, Outdoor Speakers, Blowers.

(B) The types of uses which may typically produce the noise sources described above include but are not limited to: industrial facilities including lumber mills, trucking operations, tire shops, auto maintenance shops, metal fabricating shops, shopping centers, drive-up windows, car washes, loading docks, public works projects, batch plants, bottling and canning plants, recycling centers, electric generating stations, race tracks, landfills, sand and gravel operations, and athletic fields.

1.5.3 *Study Methods and Procedures*

<u>Site Selection</u>

Developed and undeveloped land uses in the project vicinity were identified through land use maps, aerial photography, and site inspection. Within each land use category, sensitive receptors were then identified. Land uses in the Project vicinity include rural residential and natural resources. The generalized land use data and location of sensitive receptors were the basis for the selection of the noise monitoring and analysis sites.

<u>Noise Level Measurement Program</u>

Existing noise levels in the project vicinity were sampled during the Afternoon/PM peak hour. All measurements were made using an Extech Type 2 sound level meter datalogger.

The following measurement procedure was utilized:

1. Calibrate sound level meter.
2. Set up sound level meter at a height of 1.5 m (5 ft).
3. Commence noise monitoring.
4. Collect site-specific data such as date, time, direction of traffic, and distance from sound level meter to the center of the roadway.
5. Stop measurement after 15 minutes.
6. Proceed to next monitoring site and repeat.

2.0 Existing Conditions

Existing noise levels in the County are principally generated by transportation noise sources. Vehicular traffic noise is the dominant source in most areas, but aircraft activity is also significant sources of environmental noise in the local areas surrounding these operations. Noise is generated by either mobile or stationary sources.

- ✓ Mobile source noise is typically associated with transportation, such as cars, trains, and aircraft.

- ✓ Stationary noise is that generated by any 'fixed' noise source. Examples of stationary sources include outdoor machinery (i.e. such as heating/air conditioning systems and power generators), farming activities, high voltage power lines, and industrial areas within the County. Noise generated from construction sites also falls into the category of stationary sources.

2.1 Traffic Noise

Roadway traffic noise levels are generally dependent upon three primary factors, which include the traffic volume, the traffic speed, and the percent of heavy vehicles on the roadway. Traffic generated noise is the result of vehicle engines, exhaust, tires, and wind generated by taller vehicles. Vehicles with defective mufflers or faulty equipment have the propensity to increase traffic noise. Traffic noise levels are reduced by distance, terrain, vegetation, and natural/manmade obstacles between a noise receptor and the highway/roadway.

To assess existing noise conditions, VRPA Technologies staff conducted noise level measurements at two (2) locations (called receivers) in the vicinity of the Project site and tabulated the results. The weather during the time of the noise measurements taken consisted of sunshine and wind speeds of less than 5 mph. The purpose of the measurements was to determine baseline existing noise levels in the Project area and to calibrate the FHWA Traffic Noise model, which will be used to then predict and assess future year conditions.

The receivers evaluated for this Project were located near residential uses along Henness Ridge Drive and Wawona Road. The receiver locations are shown in Figure 4. One (1) additional receiver (2) was incorporated into the analysis to assess impacts of the Project. The additional receiver is also reflected in Figure 4.

Scenic Wonders Development
Noise Monitoring Locations

Figure 4

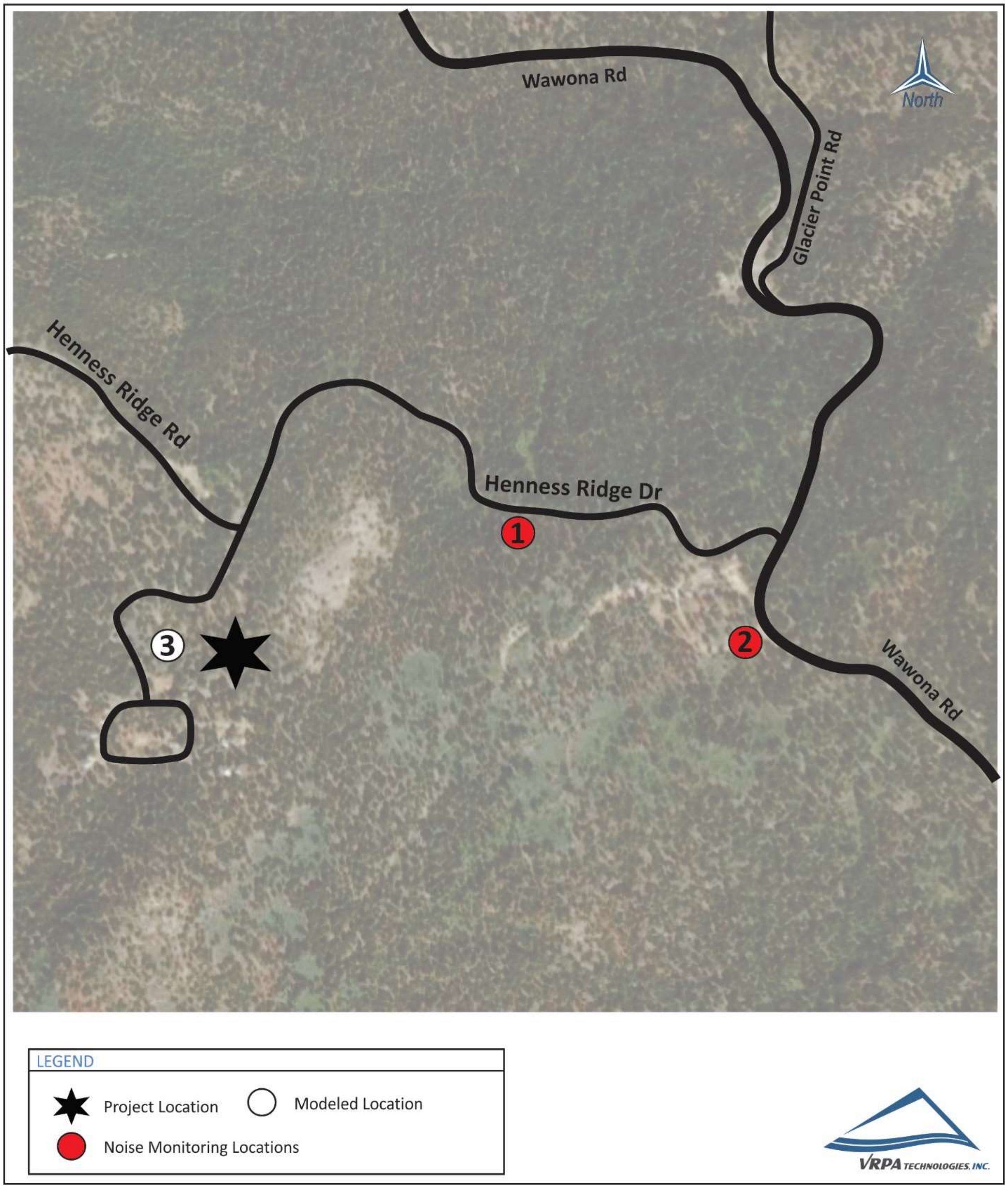


Table 3 characterizes the results of the existing noise conditions at the two (2) receivers evaluated in the study area.

Table 3
Existing Noise Levels

Receiver ID No.	Location	Distance from Noise Source-Roadway Centerline (feet)	Existing Noise Level Leq(h) dBA
1	Open Area located along Henness Ridge Drive, west of Wawona Road	25	46.0
2	Open Area located along Wawona Road, south of Henness Ridge Drive	25	55.0

Source: VRPA Technologies, 2021

Traffic noise exposure is mainly a function of the number of vehicles on a given roadway per day, the speed of those vehicles, the percentage of medium and heavy trucks in the traffic volume, and the receiver's proximity to the roadway. Every vehicle passage on every roadway in the County radiates noise.

Existing high noise levels along major streets and highways are generally caused by traffic and congestion. Potential impacts along these facilities are generally classified as follows:

- ✓ Low - Ldn 59 dB or below
- ✓ Moderate - Ldn 60 dB to 65 dB
- ✓ High - Ldn 66 dB or greater

The potential for adverse noise impacts is generally moderate to high along most segments of State highways and is generally low to moderate along most County streets and rural highways.

2.2 Stationary Noise

There are a wide variety of industrial and other non-transportation noise sources throughout the County. Stationary noise generated from construction of the Project could potentially impact the surrounding area.

The change in noise level due to distance for point sources is determined by the following formula, which comes from the California Department of Transportation's (Caltrans) Technical Noise Supplement to the Traffic Noise Analysis Protocol.

$$dBA_2 = dBA_1 + 10\log_{10}[(D_1/D_2)]^2 = dBA_1 + 20\log_{10}(D_1/D_2)$$

Where:
dBA_1 = noise level at distance D_1

dBA_2 = noise level at distance D_2

Stationary noise impacts to the Project will be developed considering the formula above and the closest distance between the Project site and stationary noise sources in the surrounding area.

2.3 Ground-borne Vibration

Ambient vibration levels in residential areas are typically 50 VdB, which is well below human perception. The operation of heating/air conditioning systems and slamming of doors produce typical indoor vibrations that are noticeable to humans. The most common exterior sources of ground vibration that can be noticeable to humans inside residences include construction activities, train operations, and street traffic. Table 4 provides some common sources of ground vibration and the relationship to human perception. This information comes from the Federal Transit Administration's "Basic Ground-Bourne Vibration Concepts."

Table 4
Typical Levels of Ground-Borne Vibration

Human/Structural Response	Velocity Level*, VdB	Typical Events (50 ft. Setback)
Threshold, minor cosmetic damage fragile buildings	100	Blasting from construction projects
		Bulldozers, vibratory rollers, and other heavy tracked construction equiment
Difficulty with tasks such as reading a video or computer screen	90	
		Commuter rail, upper range
Residential annoyance, infrequent events (e.g commuter rail)	80	Rapid transit, upper range
		Commuter rail, typical
Residential annoyance, infrequent events (e.g rapid transit)		Bus or truck over bump
	70	Rapid transit, typical
Limit for vibration sensitive equipment. Approx. threshold for human perception of vibration		Bus or truck, typical
	60	
		Typical background vibration
	50	

* RMS velocity in decibels (VdB) are 10^{-6} inches/second

3.0 Short-Term Impacts

3.1 Construction Noise Impacts

The Project has the potential to result in short-term noise impacts to surrounding land uses due to construction activity noise (collectively referred to hereafter as just “construction” noise). Construction noise represents a short-term impact on ambient noise levels and includes activities such as demolition, site preparation, grading, and other construction-related activities. Noise generated from the transport of workers and the movement of materials to and from the construction site and the physical activities associated with any construction-related activities could potentially impact neighboring sensitive land uses. Although most of the types of exterior construction activities associated with the Project will not generate continually high noise levels, occasional single-event disturbances from grading and construction activities are possible.

Table 5 depicts typical construction equipment noise levels, based upon a distance of 50 feet between the noise source and the noise receptor. Noise emitted by construction equipment is controlled by the Environmental Protection Agency's (EPS’s) Noise Control Program (Part 204 of Title 40, Code of Federal Regulations).

During construction of various components of the Project, noise from construction activities will add to the noise environment in the immediate area. Activities involved in building construction would generate maximum noise levels, as indicated in Table 5, ranging from 77 to 85 dBA at 50 feet. Construction activities will be temporary in nature and are expected to occur during normal daytime working hours. Construction noise impacts could result in annoyance or sleep disruption for nearby residences if nighttime operations occurred, or if unusually noisy equipment was used. It is not anticipated that any portion of the construction phase will take place during nighttime hours. Based on information provided in Table 5 and the noise attenuation formula provided in Section 2.2, the nearest condominiums adjacent to the southern boundary of the Project site may be subject to short-term noise reaching 65 to 75 dBA Lmax generated by construction activities. Considering the hourly Leq of 55 dB from Mariposa County’s Non-Transportation Noise Sources criteria (Table 2), construction of the Project will, more likely than not, impact the neighboring residences directly south of the Project site. Mitigation Measure 1 is recommended in Section 5.0 to attenuate this noise exposure from construction of the Project.

Table 5
Construction Equipment Noise

TYPE OF EQUIPMENT	Sound Levles Measured (dBA of 50 feet)
Rock Drills	85
Jack Hammers	85
Pneumatic Tools	85
Pumps	77
Dozers	85
Tractor	84
Vibratory Rollers[1]	80
Front-End Loaders	80
Hydraulic Backhoe	80
Hydraulic Excavators	85
Graders	85
Air Compressors	80
Trucks	84

Source: Noise Control for Buildings and Manufacturing Plants (Bolt, Beranek and Newman, 1987).
1 - Federal Highway Administration Roadway Construction Noise Model, FHWA 2006

3.2 Ground-borne Vibration

Construction activity can result in ground vibration, depending upon the types of equipment used. Operation of construction equipment causes ground vibrations, which spread through the ground and diminish in strength with distance from the source generating the vibration. Building structures that are founded on the soil in the vicinity of the construction site respond to these vibrations, with varied results. Ground vibrations as a result of construction activities very rarely reach vibration levels that will damage structures but can cause low rumbling sounds and detectable vibrations for buildings very close to the site.

Vibration levels from various types of construction equipment are shown in Table 6. The primary concern with construction vibration is building damage. Therefore, construction vibration is generally assessed in terms of peak particle velocity (PPV). It should be noted that there is a considerable variation in reported ground vibration levels from construction activities. The data provides a reasonable estimate for a wide range of soil conditions.

Despite the perceptibility threshold of about 65 VdB, human reaction to vibration is not significant unless the vibration exceeds 75 VdB according to the United States Department of Transportation. Mariposa County does not specifically identify vibration level impact standards. Caltrans has established vibration thresholds in terms of human annoyance of 0.04 in/sec PPV as documented in Caltrans' *Transportation and Construction Vibration Guidance Manual*. The vibration threshold of 0.04 in/sec PPV was used to estimate the impact of vibrations from construction activities associated with the Project. The following formula was used to estimate the human response (annoyance) at the existing condominiums located to the south of the Project site.

$PPVequip = PPVref \times (25/D)^{1.5}$

Using the vibratory roller vibration level shown in Table 6 (PPV 0.210) and the formula shown above, the anticipated vibration velocity levels at the existing condominiums is expected to approach 0.014 in/sec PPV. Based on the vibration velocity levels provided in Table 6, vibrations generated by the construction phase of the Project are considered less than significant.

Table 6
Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 ft (in/sec)	PPV Levels at existing condominiums [1] (in/sec)	Threshold (in/sec)	Threshold Exceeded
Vibratory roller	0.210	0.014	0.040	No
Large bulldozer	0.089	0.006	0.040	No
Caisson drilling	0.089	0.006	0.040	No
Loaded trucks	0.076	0.005	0.040	No
Jackhammer	0.035	0.002	0.040	No
Small bulldozer	0.003	0.000	0.040	No

[1] The nearest condominiums are located approximately 150 to 175 feet south of the Project site

4.0 Long-Term Impacts

4.1 Traffic Noise Impacts

This section provides an assessment of the anticipated noise conditions in the future as it relates to the Project and the impact of increased traffic noise generated by the Project on the surrounding land uses within the study area. The noise impacts from the Project were analyzed considering Existing Plus Project, Cumulative Year 2040 No Project, and Cumulative Year 2040 Plus Project Conditions.

Existing Plus Project Conditions

Existing Plus Project traffic noise levels were established based on previously collected traffic data, traffic volumes from the traffic study prepared for the Project, and using the Traffic Noise Model (TNM) Version 2.5. Existing Plus Project levels, which are based on expected Project trip distribution, are calculated and compared to both the existing noise level and the maximum allowable noise exposure for transportation noise sources. Referencing Table 1, Mariposa County's criteria shows that mitigation must be considered when the exterior noise exposure level of 60 Ldn/CNEL for residential/transient lodging uses has been exceeded. The Ldn is estimated to be within +/- 2 dBA of the peak hour L_{eq} under normal traffic conditions based upon Caltrans' Traffic Analysis Noise Protocol.

Traffic volumes associated with the Project in addition to existing traffic along roadway segments in the study area were entered into the model to estimate noise levels at various receivers that would be affected by the Project. In order to calibrate the TNM 2.5 model, the existing counts, lane geometry, and any other pertinent existing conditions were added to the model. The noise level measurements taken in the study area were then compared to the noise levels computed by the model. The difference between the measured and modeled noise levels, referred to as the "K constant", is then added to any additional receivers to be evaluated in the TNM 2.5 model.

Table 7 shows the predicted noise levels at sensitive receivers in the study area as a result of adding traffic associated with the Project. As shown in Table 7, the highest peak hour sound level expected at the existing condominiums is 45.0 Leq(h) dBA. When it comes to noise levels, the Ldn is determined to be within +/- 2 dBA of the peak hour Leq under normal traffic conditions based upon Caltrans' Traffic Analysis Noise Protocol. Therefore, none of the Existing Plus Project noise levels exceed Mariposa County's Maximum Allowable Noise Exposure from Transportation Noise Sources. TNM 2.5 printouts included are provided in the Appendix B.

Table 7
Existing Plus Project Noise Levels

Receiver ID No.	Location	Distance from Noise Source-Roadway Centerline (feet)	Existing Plus Project Noise Level Leq(h) dBA	Mariposa County's Maximum Allowable Noise Exposure from Transportation Noise Sources	Impact
1	Open Area located along Henness Ridge Drive, west of Wawona Road	25	46.0	--	--
2	Open Area located along Wawona Road, south of Henness Ridge Drive	25	55.0	--	--
3	Existing Condominium	100	45.0	60.0	None

Source: VRPA Technologies, 2021

<u>Cumulative Year 2040 Conditions</u>

This section provides an assessment of the anticipated noise conditions in the future as it relates to the Project and the impact of increased traffic noise generated by the Project on the surrounding land uses within the study area. The noise impacts from the development of the Project was analyzed considering Cumulative Year 2040 Conditions as a result of the Mariposa County General Plan. Future development within the planning area will result in increased traffic volumes, thus increasing noise levels in some areas. While there will be increases in some noise levels, efforts can be taken to help minimize such instances.

The levels of traffic expected in the year 2040 relate to the cumulative effect of traffic increases resulting from the implementation of the general plans of local agencies and pending development projects. Traffic conditions for the Cumulative Year 2040 scenario was determined by the traffic study prepared for the Project. Traffic volumes, truck mix, and vehicle speeds were used as inputs to the TNM 2.5 model for the Cumulative Year 2040 modeled scenarios consistent with generally-accepted engineering principles and methods.

Table 8 shows the predicted noise levels at the modeled receivers evaluated in the study area for the Cumulative Year 2040 No Project and Cumulative Year 2040 Plus Project conditions. Results of the analysis show that none of the sensitive receivers will exceed Mariposa County's Maximum Allowable Noise Exposure from Transportation Noise Sources. As a result, the Project will not create a significant impact at sensitive receptors in the study area. Table 8 also shows the increase in noise levels for the Cumulative Year 2040 scenario once Project trips are added to the surrounding roadway system. Results show that trips associated with the Project will not create an increase in noise levels to the surrounding area.

Table 8
Cumulative Year 2040 Noise Levels

Receiver ID No.	Location	Distance from Noise Source-Roadway Centerline (feet)	Cumulative Year 2040 No Project Noise Level Leq(h) dBA	Cumulative Year 2040 Plus Project Noise Level Leq(h) dBA	Noise Increase (+) or Decrease (-)	Mariposa County's Maximum Allowable Noise Exposure from Transportation Noise Sources	Impact
1	Open Area located along Henness Ridge Drive, west of Wawona Road	25	48.0	48.0	0.0	--	--
2	Open Area located along Wawona Road, south of Henness Ridge Drive	25	57.0	57.0	0.0	--	--
3	Existing Condominium	100	47.0	47.0	0.0	60.0	None

Source: VRPA Technologies, 2021

5.0 Impact Determinations and Recommended Mitigation

In accordance with CEQA, the effects of a project are evaluated to determine if they will result in significant adverse impacts on the environment. The criteria used to determine the significance of a noise impact are based on the following thresholds of significance, which come from Appendix G of the CEQA Guidelines. Accordingly, noise impacts resulting from the Project are considered significant if the Project would result in:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Generation of excessive ground-borne vibration or ground-borne noise levels?

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Each of these thresholds are evaluated individually below to determine whether the Project will cause a significant effect on the environment. Where impacts are found to be significant, mitigation measures are recommended that would avoid or reduce the impact to less than significant.

5.1 Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies

5.1.1 Short-Term Impacts

Implementation of the Project has the potential to result in short-term construction noise impacts to surrounding land uses due to construction activities. Construction noise represents a short-term impact on ambient noise levels. Although most of the types of exterior construction activities associated with the Project will not generate continually high noise levels, occasional single-event disturbances from grading and construction activities are possible. Table 5 depicts typical construction equipment noise. Construction equipment noise is controlled by the EPA's

Noise Control Program (Part 204 of Title 40, Code of Federal Regulations).

During the construction phase of the Project, noise from construction activities will add to the ambient noise environment in the immediate area. Activities involved in construction would generate maximum noise levels, as indicated in Table 5, ranging from 77 to 85dB at a distance of 50 feet. Construction activities will be temporary in nature and are expected to occur during normal daytime working hours and will be in compliance with the Mariposa County Noise Element. Therefore, noise resulting from short-term, transient construction activity will not result in significant adverse impacts to nearby sensitive receptors.

> ***MM Noise 1 -*** *Compliance with Mariposa County's Noise Element Goals and Objectives and staff recommendations for Construction Schedule.*

5.1.2 Long-Term Impacts

Traffic Noise

Tables 7 and 8 show the predicted noise levels at sensitive receivers in the study area as a result of adding traffic associated with the Project. Results of the analysis show that none of the sensitive receivers will exceed Mariposa County's Maximum Allowable Noise Exposure from Transportation Noise Sources for the Existing Plus Project and Cumulative Year 2040 scenarios. As a result, Project traffic will not create a significant impact at sensitive receptors in the study area. Therefore, no mitigation measures are needed.

5.2 Generation of excessive ground-borne vibration or ground-borne noise levels

Vibration levels from various types of construction equipment are shown in Table 6. The primary concern with construction vibration is building damage. Therefore, construction vibration is generally assessed in terms of peak particle velocity (PPV). It should be noted that there is a considerable variation in reported ground vibration levels from construction activities. The data provides a reasonable estimate for a wide range of soil conditions.

Despite the perceptibility threshold of about 65 VdB, human reaction to vibration is not significant unless the vibration exceeds 75 VdB according to the United States Department of Transportation. Mariposa County does not specifically identify vibration level impact standards. Caltrans has established vibration thresholds in terms of human annoyance of 0.04 in/sec PPV as documented in Caltrans' Transportation and Construction Vibration Guidance Manual. The vibration threshold of 0.04 in/sec PPV was used to estimate the impact of vibrations from construction activities associated with the Project.

Using the vibratory roller vibration level shown in Table 6 (PPV 0.210), the anticipated vibration velocity levels at the nearest residence of the existing condominiums is expected to approach 0.014 in/sec PPV. Based on the vibration velocity levels provided in Table 6, vibrations generated by the construction phase of the Project are considered less than significant.

5.3 For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels

The Project is not located within the vicinity of a private airstrip or an airport land use plan or within two miles of a public airport or public use airport. The Mariposa-Yosemite Airport is located more than 20 miles southwest of the Project. Therefore, the Project will not result in the stated impact.

APPENDIX A
Acoustical Terminology

ACOUSTICAL TERMINOLOGY

The following terminology has been used for purposes of this NSR:

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.

CNEL: Community Noise Equivalent Level. The average equivalent sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7 p.m. to 10p.m. and ten decibels to sound levels in the night before 7 a.m. and after 10 p.m.

Decibel, dBA: A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micro-newtons per square meter).

DNL/L_{dn}: Day/Night Average Sound Level. The average equivalent sound level during a 24-hour day, obtained after addition often decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m.

L_{eq}: Equivalent Sound Level. The sound level containing the same total energy as a time varying signal over a given sample period. L_{eq} is typically computed over 1, 8 and 24-hour sample periods.

L_{eq}(h): The hourly value of L_{eq}.

L_{max}: The maximum noise level recorded during a noise event

L_n: The sound level exceeded "n" percent of the time during a sample interval (L_{90}, L_{50}, L_{10}, etc.). L_{10} equals the level exceeded 10 percent of the time.

L_n(h): The hourly value of L_n.

Noise Exposure Contours: Lines drawn about a noise source indicating constant levels of noise exposure. CNEL and DNL contours are frequently utilized to describe community exposure to noise.

SEL or SENEL: Sound Exposure Level or Single Event Noise Exposure Level. The level of noise accumulated during a single noise event, such as an aircraft overflight, with reference to the duration of one second. More specifically, it is the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on a reference pressure of 20 micropascals and the reference duration of one second

Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighing filter network. The A-weighing 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 and gives good correlation with subjective reactions to noise.

Note: *CNEL and DNL represent daily levels of noise exposure averaged on an annual basis,* while L_n *represents the average noise exposure for a shorter time period, typically one hour.*

APPENDIX B

TNM 2.5 Sound Level Worksheets

Mariposa County
VRPA Technologies, Inc.

8 August 2021
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: Scenic Wonders Development
RUN: Existing Conditions
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	46.0	66	46.0	10	----	46.0	0.0	8	-8.0
Receiver2	2	1	0.0	55.0	66	55.0	10	----	55.0	0.0	8	-8.0
Receiver3	3	1	0.0	44.6	66	44.6	10	----	44.6	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Mariposa County **8 August 2021**
VRPA Technologies, Inc. **TNM 2.5**
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Scenic Wonders Development
RUN: Existing Plus Project Conditions
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	46.3	66	46.3	10	----	46.3	0.0	8	-8.0
Receiver2	2	1	0.0	55.0	66	55.0	10	----	55.0	0.0	8	-8.0
Receiver3	3	1	0.0	44.9	66	44.9	10	----	44.9	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Mariposa County
VRPA Technologies, Inc.

8 August 2021
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: Scenic Wonders Development
RUN: CY 2040 No Project Conditions
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	48.1	66	48.1	10	----	48.1	0.0	8	-8.0
Receiver2	2	1	0.0	56.5	66	56.5	10	----	56.5	0.0	8	-8.0
Receiver3	3	1	0.0	46.7	66	46.7	10	----	46.7	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Mariposa County
VRPA Technologies, Inc.

8 August 2021
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Scenic Wonders Development
RUN: CY 2040 Plus Project Conditions
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	48.3	66	48.3	10	----	48.3	0.0	8	-8.0
Receiver2	2	1	0.0	56.5	66	56.5	10	----	56.5	0.0	8	-8.0
Receiver3	3	1	0.0	46.9	66	46.9	10	----	46.9	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0