4.12 Noise

This section describes the potential impacts of noise and vibration from the Project on nearby receptors. The environmental setting describes the existing noise levels at noise-sensitive locations nearest to the Project site. This section also describes the regulatory setting, identifies the applicable significance thresholds for impacts, assesses potential impacts of the Project, and recommends measures to mitigate any significant impacts, if applicable. The section also provides a discussion of cumulative impacts. Alternatives are discussed in Chapter 5.0, Alternatives.

As described in Chapter 2.0, Project Description, the Project would include the demolition of aboveground infrastructure and remediation of the site, followed by soil stabilization or revegetation of disturbed areas, with some minor long-term operations associated with remediation.

4.12.1 Environmental Setting

Noise is often defined as unwanted sound, which is perceived subjectively by individuals. Noise levels at various locations of an area fluctuate and change character during different periods of the day. Exposure to severe noise levels over prolonged periods can cause physiological changes, including ear damage. The acceptability of more common noise levels and types of noise varies among neighborhoods, individuals, and time of day. The following sections describe the concepts and terminology of noise and vibration and documents existing noise levels at noise sensitive locations nearest to the Project site.

4.12.1.1 Noise Terminology

Sound is technically described in terms of amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the decibel (dB). The decibel scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound. The pitch of the sound is related to the frequency of the pressure vibration. Because the human ear is not equally sensitive to a given sound level at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) provides this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

A typical noise environment consists of a base of steady background noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise are the sounds from individual local sources. These sounds can vary from an occasional aircraft flyover to virtually continuous noise from traffic on a nearby roadway. Table 4.12.1 lists representative noise levels for specific activities.

Several rating scales have been developed to analyze the adverse effect of noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise upon people largely depends upon the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The rating scales of Equivalent Continuous Sound Level (Leq), minimum instantaneous noise level (Lmin), and the maximum instantaneous noise level (Lmax) are measures of ambient noise, while the Day-Night Average Level (Ldn) and Community Noise Equivalent Level (CNEL) are measures of community noise (or noise levels with penalties for noise in the evening or nighttime). Leq is the average A-weighted sound level measured over a given time interval. Leq can be measured over any time period, but is typically measured for 1-minute, 15-minute, 1-hour, and 24-hour periods. CNEL is another A-weighted average sound level measured over a 24-hour time period.

Table 4.12.1 Representative Environmental Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	—110—	Rock Band
Jet Fly-over at 100 feet	—105—	
	—100—	
Gas Lawnmower at 3 feet	—95—	
	—90—	
	—85—	Food Blender at 3 feet
Diesel Truck going 50 mph at 50 feet	—80—	Garbage Disposal at 3 feet
Noisy Urban Area during Daytime	—75—	
Gas Lawnmower at 100 feet	—70—	Vacuum Cleaner at 10 feet
Commercial Area	—65—	Normal Speech at 3 feet
Heavy Traffic at 300 feet	—60—	
	—55—	Large Business Office
Quiet Urban Area during Daytime	—50—	Dishwasher in Next Room
	—45—	
Quiet Urban Area during Nighttime	—40—	Theater, Large Conference Room (background)
Quiet Suburban Area during Nighttime	—35—	
	—30—	Library
Quiet Rural Area during Nighttime	—25—	Bedroom at Night, Concert Hall (background)
	—20—	
	—15—	Broadcast/Recording Studio
	—10—	
	—5—	
Lowest Threshold of Human Hearing	—0—	Lowest Threshold of Human Hearing

Note: Idling locomotive would have a noise level of about 75 dBA at 50 feet.
Source: FTA 2018

This noise scale is adjusted to account for some individuals' increased sensitivity to noise levels during the evening and nighttime hours. Leq, Lmin, and Lmax, as well as Ldn and CNEL are all applicable to this analysis and defined as follows:

- Leq, the equivalent energy noise level in dBA, is the average acoustic energy content of noise for a stated period of time. Thus, the Leq of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night;

- Ldn, the Day-Night Average Level, is a 24-hour average Leq with a 10 dBA 'weighting' or penalty added to noise the hours of 10:00 p.m. to 7:00 a.m. to account for people's increased noise sensitivity during the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour Leq would result in a measurement of 66.4 dBA Ldn;
- CNEL, the Community Noise Equivalent Level, is a 24-hour average Leq with a 5 dBA "weighting" during the hours of 7:00 p.m. to 10:00 p.m. and a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA-24-hour Leq would result in a measurement of 66.7 dBA CNEL;
- Lmin is the minimum instantaneous noise level experienced during a given period of time, in dBA; and
- Lmax is the maximum instantaneous noise level experienced during a given period of time, in dBA.

Noise environments and consequences of human activities are usually well represented by average noise levels during the day or night, or over a 24-hour period, as represented by the Ldn or the CNEL. Environmental noise levels are generally considered low when the CNEL is less than 60 dBA, moderate in the 60 to 70 dBA range, and high greater than 70 dBA. Examples of low daytime noise levels are isolated, natural settings that can provide noise levels under 30 dBA and quiet, suburban, residential streets that can provide noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA daytime Leq) and commercial locations (typically above 60 dBA daytime Leq). People may consider louder environments adverse, but most will accept the higher noise levels associated with noisier urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA) due to the expectations within the land use. For example, people might accept these noise levels when out shopping, on the freeway or visiting their mechanic, but these levels would not be acceptable when at home.

When evaluating changes in noise levels, a difference of 3 dBA is a barely perceptible increase to most people (Caltrans 2020). A 5-dBA increase is readily noticeable, while a difference of 10 dBA would be perceived as a doubling of loudness. New development within a community could potentially lead to activities that increase the 24-hour community noise levels.

4.12.1.2 Noise Effects

Noise levels are reduced the farther away a receptor is from the source because of several effects, including geometry, atmosphere, ground, and barriers. These are discussed below.

Geometric Effects

Geometric effect refers to the spreading of sound energy as a result of the expansion of the wavefronts. Geometric spreading is independent of frequency and has a major effect in almost all sound propagation situations. There are two common kinds of geometric spreading: spherical and cylindrical spreading. Spherical spreading occurs from a point source, which is due to a noise source radiating sound equally in all directions; the sound level is reduced by 6 dB for each doubling of distance from the source. A busy highway is an example of a cylindrical source with equal sound power output per unit length of highway. A cylindrical source will produce cylindrical spreading, resulting in a sound-level reduction of 3 dB per doubling of distance.

Atmospheric Effects

Atmospheric effects are due to air absorption and wind and temperature gradients. Air absorption is primarily due to the “molecular relaxation effect” between air molecules, where air molecules are excited and then relaxed by the passing sound pressure wave. High frequencies are absorbed more than low frequencies. The amount of absorption depends on the temperature and humidity of the atmosphere.

Precipitation (rain, snow, or fog) has a nominal effect on sound levels although the precipitation will affect the humidity and may also affect wind and temperature gradients. Atmospheric absorption is only an issue at higher frequencies and is a strong function of humidity and temperature. For example, at 68 degrees Fahrenheit (°F) and 70 percent humidity, air absorption of sound at frequencies of 16,000 hertz (Hz) occurs at approximately 8 dB per 100 feet. However, at 0 percent humidity, the rate drops to approximately 1 dB per 100 feet.

Under normal circumstances, atmospheric absorption can be neglected except where long distances or high frequencies are involved (greater than 4,000 Hz). At less than 2,000 Hz, the rate of sound level drop, due to air absorption, is less than 0.25 dB per 100 feet (at 68°F and 70 percent humidity).

Under conditions of a temperature inversion (temperature increasing with increasing height), the sound waves will be refracted downwards, and therefore may be heard over larger distances. This frequently occurs in winter and at sundown.

When a wind is blowing there will be a vertical wind gradient because the layer of air next to the ground is stationary. A vertical wind gradient results in sound waves propagating upwind being ‘bent’ upwards and those propagating downwind being ‘bent’ downwards. This effect can cause noise levels downwind to be higher than those upwind.

Temperature and wind gradients can result in measured sound levels being very different to those predicted from geometrical spreading and atmospheric absorption considerations alone. These differences may be as great as 20 dB. These effects are particularly important where sound is propagating over distances greater than 500 feet. Temperature inversions and winds can also result in the effectiveness of a barrier being dramatically reduced. These variables are addressed as part of the noise modeling conducted for the Project.

Ground and Barrier Effects

If sound is propagating over ground, attenuation will occur due to acoustic energy losses on reflection. These losses will depend on the surface. Smooth, hard surfaces will produce little absorption, whereas thick grass may result in sound levels being reduced by up to about 10 db per 300 feet at 2000 Hz. High frequencies are generally attenuated more than low frequencies.

Reflection from the ground can result in another mechanism by which sound levels are reduced. When the source and receiver are both close to the ground, the sound wave reflected from the ground may interfere destructively with the direct wave. This effect, called the ground effect, is normally noticed over distances of several yards or more, and in the frequency range of 200 to 600 Hz.

Research on propagation through trees yields conflicting results. Dense shrubbery can produce effective noise attenuation. A band of trees several hundred feet deep is required to achieve significant attenuation.

Significant attenuation can be achieved with solid barriers. A barrier should be at least high enough to obscure the ‘line of sight’ between the noise source and receiver. A barrier is most effective for high frequencies since low frequencies are diffracted around the edge of a barrier more easily. The maximum performance of a barrier is limited to about 40 dB, due to scattering by the atmosphere. A barrier is most effective when placed either very close to the source or the receiver.

Barriers not built for acoustical purposes are often found in sound propagation situations. The most common of these are hills and buildings. In urban situations, buildings can be effective barriers. It is possible for buildings to produce a different acoustical effect. In a city street with tall buildings, multiple reflections from parallel building facades can result in considerable reverberation and consequently reduced attenuation.

The propagation of sound is very complex and influenced by a large number of factors. This report examines the attenuation of sound due to geometry, barriers specifically placed by the Project or mitigation measures, and barriers such as the terrain, as well as air absorption for the linear decibel scale analysis incorporated into a computer model.

Tonal Effects

Noise in which a single frequency stands out is said to contain a ‘pure tone.’ Sources that produce pure tones are often described as being ‘tonal’ and tend to be more noticeable – and potentially annoying – to humans than sources that do not contain pure tones. In assessing the subjective impact of tonal noise, it is common practice to take this increased annoyance into account by adding a 5-dBA penalty to the measured noise level.

Effects on Wildlife

Wildlife response to sound is dependent not only on the magnitude but also the characteristic of the sound, or the sound frequency distribution and whether the sound is natural or human made (noise). Wildlife is affected by a broader range of sound frequencies than humans. Therefore, a linear decibel scale (non-A weighted) analysis is preferred for wildlife impact analysis. Noise is known to affect an animal’s physiology and behavior, and chronic noise-induced stress can be deleterious to an animal’s energy budget, reproductive success, and long-term survival (Radle 2007; Shannon et al. 2015).

Modeling Noise Impacts

Models are often used to estimate noise levels from proposed activities and to estimate noise levels under a range of meteorological conditions. In addition, modeling can estimate the effect of noise mitigation devices, such as sound walls and noise blankets. Noise models can incorporate a variety of environmental conditions, including the level of ground absorption, humidity, temperature inversions, atmospheric absorption, terrain, building reflections, and road type, as well as sources including automobiles, railroads, aircraft, and industry. Both A-weighted and octave band analysis can be performed with models. In addition, models incorporate a number of standards and methods, including International Organization for Standards (ISO) 9613 and the FHWA Traffic Noise Model (TNM).

ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors to predict environmental noise levels at a distance from a variety of sources. ISO 9613 requires noise estimation using a downwind propagation under a mildly developed temperature inversion (both of which enhance sound propagation) and provides a case representation of potential effects during conditions that favor transmission of sound to the receptor. Since these conditions do not occur every day, model predictions using the ISO 9613 requirements are conservative.

In 1998, the Federal Highway Administration (FHWA) released the traffic noise model (TNM), which was developed to aid compliance with policies and procedures under FHWA regulations. The FHWA TNM addresses five different vehicle types (automobiles, medium trucks, heavy trucks, buses, and motorcycles), constant- and interrupted-flow traffic, and different pavement types, as well as the effects of graded roadways.

The FHWA has also developed a Roadway Construction Noise Model (RCNM) used to estimate the noise levels associated with construction activities.

The primary noise models currently available that incorporate ISO 9613 and TNM are SoundPLAN© and Computer Aided Noise Abatement (CadnaA). Each of these high-end computational models enables a wide range of analysis.

In addition to complex noise models, simple spreadsheet models addressing only the geometric propagation of noise are utilized to conservatively estimate the effects of noise activities on receptors.

For assessing rail noise, the Federal Transportation Administration (FTA) has developed specific noise models to assess railroad noise (FTA 2018) based on a variety of factors including locomotive types, number of locomotives, number of cars, speed, track type and horn activity.

Noise Mitigation

Since industry and transportation related noise can often impact sensitive receptors, many mitigation methods are available to reduce this noise, including walls, engine exhaust silencers, mufflers, acoustical equipment enclosures, noise-absorbing blankets and padding, and sound-dampening flooring and siding materials. Properly installed acoustical materials can reduce noise by up to 40 dB, averaged over the frequency range.

The noise-reducing efficiency of insulating and acoustical materials is greater for higher frequency noise. For example, sound with a frequency of 4,000 Hz could be reduced as much as 50 to 60 dB by the same materials that would reduce 125 Hz frequency noise by less than 10 dB. Therefore, the choice of material and noise barrier design are functions of the type of equipment generating the noise.

A sound transmission class (STC) number, expressed as a frequency, rates insulating and noise barrier material as an average decibel loss across several sound frequencies. The stated STC for a given material is generally the maximum decibel reduction achievable with a perfect enclosure. Table 4.12.2 lists several barrier materials and their STC ratings.

Both the engine operation and the exhaust system of internal combustion engines generate noise. Advanced silencers and mufflers can reduce exhaust system noise levels by 10 dBA for industrial grade and by as much as 40 dBA for hospital grade silencers.

Table 4.12.2 Sound Loss by Various Noise Barrier Materials

Sound Transmission Class of Materials	STC (dB)
Concrete, 12 inches thick	53
Concrete block wall, unpainted	44
Metal panel, 4 inches thick (solid and perforated)	41
Metal panel, 2 inches thick (solid and perforated)	35
Fiberglass curtain, 2 inches with barrier of 2.5 pounds per square foot	33
Steel wall, 3/16 inch thick	31
Gypsum wallboard, 5/8 inch thick	30
Fiberglass curtain, 1 inch, barrier of 1.3 pounds per square foot	27
Wood door, solid core, closed	27
Plasterboard, 3/8 inch	26
Barrier material, density of 1.5 pounds per square foot	27
Barrier material, density of 2.5 pounds per square foot	33
Steel, 22-gauge	25

Note: STC = Sound Transmission Class, a single number rating derived from decibel loss data at several frequencies.
Source: USHUD 2009

Noise barriers attenuate sound in four ways: diffraction, absorption, reflection, and reduced transmission. Diffraction mechanisms reduce noise by extending the distance that noise waves travel to the receiver from the source (see Figure 4.12-1). The noise barrier material absorbs some noise energy, while some noise is transmitted through the barrier but at a reduced energy level, and some noise is reflected from the barrier and does not reach the receiver.

Transmitted noise is typically not taken into consideration when modeling noise attenuation by noise barriers because this noise is typically significantly lower than the source noise (FHWA 2006a). The highest noise is from the diffracted portion of the attenuated noise.

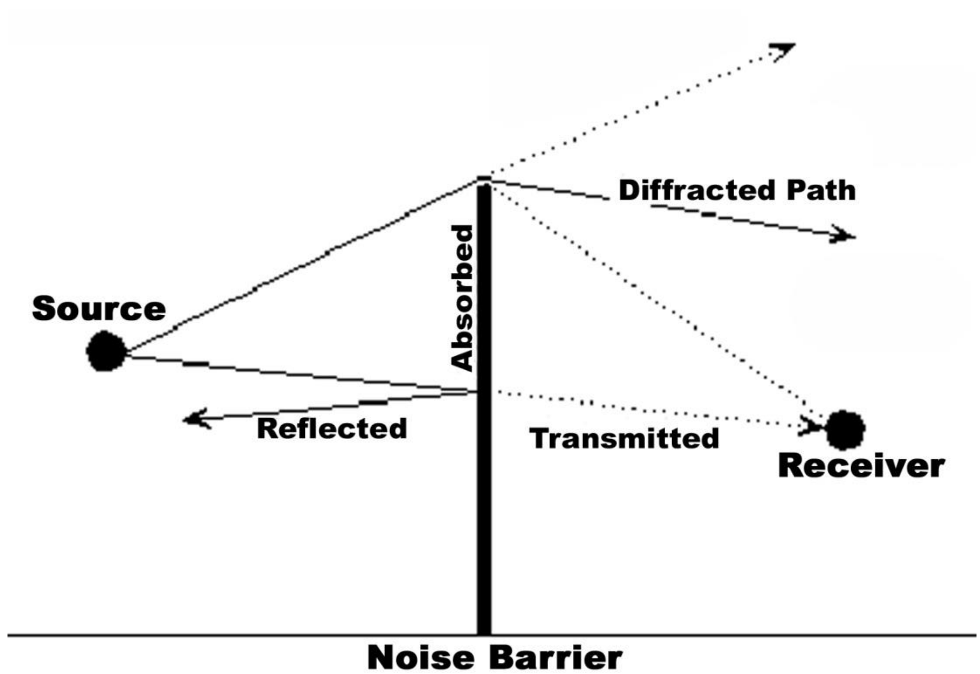
4.12.1.3 Vibration

Vibration is acoustic energy transmitted as pressure waves through a solid medium, such as soil or concrete. Like noise, the rate at which pressure changes occur is the frequency of the vibration, measured in hertz (Hz). Vibration may be the form of a single pulse of acoustical energy, a series of pulses, or a continuous oscillating motion.

Ground-Borne Vibration

The extent that vibration is transmitted through the ground depends on the soil type, the presence of rock formations or man-made features and the topography between the vibration source and the receptor location. These factors vary considerably from site to site and make accurate predictions of vibration levels at receptors distant from the source extremely difficult (often impossible) in practice.

Figure 4.12-1 Noise Attenuation Mechanisms



Source: FHWA 2000

As a general rule, vibration waves tend to dissipate and reduce in magnitude with distance from the source. Also, high frequency vibrations are generally attenuated rapidly as they travel through the ground, so that the vibration received at locations distant from the source tends to be dominated by low-frequency vibration. The frequencies of ground-borne vibration most perceptible to humans are in the range from less than 1 Hz up to 100 Hz.

When a ground-borne vibration arrives at a building, there is usually an initial ground-to-foundation coupling loss. However, once the vibration energy is in the building structure it can be amplified by the resonance of the walls and floors. Occupants can perceive vibration as motion of the building elements (particularly floors) and also rattling of lightweight components, such as windows, shutters, or items on shelves. Vibrating building surfaces can also radiate noise, which is typically heard as a low-frequency rumbling known as ground-borne noise. At very high levels, low-frequency vibration can cause damage to buildings.

Soil and subsurface conditions are known to have a strong influence on the levels of ground-borne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock. Experience with ground-borne vibration is that vibration propagation is more efficient in stiff clay soils, and shallow rock seems to concentrate the vibration energy close to the surface and can result in ground-borne vibration problems at large distances from the track. Factors such as layering of the soil and depth to water table can have significant effects on the propagation of ground-borne vibration (FTA 2018).

Vibration Measurement

Vibration may be defined in terms of the displacement, velocity, or acceleration of the particles in the medium material. In environmental assessments, where human response is the primary concern, velocity is commonly used as the descriptor of vibration level, expressed in millimeters per second (mm/s). The amplitude of vibration can be expressed in terms of the wave peaks or as an average, called the root mean square (rms). The rms level is generally used to assess the effect of vibration on humans. Vibration levels for typical sources of ground-borne vibration are shown in Table 4.12.3.

Table 4.12.3 Typical Levels of Ground-Borne Vibration

<table>
<tr><th>Source</th><th>Typical Velocity at 50 feet (inches/second, rms)</th><th>Human or Building Response</th></tr>
<tr><td>Pile Driver, impact, sheet piling</td><td>0.40</td><td>Damage to fragile buildings</td></tr>
<tr><td>Blasting from construction projects</td><td>0.10</td><td>Minor cosmetic damage to fragile buildings</td></tr>
<tr><td>Bulldozers and other heavy tracked construction equipment.</td><td>0.06</td><td rowspan="2">Workplace annoyance; difficulty with vibration-sensitive tasks.</td></tr>
<tr><td>Commuter rail, upper range</td><td>0.02</td></tr>
<tr><td>Rapid transit rail, upper range</td><td>0.010</td><td rowspan="2">Distinctly perceptible;
residential annoyance for infrequent events</td></tr>
<tr><td>Commuter rail, typical range</td><td>0.008</td></tr>
<tr><td>Bus or truck over bump</td><td>0.004</td><td rowspan="2">Barely perceptible;
residential annoyance for frequent events</td></tr>
<tr><td>Rapid transit rail, typical range</td><td>0.003</td></tr>
<tr><td>Bus or truck typical</td><td>0.002</td><td>Threshold of perception</td></tr>
<tr><td>Background vibration</td><td>0.0004</td><td>None</td></tr>
</table>

Notes: rms = root mean square

Source: FTA 2018 (Table 7-4 and Figure 5-4), with PPV converted to rms with reference velocity of $1x10^{-6}$ in seconds

Vibration can produce several types of wave motion in solids including compression, shear, and torsion, so the direction in which vibration is measured is significant and should generally be stated as vertical or horizontal. Human perception also depends to some extent on the direction of the vibration energy relative to the axes of the body. In whole-body vibration analysis, the direction parallel to the spine is usually denoted as the z-axis, while the axes perpendicular and parallel to the shoulders are denoted as the x- and y-axes, respectively.

Large vehicles can also increase ground vibration along streets that they travel. Vibration would be a function of the vehicle speeds and the condition of the pavement. California Department of Transportation (Caltrans) indicates that:

> *Vehicles traveling on a smooth roadway are rarely, if ever, the source of perceptible ground vibration*" and that "*vibration from vehicle operations is almost always the result of pavement discontinuities, the solution is to smooth the pavement to eliminate the discontinuities* (Caltrans 2020).

Trucks traveling on area roadways could cause vibrations at nearby receptors if roadways are not maintained.

4.12.1.4 Receptors

Some land uses are more sensitive to noise than others, due to the amount of noise exposure and the types of activities typically involved. Residential areas, schools, libraries, religious institutions, hospitals, nursing homes, parks, some wildlife areas, and quiet outdoor recreation areas are generally more sensitive to noise than are commercial and industrial land uses. Receptors near the Project site include:

- Oceano Dunes State Vehicular Recreation Area (ODSVRA);
- Oso Flaco Lake and Dunes;
- Fire Station No. 22 to the north on State Route 1 (Willow Road);
- Residences along Monadella Street and areas to the north and south of State Route 1 (Willow Road);
- Commercial uses north and south of State Route 1 (Willow Road);
- Agricultural uses to the east and south along State Route 1 (Cabrillo Highway);
- Golf course and residences to the east along State Route 1 (Cabrillo Highway); and
- Residences along routes to and from U.S. Highways 101 and 166.

In addition, areas along the railroad route that runs from the Santa Maria Refinery (SMR) are exposed to elevated noise levels due to the passenger and freight trains that run along the railroad route.

4.12.1.5 Existing Noise Sources

Historical operations at the SMR constitute one noise source in the Project area. Other noise sources near the Project site and nearby vicinity contributing to the noise environment include traffic on adjacent roads, railroad operations, and commercial, agricultural, and industrial operations at neighboring facilities. The following sections discuss each of these noise sources.

Traffic Noise
The predominant sources of traffic noise near the Project site are vehicles on State Route 1. Noise levels from traffic are estimated in the County of San Luis Obispo (County) General Plan Noise Element for 2010 traffic levels, which are estimates generated at the time of the Noise Element adoption in 1992 (County 1992). The Noise Element estimates that CNEL (or Ldn) noise levels along State Route 1 near the Project site exceed 65 dBA due to roadway noise. Table 4.12.4 shows centerline distances to specific noise levels.

Existing traffic-generated noise levels were also modeled using a version of the Federal Highway Administration Traffic Noise Model (FHWA 2018) and traffic data provided by the County and Caltrans for traffic levels in 2021. This analysis was conducted in order to demonstrate the noise levels associated with current traffic levels (the Noise Element addresses estimated traffic levels for 2010). The analysis indicates that areas along State Route 1 near the SMR are exposed to a traffic-generated CNEL of 67 dBA (at 100 feet from the road centerline). See Table 4.12.4.

Table 4.12.4 Roadway and Railroad Noise Levels: Noise Element and Calculated Current

Roadway	Segment	Noise at 100 feet, CNEL	Distance to Noise Contour, feet		
			60 CNEL	65 CNEL	70 CNEL
FHWA Model Calculated Values: Current Traffic Levels (2021), FTA Train model					
State Route 1	At Santa Maria Refinery entrance	66.6	461	146	46
Willow Road	At Highway 1	64.1	261	82	26
Railroad Mainline	At Santa Maria Refinery	74.9	554	311	175
Noise Element Values (estimated for 2010 traffic levels)					
State Route 1	Santa Barbara County to Valley Road	-	136	63	29
State Route 1	Valley Road to Halcyon Road	-	223	104	48
Railroad Mainline	Grade Crossing	-	525	244	113

Notes: Distances are in feet from roadway centerline. Local streets based on County Public Works Traffic Counts from December 2021. Time of day distribution based on Noise Element Technical Reference Document.
Source: Rail noise based on FTA calculations assuming one freight train at night, six passenger trains per 24-hour period plus one train per week from the SMR

Railroad Noise

The railroad runs through the SMR site. Noise levels due to railroad activity are estimated in the County General Plan Noise Element. These estimates are based on ten freight and four passenger trains per day. Distances to the 60 dB contour value range up to 525 feet from a grade crossing (see Table 4.12.4). Other areas along the mainline track would experience similar railroad noise levels depending upon the amount of other rail traffic. Modeling was also conducted utilizing the FTA models to estimate the impacts of train noise including the SMR train activities (see Table 4.12.4).

Commercial, Industrial, Residential, and Recreational Noise

The area near the Project site includes some industrial and commercial uses, as well as residential and recreational uses that could generate noise which include the following:

- Recreational vehicular uses to the west at the ODSVRA;
- County Fire Department activities to the north at Fire Station No. 22;
- Residential activities to the north along Monadella Street;
- Industrial and commercial uses along State Route 1 (Willow Road);
- Industrial uses, such as a junk yard, recreational vehicle storage and repair, and auto sales, to the northeast on Alley Oop Way and Gasoline Alley Place; and
- Recreational and golf activities to the east at Monarch Dunes Golf Club along State Route 1 (Cabrillo Highway).

All of these locations produce noise on an intermittent basis due to activities.

Agricultural Noise

The County General Plan Noise Element discusses noise associated with agricultural operations. Noise levels from agricultural sources to the east and southwest of the SMR include diesel engines (74 to 85 dBA at 50 feet) and tractors (72 to 75 dBA at 50 feet).

4.12.1.6 Noise Measurements

Noise measurements involve utilizing a noise meter and measuring the level of noise in different locations, generally residential areas, areas along transportation routes and areas along the fence line of the SMR. Measurements have been historically obtained and documented in a variety of sources including:

- Previous environmental impact report (EIR) analysis' Throughput EIR (County 2012) in 2011 and 2014, in the vicinity of the Project site, and along transportation routes;
- Previous EIR analysis Rail Spur EIR (County 2015) in 2015 by the Applicant and the EIR consultant; and
- By the Applicant for the Project in 2022.

The results of these measurements and their locations are shown in Figure 4.12-2 and Table 4.12.5. The 2011 measurements (County 2012) were taken at four locations during the day, evening, and nighttime to allow for a calculation of CNEL. The 2014 measurements (County 2015) were taken at three locations near residential areas and were monitored continuously over three days.

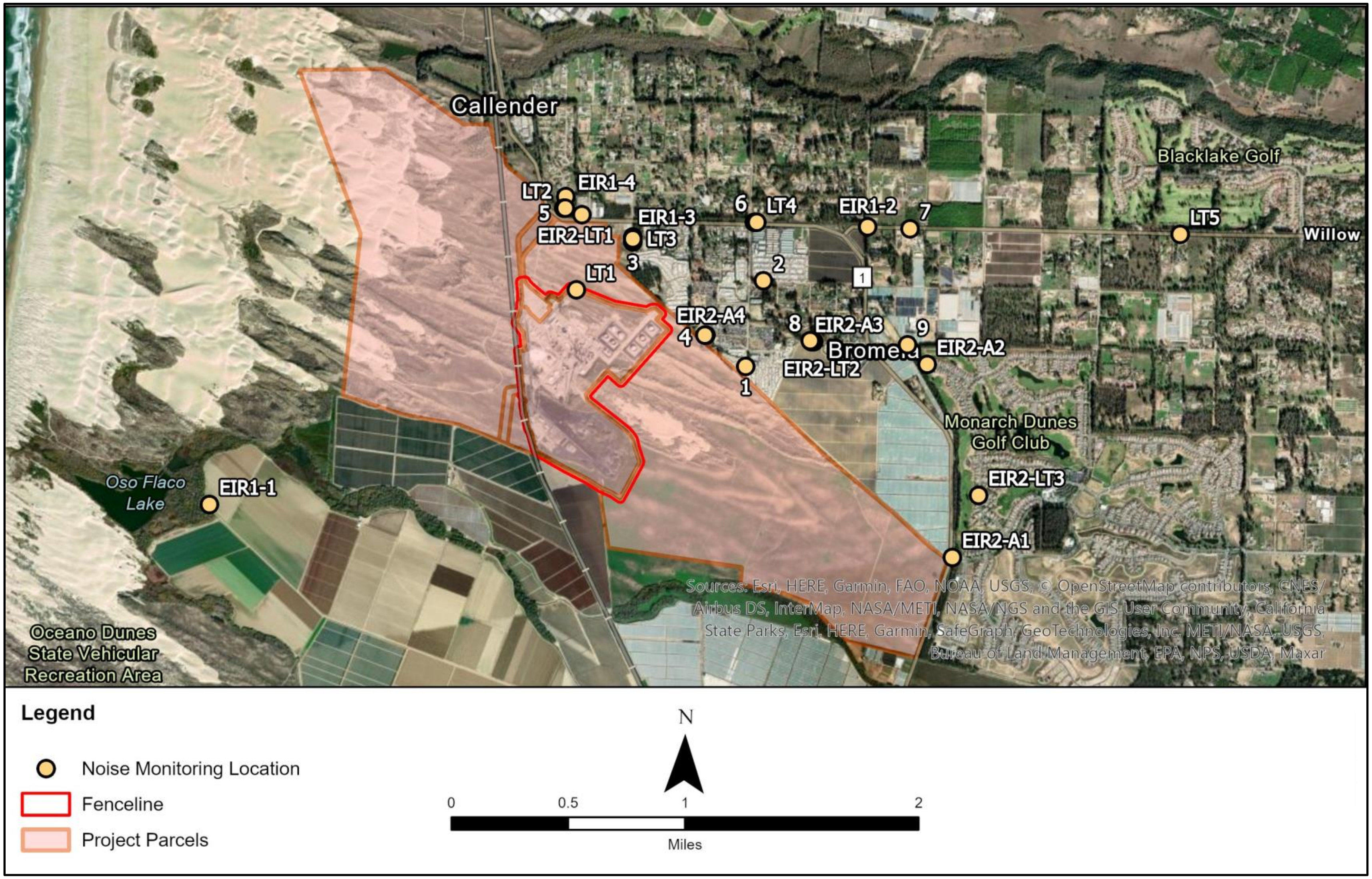
The Rail Spur EIR also included noise measurements as submitted in the Project's application materials as well as noise measurements taken during train movements at the SMR. Noise measurements were conducted at specific locations listed in Table 4.12.5.

Phillips 66 also included noise measurements as submitted in the Project's application materials. Noise measurements were conducted at specific locations listed in Table 4.12.5.

The noise baseline in the area is generally dominated by traffic noise, which produces a CNEL up to 69 dBA CNEL for areas close to roadways (along State Route 1) with a minimum level of 51 dBA CNEL away from roadways. Residential areas experience daytime minimum hour noise levels down to 43 dBA Leq with a nighttime minimum hour of 39 dBA Leq. The minimum hour number is used to define the potential impacts of a project as the incremental increase in noise levels would be greatest over a minimum hour.

In 2014 measurements associated with the Rail Spur EIR were also taken during the daytime, both at the residential areas and at the SMR during train movements. These measurements were taken by the EIR consultant. On January 29, 2014, in the morning, 34 rail cars of coke were picked up by two locomotives from the coke area at the SMR (i.e., in the western portion of the proposed Rail Spur Project footprint). Noise monitoring was conducted during these activities to refine the noise levels used in the noise model and to assess the potential impacts of actual rail movements on area receptors.

Figure 4.12-2 Noise Monitoring Locations



Note: Locations are approximate.
Source: Prepared as part of the EIR by MRS 2023

Table 4.12.5 Historical Ambient Noise Levels Near the Project Site

#	Location	Daytime Leq (dBA)	Evening Leq (dBA)	Nighttime Leq (dBA)	CNEL (dBA)	Noise Sources
EIR1-1	Oso Flaco Lake Parking Lot	43.6	40.1	48.9	54.9	Visitors, wind, surf, automobiles, birds, frogs (at night) tractors
EIR1-2	Willow Road and Guadalupe Road	65.8	65	60.9	68.9	Traffic noise on Willow and Highway 1
EIR1-3	Winterhaven Way	59.2	51.5	42.0	57.3	Traffic noise on Highway 1, dogs, fire station alarms, occasional alarms from the SMR
EIR1-4	Monadella Street	49.3	45	43.6	51.5	Traffic noise from Highway 1, birds, wind in trees
EIR2-A1	Hwy 1 and Via Concha	54.5	-	45.6	-	-
EIR2-A2	Near Nathan Way	51.0	-	40.0	-	-
EIR2-A3	Olivera Avenue	49.5	-	40.4	-	-
EIR2-A4	Gasoline Alley	56.1	-	41.7	-	-
EIR2-LT1	Mesa Vu Storage	59.7	56.3	49.3	64.8	Traffic on highway
EIR2-LT2	Olivera and Los Reyes	43.2	41.0	40.2	55.2	Traffic on highway and light industrial
EIR2-LT3	1918 Eucalyptus Road	48.7	46.5	38.6	54.1	Traffic on highway
1	931 Sheridan Road	45.5	-	-	-	Nearby industrial activities/backup beepers, vehicles on area roadways
2	Arriba Place east of Sheridan Road	51.4	-	-	-	Nearby industrial activities/backup beepers, vehicles on area roadways
3	Winterhaven Way south of SR 1	49.5	-	-	-	Vehicle traffic on area roadways
4	Alley Oop Way at Gasoline Alley	48.2	-	-	-	Nearby industrial activities/backup beepers, vehicles on area roadways
5	North of SR 1 near Calendar Loop Path	53.2	-	-	-	Vehicle traffic on area roadways
6	SR 1 east of Sheridan Road	70.7	-	-	-	Vehicle traffic on area roadways
7	Willow Road, east of SR 1	68.4	-	-	-	Vehicle traffic on area roadways
8	Olivera Avenue, west of SR 1	47.2	-	-	-	Vehicle traffic on area roadways
9	Dawn Road, east of SR 1	51.8	-	-	-	Vehicle traffic on area roadways
LT1	Phillips 66 Refinery, Northern Plant Boundary	50	-	54	-	Plant operations.

Table 4.12.5 Historical Ambient Noise Levels Near the Project Site

#	Location	Daytime Leq (dBA)	Evening Leq (dBA)	Nighttime Leq (dBA)	CNEL (dBA)	Noise Sources
LT2	North of SR 1 near Calendar Loop Path	52	-	44	-	Vehicle traffic on area roadways
LT3	Winterhaven Way, south of SR 1	55	-	53	-	Vehicle traffic on area roadways
LT4	SR 1, east of Sheridan Road	68	-	59	-	Vehicle traffic on area roadways
LT5	Willow Road, east of Padre Lane	58	-	48	-	Vehicle traffic on area roadways

Note: Leq = Equivalent Continuous Sound Level; SR = State Route
Source: EIR1 is associated with the Throughput EIR (County 2012). In-field measurements EIR1-1 through EIR1-4 taken June 21, 2011, by MRS with a Quest 1900 noise meter. Measurements EIR2-A1-4 and EIR2 LT1-3 as associated with the Rail Spur EIR taken January 27–29, 2012, by MRS and taken October 18–19, 2012, by Rail Spur Applicant. Measurements 1–9, LT1–5 are associated with the current Project Phillips 66 and taken in December 2022 by Phillips 66.

Generally, the noise levels produced by the rail movements were slightly less than those estimated by the FTA models, most likely due to the inaccuracies of the FTA model at slower speeds. In each case, the estimated train noise level from the SMR spur is more than 10 dBA below the daytime ambient noise levels at the receptors, which indicates that activity on the existing rail spur is mostly inaudible. This conclusion is supported by review of the audio recordings made at 1918 Eucalyptus Road during the Rail Spur Project EIR in which no discernable train noise could be heard.

Applicant Noise Monitoring

To document existing ambient noise levels at the Project site, the Applicant conducted short-term ambient noise measurements on the weekdays of December 5th, 7th, 8th, and 16th, and on Saturday, December 17, 2022 (see locations 1–9 in Table 4.12.5). Noise levels ranged from a high of 70.7 dBA along SR1 to a low of 45.5 dBA near Sheridan Road. Long-term noise measurement surveys were also conducted near the northern boundary of the Project site, in the general vicinity of nearby residential land uses and along State Route 1 and Willow Road (see LT1–5 in Table 4.12.5). Noise levels ranged from 50-68 dBA daytime average and a range of 44-59 dBA nighttime average. See Appendix E for the results of the noise monitoring.

4.12.2 Regulatory Setting

This subsection summarizes the federal, state, and local laws, regulations, and standards that address the noise and vibration impacts as applies to the Project.

4.12.2.1 Federal Regulations

Noise Control Act

The Noise Control Act of 1972 established a means for effective coordination of federal research and activities in noise control, established federal noise emission standards for products distributed in commerce, and provided information to the public regarding the noise emission and noise reduction characteristics of such products.

The FHWA's Office of Motor Carrier and Highway Safety implements the Interstate Motor Carrier Noise Emission Standards for Exhaust Systems from the Code of Federal Regulations (CFR) (49 CFR 325).

Federal Transit Administration Criteria

The FTA developed methodology and significance criteria to evaluate vibration impacts from surface transportation modes (i.e., passenger cars, trucks, buses, and rail) in the Transit Noise and Vibration Impact Assessment (FTA 2018). This assessment provides guidance for preparing and reviewing the noise and vibration sections of environmental documents by setting forth methods and procedures for determining the level the level of noise and vibration impacts resulting from federally funded transit projects and determining appropriate and feasible mitigation.

Federal Highway Administration

The Federal Highway Administration (FHWA) is the agency responsible for administering the federal-aid highway program in accordance with federal statutes and regulations. The FHWA developed noise regulations as required by the Federal-Aid Highway Act of 1970 (Public Law 91-605, 84 Stat. 1713). The Regulation 23 CFR 772 Procedures for Abatement of Highway Traffic Noise and Construction Noise applies to highway construction projects where a state department of transportation has requested federal funding for participation in the project. The regulation requires the highway agency to investigate traffic noise impacts in areas adjacent to federally aided highways for proposed construction of a highway on a new location or the reconstruction of an existing highway to either significantly change the horizontal or vertical alignment or increase the number of through-traffic lanes. If the highway agency identifies impacts, it must consider abatement. The highway agency must incorporate all feasible and reasonable noise abatement into the project design.

U.S. Department of Housing and Urban Development

U.S. Department of Housing and Urban Development (USHUD) guidelines for the acceptability of residential land use are included in the 24 CFR Part 51. These guidelines establish that noise exposure of 65 dBA CNEL/Ldn, or less, is acceptable and between 65 and 75 dBA CNEL/Ldn noise exposure is considered normally acceptable provided appropriate sound-reduction measures are provided. Above 75 dBA CNEL/Ldn noise exposure is generally considered unacceptable. The guidelines also identify the recommended interior noise levels of 45 dBA CNEL/Ldn. These guidelines apply only to new construction supported by USHUD grants and are not binding on local communities.

4.12.2.2 State Regulations

California Health and Safety Code, Division 28, Noise Control Act

The California Noise Control Act states that "excessive noise is a serious hazard to public health and welfare" and that "it is the policy of the state to provide an environment for all Californians free from noise that jeopardizes their health or welfare" (Health and Safety Code, Section 46000).

California Government Code Section 65302

Section 65302(f) of the California Government Code and the Guidelines for the Preparation and Content of the Noise Element of the General Plan provide requirements and guidance to local agencies in the preparation of their Noise Elements. The guidelines require that major noise sources and areas containing noise-sensitive land uses be identified and quantified by preparing generalized noise exposure contours for current and projected conditions. Contours may be prepared in terms of either the CNEL or the Ldn, which are descriptors of total noise exposure at a given location for an annual average day. The CNEL and Ldn are generally considered to be equivalent descriptors of the community noise environment within plus or minus 1 dB.

4.12.2.3 Local Regulations

The applicable noise standards governing the Project area are the criteria in the County's Noise Element of the General Plan, which covers noise exposure from major sources in the County including roadways, railways, airports, and stationary sources, and the criteria in the County's Municipal Code, covering stationary noise sources such as loading docks, parking lots, and ventilation equipment.

The County's Noise Element provides a policy framework for addressing potential noise impacts in the planning process. The Noise Element is directed at minimizing future noise conflicts, whereas a noise ordinance focuses on resolving existing noise conflicts and implementing the Noise Element policies in new development. The Noise Element includes maps showing the extent of noise exposure from the major noise sources in the County (roadways, railways, airports, and stationary sources), along with the goals, policies, and implementation program adopted by the County to reduce future noise impacts. The goals of the Noise Element, compiled under the mandate of Section 65302(f) of the California Government Code and guidelines prepared by the California Department of Health Services, are to: 1) ensure that all areas of the county are free from excessive noise and that appropriate maximum levels are adopted for residential, commercial, and industrial areas; 2) to reduce new noise sources to the maximum extent possible; 3) to reduce, to the maximum extent possible, the impact of noise within the County; and 4) to ensure that land uses are compatible with the related noise characteristics of those uses.

Among the most significant policies of the Noise Element are numerical noise standards that limit noise exposure within noise-sensitive land uses and performance standards for new commercial and industrial uses that might adversely impact noise-sensitive land uses. When the potential for adverse noise impacts is identified, mitigation is required to carry out the specific recommendations of an expert in acoustics or, under some circumstances, by implementing standard noise mitigation packages. When mitigation is required, highest priority is given to avoiding or reducing noise impacts through site planning and project design, and lowest priority is given to structural mitigation measures, such as construction of sound walls and acoustical treatment of buildings.

The County has identified the following noise-sensitive land uses:

- Residential development, except temporary dwellings;
- Schools–preschool to secondary, colleges and universities, specialized education and training;
- Health care services (hospitals);
- Nursing and personal care;
- Churches;
- Public assembly and entertainment;
- Libraries and museums;
- Hotels and motels;
- Bed and breakfast facilities;
- Outdoor sports and recreation; and
- Offices.

For residential land uses, the Noise Element recommends an exterior noise standard of 60 dBA CNEL and an interior noise standard of 45 dBA CNEL. Table 4.12.6 lists the County's maximum exterior noise levels for stationary noise sources. Table 4.12.7 lists the County's maximum allowable noise exposure for noise from transportation noise sources.

Table 4.12.6 Noise Element Maximum Allowable Noise Exposure – Stationary Sources

Level	Daytime (7:00 a.m.–10:00 p.m.)	Nighttime (10:00 p.m.–7:00 a.m.)
Hourly Leq	50	45
Maximum Level, Lmax	70	65
Maximum Level – Impulsive Noise, Lmax	65	60

Notes: As determined at the property line of the receiving land use. When determining the effectiveness of noise mitigation measures, the standards may be applied on the receptor side of the noise barrier or other property line noise mitigation measures. Nighttime applies only where the receiving land use operates or is occupied during nighttime hours.
Source: County 1992

If the baseline noise level during the day at some noise-sensitive locations exceeds the thresholds, as per Title 23, Section 23.06.044(b), "the applicable standard shall be adjusted so as to equal the ambient noise level plus one dB," which equates to an allowable increase of one dBA. When the receiving noise-sensitive land use is outdoor sports and recreation, the noise level standards shall be increased by 10 dB.

Table 4.12.7 Noise Element Maximum Allowable Noise Exposure – Transportation Sources

Land Use	Outdoor Areas Ldn/CNEL, dB	Interior Spaces	
		Ldn/CNEL, dB	Leq dB
Residential (except temporary dwellings and residential accessory uses)	60	45	--
Bed and breakfast facilities, hotels, and motels	60	45	--
Hospitals, nursing, and personal care	60	45	--

Table 4.12.7 Noise Element Maximum Allowable Noise Exposure – Transportation Sources

Land Use	Outdoor Areas Ldn/CNEL, dB	Interior Spaces	
		Ldn/CNEL, dB	Leq dB
Public assembly and entertainment (except meeting halls)	--	--	35
Offices	60	--	45
Churches, meeting halls	--	--	45
Schools – preschool to secondary, college and university, specialized education and training, libraries, and museums	--	--	45
Outdoor sports and recreation	70	--	--

Notes: CNEL = community noise equivalent level; dB = decibel; dBA = A-weighted decibel; Ldn = day-night average level; Leq = equivalent continuous sound level
Source: County 1992

Chapter 6, Section 40 of Title 23 (23.06.040) of the County Municipal Code establishes standards for acceptable exterior and interior noise levels and describes how noise should be measured. The Code states that these standards are intended to protect persons from excessive noise levels, which are detrimental to the public health, welfare, and safety. Excessive noise levels are also contrary to the public interest because they can interfere with sleep, communication, relaxation, and full enjoyment of one's property; contribute to hearing impairment and a wide range of adverse physiological stress conditions; and adversely affect the value of real property. The interior and exterior noise standards established in the County's Land Use Ordinance are consistent with the noise exposure standards in the County's General Plan Noise Element.

The County Code exempts construction activities from the noise standards between the hours of 7:00 a.m. and 9:00 p.m., Monday through Friday, and between 8:00 a.m. and 5:00 p.m. Saturdays and Sundays. Construction conducted outside of these hours should comply with the respective standards described above.

4.12.3 Thresholds of Significance

The significance of potential noise and vibration impacts is based on thresholds identified within the County's Initial Study Checklist, which was developed in accordance with Appendix G of the State California Environmental Quality Act (CEQA) Guidelines. According to the County's Initial Study Checklist, noise and vibration impacts would be considered significant if the Project would:

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 groundborne vibration or groundborne noise levels; or

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.

For exceedance to the noise element, see the designated noise levels discussed above under 4.12.2.3.

The County has not adopted noise standards that apply to construction activities such as the demolition and remediation activities of the Project. Instead, construction activities are exempted from the County noise standards if they occur during certain hours of the day. The first significance criteria listed above do not assign a threshold of acceptability from increased levels of noise. The following thresholds were utilized for the Rail Spur Project EIR (associated with the same Project site) for new development, not construction:

- Any increase above background (ambient) noise that is less than 3 dBA is less than significant;
- When a project (plus the background noise) results in an increase in noise between 3 and 10 dBA as measured from the nearest sensitive receptor, it is considered adverse.; and
- When a project (plus the background noise) results in an increase in noise greater than 10 dBA, as measured from the nearest sensitive receptor that is a significant impact warranting mitigation.

A project-related operational noise increase of between 3 dBA and 10 dBA is considered adverse, but could be either significant or insignificant, depending upon the circumstances of a particular case. Factors considered when determining the significance of an adverse impact as defined above include, but are not necessarily limited to:

- The resulting noise level;
- The duration and frequency of the noise;
- The number of people affected;
- The land use designation of the affected receptor sites; and
- The land use designations of adjacent parcels and adjacent noise sources such as roads.

The criteria described above are based on hourly Leq noise levels and for operations. The intent is to provide a relatively simple, easily understood description of the noise environment that does not require overly complex analysis to measure or enforce.

Leq correlates well with subjective reaction to many environmental noise sources and has been widely adopted in environmental noise impact studies. Because it is an energy average, Leq allows complex, time-varying noise environments to be described with a single figure, capturing contributions from noise sources that vary rapidly with time as well as those with a steady-state noise characteristic.

Noise due to construction activities, as with this Project, is generally considered to be less than significant when it falls under the hours and definition specified in the County's Noise Ordinance. However, for construction impacts which occur over a long duration that could affect the same receptors during that period and only during the daytime hours (in compliance with the exemption requirements of County Code), an increase over 10 dBA Leq could be in conflict with the underlying purpose of the County Code, which is to establish standards to:

> *[P]rotect persons from excessive noise levels, which are detrimental to the public health, welfare, and safety*" and that could "*interfere with sleep, communication, relaxation, and full enjoyment of one's property; contribute to hearing impairment and a wide range of adverse physiological stress conditions; and adversely affect the value of real property*. [23.06.040]

These long term construction activities could be "potentially adverse" and produce "excessive noise levels, which are detrimental to the public health". The 10 dBA increase level is a level that, with long-term activities that could affect the same receptors during that period, could cause a degree of excessive noise levels in conflict with the underlying purpose of the County Code and therefore potentially generate a significant impact.

For threshold b), vibration impacts would be considered significant if the vibration levels generated by the Project equipment exceeded a velocity of 0.01 inches per second at the property line of a neighboring use. This value corresponds with the perceptible level, and other jurisdictions (Los Angeles County, for example) define this level as a threshold for vibration impacts.

For threshold c), as the area is not located within an airport land use plan designation, this impact is not discussed further.

4.12.4 Impact Assessment Methodology

Noise levels associated with equipment utilized as part of the Project are estimated based on equipment manufacturers' information and available published data. This information is used in a SoundPLAN© model analysis which estimates the worst-case noise levels associated with the Project. This study was conducted by the Applicant and peer reviewed by the EIR consultant. Historical noise levels in the area were gathered both by the Applicant and by the EIR consultant as part of past studies and these are used to estimate the background noise levels and the associated increases in noise that might be expected by the Project. Generally, as the demolition is considered construction, daytime noise levels would be excluded from the municipal code requirements; however, as the Project would have a long duration, potential disturbances to nearby residences are also addressed.

4.12.5 Project-Specific Impacts and Mitigation Measures

This section discusses the approach for estimating the potential noise impacts, as well as a discussion of the modeling results and the potential impacts and cumulative impacts. Alternatives are discussed in Chapter 5.0.

Impact #	Impact Description	Residual Impact
NOI.1	Threshold a): Would the Project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Class II

The proposed project would generate a short-term, intermittent increase in ambient noise during the construction of the Project from vehicle and construction equipment. To predict the noise levels generated by planned demolition activities at the site, noise models were developed with the use of three-dimensional computer noise modeling software. All models in this report were developed with SoundPLAN© 8.0 software using the ISO 9613-2 standard. Noise levels are predicted based on the locations, noise levels and frequency spectra of the noise sources, and the geometry and reflective properties of the local terrain, buildings, and barriers. To ensure a conservative assessment, the ISO 9613-2 standard assumes light to moderate winds are blowing from the source to receivers.

Noise levels associated with on-site demolition/remediation were calculated based on representative offroad equipment identified for aboveground and belowground activities. A detailed list of equipment is included in Table 4.12.8. Representative noise levels associated with off-road equipment are summarized in Table 4.12.9. To be conservative, all equipment was assumed to be operating simultaneously.

Based on FHWA construction equipment noise model noise levels for individual equipment and the FHWA RCNM, off-road equipment operations were estimated to generate a combined noise levels of 74 dBA Leq at 200 feet for belowground/remediation activities and 71.9 dBA Leq at 200 feet for aboveground activities (FHWA 2006c).

Maximum instantaneous noise levels associated with a single piece of equipment would be approximately 78 dBA Lmax at 200 feet used for belowground/remediation activities and 68.6 dBA Lmax at 200 feet for aboveground activities (FHWA 2006a).

Use of the concrete crusher and asphalt pulverizer were assumed to generate noise levels of approximately 86.5 Leq and 83.6 dBA Lmax at 50 feet, based on measurements obtained from similar equipment (Ambient 2023).

Table 4.12.8 Anticipated Construction Equipment Usage

Aboveground Phase	Belowground Phase	Crushing Equipment
2 skid steer loaders 2 aerial lifts 1 off-highway truck 2 cranes 2 generator sets	<u>Each Area (2 areas):</u> 3 excavators 1 hydraulic breaking ram 1 skid steer loader 1 off-highway truck 1 generator set 1 auger drill rig	Rock crusher Pulverizer

Source: Applicant noise report (Ambient 2023)

Table 4.12.9 Noise Levels for Off-Road Equipment

Equipment	Distance	Leq
Aerial Lift	200	55.7
Auger Drill Rig	200	65.3
Concrete Crusher & Asphalt Pulverizer	50	75.9
Cranes	200	60.6
Excavators	200	64.7
Front End Loader	200	63.1
Generator Set	200	65.6
Hydraulic Braker Ram	200	68.0
Off-Highway Trucks	200	60.4
Skid Steer Loader	200	63.1

Source: Applicant noise report (Ambient 2023), FHWA RCNM 1.1

Aboveground demolition is anticipated to take approximately 8 months, with soil remediation activities beginning as areas are cleared and tested. The bulk of the remediation work would be completed within the first three years: however, it would likely continue at a reduced level for up to 10 years, depending on site conditions and work plans. Based on information provided for the Project by the Applicant, some activities would be anticipated to occur simultaneously. Predicted worst-case noise levels at the nearest residential land uses were determined to occur during periods associated with the belowground demolition of the tanks, aboveground demolition at the SMR, and operation of the asphalt pulverizer, and rock crusher, potentially creating worst-case noise levels during construction. Combined noise levels associated with these activities, predicted noise contours, and predicted noise levels at nearby land uses were predicted using the SoundPLAN© computer program.

Predicted noise levels and contours associated with on-site demolition/remediation activities are summarized in Table 4.12.10. Predicted average-hourly (dBA Leq) and instantaneous (dBA Lmax) noise contours are depicted in Figures 4.12-3 and 4.12-4.

Table 4.12.10 Modeled Noise Levels at Nearby Receptors

Receiver	Distance to Closest Project Activity, feet	Modeled Noise Level dBA Leq	Representative Baseline Location	Increase Over Baseline, Leq	Potentially Adverse?
R-1	2,450	61.4	LT2, 5, EIR1-4, EIR2-LT1	12.4	Yes
R-2	2,220	62.4	LT2, 5, EIR1-4, EIR2-LT1	13.3	Yes
R-3	1,780	64.8	LT3, 3, EIR1-3	15.4	Yes
R-4	1,240	66.1	EIR2-A4, 4, 1	20.6	Yes
R-5	1,710	59.7	LT3, 3, EIR1-3	10.6	Yes
R-6	6,150	52.5	EIR2-A2, 9	3.8	No
R-7	7,550	50.3	EIR2-LT3	3.9	No
R-8	9,050	48.2	EIR2-A1	0.9	No

Source: Applicant noise report (Ambient 2023), baseline noise level based on the lowest daytime Leq.

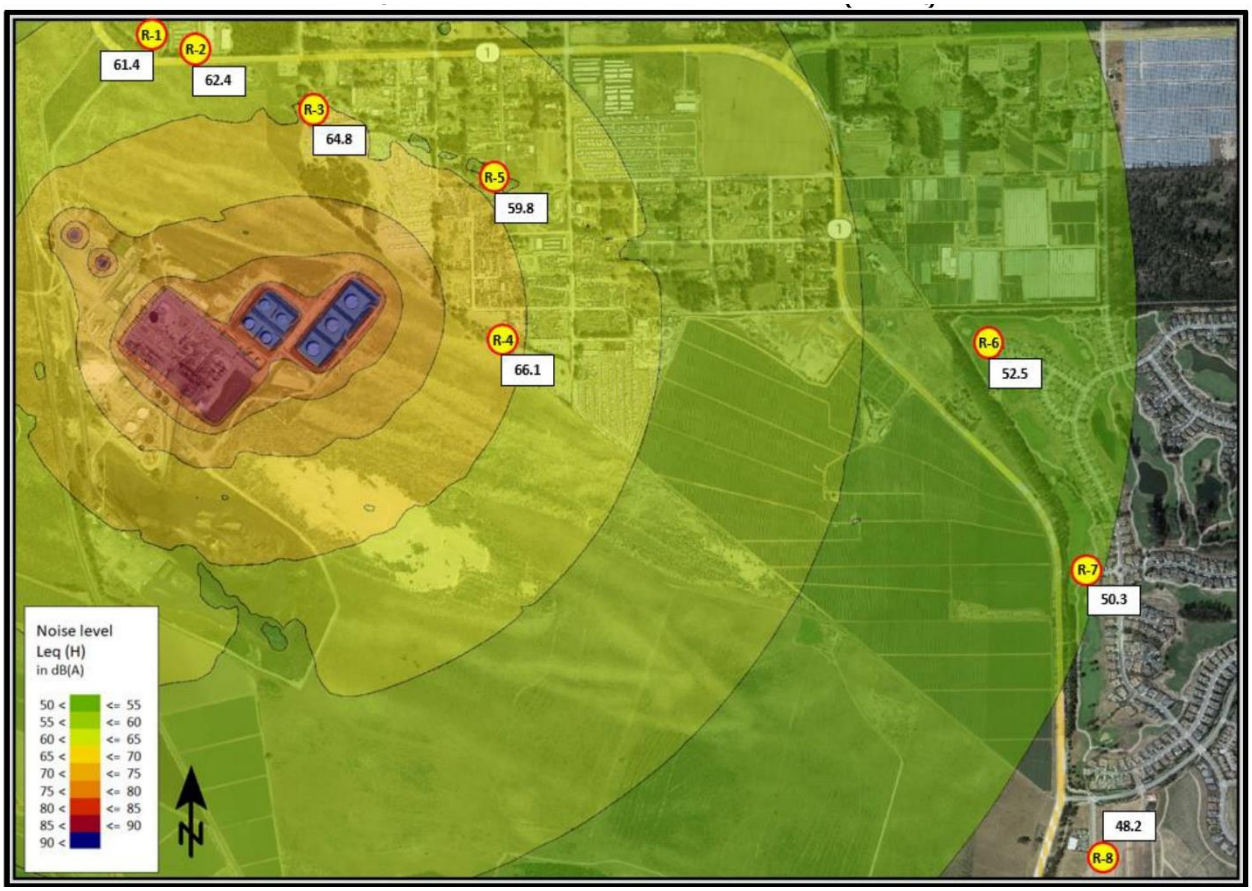
As depicted in Table 4.12.10, predicted exterior demolition/remediation noise levels at the property line of nearest residential land use (Receiver R-4 located at a residence on an industrial zoned site, adjacent to auto wrecking yards) would be 66.1 dBA Leq. Predicted noise levels at other nearby residences would range from 48.0 to 64.6 dBA Leq. Based on the conservative assumption used for the noise modeling, noise levels could increase by 0.6 dBA to as much as 20.6 dBA Leq over the baseline noise levels during the daytime. Increases over 10 dBA Leq could occur at receptors R-1 through R-5. However, it is important to note that Receivers R1 and R2 are located adjacent to State Route 1 and receiver R3 is located adjacent to commercial development and State Route 1. Receivers R-6 through R-8 are far enough away from activities so noise level increase would be below 10 dBA Leq. Furthermore, under the Project, the demolition of aboveground structures would likely have less overlap over a shorter duration with belowground work, as the surface hardscape and belowground structures would only be removed as necessary for remediation.

Materials would be moved by both off-site truck and rail traffic. As discussed in Chapter 2.0, Project Description, truck traffic would be limited during the Project to less than the average levels during the operational, historical period of the Project. In addition, although the annual number of trains would increase, train traffic would average less than one train per day. Therefore, daily and peak level noise from trains would be the same as during the historical operations of the SMR. Therefore, impacts from off-site traffic, both truck and trains, would not increase over the historical peak period baseline levels and impacts from off-site vehicle movement would be less than significant.

The Noise Element levels are shown in Section 4.12.2.3 and indicate that acceptable noise limits range from 50–60 dBA Leq for stationary and transportation sources impacts at residential receptors. However, the County Code exempts construction activities from the noise standards during the day. If construction were to occur outside of these allowable hours, it could produce a significant impact. In addition, as shown in Figure 4.12-4, the noise levels are below the Lmax maximum instantaneous noise level (see Table 4.12.6).

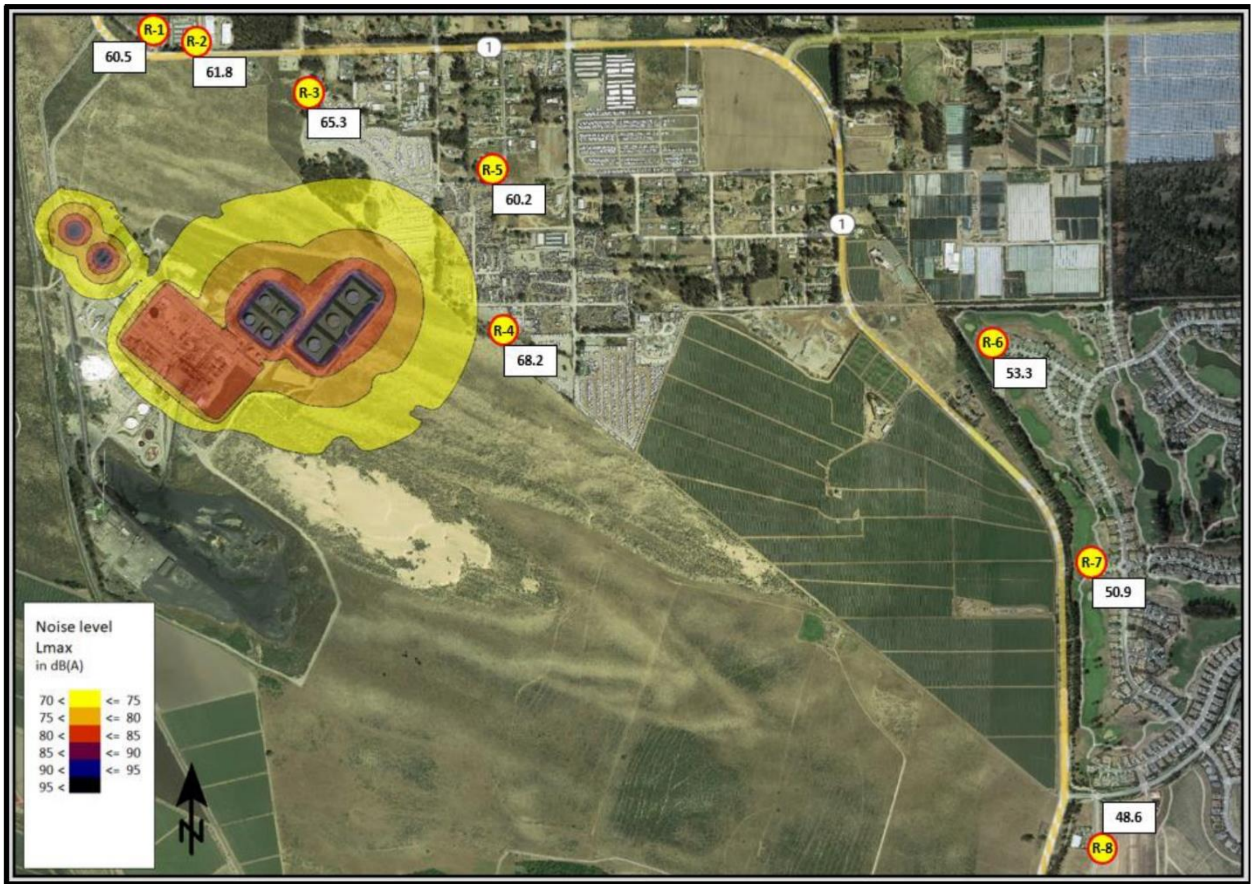
While the demolition and remediation activities are planned to comply with the municipal code construction time limits and therefore are exempt, the duration of the remediation activities and the potentially large increases in noise levels at some receptors (> 20 dBA Leq increases) could be detrimental and interfere with residential properties over the long term.

Figure 4.12-3 Modeled Noise Level Contours: Leq



Note: Noise levels and contours were calculated using the SoundPLAN© computer program assuming receiver would be placed at a height of approximately five feet above ground level. Locations are approximate.
Source: Applicant noise report (Ambient 2023)

Figure 4.12-4 Modeled Noise Level Contours: Lmax



Note: Lmax for single loudest piece of equipment. Noise levels and contours were calculated using the SoundPLAN© computer program assuming receiver would be placed at a height of approximately five feet above ground level. Locations are approximate.
Source: Applicant noise report (Ambient 2023)

Mitigation that could be effective range from equipment configurations, policies and construction phasing and barrier and equipment shrouds. Caltrans (Caltrans 2013) indicates that the following measures can be used to reduce noise impacts on nearby receptors:

- Reroute haul routes away from residences;
- Require modern equipment;
- Plan noisiest operations for times of day when people are less sensitive to noise;
- Plan operations to minimize the use of backup warning devices;
- Set backup warning devices to lowest level without jeopardizing safety;
- Operate equipment at minimum power; and
- Use quieter alternate methods or equipment

Caltrans also indicates that:

> *Residents' tolerance toward construction noise is greatly increased if they are informed that the noise is temporary, that they have a telephone number to call for*

> *more information and to report specific noise concern, and that every effort will be made to address those concerns.*

Studies conducted related to the Central Artery Project in Boston (Institute of Noise Control Engineering 2000) indicate that:

> *The greatest single source of noise complaints results from the use of loud backup alarms on vehicles working at night. The solution has involved requiring all project-related vehicles to be equipped with either manually-adjustable or ambient-sensitive backup alarms.*

FHWA (FHWA 2006b) indicates that backup alarms account for the largest portion (41 percent) of problems related to construction noise issues, followed by slamming tailgates (27 percent) and hoe rams (24 percent).

Installing shrouds and barriers around relatively stationary equipment, such as generators and crushers/pulverizers, can also be a very effective method of reducing noise levels, achieving reductions of 15–20 dBA. The generators produce a relatively large portion of the sound energy on site for both aboveground and belowground demolition. Effective methods to reduce this equipment noise would reduce the overall noise impacts to residences. These methods are less effective when equipment moves around a lot as the barriers are not able to prevent noise propagation under many circumstances.

While the concrete crusher and asphalt pulverizer and the hydraulic braker ram are indicated in the modeling to contribute only minimally to the noise levels, historical information (such as pile drivers in the FHWA RCNM (FHWA 2006c) database and Hy-Ram (Hy-Ram 2023) manufactures information) indicate that this equipment could have a wide range of noise levels. Ensuring noise monitoring and installation of noise shrouds and barriers around this equipment if disturbance is identified would also ensure that impacts are minimized.

Therefore, control of backup alarms, communication with nearby residences and methods to reduce stationary equipment noise if there are issues can effectively reduce the potential impacts of construction activities. Measures are listed below.

Mitigation Measures

NOI.1-1 ***Nighttime Activities Limits:*** *Noise activities during the nighttime shall be prohibited in order to reduce the potential for impacts to surrounding residences and other sensitive receptors. County Land Use Ordinance 23.06.040 construction time limits (Noise sources associated with construction shall not take place before 7:00 a.m. or after 9:00 p.m. any day except Saturday or Sunday, or before 8:00 a.m. or after 5:00 p.m. on Saturday or Sunday). This requirement shall be incorporated into the NOI.1-2 Construction Noise Control Management Plan, reproduced on plans submitted for permits, and strictly enforced throughout construction.*

Submittal Timing: *Prior to County permit issuance.* ***Approval Trigger:*** *Issuance of County permit.* ***Responsible Party:*** *The Applicant or designee.* ***What is required:*** *Construction Noise Control Management Plan, and description of requirements on all* *construction plans.* ***To whom it is submitted and approved by:*** *County Department of Planning and Building.*

NOI.1-2 ***Construction Noise Control Measures:*** *The Applicant shall provide the following construction noise control performance, implementation, management, and reporting measures, described in a Construction Noise Control Management Plan:*

1. *All noise-producing construction equipment and vehicles using internal combustion engines shall be equipped with critical grade mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition and appropriate for the equipment that meet or exceed original factory specifications. Mobile or fixed "package" equipment (e.g., arc-welder, air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment;*
2. *All heavy-duty stationary construction equipment (including generators and crushers/pulverizers) shall be placed so that emitted noise is directed away from the nearest sensitive receptors;*
3. *Smart back-up alarms shall be used with mobile construction equipment that automatically adjust the sound level of the alarm in response to ambient noise levels or back-up alarms shall be disabled and replaced with human spotters to ensure safety when mobile construction equipment is moving in the reverse direction;*
4. *Limit unnecessary idling of construction equipment;*
5. *Communication or music systems shall not be audible at any adjacent receptor;*
6. *Inform residents and other noise sensitive receptors within 3,000 feet of Project work areas of anticipated noise disturbances two to four weeks prior to construction, including a contact telephone number to register noise complaints. The Project Applicant shall ensure that a noise liaison is assigned to respond to all public construction noise complaints in a timely manner, and either a) the telephone number is staffed by the noise liaison during construction hours; or b) the phone number is connected to an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended;*
7. *Noise complaints shall be forwarded to the County of San Luis Obispo Planning and Building Department within 24 hours, along with the Owner/Applicant's initial response to the complaint;*
8. *The noise complaint telephone number shall be posted in a manner visible to passersby and provided individually to potentially affected residences as part of the notification efforts;*
9. *Should a complaint be received and verified, as determined by the County, the Applicant shall do the following to reduce noise:*
    a. *Schedule construction activities to avoid operating construction spreads in the same location or the same distance from the same receptor*

simultaneously, with a minimum separation distance of 1,000 feet between spreads (relative to the same receptor);

b. Install barriers or shrouds between the noisy construction equipment (generators and crushers/pulverizers) and the closest noise receptor; and

c. Conduct noise monitoring at the construction site and along the site boundary and at the closest receptor to ensure noise levels attributed to the Project do not exceed a 10 dBA Leq increase over background levels at the closest residence.

10. The Plan shall include a compliance reporting schedule and outline the information to be reported to the County, and include a sample report form.

***Submittal Timing:** Prior to County permit issuance. **Approval Trigger:** Issuance of County permit. **Responsible Party:** The Applicant or designee. **What is required:** Construction Noise Control Management Plan and description of requirements on all construction plans. **To whom it is submitted and approved by:** County Department of Planning and Building.*

Residual Impacts

The potential impacts of construction noise and the effect on residences can be reduced by effective measures such as limits on back-up beepers, communication, equipment modifications and effective noise management practices. The goal of the program is to ensure good communication with residents and to address complaints should noise levels attributed to the Project exceed a 10 dBA Leq increase over baseline. Prohibiting activities during the night would also reduce the potential for impacts to area residences and ensure that construction activities are limited to those hours allowing for normal exemption of construction noise activities. With these measures, the potential for excessive noise levels would be substantially reduced and therefore impacts would be **less than significant with mitigation (Class II).**

The long-term noise levels, after the construction phases of the Project are completed, would result in reduced, beneficial noise levels in the area as the SMR would no longer be operating.

Impact #	Impact Description	Residual Impact
NOI.2	Threshold b): Would the Project generate excessive groundborne vibration or groundborne noise levels?	Class III

Noise levels that persons may be exposed to are discussed in impact NOI.1 above.

For vibrations, based on FTA vibration levels with a range of construction equipment (see Section 4.12.1.3), and due to the distances to the nearest receptors, the vibration levels from a worst-case construction/demolition activity of the operation of a pile driver indicates vibration would generate a peak particle velocity (PPV) of 0.01 inches/second at the closest receptor, which would be barely perceptible to humans and would not cause any damage to structures (see Appendix E). Impacts from potential vibration would therefore be **less than significant (Class III).**

Impact #	Impact Description	Residual Impact
NOI.3	Threshold 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?	Class III

The Project site is not located within the vicinity of a private airstrip or an airport land use plan, nor is the Project located within two miles of a public, or public use, airport. The Oceano Airport is located approximately four miles north of the Project site. Therefore, the Project would not result in any impacts associated with excessive noise within an airport land use plan or within two miles of a public, or public use, airport. Potential impacts would be **less than significant (Class III).**

4.12.6 Mitigation Measure Impacts to Other Issue Areas

Mitigation measures would be targeted to reduce impacts from equipment operations through noise management practices and increased muffler efficiency. None of these measures would produce impacts in other issue areas.

4.12.7 Cumulative Impacts

Cumulative projects are discussed in Chapter 3.0, Cumulative Study Area. Cumulative projects are discussed in each of the categories below.

Ongoing SMR projects, including the Slop Oil Spill and the Northern Inactive Waste Site (NIWS) remediation projects and the remaining facilities off-site projects (Summit Pump Station and Santa Maria Pump Station), would not involve noise sources and therefore, in combination with the Project, would not have a cumulative impact.

Other projects in the area, such as the Arroyo Grande Oil Field, Caballero Battery project, Monarch Dunes or the Dana Reserve development projects, or the Santa Barbara County projects, would entail the use of equipment and transportation and could contribute to increases in noise levels use in their respective project areas. However, as the Project noise levels would not overlap with the noise levels from other projects as they are located a substantial distance away, a cumulative impact would not occur.

Roadway projects would not entail the generation of large amounts of noise levels that could affect the same receptors as the Project and would therefore not produce cumulative impacts.

4.12.8 References

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