16.0 NOISE

16.1 Regulatory Setting

16.1.1 California Coastal Act

As described in greater detail in Chapter 14, "Land Use and Planning," of this Draft EIR, the California Coastal Act (PRC §30000 et seq.) governs development within the Coastal Zone.

Chapter 3 of the Act, Coastal Resources Planning and Management Policies (PRC §30200 et seq.), sets forth the policies that constitute the standards for development subject to the Coastal Act. Chapter 3 of the Coastal Act does not contain any policies applicable to noise or vibration.

16.1.2 Other Applicable Noise Standards/State of California

Applicable policies for land use-noise compatibility are typically determined in local land use plans such as General Plan noise elements and noise standards that are normally developed for a local noise ordinance. These types of local policies and standards do not directly apply to State Park owned lands or State Park projects.

The State of California General Plan Guidelines (Office of Planning and Research 2017) identify recommendations for the noise elements of local general plans, including a sound level/land-use compatibility chart. The noise element guidelines identify the "normally acceptable" range of noise exposure for low-density residential uses as less than 60 dB L_{dn}, and the "conditionally acceptable" range as 55–70 dB L_{dn}. The "normally acceptable" range for high-density residential uses is identified as below 65 dB L_{dn}, and the "conditionally acceptable" range is identified as 60–70 dB L_{dn}. For educational and medical facilities, levels below 70 dB L_{dn} are considered "normally acceptable," and levels of 60–70 dB L_{dn} are considered "conditionally acceptable." For office and commercial land uses, levels below 70 dB L_{dn} are considered "normally acceptable," and levels of 67.5–77.5 dB L_{dn} are considered "conditionally acceptable." (OPR 2017).

16.2 Environmental Setting

16.2.1 Acoustic Fundamentals

Noise is generally defined as sound that is loud, disagreeable, or unexpected. Sound, as described in more detail below, is mechanical energy transmitted through a medium (e.g., air) in the form of a wave from a disturbance or vibration.

16.2.1.1 Sound Properties

A sound wave is introduced into a medium by a vibrating object. The vibrating object is the source of the disturbance that moves through the medium. The source could be vibrating vocal cords, the string, and soundboard of a guitar, or the diaphragm of a radio speaker. Regardless of the type of source creating the sound wave, the particles of the medium through which the sound moves are vibrating in a back-and-forth motion at a given frequency (i.e., pitch).

The frequency of a wave is determined by how often the particles vibrate when a wave passes through the medium. It is measured as the number of complete back-and-forth vibrations of a particle per unit of time. If a particle of air undergoes 1,000 longitudinal vibrations in 2 seconds, then the frequency of the wave would be 500 vibrations per second. A commonly used unit for frequency is Hertz (Hz).

Each particle of the medium vibrates because of the motion of its nearest neighbor. The first particle begins vibrating, at, say, 500 Hz, and sets the second particle of the medium into motion at the same frequency. The second particle begins vibrating at 500 Hz and thus sets the third particle into motion at 500 Hz. The process continues throughout the medium until each particle of the medium vibrates at the same frequency, which is equal to the frequency of the source. Subsequently, a guitar string vibrating at 500 Hz will set the air particles in the room vibrating at the same frequency, which carries a sound signal to the ear of a listener that is detected as a 500-Hz sound wave.

The back-and-forth vibration motion of the particles of the medium is not the only observable phenomenon occurring at a given frequency. Because a sound wave is a pressure wave, a detector can be used to detect oscillations in pressure from high pressure to low pressure and back to high pressure. As the compression (high-pressure) and rarefaction (low-pressure) disturbances move through the medium, they reach the detector at a given frequency. For example, the compression and rarefaction disturbances reach the detector 500 times per second if the frequency of the wave is 500 Hz. Thus, the frequency of a sound wave refers not only to the number of back-and-forth vibrations of the particles per unit of time but to the number of compression or rarefaction disturbances that pass a given point per unit of time.

A detector can be used to detect the frequency of these pressure oscillations over a given period. The period of the sound wave can be found by measuring the time between successive high-pressure points (corresponding to the compressions) or the time between successive low-pressure points (corresponding to the rarefactions). The frequency is simply the reciprocal of the period. Thus, an inverse relationship exists: As frequency increases, the period decreases, and vice versa.

As mentioned previously, a wave is an energy transport phenomenon that transports energy along a medium. The amount of energy carried by a wave is related to the amplitude (i.e., loudness) of the wave. A high-energy wave is characterized by high amplitude; a low-energy wave is characterized by low amplitude. The amplitude of a wave refers to the maximum amount of displacement of a particle from its rest position. The energy transported by a wave is directly proportional to the square of the amplitude of the wave. This means that a doubling of the amplitude of a wave is indicative of a quadrupling of the energy transported by the wave. A tripling of the amplitude of a wave is indicative of a nine-fold increase in the amount of energy transported by the wave.

16.2.1.2 Sound and the Human Ear

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 (dB). 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 (Caltrans 2013).

Also, 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. An A-weighted dB (dBA) scale performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. The basis for compensation is the faintest sound audible to the average ear at the frequency of maximum sensitivity. This A-weighted dB scale has been chosen by most authorities for regulation of environmental noise. Table 16-1 lists typical indoor and outdoor noise levels.

Table 16-1. Typical Indoor/Outdoor Noise Levels and Common Environmental Noise Sources

Indoor/Outdoor	Common Activities	Noise Level (dBA)
Indoor	Jet fly-over at 1,000 feet	100 - 110
Indoor	Gas lawn mower at 3 feet	90 - 100
Indoor	Diesel truck at 50 feet at 50 mph	80 - 90
Indoor	Noisy urban area, daytime	70 - 80
Indoor	Gas lawn mower, 100 feet	70
Indoor	Commercial area	60 - 70
Indoor	Heavy traffic at 300 feet	60
Indoor	Quiet urban daytime	50
Indoor	Quiet urban nighttime	40
Indoor	Quiet suburban nighttime	30 - 40
Indoor	Quiet rural nighttime	20 - 30
Indoor	Lowest threshold of human hearing	0
Outdoor	Front rows of a rock concert	110
Outdoor	Food blender at 3 feet	80 - 90
Outdoor	Garbage disposal at 3 feet	80
Outdoor	Vacuum cleaner at 10 feet	70
Outdoor	Normal speech at 3 feet	60 - 70
Outdoor	Large business office	50 - 55
Outdoor	Dishwasher, next room	50
Outdoor	Theater, large conference room (background)	40
Outdoor	Library	30
Outdoor	Bedroom at night, concert hall (background)	20 - 25
Outdoor	Broadcast/recording studio	10 - 15
Outdoor	Lowest threshold of human hearing	0

Source: Caltrans 2013

16.2.1.3 Sound Propagation

As sound (noise) propagates from the source to the receptor, the attenuation—the manner of noise reduction relative to distance—depends on such factors as the inverse square law, surface characteristics, atmospheric conditions, and the presence of physical barriers. The inverse square law describes the attenuation attributable to the pattern in which sound travels from the source to the receptor. Sound travels uniformly outward from a point source in a spherical pattern with an attenuation rate, generally, of 6 dBA per doubling of distance (dBA/DD). In other words, sound decreases by 6 dBA each time the distance between the noise source and the receptor is doubled.

However, from a line source (e.g., road), sound travels uniformly outward in a cylindrical pattern with an attenuation rate, generally, of 3 dBA/DD. The characteristics of the surface between the source and the receptor may further absorb and/or reflect sound, thus resulting in a different attenuation rate. Atmospheric conditions such as wind speed, temperature, and humidity may also affect noise levels. Furthermore, the presence of a barrier between the source and the receptor may attenuate noise levels. The actual amount of attenuation depends on the barrier size and the frequency of the noise. A noise barrier may be any natural or human-made feature, such as a hill, tree, building, wall, or berm (Caltrans 2013).

16.2.1.4 Human Response to Changes in Noise Levels

Under controlled conditions in a laboratory setting a human is able to discern 1 dB changes in sound levels when exposed to steady, single-frequency ("pure-tone") signals in the mid-frequency range (1,000 Hz-8,000 Hz). In typical noisy environments, changes in noise level of 1–2 dB are generally not perceptible. However, people are able to begin to detect sound level changes of 3 dB in typical environments. A 5-dB change is readily noticeable, a 6-dB change is clearly noticeable, and a 10-dB change is generally perceived as a doubling or halving of loudness (Caltrans 2013).

16.2.1.5 Noise Descriptors

The proper descriptor for noise from a specific source depends on the spatial and temporal distribution, duration, and fluctuation of the noise. The following are the noise descriptors most often encountered when dealing with traffic, community, and environmental noise (Caltrans 2013):

- *L_{max} (maximum noise level):* The maximum instantaneous noise level during a specific period of time. The L_{max} may also be referred to as the "peak (noise) level."
- *L_{min} (minimum noise level):* The minimum instantaneous noise level during a specific period of time.
- *L_n (statistical descriptor):* The noise level exceeded "n" percent of a specific period of time.
- *L_{eq} (equivalent noise level):* The average noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, average energy value is calculated, which is then converted back to dBA to determine the L_{eq}.
- *L_{dn} (day-night noise level):* The 24-hour L_{eq} with a 10 dBA "penalty" for the noise-sensitive hours between 10:00 p.m. and 7:00 a.m. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.
- *CNEL (community noise equivalent level):* The CNEL is similar to the L_{dn} described above, but with an additional 4.77 dBA "penalty" for the noise-sensitive hours between 7:00

p.m. and 10:00 p.m., which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the CNEL is typically about 0.5 dBA higher than the L_{dn}.

16.2.1.6 Negative Effects of Noise on Humans

Negative effects of noise exposure include physical damage to the human auditory system, interference, and disease. Exposure to noise may result in physical damage to the auditory system, which may lead to gradual or traumatic hearing loss. Gradual hearing loss is attributable to sustained exposure to moderately high noise levels over a period of time, while traumatic hearing loss is attributable to sudden exposure to extremely high noise levels over a short period. However, both gradual and traumatic hearing loss may result in permanent hearing damage. In addition, noise may interfere with or interrupt sleep, relaxation, recreation, and communication. Although most interference may be classified as annoying, the inability to hear a warning signal may be considered dangerous. Noise may also contribute to diseases associated with stress, such as hypertension, anxiety, and heart disease. The degree to which noise contributes to such diseases depends on the noise frequency, bandwidth, level, and exposure time (Caltrans 2013).

16.2.1.7 Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides) and human activity (explosions; traffic; and operation of machinery, trains, or construction equipment). Vibration sources may be continuous (e.g., operating factory machinery) or transient (e.g., explosions).

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. RMS is a measurement of the effective energy content in a vibration signal, expressed mathematically as the average of the squared amplitude of the signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (Caltrans 2020). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response to vibration. The response of the human body to vibration relates well to average vibration amplitude. Therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity, and like airborne sound impacts on humans, vibration velocity can be expressed in decibel notation, as vibration decibels (VdB).[1] Table 16-2 summarizes the general human response to different levels of groundborne vibration.

[1] Vibration levels described in VdB are referenced to 1 microinch per second.

Table 16-2. Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum Vibration Level–Transient Sources		Maximum Vibration Level–Continuous/Frequent Intermittent Sources*	
Barely perceptible	0.04 PPV (in/sec)	80 VdB	0.01 PPV (in/sec)	68 VdB
Distinctly perceptible	0.25 PPV (in/sec)	96 VdB	0.04 PPV (in/sec)	80 VdB
Strongly perceptible	0.9 PPV (in/sec)	107 VdB	0.10 PPV (in/sec)	88 VdB
Severe	2.0 PPV (in/sec)	114 VdB	0.4 PPV (in/sec)	100 VdB

Note: PPV = peak particle velocity, VdB = velocity decibels referenced to 1 µinch/sec and based on the root mean square vibration velocity.
*Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.
Source: Caltrans 2020

The effects of groundborne vibration include movement of building floors, rattling of windows, shaking of items that sit on shelves or hang on walls, and rumbling sounds. In extreme cases, vibration can damage buildings, although this is not a factor for most projects. Human annoyance from groundborne vibration often occurs when vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance can be well below the damage threshold for normal buildings. Table 16-3 shows the general thresholds for structural responses to vibration levels.

Table 16-3. Structural Responses to Vibration Levels

Structure and Condition	Peak Vibration Threshold–Transient Sources	Peak Vibration Threshold–Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12 (in/sec PPV)	0.08 (in/sec PPV)
Fragile buildings	0.2 (in/sec PPV)	0.1 (in/sec PPV)
Historic and some old buildings	0.5 (in/sec PPV)	0.25 (in/sec PPV)
Older residential structures	0.5 (in/sec PPV)	0.3 (in/sec PPV)
New residential structures	1.0 (in/sec PPV)	0.5 (in/sec PPV)
Modern industrial/commercial buildings	2.0 (in/sec PPV)	0.5 (in/sec PPV)

Notes: in/sec = inches per second; PPV = peak particle velocity
Source: Caltrans 2020

16.2.2 Existing Noise Environment

The existing noise environment within the project area is primarily influenced by surface-transportation noise emanating from vehicular traffic on Highway 1 and other local roads. Other noise sources include off-highway vehicles (OHVs), airports, railroads, and industrial facilities. Amtrack trains run along the railway to the east of Highway 1. Existing commercial uses also contribute to the noise environment at existing adjacent residential uses due to loading dock activities, parking lot vehicle movements, and people walking and talking. Intermittent noise from outdoor activities at the surrounding residences and campgrounds (e.g., people talking, operation of landscaping equipment, car doors slamming, and dogs barking), also influences the existing noise environment. Activities at the beach and natural sources such as ocean waves, wildlife such as birds, and wind also contribute to the noise environment in the area. Railroad-related noise to the east of the project site can be substantial (greater than 100 dBA when trains blow their horns). The airport and the Phillips 66 Refinery also contribute to the existing noise environment.

16.2.2.1 Sensitive Noise Receptor Locations

Noise-sensitive land uses generally consist of those uses where noise exposure would result in adverse effects on uses for which quiet is an essential element of their intended purpose. Sensitive receptors are individuals or groups of individuals who would be potentially affected by increases in noise levels (both ambient and short-duration noise). Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise. Other examples of noise-sensitive land use include nursing homes, schools, hospitals, libraries, childcare facilities, and places of worship. For the purposes of this EIR, sensitive receptors are considered to be public park areas and residences in the vicinity of proposed project sites.

16.2.2.2 Existing Ambient Noise Levels

An ambient noise survey was conducted in the vicinity of the project site from November 11 through November 12, 2020. The purpose of the survey was to establish existing noise conditions. Ambient noise measurements were conducted near existing noise-sensitive uses at various locations in the vicinity of the project sites. The results of the noise survey are shown in Table 16-4. Exhibit 16-1 shows the locations of the ambient noise measurement sites. Three long-term (24-hour) measurements were conducted on and off the project site. Long-term measurement sites LT-01, LT-02, and LT-03, measured ambient noise levels of 53 dBA L_{dn} to 58 dBA L_{dn}. Six short-term measurements of ambient noise levels were conducted during daytime hours. As shown in Table 16-4, measured ambient noise levels at the noise-sensitive land uses closest to the project sites range from 45 to 61 dBA L_{eq}.

16.2.2.3 Oceano Dunes SVRA and Pismo State Beach

The noise setting of Oceano Dunes State Vehicular Recreation Area (SVRA) and Pismo State Beach is characterized by the persistent, natural sounds of waves, wildlife (e.g., bird calls), and wind passing over dunes and vegetation, and the intermittent, punctuated by recreational activities, including beach camping activities and vehicle recreation (both street-legal and OHV). In addition, the OHMVR Division uses vehicles, equipment, and machines to maintain and administer these parks. This includes equipment use related to existing dust control activities in Oceano Dunes SVRA and Pismo State Beach, such as the installation and maintenance of wind fencing and street sweeping (Oceano Dunes SVRA Dust Control DEIR, 2016).

When winds are high (approximately 10 miles per hour or higher), which is not uncommon in the project area, the sound of sand moving along the dune surface and wind rushing past the ear can drown out noise sources that are not in the immediate vicinity of the receiver, but can also reflect sound waves upward and cause them to travel farther than under low-wind conditions (Oceano Dunes SRVA Dust Control DEIR, 2016).

Table 16-4. Summary of Ambient Noise Level Survey Results in the Vicinity of the Project Site

Site	Location	Date	Time	Duration	Measured Sound Level, dB Daytime (7 a.m.–7 p.m.)
LT-01	By Fin's Bar & Grill @ West Grand Avenue Entrance	11-11/12-2020	10:00	24 Hour	55 L_{eq}, 89 L_{max}, 51 L_{50}, 49 L_{90}, 58 L_{dn}
LT-02	Oceano Campground by Lagoon Trail	11-11/12-2020	11:00	24 Hour	49 L_{eq}, 83 L_{max}, 45 L_{50}, 43 L_{90}, 53 L_{dn}
LT-03	By 2359 Willow Road, Arroyo Grande, CA 93420	11-11/12-2020	13:00	24 Hour	50 L_{eq}, 85 L_{max}, 47 L_{50}, 43 L_{90}, 54 L_{dn}
ST-01	3098 Oso Flaco Lake Road, Arroyo Grande, CA 93420	11-11-2020	11:35	30 mins	45 L_{eq}, 67 L_{max}
ST-02	By Pier Avenue Entrance by Beach Front Vacation Houses	11-11-2020	13:05	30 mins	61 L_{eq}, 80 L_{max}
ST-03	Pismo State Beach Houses by 1001 Cabrillo Hwy, Oceano, CA 93445	11-11-2020	13:53	30 mins	55 L_{eq}, 70 L_{max}
ST-04	By Pismo State Beach Boardwalk Project Site	11-11-2020	14:53	30 mins	57 L_{eq}, 61 L_{max}
ST-05	Monarch Butterfly Grove, 400 S Dolliver St, Pismo Beach, CA 93449	11-11-2020	15:42	30 mins	56 L_{eq}, 67 L_{max}
ST-06	North Beach Campground by 165 S Dolliver Street, Pismo Beach, CA 93449	11-11-2020	16:20	30 mins	51 L_{eq}, 59 L_{max}

Notes: dB = decibels; L_{eq} = equivalent sound level (the sound energy averaged over a continuous period of time); L_{max} = maximum instantaneous sound level; ST = short-term measurement

Noise-level measurements were completed using a Larson Davis Laboratories (LDL) Model 831 and 820 precision integrating sound-level meters. The meter was calibrated before the measurements using an LDL Model CAL200 acoustical calibrator. The meter was programmed to recorded A-weighted sound levels using a "slow" response. The equipment used complies with all pertinent requirements of the American National Standards Institute for Class 1 sound-level meters (ANSI S1.4).

Source: Data compiled by AECOM in 2020

Noise from vehicle recreation is highest in Oceano Dunes SVRA, where the OHV activity is permitted. In general, vehicle noise levels are highest on busy weekends (especially holiday weekends) and lowest on weekdays, although individual OHVs can generate noise levels in the range of 80 – 90 dBA in the immediate vicinity of the vehicle and 70 – 80 dBA approximately 50 – 100 feet away from the vehicle. Noise generated from the beach and open riding and camping area does not substantially influence the noise environment outside of the Park due to the presence of intervening topography, vegetation, and the fact that recreational activities within the park are relatively dispersed; however, the OHMVR Division has received complaints from residents on the Nipomo Mesa that OHV noise can be heard at private residential locations. Certain meteorological conditions, such as fog and low-level clouds can reduce the attenuation of sound in the atmosphere (Oceano Dunes SRVA Dust Control DEIR, 2016).

16.2.2.4 Existing Traffic Noise

Table 16-5 shows existing traffic noise levels along Highway 1, the dominant traffic noise source, in the project area. Traffic noise modeling was conducted using the Federal Highway Administration's (FHWA 1978) traffic noise prediction model (FHWA-RD-77-108) and was used to predict traffic noise levels under existing conditions. Traffic data from Caltrans traffic counts were used to model existing traffic noise levels. Detailed noise analytical information is provided in Appendix C, Supporting Noise Information. As shown Table 16-5, the existing traffic noise levels in the project area range from 65 dBA to 68 dBA L_{dn} along Highway 1.

Table 16-5. Existing Traffic Noise in the Project Area

Roadway	Segment	Existing No Project Condition–Distance	Existing No Project Condition–Noise Level	Existing No Project Condition–Contour Distances
Highway 1	From Oso Flaco Underpass to North of Oso Flaco Underpass	50 ft	66 L_{dn}, dBA	70 dB–18 ft 65 dB–56 ft 60 dB–177 ft
Highway 1	From Entrance, Union Oil Coking Plant to North of Entrance, Union Oil Coking Plant	50 ft	66 L_{dn}, dBA	70 dB–19 ft 65 dB–59 ft 60 dB–187 ft
Highway 1	From Arroyo Grande Road to North of Arroyo Grande Road	50 ft	65 L_{dn}, dBA	70 dB–18 ft 65 dB–55 ft 60 dB–175 ft
Highway 1	From Halcyon Road to North of Halcyon Road	50 ft	67 L_{dn}, dBA	70 dB–24 ft 65 dB–76 ft 60 dB–241 ft
Highway 1	From Entrance, Pismo Beach State Park to North of Entrance, Pismo Beach State Park	50 ft	67 L_{dn}, dBA	70 dB–28 ft 65 dB–88 ft 60 dB–277 ft
Highway 1	From Grand Avenue to North of Grand Avenue	50 ft	68 L_{dn}, dBA	70 dB–32 ft 65 dB–100 ft 60 dB–316 ft
Highway 1	From Pismo Beach, Villa Creek to North of Pismo Beach, Villa Creek	50 ft	67 L_{dn}, dBA	70 dB–25 ft 65 dB–80 ft 60 dB–253 ft

Ldn = day-night sound level
dBA = A-weighted decibel
Source: Caltrans 2018. AECOM 2020.

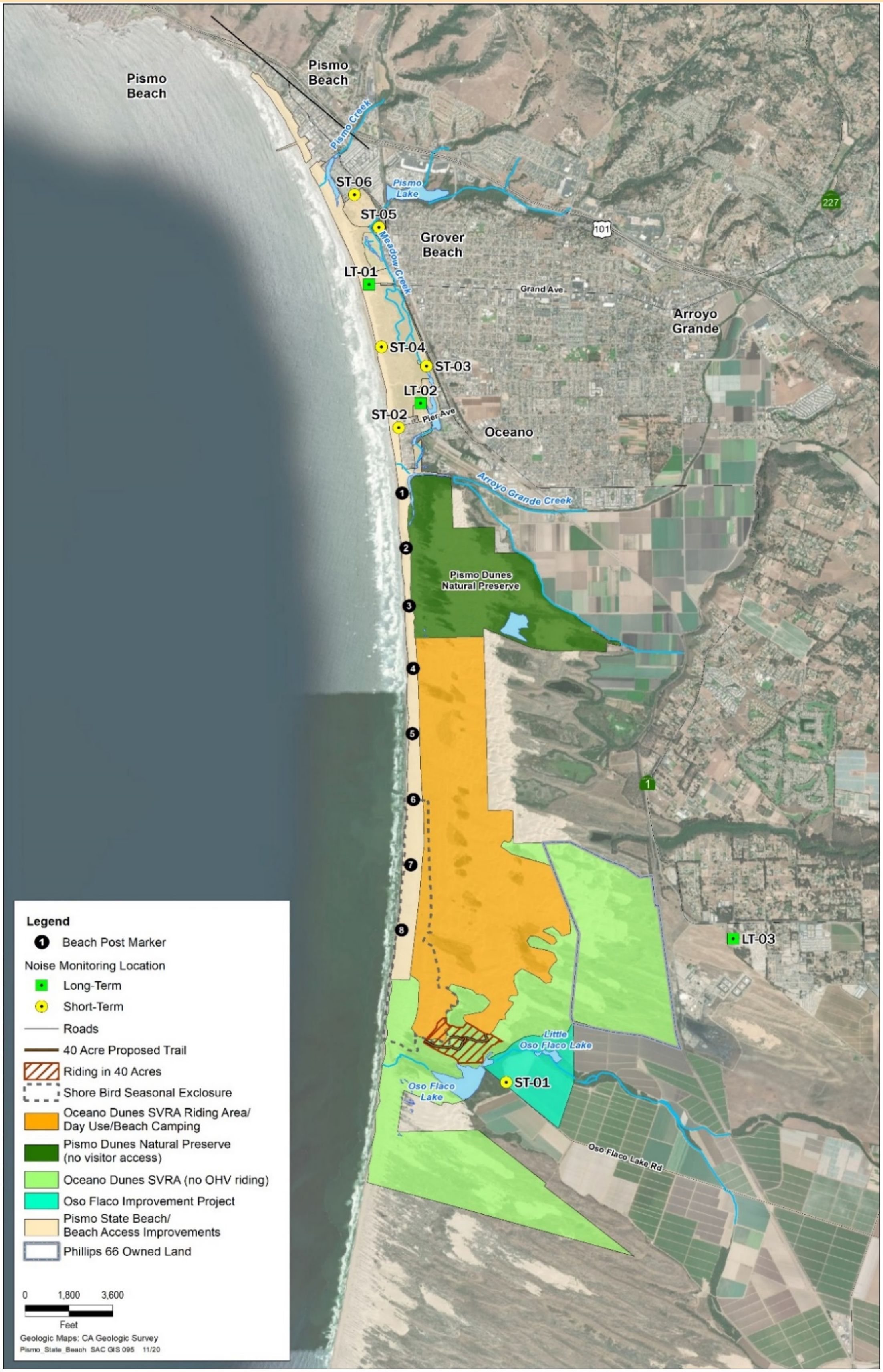

Figure 16-1. Ambient Noise Survey Locations

16.3 Project Impacts

16.3.1 Noise Characteristics of the Project

The proposed project activities (construction of the Development Projects) include site preparation (e.g., excavation, and construction); material transport; construction of the new facilities, and related-support structures; and other miscellaneous activities (e.g., paving). To assess potential short-term, temporary (i.e., construction-related) noise impacts, sensitive receptors, and their relative exposure were identified for each of the Development Projects. Noise levels of specific construction equipment were determined and resultant noise levels at those receptors (at given distances from the source) were calculated. Table 16-6 lists the noise levels generated by typical construction equipment at a distance of approximately 50 feet from the source. Based upon the equipment noise levels, usage factors, and a typical noise-attenuation rate of 6 dB (hard surface) and 7.5 dB (soft ground) for every doubling of distance, exterior noise levels at noise-sensitive receptors located within 50 feet of the project site could be as high as 90 dB L_{max} and 83 dB L_{eq}.

Table 16-6. Typical Construction Equipment Noise Levels

Equipment	Noise Level @ 50 Feet from Source, dBA
Air Compressor	80 L_{max} 76 L_{eq}
Backhoe	80 L_{max} 76 L_{eq}
Bulldozer	85 L_{max} 81 L_{eq}
Concrete Saw	90 L_{max} 83 L_{eq}
Crane	85 L_{max} 77 L_{eq}
Excavator	85 L_{max} 81 L_{eq}
Generator	82 L_{max} 79 L_{eq}
Paver	85 L_{max} 82 L_{eq}
Roller	85 L_{max} 78 L_{eq}
Truck (supplies delivery)	84 L_{max} 80 L_{eq}

Source: FHWA 2006.

Park operation under the PWP would be the same as or very similar to existing conditions and would not increase the noise level in the project area above the existing noise environment. Therefore, PWP operations will not be further discussed, and the analysis in this section focuses on construction noise only.

16.3.2 Thresholds of Significance

Based on Appendix G of the CEQA Guidelines, general standards for community ambient noise degradation, and the local standards identified above, the project would have a significant noise impact if it 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 groundborne vibration or groundborne noise levels?

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

As stated above under the discussion of "Human Response to Changes in Noise Levels", a significant noise impact would occur if project-related noise levels would result in a noticeable increase of 5 dBA or greater at noise-sensitive land uses. As stated above, A 5-dB change is readily noticeable (Caltrans 2013).

16.3.3 Impacts from PWP Development Projects and Small Development Projects and Mitigation

Impact 16-1. Generation of a Substantial Temporary or Permanent Increase in Ambient Noise Levels in the Vicinity of Development Project in Excess of Applicable Standards.

This PWP includes a series of proposed Development Projects, a series of proposed Small Development Projects, and other implementation activities. Each of the Development Projects is described in Chapter 3, "The Plan," at the level of detail currently known. The locations of all Development Projects and Small Development Projects are shown in Figure 3-1, Proposed Specific and Small Development Projects in Chapter 3.

The Phillips 66/ Southern Entrance Project would involve additional construction. Construction at this site would be temporary and is anticipated to occur several years into the future, not likely concurrently with other site-specific projects shown above. However, there is not enough information available at the time of this analysis regarding anticipated construction requirements and future operations to support a detailed analysis.

An average of approximately 30 construction workers would be employed at the project site during peak construction activities. Trucking for delivery and disposal of materials would occur throughout the construction period and would average one to two truck trips per day. Project-related construction traffic would result in a noise level of 54 dB L_{eq} at 50 feet from the roadway centerlines.

Table 16-7 summarizes modeled construction noise levels compared to existing noise levels measured during the ambient noise survey at the nearest noise-sensitive locations to each proposed Development Project site. Please refer to Appendix C for modeling input parameters and output results.

As shown in Table 16-7, simultaneous operation of the on-site construction equipment could generate combined intermittent noise levels of approximately 87 dBA L_{eq} at 50 feet from the project construction activities. The nearest noise-sensitive uses from the construction sites for the proposed project activities are approximately as close as 50 feet from the construction activities. As a result, exterior noise levels at the nearest sensitive receptors would be up to 87 dBA L_{eq}. Also, as shown in Table 16-7, the proposed project is causing an increase in noise due to construction in all project areas, which is an increase of 12 to 42 dB above existing ambient noise conditions. Therefore, this impact would be significant.

Mitigation Measure 16-1: Implement Noise Control Measures

State Parks and the general construction contractor shall implement the following measures to reduce construction-generated noise:

- Project construction activities shall be limited to 8 a.m. to 5 p.m. Monday through Friday.
- Construction staging areas within the Development Projects shall be located as far from noise-sensitive uses as feasible.
- Construction equipment and vehicles shall be fitted with efficient, well-maintained mufflers that reduce equipment noise emission levels at the project site. Internal combustion-powered equipment shall be equipped with properly operating noise suppression devices (e.g., mufflers, silencers, wraps) that meet or exceed manufacturers' specifications. Mufflers and noise suppressors shall be properly maintained and tuned to ensure proper fit, function, and minimization of noise.
- Portable and stationary site support equipment (such as generators, compressors, rock crushers, and cement mixers) shall be located as far as possible from nearby noise-sensitive receptors.
- Impact tools shall have the working area/impact area shrouded or shielded, with intake and exhaust ports on power equipment muffled or suppressed. This may necessitate the use of temporary or portable, application-specific noise shields or barriers.
- Construction equipment shall not be idled for extended periods (e.g., 15 minutes or longer) of time in the immediate vicinity of noise-sensitive receptors.
- A disturbance coordinator shall be designated by the general contractor, which will post contact information in a conspicuous location near the entrance of the subject construction sites so that it is visible to nearby receivers most likely to be disturbed. The coordinator shall manage complaints resulting from the construction noise. Reoccurring disturbances shall be evaluated by a qualified acoustical consultant retained by the project proponent to ensure compliance with applicable standards.

Table 16-7. Ambient and Project Construction Noise Levels at Closest Sensitive Receptors

Proposed Development Project	City/County	Noise Receptors Represented by	Exterior Noise Level, Ambient Noise	Exterior Noise Level, Project Noise	Exterior Noise Level, Increase vs. Ambient	Interior Noise Level with Project, Doors/ Windows Open (EPA)	Interior Noise Level with Project, Doors/ Windows Closed (EPA)
Oso Flaco Improvement Project	SLO County	ST-01	45 dBA L_{eq}	87 dBA L_{eq}	42 dBA L_{eq}	NA	NA
Park Corporation Yard Improvement Project	SLO County\Oceano	ST-03	55 dBA L_{eq}	87 dBA L_{eq}	31 dBA L_{eq}	72 dBA L_{eq}	62 dBA L_{eq}
Oceano Campground Infrastructure Improvement Project	SLO County\Oceano	LT-02	53 dBA L_{eq}	87 dBA L_{eq}	33 dBA L_{eq}	72 dBA L_{eq}	62 dBA L_{eq}
Pier Avenue Entrances & Lifeguard Towers Project	SLO County\Oceano	ST-02	61 dBA L_{eq}	87 dBA L_{eq}	25 dBA L_{eq}	72 dBA L_{eq}	62 dBA L_{eq}
Grand Avenue Entrances & Lifeguard Towers Project	City of Grover Beach	LT-01	58 dBA L_{eq}	87 dBA L_{eq}	29 dBA L_{eq}	NA	NA
North Beach Campground Facility Improvements Project	City of Pismo Beach	ST-06	51 dBA L_{eq}	87 dBA L_{eq}	36 dBA L_{eq}	72 dBA L_{eq}	62 dBA L_{eq}
Butterfly Grove Public Access Project	City of Grover Beach	ST-05	56 dBA L_{eq}	87 dBA L_{eq}	31 dBA L_{eq}	72 dBA L_{eq}	62 dBA L_{eq}
Pismo State Beach Boardwalk Project	SLO County\Oceano	ST-04	57 dBA L_{eq}	86 dBA L_{eq}	29 dBA L_{eq}	NA	NA
40 Acre	SLO County\Oceano	SVRA	70 dBA L_{eq}	86 dBA L_{eq}	16 dBA L_{eq}	NA	NA
Floating Bridge Installation	SLO County\Oceano	SVRA	70 dBA L_{eq}	84 dBA L_{eq}	14 dBA L_{eq}	NA	NA
Trash Enclosure	SLO County\Oceano	SVRA	70 dBA L_{eq}	86 dBA L_{eq}	16 dBA L_{eq}	NA	NA
Safety and Education Center Replacement	SLO County\Oceano	SVRA	70 dBA L_{eq}	82 dBA L_{eq}	12 dBA L_{eq}	NA	NA
Oceano Campfire Center	SLO County\Oceano	LT-02	53 dBA L_{eq}	86 dBA L_{eq}	33 dBA L_{eq}	71 dBA L_{eq}	61 dBA L_{eq}

Refer to Appendix C for modeling input parameters and output results.
dBA = A-weighted decibels
EPA = U.S. Environmental Protection Agency, minus 15 dB for doors/windows open, minus 25 dB for doors/windows closed.
L_{eq} = Equivalent Noise Level.
NA = Not Applicable, no interior use.
SVRA = State Vehicular Recreation Area (Oceano Dunes SRVA Dust Control DEIR, 2016).
Sources: Modeled by AECOM 2020

With implementation of Mitigation Measure 16-1, impacts from temporary, short-term exposure of sensitive receptors to increased equipment noise would be reduced by limiting construction to daytime hours, for which associated noise levels are considered exempt from the provisions of applicable standards; ensuring the associated equipment is properly maintained and operated only when necessary and within allowable hours; and by maximizing the distance between construction staging areas and nearby uses. The proposed project is causing increased noise due to construction in all project areas, which is an increase of 12 to 42 dB above existing ambient noise conditions, as shown in Table 16-7. However, it is not possible to demonstrate that implementing Mitigation Measure 16-1 would avoid significant construction noise impacts in every case. There is no additional feasible mitigation. Therefore, the impact is considered **significant and unavoidable.**

Mitigation Measure: Implement Mitigation Measure 16-1.

Impact 16-2. Generation of Excessive Groundborne Vibration or Groundborne Noise Levels

The movement and operation of construction equipment during construction of the Development Projects may generate temporary ground-borne vibration. The California Department of Transportation (Caltrans) has developed criteria for avoiding human annoyance and for potential structural damage to adjacent buildings. These Caltrans standards are commonly applied as an industry standard to determine the impacts of project vibration relative to human annoyance and structural damage. Caltrans determines that the vibration level of 80 VdB (0.04 inches per second (in/sec) peak particle velocity (PPV)) would be distinctly perceptible. Therefore, remaining less than 80 vibration decibels (VdB) at residential uses would avoid human annoyance. Also, Caltrans recommends staying below 0.5 inches per second (in/sec) peak particle velocity (PPV) at older residential structures to avoid structural damage to newer buildings (Caltrans 2020).

The vibration level associated with the use of a large bulldozer is 0.089 in/sec PPV (87 VdB) at 25 feet (FTA 2018). The nearest vibration-sensitive uses (buildings) to any of the Development Project construction sites are approximately 50 feet. At these distances, the most substantial vibration generated by project construction equipment would attenuate to less than 78 VdB and 0.031 in/sec PPV, less than the criteria of 80 VdB and 0.5 in/sec PPV recommended by Caltrans. The vibration generated by equipment is not anticipated to be excessive or significant. Therefore, short-term construction of the Development Projects would not expose persons to or generate excessive ground-borne noise or vibration. For these reasons, this impact would be ***less than significant***.

Mitigation Measures: No mitigation is required.

Impact 16-3. 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 proposed project activities would be located within the airport land use plan area for Oceano County Airport, but would not increase or otherwise affect the number of people exposed to noise from the project. The proposed project does not have the potential to expose people residing or working at the proposed project sites to excessive, airstrips-related noise levels because there are no private airstrips within two miles of the project sites. This impact would be ***less than significant***.

Mitigation Measures: No mitigation is required.

16.4 Cumulative Effects

Noise is a localized occurrence and attenuates rapidly with distance. Therefore, only cumulative development projects in the direct vicinity of the project site could add to anticipated project-generated stationary-source noise, thus resulting in cumulative noise impacts. Implementation of the PWP Development Projects would not occur all at the same time and would be spread out over years. Construction noise is temporary, with no associated long-term operations to add to the permanent noise environment as a cumulative impact. Therefore, this impact is **cumulatively less than significant**.