5.10 NOISE

This section of the Draft Environmental Impact Report (DEIR) discusses the fundamentals of sound; examines federal, state, and local noise guidelines, policies, and standards; reviews noise levels at existing receptor locations; and evaluates potential noise impacts associated with the proposed project. The noise calculations on which this analysis is based are included in Appendix P-of this DEIR.

5.10.1 Environmental Setting

Noise Descriptors

Noise is most often defined as unwanted sound. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness."

The following are brief definitions of terminology used in this chapter:

- **Sound.** A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale.
- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Equivalent Continuous Noise Level (L_{eq}).** The mean of the noise level, energy-averaged over the measurement period.
- **Community Noise Equivalent Level (CNEL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the levels occurring during the period from 7:00 PM to 10:00 PM and 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.

Characteristics of Sound

When an object vibrates, it radiates part of its energy as acoustical pressure in the form of a sound wave. Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). The human hearing system is not equally sensitive to sound at all frequencies. Therefore, to approximate the human, frequency-dependent response, the A-weighted filter system is used to adjust measured sound levels. The normal range of human hearing extends from approximately 0 dBA (the threshold of detection) to 140 dBA (the threshold of pain).

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale. Because of the physical characteristics of noise transmission and perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Table 5.10-1 presents the subjective effect of changes in sound pressure levels.

Table 5.10-1
Change in Apparent Loudness

± 3 dB	Threshold of human perceptibility
± 5 dB	Clearly noticeable change in noise level
± 10 dB	Half or twice as loud
± 20 dB	Much quieter or louder

Source: Bies and Hansen 1988.

Sound is generated from a source and the decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. This phenomenon is known as spreading loss or distance attenuation.

When sound is measured for distinct time intervals, the statistical distribution of the overall sound level during that period can be obtained. For example, L_{50} is the noise level that is exceeded 50 percent of the time: half the time the noise exceeds this level and half the time it is less than this level. This is also the level that is exceeded 30 minutes in an hour. Similarly, the L_{02}, L_{08}, and L_{25} values are exceeded 2, 8, and 25 percent of the time or 1, 5, and 15 minutes per hour. The energy-equivalent sound level (L_{eq}) is the most common parameter associated with community noise measurements. The L_{eq} metric is a single-number noise descriptor of the energy-average sound level over a given period of time. Other values typically noted during a noise survey are the L_{min} and L_{max}. These values are the minimum and maximum root-mean-square (RMS) noise levels obtained over the stated measurement period.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and nighttime hours, state law requires that, for planning purposes and to account for this increased receptiveness of noise, an artificial decibel increment is to be added to quiet-time noise levels to calculate the 24-hour CNEL noise metric

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. Extended periods of noise exposure above 90 dBA would result in permanent cell damage, which is the main driver for employee hearing protection regulations in the workplace. For community environments, the ambient or background noise problem is widespread, through generally worse in urban areas than in outlying, less-developed areas. Elevated ambient noise levels can result in noise interference (e.g., speech interruption/masking, sleep disturbance, disturbance of concentration) and cause annoyance. Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level (SPL) number means. To help relate noise level values to common experience, Table 5.10-2 shows typical noise levels from noise sources.

Table 5.10-2
Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at three feet		
	90	
Diesel Truck at 50 feet, at 50 mph		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime		
	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans 2009.

Vibration Descriptors

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities such as railroads or vibration-intensive stationary sources, but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. Vibration displacement is the distance that a point on a surface moves away from its original static position. The instantaneous speed that a point on a surface moves is the velocity, and the rate of change of the speed is the acceleration. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During project construction, the operation of construction equipment can cause groundborne vibration. During the operational phase of a project, receptors may be subject to levels of vibration that can cause annoyance due to noise generated from vibration of a structure or items within a structure. These types of vibration are best measured and described in terms of velocity and acceleration.

The three main types of waves associated with groundborne vibrations are surface or Rayleigh waves, compression or P-waves, and shear or S-waves.

- Surface or Rayleigh waves travel along the ground surface. They carry most of their energy along an expanding *cylindrical* wave front, similar to the ripples produced by throwing a rock into a lake. The particle motion is more or less perpendicular to the direction of propagation.

- Compression or P-waves are body waves that carry their energy along an expanding *spherical* wave front. The particle motion in these waves is longitudinal, in a push-pull motion. P-waves are analogous to airborne sound waves.

- Shear or S-waves are also body waves, carrying their energy along an expanding *spherical* wave front. Unlike P-waves, however, the particle motion is transverse, or perpendicular to the direction of propagation.

Vibration amplitudes are usually described in terms of either the peak particle velocity (PPV) or the root mean square (RMS) velocity. PPV is the maximum instantaneous peak of the vibration signal and RMS is the square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage, whereas RMS is typically more suitable for evaluating human response.

The units for PPV and RMS velocity are normally inches per second (in/sec). Often, vibration is presented and discussed in dB units in order to compress the range of numbers required to describe the vibration. In this study, all PPV and RMS velocity levels are in in/sec and all vibration levels are in dB relative to one microinch per second (abbreviated as VdB). Typically, groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration. Even the more persistent Rayleigh waves decrease relatively quickly as they move away from the source of the vibration. Man-made vibration problems are, therefore, usually confined to short distances (500 to 600 feet or less) from the source (FTA 2006).

Construction operations generally include a wide range of activities that can generate groundborne vibration. In general, blasting and demolition of structures generate the highest vibrations. Vibratory compactors or rollers, pile drivers, and pavement breakers can generate perceptible amounts of vibration at up to 200 feet. Heavy trucks can also generate groundborne vibrations, which can vary, depending on vehicle type, weight, and pavement conditions. Potholes, pavement joints, discontinuities, differential settlement of pavement, etc., all increase the vibration levels from vehicles passing over a road surface. Construction vibration is normally of greater concern than vibration from normal traffic flows on streets and freeways with smooth pavement conditions. Trains generate substantial quantities of vibration due to their engines, steel wheels, heavy loads, and wheel-rail interactions.

Noise- and Vibration-Sensitive Receptors

Certain land uses are particularly sensitive to noise and vibration. Noise- and vibration-sensitive uses include residential land uses, where quiet environments are necessary for enjoyment and public health and safety. Residential receptors are 220 feet south of the project site across Malibu Road.

Regulatory Setting

To limit population exposure to damaging or intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. Potential noise and vibration impacts were evaluated based on the City of Malibu Municipal Code and the FTA methodology to determine whether a significant adverse noise impact would result from the construction and operation of the proposed project.

State of California Noise Standards

The state of California's noise insulation standards are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, California Building Code. These noise standards are applied to new construction in California for the purpose of interior noise compatibility from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential buildings, schools, or hospitals, are located near major transportation noise sources, and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction in 45 dBA CNEL.

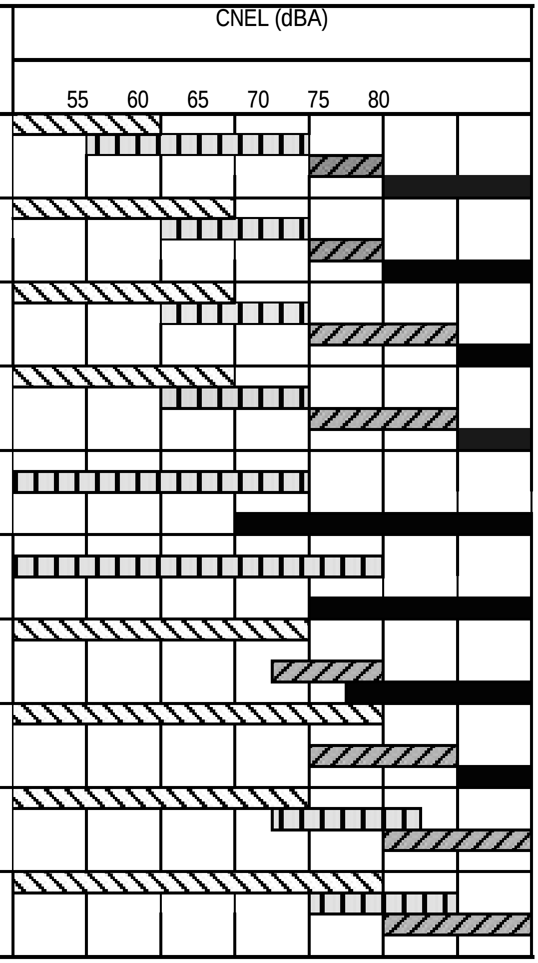
City of Malibu Noise Standards

Noise Compatibility

The City of Malibu General Plan Noise Element discusses the effects of noise exposure on the population and sets goals aimed at protecting its residents from undue noise. The general plan noise element contains noise thresholds for developments adjacent to mobile or transportation noise sources and thresholds for stationary noise sources. The City applies the state's Community Noise and Land Use Compatibility standards, summarized in Table 5.10-3, to assess the compatibility of new development with existing noise sources, such as vehicles and trains. This table identifies normally acceptable, conditionally acceptable, and clearly unacceptable noise levels for various land uses. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design. A normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements.

Table 5.10-3
Community Noise and Land Use Compatibility

Land Uses
Residential – Low Density Single-Family, Duplex, Mobile Homes
Residential – Multi-Family
Transient Lodging – Motels, Hotels
Schools, Libraries, Churches, Hospitals, Nursing Homes
Auditoriums, Concert Halls, Amphitheaters
Sports Arena, Outdoor Spectator Sports
Playgrounds, Neighborhood Parks
Golf Courses, Riding Stables, Water Recreation, Cemeteries
Office Buildings, Business Commercial and Professional
Industrial, Manufacturing, Utilities, Agricultural



Explanatory Notes

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

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

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

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

Source: City of Malibu, *Malibu General Plan*, Adopted November 1995. Adapted from the Governor's Office of Planning and Research. State of California General Plan Guidelines.

Stationary (Nontransportation) Noise

Besides land use compatibility standards, the City of Malibu General Plan Noise Element contains thresholds for stationary-source noise generated at a property resulting in a noise nuisance at other nearby noise-sensitive properties. These standards provide restrictions on the amount and duration of noise generated at a property, as measured at the property line of the noise receptor. The City's stationary-source noise policies are designed to protect people from objectionable nontransportation noise sources such as music, machinery, pumps, and air conditioners. Specifically, under the City's municipal code, section 8.24, Noise, the City prohibits the generation of unnecessary noise that interferes with the peace and comfort of persons within the City. These standards are summarized in Table 5.10-4.

Table 5.10-4
City of Malibu Nontransportation Exterior Noise Standards (L_{eq})

Receiving Land Use Category	General Plan Land Use District	Time Interval	Maximum Daytime Noise Levels (dBA)	
			L_{eq}	L_{max}
Rural	All Rural Residential, Private Recreational Facilities, Agricultural-Horticulture, Open Space	7 AM to 7 PM	55	75
		7 PM to 7 AM	50	65
		10 PM to 7 AM	40	55
Other Residential	Single-Family, Multi-Family, Beach-Front Multi-Family Zones	7 AM to 7 PM	55	75
		7 PM to 7 AM	50	65
		10 PM to 7 AM	45	60
Commercial, Institutional	Commercial Neighborhood, Community Commercial, Business Professional Office, Commercial General and Institutional	7 AM to 7 PM	65	85
		7 PM to 7 AM	60	70

Source: City of Malibu Noise Element, Maximum Exterior Noise Standards, Non-Transportation Sources.

Construction Noise

The City realizes that the control of construction noise is difficult and therefore provides exemption for this type of noise. Construction activities are subject to the provisions of the City of Malibu Municipal Code (MMC) Chapter 8.24.040, Prohibited Noises. According to this chapter, construction is permitted on weekdays between the hours of 7:00 AM and 7:00 PM and on Saturdays between the hours of 8:00 AM and 5:00 PM. Construction is not permitted on Sundays or any federal holiday unless it falls within the exemption found under MMC Chapter 8.24.060, Exemptions.

Vibration Standards

The City of Malibu does not have specific limits or thresholds for vibration. The human reaction to various levels of vibration is highly subjective. The Federal Transit Administration (FTA) provides criteria for acceptable levels of groundborne vibration for various types of land uses that are sensitive to vibration. These criteria can be separated into annoyance effects and architectural damage effects due to vibration (as discussed below).

Vibration Annoyance

Table 5.10-5 shows the FTA and Caltrans vibration criteria to evaluate vibration-related annoyance due to resonances of the structural components of a building. These criteria are based on the work of many researchers that suggested that humans are sensitive to vibration velocities in the range of 8 to 80 Hz.

Table 5.10-5
Groundborne Vibration Criteria: Human Annoyance

Land Use Category	Vibration Velocity, in/sec (RMS amplitude)[1]	Description
Workshop	0.032	Distinctly felt vibration. Appropriate to workshops and non-sensitive areas
Office	0.016	Felt vibration. Appropriate to offices and non-sensitive areas.
Residential – Daytime	0.008	Barely felt vibration. Adequate for computer equipment.
Residential – Nighttime	0.004	Vibration not felt, but groundborne noise may be audible inside quiet rooms.

Source: FTA 2006 and Caltrans 2004.
[1] As measured in 1/3-octave bands of frequency over the frequency ranges of 8 to 80 Hz.

For purposes of this study, the relevant annoyance criterion is the residential-daytime threshold (in terms of vibration velocity) of 0.008 inches per second.

Vibration-Related Architectural Damage

Structures amplify groundborne vibration, and wood-frame buildings, such as typical residential structures, are more affected by ground vibration than heavier buildings. The level at which groundborne vibration is strong enough to cause architectural damage has not been determined conclusively. The most conservative estimates are reflected in the FTA standards, shown in Table 5.10-6.

Table 5.10-6
Groundborne Vibration Criteria: Architectural Damage

Building Category	PPV (in/sec)	L_v (VdB)[1]
I. Reinforced concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Source: FTA 2006.
[1] RMS velocity calculated from vibration level (VdB) using the reference of one microinch/second and assuming a crest factor of 4.

The relevant threshold at which there is a risk of architectural damage to normal houses with plastered walls and ceilings is 0.2 in/sec (equivalent to 94 VdB RMS).

Existing Noise Environment

The 24-acre project site is currently vacant. Existing noise sources within the vicinity of the project site include noise generated at the Malibu Bluffs Park recreational area to the west of the proposed project site, which includes landscaping noise (lawnmowers, blowers, etc.), noise generated by heating, ventilation, and air conditioning

(HVAC) units, other onsite stationary noise, noise from the use of the two baseball fields and general turf field, and noise generated by the vehicle trips made by the patrons of the facilities. The primary noise sources in the area, though, are the traffic flows on Pacific Coast Highway (PCH) north of the proposed project site and, to a lesser extent, on Malibu Canyon Road.

On-Road Vehicles

Noise from motor vehicles is generated by engine vibrations, the interaction between tires and the road, aerodynamics, and the exhaust system. The general vehicle flow speed will influence the resulting noise emissions for the overall roadway. Reducing the average motor vehicle speed reduces the noise exposure of receptors adjacent to the road. For example, each reduction of five miles per hour reduces noise by about 1.3 dB. Likewise, changes in vehicle volumes will affect the roadway noise profile. Assuming free-flowing conditions, a doubling (or halving) of the total vehicle volumes on any given roadway segment will result in a +3 (or -3) dB change in the noise emissions. A +1 dB increase would require a traffic volume increase of approximate 26 percent, and a +2 dB increase would require a traffic volume increase of approximate 58 percent (all other transit factors remaining the same). Traffic flow parameters and roadway characteristics reported in the project's traffic study—conducted by Arch Beach Consulting (December 2012)[1]—were used for the noise assessment.

5.10.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would result in:

N-1 Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Based on local noise criteria as established in the City of Malibu General Plan and Municipal Code the following would be considered significant:

- Stationary noise generated by the proposed project exceeding the stationary noise standards of the City's Municipal Code of at the property line of nearby residences.
- Noise-sensitive portions of residential land uses would be exposed to exterior noise levels that exceed 65 dBA CNEL (City of Malibu land use compatibility criteria) or interior noise levels that exceed 45 dBA CNEL (California Noise Insulation Standards).

N-2 Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

Based on the Federal Transit Administration criteria, the following would be considered significant:

- Project-related activities resulting in an exceedance of the FTA vibration criteria during construction activities for human annoyance at nearest sensitive receptors.

N-3 A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

[1] Original assessments were made using information from traffic studies performed by Garland Associates in 2008.

Based on local noise criteria as established in the City of Malibu General Plan and Municipal Code the following would be considered significant:

- Project-related on-site activities increasing the CNEL at any noise-sensitive receptor by an audible amount of 3 dBA or more when the CNEL is 60 dB or greater in the vicinity of noise-sensitive land uses. A minimum 3 dB change in noise levels is necessary for human hearing to discern a change in noise levels.

N-4 A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Based on local noise criteria as established in the MMC the following would be considered significant:

- Short-term construction activities occurring outside of the hours specified (weekdays from 7:00 AM and 7 PM, Saturdays between the hours of 8:00 AM and 5:00 PM, and any time on Sundays or any federal holiday) under MMC Chapter 8.24.050(G).

N-5 For a project located within 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, expose people residing or working in the project area to excessive noise levels.

N-6 For a project within the vicinity of a private airstrip, expose people residing or working the project area to excessive noise levels.

5.10.3 Environmental Impacts

The following impact analysis addresses the above thresholds of significance. The applicable thresholds are identified in brackets after the impact statement.

Impact 5.10-1 Project-related traffic and stationary noise would not result in a substantial permanent increase in ambient noise levels in the project area. [Thresholds N-1 and N-3]

Impact Analysis: The proposed project includes construction and operation of five new residential units and an adjoining recreational facility (either a baseball field or a skateboard park) in the City of Malibu. Project-generated noise during the operations phase of the project would be from project-generated traffic (mobile-source noise) and onsite operations (stationary-source noise).

Mobile-Source Noise Generation

To evaluate noise impacts under CEQA, long-term, offsite impacts from traffic noise are measured against two criteria, both of which must be met for a significant impact to be identified:

1. Project traffic must cause a substantial noise level increase on a roadway segment adjacent to a noise-sensitive land use.

2. The future with-project noise level must exceed the compatibility criteria level for the noise-sensitive land use.

To determine if the noise increase is a significant adverse environmental effect, consideration must be given to the magnitude of the increase and the existence of noise-sensitive receptors. Since CEQA does not define the magnitude of a significant increase, other applicable sources must be referenced. In general, a noise level increase of 3 dBA is considered barely perceptible, while an increase of 5 dBA is considered clearly noticeable. An increase of 3 dBA is often used as a threshold for a substantial increase. However, residential areas adjacent to roadways in the project vicinity are projected to have future noise levels approaching or exceeding the 65 CNEL standard. Therefore, for this project, a more conservative 1 dBA traffic noise level increase due to the project is considered substantial.

In order to cause an increase of 1 dBA over existing conditions, the project would have to add approximately 25 percent of the existing traffic along roadways. According to the traffic impact analysis prepared for the project (Arch Beach 2012), the existing daily traffic volumes of PCH is approximately 29,000. Since the project would add 168 trips per day, 90 percent of which will be distributed to PCH, project-related traffic would be negligible compared to the existing traffic volumes on PCH and along other study area roadways.[2] With implementation of the proposed project, there would be negligible changes in traffic noise (i.e., less than 0.03 dB). Therefore, the project would not result in significant long-term, traffic-related noise impacts to offsite uses and no mitigation is required.

Stationary-Source Noise Generation

Stationary noise sources at the project site would include mechanical equipment at each residential lot (such as HVAC units and/or pool pump/filtration equipment) as well as sources in common areas, including the onsite wastewater treatment system (for the entire development). Also, reasonably foreseeable recreational facilities (on Lot 7) could generate notable noise.

Onsite Mechanical Equipment

Unlike industrial or commercial uses that can generate substantial noise from onsite machinery and truck trip deliveries, noise generated by residential uses are generally not considered substantial. Stationary-source noise generated by residential uses would include noise from HVAC units, residential landscaping activities (lawnmower, leaf-blower, etc.), pool pump/filtration systems, and other similar types of residential noise (i.e., voices, dogs, car starts, music, etc.). Onsite stationary-source noise generated by the five new residential units would not exceed noise levels at the recreational park facility of Malibu Bluffs. Furthermore, all new uses onsite are required to abide by Chapter 8.24 of the City's municipal code, which prohibits noise that interferes with the peace and comfort of the adjacent residential uses.

Onsite Wastewater Treatment System

Each of the proposed residences would have their own wastewater septic tank. These individual tanks would be routed by underground piping to an onsite wastewater treatment system (OWTS) Package Plant to meet the development's wastewater treatment needs. The wastewater from the gatehouse would also go to the OWTS, which is proposed to be on the northwestern corner of Lot 6 at the northwest corner of the project site, near the intersection of Winter Mesa Drive and PCH. Clean effluent from the treatment plant would be discharged to seepage pits in the southernmost portion of Lot 7 along Winter Mesa Drive (and in the southern portion of the recreational facilities).

The OWTS Package Plant would be primarily underground, but there may be relatively small mechanical equipment, such as pumps and remotely activated valves, that may generate noise in the immediate vicinity. Noise

[2] The remainder of project-related traffic would use Malibu Canyon Road.

levels from a nominal OWTS installation would be approximately 50 dBA at a distance of 10 feet.[3] The nearest potential receptor would be the project's gatehouse, which is on the order of 70 feet from the façade of the OWTS. Distance attenuation would yield expected noise levels at the gatehouse that would be below 35 dBA, which would be inaudible in comparison to noise levels from the traffic flows on the adjacent PCH. Likewise, OWTS noise emissions would be completely negligible at any existing, offsite sensitive receptors or proposed project residential locations since all these are at least 1,000 feet from the OWTS locations.

Lastly, noise levels from the OWTS would be required to comply with the City's Municipal Code, Section 8.24, Noise Ordinance. The low noise emissions ratings and the equipment's compliance with the City's Municipal Code limits would result in OWTS noise that would be an insignificant noise impact.

Recreational Facilities

Reasonably foreseeable recreational facilities on Lot 7 could either be a community skate park or another baseball/softball field to complement the two existing baseball fields at the Malibu Bluffs Park.

Baseball Fields (Optional)

The two existing baseball fields at the Malibu Bluffs Park could generate sound from game activities that may be audible at nearby receptors. Typical noises from baseball games include general spectator cheering and noise from the game itself, which includes the calls of the umpires, activity on the base paths, and when the bat makes contact with the ball. Overall, though, the primary noise source would be from cheering/yelling spectators.

As an option, a third baseball field could be constructed on the Crummer subdivision site adjacent to the Malibu Bluffs fields, which currently host Little League baseball and adult softball leagues throughout the year. Typical Little League games at Malibu Bluffs Park attract about 63 spectators, and adult league softball games have attendance of approximately 30 spectators. It is expected that the potential Crummer field would host similar activities.

The nearest noise-sensitive receptors would be the homes planned for Crummer Lots 4 and 5. The distance from the property line of Lot 4 to the home plate of the optional Crummer field would be approximately 240 feet[4] and approximately 320 feet[5] from the home plate of the (existing) eastern Malibu Bluffs field. The (existing) eastern Malibu Bluffs home plate is approximately 160 feet west of the Lot 5 property line,[6] and the optional Crummer field home plate would be a comparable 180 feet to the Lot 5 property line.[7] Distances are referenced to the home plate of each field because the majority of noise would be concentrated in that area of the baseball field. Table 5.10-7 summarizes the noise levels from the baseball activities, as predicted at the nearest two Crummer development lots.

[3] Based on a letter to the Planning Department dated March 10, 2008, regarding noise monitoring data on an AdvanTex system manufactured by Orenco Systems Inc.
[4] and approximately 275 feet to the western portion of the Lot 4 pool house.
[5] and approximately 375 feet to the western portion of the Lot 4 pool house.
[6] and approximately 420 feet to the Lot 5 guest house.
[7] and approximately 400 feet to the Lot 5 guest house.

Table 5.10-7
Noise Levels (dBA L_{eq}) at the Adjacent Residences from Baseball Fields

Source	Lot 4 Property Line (dBA Leq)	Lot 4 Pool House (dBA Leq)	Lot 5 Property Line (dBA Leq)	Lot 5 Guest House (dBA Leq)
Optional Crummer Baseball Field	46.2 at 240 feet	44.5 at 275 feet	50.0 at 180 feet	39.6 at 400 feet
Malibu Bluffs Baseball Field (East)	42.5 at 320 feet	40.4 at 375 feet	51.5 at 160 feet	38.9 at 420 feet
Combined Noise Level	47.8	45.9	53.8	42.3

Source: Based on noise monitoring of an adult league softball game at Worthy Park in Huntington Beach, California, and adjusted to account for larger crowd size at the proposed project site. See Appendix P for additional details.
Notes: Assumes 'large-capacity' Little League games at both fields.
Assumes a conservative barrier shielding benefit of 5 dB from the 6-foot-high wall at the perimeter of the Crummer ball field.

The City's nontransportation exterior noise level limit at the adjacent property line is 55 dBA L_{eq} during the hours of 7:00 AM to 7:00 PM. As shown in the table above, noise levels from games at the baseball fields are predicted to be 48 dBA L_{eq} at the property line of Lot 4 and 54 dBA L_{eq} at the property line of Lot 5. At the nearest developed facilities at these proposed properties—the pool house at Lot 4 and the guest house at Lot 5—the predicted ball field noise levels are 46 dBA and 42 dBA L_{eq}, respectively. All these results assumed a worst-case combination of two Little League games, as well as a conservative barrier attenuation effect of only 5 dB for the "home run" wall at the perimeter of the optional Crummer ball field.

The results, both at the property line and at the nearest developed facilities on these lots, show that the projected noise levels from ball field activities are below the City's exterior noise level limit for nontransportation sources. Thus, baseball field noise would not result in a significant noise impact provided that a solid home run wall (nominally taken to be 6 feet high) is included in the design of the optional Crummer ball field.

Skate Park (Optional)

Besides the third ball field option, the other reasonably foreseeable recreational facility on Lot 7 would be an optional skate park that would accommodate skateboarders, rollerbladers, and BMX bicyclists. The skate park would be approximately 12,500 square feet and would be located south of the proposed main-access private road and north of the OWTS seepage pits, all at the east end of Lot 7.

Noise from daytime use of the skate park (it would not be lighted) would be most audible at the residential receptors at proposed Lots 4 and 5 and less audible at the more distant residential areas (Lots 1, 2, and 3). Activities at the optional skate park would be intermittent and highly variable depending on the number and type of participants at the venue.

Based on numerous measurements conducted at similar skate park venues for previous, comparable projects, a reasonable estimate for noise emissions would be 64 dBA L_{eq} at a distance of 50 feet.[8] Given that the center of the skate park facility is approximately 190 feet from the Lot 4 pool house and approximately 360 feet from the Lot 5 guest house, distance attenuation would account for noise level reductions of 12 and 17 dB, respectively. The resulting contributions from skate park activities are expected to be approximately 52 dBA L_{eq} (i.e., 64 – 12 dBA) at the nearest habitable areas of Lot 4 and approximately 47 dBA L_{eq} (i.e., 64 – 17 dBA) at the nearest habitable

[8] It is estimated that noise from the play area would be considerably less than this value, so either the basketball courts or the skate park would be a worst-case source.

areas of Lot 5. Both of these results are below the City's nontransportation exterior noise level limit of 55 dBA L_{eq} during the hours between 7:00 AM to 7:00 PM. It should be noted also that these results are conservative because they neglect (a) the "soft site" ground attenuation from the envisioned turf and vegetation between the park and the residential lots and (b) the design consideration that the majority of the skate facilities would be sunken into the ground, thereby providing some shielding benefits from the effective barrier attenuation effects. Further, the traffic noise from vehicles on PCH would tend to surpass noise generated from these potential recreational facilities.

While the intermittent and variable noise from the potential skate park may, at times, be audible to nearby residential receptors, the daytime noise environment would generally be dominated by traffic noise from the surrounding roadways. No activities would take place at the optional skate park at night when traffic levels on PCH would be reduced. Consequently, noise from skate park activities would not have the potential to substantially elevate community noise levels. Also, skate park activities are conservatively projected to be well below City ordinance limits at the nearest habitable areas of the proposed residential development. Therefore, noise generated by the potential skate park facilities would be less than significant at the project site.

Impact 5.10-2	Noise levels from traffic would not result in exterior noise levels that would exceed the land use compatibility criteria for residential land uses for noise-sensitive portions of the property. [Thresholds N-1 and N-3]

Impact Analysis: The proposed project is located off of PCH, the major thoroughfare in the City of Malibu. According to the City of Malibu General Plan (1995), noise generated by traffic on PCH is considered substantial, and exterior noise levels for new construction in the vicinity of this high-volume roadway may not be compatible with the City's noise compatibility criteria for new residential construction. Based on the City of Malibu General Plan, "single-family residential uses that are within 65 dB CNEL [noise contour] are exposed to noise levels incompatible with the land uses." However, the City of Malibu applies this threshold only to noise-sensitive outdoor portions of single-family residential properties, such as active areas at an individual property (swimming pools, tennis courts, patios, etc.). Individual residential units would also be required to be designed to meet the interior noise standard of 45 dBA CNEL of the California Building Code.

To assess future, buildout noise compatibility with PCH traffic, noise modeling was conducted using SoundPlan and was based on input information from the project's traffic studies. The projected noise levels are graphically shown on Figure 5.10-1, *Future Noise Contours at Project Buildout*. This figure indicates that the far northern portions of the property adjacent to PCH (i.e., Lot 1) would have noise levels that would exceed the City's 65 dBA CNEL noise compatibility criterion. However, these portions of the lot do *not* contain noise-sensitive uses since they are outside of the property's security wall/fence and on the downslope facing PCH. Consequently, the City's noise compatibility criterion would not apply to these areas. The nearest noise-sensitive exterior areas on Lot 1 are the rear yard and swimming pool areas, which are on the south side of the lot and thus shielded from PCH traffic by the house structure. This swimming pool area would be within the 45 and 55 dBA CNEL noise contours, and therefore its placement would not result in excessive noise exposure that exceeds the City's exterior noise compatibility criteria of 65 dBA CNEL. Thus, no exterior sound reduction features (such as a higher security wall along the northern lot perimeter) are necessary to achieve the City's exterior noise standards.

The highest predicted noise levels from traffic on PCH would yield exterior noise levels at the northern façade of the Lot 1 house between 55 and 60 dBA CNEL. The proposed Lot 1 design shows that this façade is for the northern portion of the garage as well as the side entrance which leads into the service entry, the kitchen, the breakfast nook, and the family room. Because standard windows and doors in a warm-weather climate typically achieve a minimum of 24 dB reduction with windows closed (SAE 1971), noise levels inside these Lot 1 northern façade rooms would range between 31 to 36 dBA CNEL. Thus, the worst-case interior noise levels would meet the California Building Code standard of 45 dBA CNEL with standard building construction, and no architectural improvements would be required to achieve the state's interior noise standards.

The next-closest proposed house (on Lot 4) is predicted to have exterior sound levels from traffic flows on PCH at or below 50 dBA CNEL at all usable exterior portions of the property. The three other properties (Lots 2, 3, and 5) are predicted to have exterior sound levels at or below 45 dBA CNEL at all usable exterior areas. Consequently, the proposed project would not result in significant noise impacts from the exposure of noise-sensitive uses to excessive exterior or interior noise levels.

Impact 5.10-3:	Construction of the proposed project would not generate significant levels of groundborne vibration at nearby sensitive receptors and structures. [Threshold N-2]

Impact Analysis: Because the project's uses are residential and recreational, no significant sources of vibration would be present during project operations. However, construction operations can generate varying degrees of ground vibration, depending on the construction procedures and the equipment in use at any given time. Construction equipment can produce vibration from vehicles traveling over uneven surfaces as well as from grading and building activities. No pile driving, blasting, or other vibration-intensive activity would be required in the construction effort.

Construction of the Crummer Site Subdivision would occur over a period of approximately 38 months. The proposed project would involve grading of the project site and construction and operation of five new residential units. Construction of the optional recreational facility (most probably either a baseball field or a skate park) is not part of this project.

Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. Groundborne vibration is typically not perceptible outdoors, and, therefore, impacts are based on the distance to the nearest building. The effect on buildings near a construction site varies depending on soil type, ground strata, and receptor building construction. The generation of vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight damage at the highest levels. Ground vibrations from construction activities rarely reach levels that can damage structures, but can achieve the audible and perceptible ranges in buildings close to a construction site. Construction-related vibration impacts can be divided into annoyance impacts and architectural damage impacts, as discussed below.

Vibration Annoyance

Vibration is typically not perceptible in outdoor environments. Rather, vibration is typically sensed at nearby structures as a perception of movement or when objects within the structure generate noise from the vibration, such as rattling windows or picture frames.[9] Maximum vibration is based on construction equipment operating adjacent to the property line. Although the maximum vibration levels associated with certain construction activities could be perceptible in certain instances, its impact would be limited because it would not occur frequently throughout the day. That is, potential impacts would occur in the daytime when people are least sensitive to vibration levels and would only occur for a very limited duration when equipment would be working in close

[9] This is effect is often called 'groundborne noise'.

proximity. Further, construction activities are typically distributed throughout the project site. Therefore, construction vibration is based on average vibration levels (levels that would be experienced by sensitive receptors the majority of the time).

Typical heavy earthmoving equipment, such as large bulldozers (or similarly, a grader/scraper), can generate levels of up to 0.089 PPV when measured at 25 feet. Lighter earthmoving equipment, such as small bulldozers, generate reference vibration levels of 0.003 PPV at 25 feet. Since vibration dissipates rapidly with distance, these standard reference levels would dissipate to approximately 0.011 PPV for the large bulldozer and 0.000375 PPV for the small bulldozer in propagating through typical ground strata from 25 feet to 100 feet.[10] Using the same methodologies but solving for the distances to the 0.008 PPV threshold (see Table 5.10-5 above), these equipment items would need to operate at distances greater than 125 feet for the large bulldozer or 13 feet for the small bulldozer to generate below-threshold vibration levels.

Since the closest that large earthmoving equipment would potentially operate near existing, offsite residences is approximately 220 feet,[11] these heavy earthmoving activities would be expected to produce groundborne vibration levels below no higher than 0.0034 PPV (approximately 43 percent of the threshold). Likewise, the closest that smaller earthmoving equipment would potentially operate near existing, offsite residences is approximately 100 feet,[12] which would result in predicted groundborne vibration levels of 0.000375 PPV (approximately 5 percent of the threshold). See Figure 5.10-2, *Nearest Noise-Sensitive Uses*. Earthmoving activities at more distant project site locations, such as at Lot 4, would be considerably less than these results given the longer propagation distances.

Since even the closest residential receptor locations to the proposed project's work area would be expected to experience groundborne vibration levels at least half of the annoyance impact threshold, no significant vibration impact would occur during project construction activities. Therefore, project development impacts related to vibration annoyance would not require mitigation measures.

Vibration-Induced Architectural Damage

In addition to vibration-induced annoyance, project-related construction vibration was evaluated for its potential to cause architectural damage (see Table 5.10-6 above for the vibration-induced architectural damage criteria). The FTA/Caltrans threshold of 0.2 PPV in/sec is the threshold at which there is a risk of architectural damage to standard, wood-framed houses with plastered walls and ceilings. As discussed in the previous subsection on vibration annoyance, even heavy earthmoving equipment would generate less than half of the damage threshold level at a distance of 25 feet.

The nearest offsite residential structures to construction activities would be single-family residences over 100 feet away. Because vibration dissipates quickly with distance and because construction would mostly require the use of small earthmoving equipment that does not generate considerable amounts of vibration, the maximum construction-related vibration level would be well below the 0.2 PPV in/sec threshold for vibration-induced architectural damage at the nearby structures. Therefore, architectural-damage vibration impacts would be less than significant and no mitigation measures are required.

---

[10] Per vibration propagation methodologies in FTA and Caltrans impact assessment manuals (FTA 2006; Caltrans 2004).
[11] That is, the potential pool excavation and deck grading earthwork at Lot 5, just north of the existing residences on Malibu Road.
[12] That is, the potential drainage earthwork and bluff protection berms at the top of slope on Lots 2 and 5, just north of the existing residences on Malibu Road.

Future Noise Contours at Project Build-out

Noise Level Ldn in dB(A)

45 50 55 60 65 70

Site Boundary

0 500
Scale (Feet)

Basemap Source: Google Maps 2012

This page intentionally left blank.

Nearest Noise-Sensitive Uses

Source: Google Earth Pro 2012

This page intentionally left blank.

Impact 5.10-4: Construction activities would not result in a substantial short-term increase in existing noise levels at noise-sensitive receptors. [Threshold N-4]

Impact Analysis: Short-term noise impacts are associated with site preparation, and construction of the proposed land uses. Construction of the Crummer Site Subdivision project would occur over approximately 38 months. During construction, the majority of heavy construction equipment would be used during the grading phase, which is slated to last approximately three months. While the majority of this equipment would not operate directly at the property line, the surrounding residences would be exposed to construction noise during each construction phase. The nearest noise-sensitive uses would be the residences to the south and the east of the proposed project; both beyond the respective bluff edges. The following analysis describes noise levels from full buildout of the Crummer Site Subdivision.

Construction Worker Noise

The transport of workers and equipment to the construction site would incrementally increase noise levels along site access roadways. The primary access route for the construction vehicles would be Pacific Coast Highway. Although there would be a relatively high single-event noise exposure potential with passing trucks (a maximum noise level of 86 dBA at 50 feet), the expected number of workers and trucks is minimal (Caltrans 2009). Based on the construction information provided by the applicant, it is projected that construction-related activities would generate, as a worst-case, a total of 166 trips per day.[13] The existing roadway volumes along the primary access route average approximately 29,000 average daily trips per day (Arch Beach Consulting). Construction-related trips would represent increases of only 0.6 percent when compared to the current traffic volumes. This traffic increment would equate to a noise level increase of approximately 0.02 dB, well below the 3 dB increase that is the threshold for an audible increase in the ambient noise environment. In addition, truck trips would be spread throughout the work day and would primarily occur during nonpeak traffic periods. Therefore, these impacts are less than significant at noise receptors along the construction routes.

Construction Equipment Noise

Local residents would be subject to elevated noise levels due to the operation of project-related construction equipment. Construction activities are carried out in discrete steps, each of which has its own mix of equipment and its own noise characteristics. These various phases would change the character of the noise surrounding the construction site as work progresses. Construction noise levels reported in *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances* (Bolt, Beranek, and Newman 1971) were used to estimate future construction noise levels for the proposed project. Typically, the estimated construction noise levels are governed by the equipment that produces the highest noise levels. Construction noise levels for each generalized construction phase (ground clearing/demolition, excavation, foundation, construction, building construction, finishing, and site cleanup) are based on a typical construction equipment mix and do not include use of an atypical, very loud, and vibration-intensive equipment such as pile drivers.

Mass grading, site preparation, and foundation excavations at the project site would involve the heaviest and loudest pieces of construction equipment. Consequently, this portion of construction would result in some of the loudest noise levels at the existing noise-sensitive receptors near the proposed project site. Grading and excavation activities associated with infrastructure and utility improvements for the project site would occur for approximately

[13] Based on CalEEMod, Version 2011.1.1 methodology in calculating construction worker and vendor trips. The 166 trip ends per day consists of total worker trips (26) plus vendor trips (6) plus haul trips (134) during the peak period of construction work that has overlapping site grading, grading haul-offs, water main installation, and water main haul-offs.

six to seven months. Building construction phase would last for approximately 27 months. The total construction period is expected to be 37 months long, a substantial amount of time. Table 5.10-8 shows typical noise levels from each construction phase at the closest noise-sensitive areas.

Table 5.10-8
Worst-Case Construction Noise Levels at Noise-Sensitive Uses, dBA L_{eq}

Construction Phase	Offsite Northern Residences – Within 750 Feet	Offsite Southern Residences – Within 100 Feet	Offsite Eastern Residences – Within 300 Feet
Ground Clearing/Grading	54	75	64
Excavation	59	80	69
Foundation Construction	52	73	62
Building Construction	52	73	62
Finishing and Site Cleanup	59	80	69

Source: Bolt, Beranek and Newman 1976.
Note: Noise levels from construction activities do not take into account barrier attenuation provided by intervening structures or topographical shielding effects, but ground absorption effects (for soft soil and/or vegetation are included.
Worst-case scenario assumes all applicable equipment in use for each phase.

These values take into account both the number of equipment pieces and their spacing within the construction zone. Noise levels were conservatively calculated for the operation of *all* applicable construction equipment within the activity zones closest to the nearest sensitive receptors. Also for conservatism, the indicated noise levels neglect the substantial barrier attenuation benefits that would be afforded by the topographical features at the site (i.e., the receptors being well below the knee of the bluff edge). Also, noise levels during later phases, such as the building assembly period, are typically less than the tabled values since a majority of the work is inside the building shells, and the constructed structures further break line-of-sight noise propagation to offsite receptors. In general, construction noise at the northern noise-sensitive receptors would be overshadowed by traffic noise along PCH and would be mostly inaudible. Construction noise at the southern and eastern noise-sensitive receptors would be considerably reduced by the topographical shielding effects. For all receptors, though, construction noise may at times be audible and potentially annoying depending on the types of equipment in use, their location relative to any given receptor, and the operations being conducted. However, construction hours would be restricted to the allowable periods per the City of Malibu's Municipal Code. Specifically, construction activities are restricted to the hours of 7:00 AM to 7:00 PM on weekdays and between 8:00 AM and 5:00 PM on Saturdays. Construction activities are prohibited on Sundays and City observed holidays.

Although the implementation of the proposed project may result in a temporary short-term increase in ambient noise resulting from the use of construction equipment, any increase in noise levels would cease upon completion of construction. Because noise from construction activities would comply with the hours allowed by the City of Malibu and because the duration of the noisiest demolition and site preparation periods would be relatively short (limited to six to seven months), a significant noise impact would not occur during project construction. No mitigation measures would be required.

Impact 5.10-5	The project would not cause people residing or working in the area to be exposed to excessive noise levels from public airports or private airstrips. [Thresholds N-5 and N-6]

There are no public-use airports or private airstrips within two miles of the site. The project site is outside of any airport influence area and outside of any airport's 65 dBA CNEL noise contours. No impact would occur and no mitigation is required.

5.10.4 Cumulative Impacts

Mobile-Source Noise

As stated in Impact 5.10-1 above, the proposed project would generate an inconsequential change in traffic volumes and the associated noise levels on adjacent roadways. Because the project would result in a negligible increase in trips, the project would not result in an increase in traffic noise levels on roadways within the vicinity of the project site and therefore would not significantly contribute to cumulative traffic noise impacts.

Stationary-Source Noise

Unlike transportation noise sources, whose effects can potentially extend well beyond the limits of the project site, stationary-source noise generated by the project would be limited to effects at noise-sensitive receptors adjacent to the project site (approximately seven residences). Since no significant stationary noise impacts from project implementation were identified and since the MMC restricts stationary noise generated on a property from creating a nuisance to other noise-sensitive receptors, cumulative stationary-source noise generation would also be less than significant.

Construction Noise and Vibration

As with stationary-source noise, cumulative construction noise and vibration impacts are confined to a localized area of impact. No significant construction noise or vibration impacts were identified, and therefore the project would not cumulatively contribute to impacts in this regard.

5.10.5 Existing Regulations and Standard Conditions

- City of Malibu Municipal Code Chapter 8.24, *Noise*.
- Community compatibility noise standards, adopted by the City of Malibu in the General Plan Noise Element.
- Exterior noise standards (for nontransportation sources), adopted by the City of Malibu in the General Plan Noise Element.
- Interior noise standards per the California Building Code (Title 24 and Title 25, California Code of Regulations).

5.10.6 Level of Significance Before Mitigation

Upon implementation of regulatory requirements and standard conditions of approval, the following impacts would be **less than significant**: 5.10-1, 5.10-2, 5.10-3, 5.10-4, 5.10-5, and Cumulative.

- Impact 5.10-1 — The proposed project would not result in a substantial permanent increase to the ambient noise environment.
- Impact 5.10-2 — The proposed project would not result in significant exterior noise impacts that would exceed the land use compatibility criteria (for either exterior or interior noise).
- Impact 5.10-3 — Neither construction nor operation of the proposed project would result in significant vibration impacts.
- Impact 5.10-4 — Construction of the proposed project would not result in substantial short-term noise increases at noise-sensitive receptors.
- Impact 5.10-5 — The proposed project would not cause people residing or working in the area to be exposed to excessive noise levels from public airports or private airstrips
- Cumulative Impacts — The proposed project would not result in any significant cumulative impacts related to noise.

5.10.7 Mitigation Measures

No mitigation measures are necessary as no significant impacts were identified.

5.10.8 Level of Significance After Mitigation

No significant unavoidable noise impacts were identified.