Section 4.13
Noise and Vibration

4.13.1 Overview

This section describes the geographic and regulatory setting for noise, discusses noise impacts that would result from construction and operations of the proposed Alpine Park, determines the significance of impacts (where applicable), and identifies mitigation measures that would reduce or avoid significant impacts, where feasible.

~~As described in Chapter 3, *Project Description*, the study area would include the development of an approximately 25-acre active park and 1 mile of trails within 96.6 acres of undeveloped land in the unincorporated community of Alpine. The portion of the project site not developed by the active park would remain as open space/preserve.~~

The analysis in this section includes impact determinations under CEQA for the proposed Alpine Park based on the applicable County thresholds. Where impacts have been identified, mitigation measures have been identified to reduce impact to less than significant (where applicable). Mitigation measures will be included as part of the project.

4.13.2 Noise and Vibration Fundamentals

4.13.2.1 Environmental Noise

Noise is commonly defined as unwanted sound. Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is often defined as sound that is objectionable because it is disturbing or annoying.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receptor, and the propagation path between the two. The loudness of the noise source and the obstructions or atmospheric factors, which affect the propagation path to the receptor, determine the sound level and the characteristics of the noise perceived by the receptor.

Decibels and Frequency

Continuous sound can be described by *frequency* (pitch) and *amplitude* (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz, or thousands of Hz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

The amplitude of pressure waves generated by a sound source determines the loudness of that source. The amplitude of a sound is typically described in terms of *sound pressure level*, which refers to the root-mean-square pressure of a sound wave and can be measured in units called microPascals (μPa). One μPa is approximately ~~one~~ one hundred-billionth (0.00000000001) of normal atmospheric pressure. Sound pressure levels for different kinds of noise environments can range from less than 100 to over 100,000,000 μPa. Because of this large range of values, sound is rarely expressed in terms of μPa. Instead, a logarithmic scale is used to describe the sound pressure level (also referred to simply as the sound level~~), expressed~~) in terms of decibels~~ and~~, abbreviated ~~as~~ ~~“~~dB~~.”~~. Specifically, the decibel describes the ratio of the actual sound pressure to a reference pressure and is calculated as follows:

$$SPL = 20 \times \log_{10}\left(\frac{X}{20\,\mu Pa}\right)$$

where X is the actual sound pressure and 20 μPa is the standard reference pressure level for acoustical measurements in air. The threshold of hearing for young people is about 0 dB, which corresponds to 20 μPa.

Decibel Addition

Because decibels are logarithmic, sound pressure levels cannot be added or subtracted through ordinary arithmetic. On the dB scale, a doubling of sound energy corresponds to a 3 dB increase. In other words, when two identical sources are each producing sound of the same loudness, their combined sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one~~ soil~~ excavator produces a sound pressure level of 80 dB, two excavators would not produce 160 dB. Rather, they would combine to produce 83 dB. The cumulative sound level of any number of sources can be determined using decibel addition. The same decibel addition is used for A-weighted decibels described below.

Perception of Noise and A-Weighting

The dB scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the sound pressure level in that range. In general, people are most sensitive to the frequency range of 1,000 to 8,000 Hz and perceive sounds within that range better than sounds of the same amplitude at higher or lower frequencies. To approximate the response of the human ear, sound levels in various frequency bands are adjusted (or “weighted”), depending on human sensitivity to those frequencies. The resulting sound pressure level is expressed in A-weighted decibels, abbreviated dBA. When people make judgments regarding the relative loudness or annoyance of a sound, their judgments correlate well with the A-weighted sound levels of those sounds. Table 4.13-1 describes typical A-weighted sound levels for various noise sources.

Human Response to Noise

Noise-sensitive receptors (also called “receivers”) are locations where people reside or where the presence of unwanted sound may adversely affect the use of the land~~ (e.g, a library) .~~. The effects of noise on people can be listed in three general categories~~.~~:

- Subjective effects of annoyance, nuisance, or dissatisfaction,

- Interference with activities such as speech, sleep, learning, or working, and
- Physiological effects such as startling and hearing loss.

In most cases, effects from sounds typically found in the natural environment (compared to an industrial or an occupational setting) would be limited to the first two categories: creating an annoyance or interfering with activities. (Further discussion of health-related effects is provided below.) No completely satisfactory method exists to measure the subjective effects of sound or the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard arises primarily from the wide variation in individual thresholds of annoyance and habituation to sound. Therefore, an important way of determining a person's subjective reaction to a new sound is by comparing it to the existing baseline or "ambient" environment to which that person has adapted. In general, the more the level or tonal (frequency) variations of a sound exceed the previously existing ambient sound level or tonal quality, the less acceptable the new sound will be, as judged by the exposed individual.

Studies have shown that under controlled conditions in an acoustics laboratory, a healthy human ear is able to discern changes in sound levels of 1 dBA. In the normal environment, the healthy human ear can detect changes of about 2 dBA; however, it is widely accepted that a doubling of sound energy, which results in a change of 3 dBA in the normal environment, is considered just noticeable to most people. A change of 5 dBA is readily perceptible, and a change of 10 dBA is perceived as being twice as loud. Accordingly, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) resulting in a 3 dBA increase in sound would generally be barely detectable.

Table 4.13-1. Typical Noise Levels in the Environment

Common Outdoor Noise Source	Sound Level (dBA)	Common Indoor Noise Source
	— 110 —	Rock band
Jet flying at 1,000 feet		
	— 100 —	
Gas lawn mower at 3 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		
Gas lawn mower at 100 feet	— 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 in next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night
	— 20 —	
		Broadcast/recording studio
	— 10 —	

Common Outdoor Noise Source	Sound Level (dBA)	Common Indoor Noise Source
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: California Department of Transportation 2013.

Noise Descriptors

Because sound levels can vary markedly over a short period of time, various descriptors or noise “metrics” have been developed to quantify environmental and community noise. These metrics generally describe either the average character of the noise or the statistical behavior of the variations in the noise level. The most common of these metrics are described below.

Equivalent Sound Level (L_{eq}) is the most common metric used to describe short-term average noise levels. Many noise sources produce levels that fluctuate over time; examples include mechanical equipment that cycles on and off or construction work, which can vary sporadically. The L_{eq} describes the average acoustical energy content of noise for an identified period of time, commonly 1 hour. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustical energy over the duration of the exposure. For many noise sources, the L_{eq} will vary, depending on the time of day. A prime example is traffic noise, which rises and falls, depending on the amount of traffic on a given street or freeway.

Maximum Sound Level (L_{max}) and **Minimum Sound Level (L_{min})** refer to the maximum and minimum sound levels, respectively, that occur during the noise measurement period. More specifically, they describe the root-mean-square sound levels that correspond to the loudest and quietest 1-second intervals that occur during the measurement.

Percentile-Exceeded Sound Level (L_{xx}) describes the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10% of the time, and L_{90} is the sound level exceeded 90% of the time)

Community Noise Equivalent Level (CNEL) is a measure of the cumulative 24-hour noise level that considers not only the variation of the A-weighted noise level but also the duration and the time of day of the disturbance. The CNEL is derived from the 24 A-weighted 1-hour L_{eq}s that occur in a day, with “penalties” applied to the level occurring during the evening hours (7 p.m. to 10 p.m.) and nighttime hours (10 p.m. to 7 a.m.) to account for increased noise sensitivity during these hours. Specifically, the CNEL is calculated by adding 5 dBA to the evening L_{eq}, adding 10 dBA to the nighttime L_{eq}, and then taking the average value for all 24 hours.

Day-Night Average Sound Level (L_{dn}) is a measure of the cumulative 24-hour noise that is very similar to CNEL (described above); the only difference is that L_{dn} does not apply a “penalty” to evening noise levels. The L_{dn} is derived from the 24 A-weighted 1-hour L_{eq}s that occur in a day. A 5 dBA “penalty” is added to the levels occurring during the nighttime hours (10 p.m. to 7 a.m.) and then the average is calculated for all 24 hours.

Sound Propagation

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

Geometric Spreading. Sound from a single source (i.e., a *point source*) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of 6 dBA for each doubling of distance. Highway noise is not a single stationary point source of sound. The movement of vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a *line source*) rather than from a point. This results in cylindrical spreading rather than the spherical spreading resulting from a point source. The change in sound level (i.e., attenuation) from a line source is 3 dBA per doubling of distance.

Ground Absorption. Usually the noise path between the source and the observer is very close to the ground. The excess noise attenuation from ground absorption occurs due to acoustic energy losses on sound wave reflection. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is done for simplification only; for distances of less than 200 feet, prediction results based on this scheme are sufficiently accurate. For acoustically “hard” sites (i.e., sites with a reflective surface, such as a parking lot or a smooth body of water, between the source and the receptor), no excess ground attenuation is assumed because the sound wave is reflected without energy losses. For acoustically absorptive or “soft” sites (i.e., sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source and 7.5 dBA per doubling of distance for a point source.

Atmospheric Effects. Research by the California Department of Transportation (Caltrans) (2013) and others has shown that atmospheric conditions can have a major effect on noise levels. Wind has been shown to be the single most important meteorological factor within approximately 500 feet, whereas vertical air temperature gradients are more important over longer distances. Other factors, such as air temperature, humidity, and turbulence, also have major effects. Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lower noise levels. Increased sound levels can also occur because of temperature inversion conditions (i.e., increasing temperature with elevation, with cooler air near the surface, where the sound source tends to be, and the warmer air above that acts as a cap, causing a reflection of ground level–generated sound).

Shielding by Natural or Human-Made Features. A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by this shielding depends on the size of the object, proximity to the noise source and receptor, surface weight, solidity, and the frequency content of the noise source. Natural terrain features (such as hills and dense woods) and human-made features (such as buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receptor with the specific purpose of reducing noise. A barrier that breaks the line of sight between a source and a receptor will typically result in at least 5 dB of noise reduction. A higher barrier may provide as much as 20 dB of noise reduction.

4.13.2.2 Environmental Vibration

Ground-borne vibration is an oscillatory motion of the soil with respect to the equilibrium position and can be quantified in terms of *velocity* or *acceleration*. The velocity describes the instantaneous speed of the motion and acceleration is the instantaneous rate of change of the speed. Each of these measures can be further described in terms of *frequency* and *amplitude*.

In contrast to airborne sound, ground-borne vibration is not a phenomenon that most people experience every day. The background vibration velocity level in residential areas is usually much lower than the threshold of human perception. Most perceptible indoor vibration is caused by sources within buildings, such as mechanical equipment while in operation, people moving, or doors slamming. Typical outdoor sources of perceptible ground-borne vibration are heavy construction equipment (such as blasting and pile driving), railroad operations, and heavy trucks on rough roads. If a roadway is smooth, the ground-borne vibration from traffic is rarely perceptible. Ground-borne vibration can be a serious concern for neighbors of nearby sources, causing buildings to shake and rumbling sounds to be heard. If a person is engaged in any type of physical activity, vibration tolerance increases considerably. Vibration can result in effects that range from annoyance to structural damage. Variations in geology and distance result in different vibration levels with different frequencies and amplitudes.

Vibration Descriptors

Various descriptors, or "metrics," can be used to quantify ground-borne vibration. The metrics used in the assessment of environmental impacts are generally focused on the short-term maximum vibration levels. The two metrics considered in this study are described below.

Peak particle velocity (PPV) is defined as the maximum instantaneous positive or negative peak amplitude of the vibration velocity. The unit of measurement for PPV is inches per second (in/s).

Vibration velocity level (L_v) describes the root-mean-square (rms) velocity amplitude of the vibration. This rms value may be thought of as a "smoothed" or "magnitude-averaged" amplitude. The maximum L_v describes the maximum rms velocity amplitude that occurs over a 1-second period during a vibration measurement (in this way, L_v is analogous to the L_{max} metric used to describe maximum noise levels). L_v can be measured in in/s but is typically expressed on a logarithmic scale using decibels. To avoid confusion with decibels used to describe sound levels, the abbreviation "VdB" is used to denote vibration velocity level decibels. Specifically, a vibration velocity level (L_v), in decibels (VdB), is calculated as follows:

$$L_V = 20 \log_{10}\left(\frac{V}{1\times10^{-6}\, in./s}\right),$$

where V is the actual 1-second rms velocity amplitude and 1×10^{-6} in/s is the standard reference velocity amplitude.

4.13.3 Existing Conditions

The existing noise-sensitive receivers in the vicinity of the project consist of low-density single-family residential uses and undeveloped land uses surrounding the project site. Residential properties to the north are immediately adjacent to the project site and to the east and south are separated by South Grade Road. Single-family residences to the west are separated from the project site by undeveloped land.

The existing noise environment in the project vicinity is generally quiet. The primary sources of noise are traffic on South Grade Road. Other noise sources in the project are birds and landscaping activity.

In order to document existing noise levels in the study area, three short-term (ST) measurements and two long-term (LT) measurements were obtained in the project vicinity (see Figure 4.13-1~~)~~)

between Friday, March 27, and Tuesday, March 31, 2020.[1] These locations were selected to document the existing noise levels at the closest noise-sensitive receptors to the north, east, south, and west. Each short-term measurement was conducted over a period of at least 15 to 30 minutes. The long-term measurements were conducted over a period of approximately 96 hours.

The instrumentation used to obtain the noise measurements consisted of a Type 1 Larson Davis (Model Lxt) integrating sound level meter (SLM) for short-term noise measurements, two Type 2 Picc~~i~~olo II integrating SLMs for long-term noise measurements, and a Larson Davis (Model CAL200) acoustical calibrator used to field-calibrate all SLMs before and after each measurement for accuracy. The instruments are maintained to manufacturer specifications to ensure accuracy, in accordance with American National Standards Institute (ANSI) standard S1.4-2006. For all measurements, the SLM microphone was mounted at a height of 5 feet above the ground.

Short-term noise measurements (ST1 through ST3) indicate that the ambient measured noise levels were generally in the range of 46 to 51 dBA L_{eq} at land uses surrounding the project site. Long-term noise measurements indicated that daytime ambient noise levels (7:00 a.m. to 10:00 p.m.) range from 49 to 64 dBA L_{eq} and 52 to 65 dBA L_{eq} at measurement sites LT1 and LT2. Nighttime ambient noise levels were generally in the range of 33 to 56 dBA L_{eq} and 39 to 57 dBA L_{eq} at land uses surrounding the project site (LT1 and LT2). Additional details and a summary of the measurement results are provided in Table 4.13-2. Field photos and field noise survey sheets are included in Appendix G of ~~this~~the Draft EIR.

Table 4.13-2. Measured Existing Noise Levels in the Study Area

	Weekday Hourly L_{eq}, dBA		Weekend Hourly L_{eq}, dBA	
Location Number, Description (time, date)	Daytime	Nighttime	Daytime	Nighttime
ST1, 2501 Engelman Oak Ln (9:45 a.m.; 3/31/2020)	47	N/A	N/A	N/A
ST2, 2620 Via Viegas (10:48 a.m.; 3/31/2020)	51	N/A	N/A	N/A
ST3, Park North of S Grade Rd (11:48 a.m. 3/31/2020)	46	N/A	N/A	N/A
LT1,[1] Park near S. Grade Rd and Calle de Campadres (11:00 a.m.; 3/27/20–3/31/20)	54–64	33–56	49–64	36–55
LT2,[1] 2387 S. Grade Rd (11:00 a.m. 3/27/20–3/31/20)	53–65	39–57	52–61	42–56

[1] Appendix G shows the long-term measurement ranges in further detail.
Notes: Daytime = 7 a.m. to 10 p.m.; Nighttime = 10 p.m. to 7 a.m.; N/A = no measurement was obtained at the corresponding location and timeframe.

[1] Field measurements were taken during the beginning of the stay-at-home orders associated with the COVID-19 outbreak. Therefore, noise levels may be artificially lower than normal.

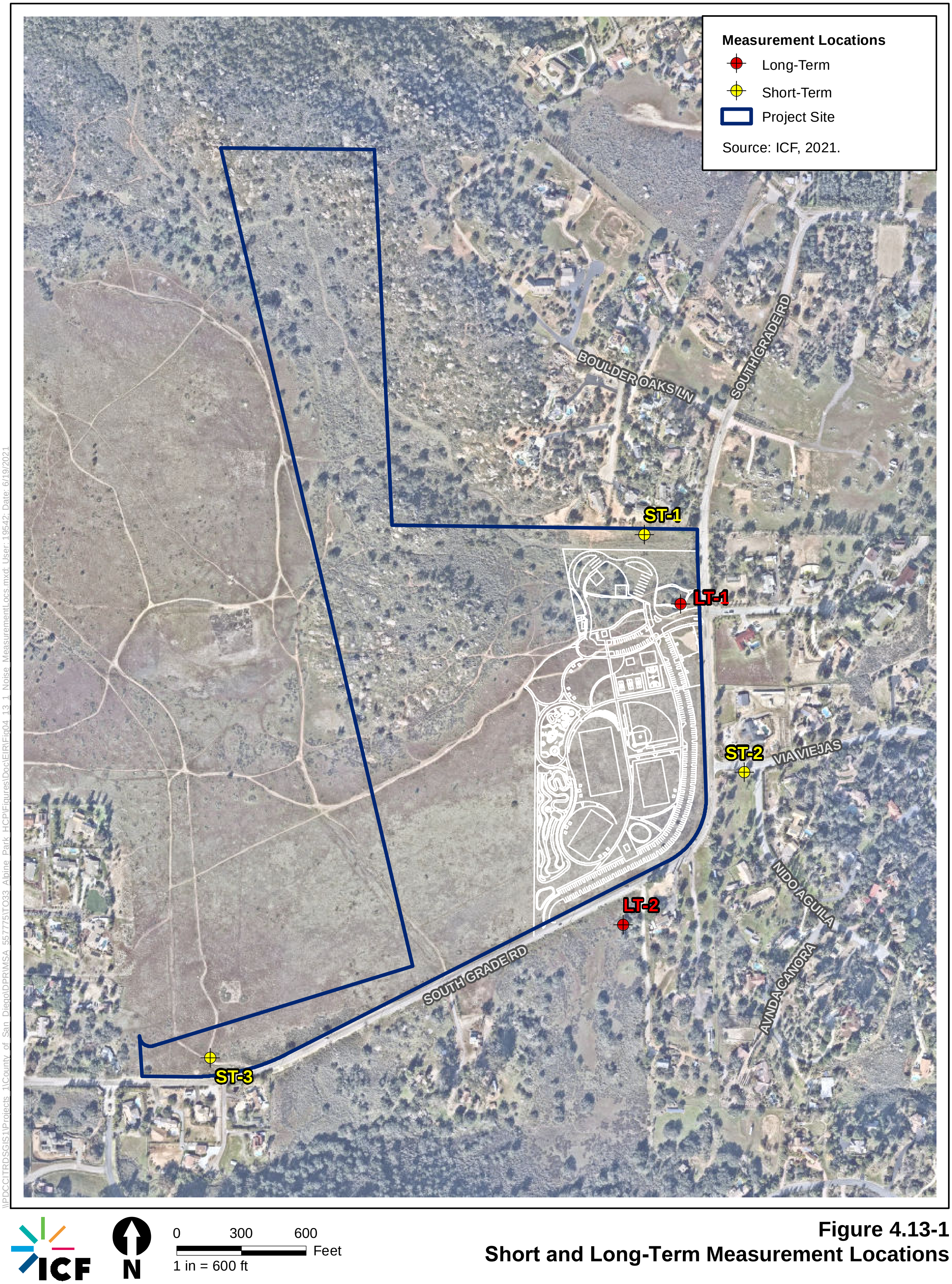


Figure 4.13-1
Short and Long-Term Measurement Locations

4.13.4 Applicable Laws and Regulations

4.13.4.1 State

California requires each local government entity to perform noise studies and implement a noise element as part of its general plan. The purpose of the noise element is to limit the exposure of the community to excessive noise levels; the noise element must be used to guide decisions concerning land use. The County of San Diego General Plan is discussed below.

4.13.4.2 Local

County of San Diego

The County ~~of San Diego~~ maintains applicable noise and vibration impact thresholds of significance in its document *County of San Diego, Guidelines for Determining Significance, Noise* (County of San Diego 2009). These guidelines define ~~a~~ noise-sensitive land uses as "[a]ny residence, hospital, school, hotel, resort, library, or similar facility where quiet is an important attribute of the environment" and summarize standards from various sources to address the various types of impact that could potentially occur with implementation of a given project. The sources of the noise and vibration thresholds include the County's Noise Ordinance and Noise Element of the General Plan Division, and the U.S Department of Transportation, Federal Transit Administration (FTA). Each of the thresholds that are applicable to the project are described in further detail, below.

Noise-Sensitive Land Uses Affected by Airborne Noise

For the potential impact of airborne noise on noise-sensitive land uses, the thresholds are based largely on the County's Noise Element and state that a significant impact will occur if project implementation will result in the exposure of any on- or offsite, existing or reasonably foreseeable future noise-sensitive land uses to exterior or interior noise in excess of any of the following:

A. Exterior Locations:

   i. 60 dB (CNEL); or

   ii. An increase of 10 dB (CNEL) over pre-existing noise.

B. Interior Locations:

   45 dB (CNEL) except for the following cases:

   i. Rooms which are usually occupied only a part of the day (schools, libraries, or similar facilities), the interior one-hour average sound level due to noise outside should not exceed 50 decibels (A).

   ii. Corridors, hallways, stairwells, closets, bathrooms, or any room with a volume less than 490 cubic feet.

Project-Generated Airborne Noise

For the potential impact of project-generated noise on surrounding noise-sensitive land uses, the thresholds are based on the County's Noise Ordinance, which provides separate noise standards for construction and non-construction activities, as discussed below.

Construction Noise

A significant noise impact will occur if noise generated by construction activities related to the project will exceed the limit specified in San Diego County Code Section 36.409, *Sound Level Limitations on Construction Equipment*. Section 36.409 states that "[e]xcept for emergency work, it shall be unlawful for any person to operate construction equipment or cause construction equipment to be operated, that exceeds an average sound level of 75 decibels for an eight-hour period, between 7 a.m. and 7 p.m., when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is being received."

Non-Construction Noise

A significant noise impact will occur if noise generated by operational activities related to the project will exceed the limit specified in San Diego County Code Section 36.404, *General Sound Level Limits*, at the property line of the property on which the noise is produced or at any location on a property that is receiving the noise. Section 36.404 provides the limits shown in Table 4.13-3.

Table 4.13-3. San Diego County Code Section 36.404 Noise Limits

Zone	Time	One-Hour Average (L_{eq}) Sound Level Limits, dBA [1,2]
(1) ~~R-S, R-D, R-R, R-MH, A-70, A-72, S-80, S-81, S-87, S-90, S-92~~RS, RD, RR, RMH, A70, A72, S80, S81, S87, S90, S92 and ~~R-V~~RV and ~~R-U~~RU with a density of less than ~~11~~10.9 dwelling units per acre.	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	50 45
(2) ~~R-RO, R-C, R-M, S-86,~~ RRO, RC, RM, S86, FB-V5 and ~~R-V~~RV and ~~R-U~~RU with a density of ~~11~~10.9 or more dwelling units per acre.	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	55 50
(3) ~~S-94,~~ S94, FB-V4, AL-V2, AL-V1, AL-CD, RM-V5, RM-V4, RM-V3, RM-CD and all other commercial zones.	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	60 55
(4) FB-V1, FB-V2, RM-V1, RM-V2	7 a.m. to 7 p.m.	60
	7 p.m. to 10 p.m.	55
FB-V1, RM-V2	10 p.m. to 7 a.m.	55
FB-V2, RM-V1	10 p.m. to 7 a.m.	50
FB-V3	7 a.m. to 10 p.m.	70
	10 p.m. to 7 a.m.	65
(5) ~~M-50, M-52~~M50, M52 and ~~M-54~~M54	Anytime	70
(6) ~~S-82, M-56~~S82, M56 and ~~M-58~~M58	Anytime	75

[1] If the measured ambient level exceeds the applicable limit noted above, the allowable one-hour average sound level shall be the ambient noise level, plus three decibels.

[2] The sound level limit at a location on a boundary between two zones is the arithmetic mean of the respective limits for the two zones; provided however, that the one-hour average sound level limit applicable to extractive industries,

including but not limited to borrow pits and mines, shall be 75 decibels at the property line regardless of the zone which the extractive industry is actually located.

It is noted that the zoning of the project site and the surrounding uses is a mix of ~~S-80 (open space), R-R (rural residential),~~S80, *Open Space*, RR, *Rural Residential*, and ~~A-70 (limited agricultural use),~~A70, *Limited Agricultural Use*, which all fall under Zone 1. Therefore, the applicable base sound level limits (before any corrections for ambient noise levels) are 50 dBA L_{eq} between 7 a.m. and 10 p.m. and 45 dBA L_{eq} between 10 p.m. and 7 p.m. However, as noted in the table, the limits would be increased where existing daytime ambient noise levels exceed 50 dBA or existing nighttime ambient noise levels exceed 45 dBA.

Groundborne Vibration

A significant vibration impact will occur if vibration generated by construction or operational activities related to the project will exceed limits specified by the County in the *County of San Diego Guidelines for Determining Significance for Noise* (County of San Diego 2009) or in the FTA guidelines *Transit Noise and Vibration Impact Assessment* (FTA 2018) at noise-sensitive land uses or other vibration-sensitive uses (such as certain research and manufacturing facilities). This includes new development which creates or locates noise-sensitive land uses or other vibration-sensitive uses in a location where they would be impacted by groundborne vibration and noise (such as developing a new residential project close to a railroad). The manual provides guidance for two types of potential impact: (1) damage to structures and (2) annoyance to people. Guideline criteria for each are provided in Tables 4.13-4 and 4.13-5. It is noted that potential building damage is assessed using PPV, whereas potential annoyance is assessed using L_v.

Table 4.13-4. FTA Guideline Vibration Damage Criteria

Building Category (Structure and Condition)	PPV, in/s
I. Reinforced-concrete, steel, or timber buildings (no plaster)	0.5
II. Engineered concrete and masonry buildings (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings that are extremely susceptible to vibration damage	0.12

Source: FTA 2018

Table 4.13-5. FTA Guideline Vibration Annoyance Criteria

	Ground-borne Vibration Level, L_v		
Land Use Category	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations	65 VdB[4]	65 VdB[4]	65 VdB[4]
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB

Source: FTA 2018.
[1] "Frequent Events" is defined as more than 70 vibration events from the same source per day.
[2] "Occasional Events" is defined as between 30 and 70 vibration events from the same source per day.
[3] "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day.
[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes.

Accurate calculation of groundborne noise is a complex process typically reserved for assessing long-term impacts from rail projects. For the purposes of analyzing the project, it is assumed that compliance with the groundborne vibration thresholds would also achieve compliance with the groundborne noise thresholds. Because the vibration sources during construction, such as graders and bulldozers, would operate continuously for extended periods of time, the applicable vibration thresholds would be those for *frequent events*.

4.13.5 Project Impact Analysis

4.13.5.1 Methodology

Construction Noise and Vibration

The evaluation of potential noise and vibration impacts associated with project construction was based on the construction equipment schedule and phasing assumptions developed by ~~the~~ County DPR, along with the methods described below.

Noise

Construction-related noise was analyzed using data and modeling methodologies from the Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) (FHWA 2008), which predicts noise levels at nearby receptors by analyzing the type of equipment, the distance from source to receptor, usage factor, and the presence or absence of intervening shielding between source and receptor. For the proposes of this analysis it is assumed that the calculated noise level would be equivalent to the 8-hour L_{eq}. RCNM is a comprehensive construction noise model developed and published by the federal government. Although the project is not specifically a roadway construction project, the model is broad enough to be applicable, providing noise data for all of the equipment types typically required during conventional construction. Therefore, it is considered appropriate for use in analyzing the project.

Project construction would be broken down into phases. Given the size of the proposed site, and in order to provide a conservative analysis, it was assumed that all phases of onsite construction could occur simultaneously with construction activity spread across the whole 25-acre site. To reflect the assumed distribution of equipment across the site, source-to-receptor distances used in the analysis were the acoustical average distances between the construction site and each receptor.[2] It should be noted that the RCNM program uses a hard site ground type, which conservatively applies that noise would decrease at a rate of 6 dB per doubling of distance, which is the default in the RCNM program.

Vibration

Construction-related vibration was analyzed using data and modeling methodologies provided by the FTA guidance manual (FTA 2018), as required by the County of San Diego ~~CEQA guidelines.~~Guidelines for Determining Significance. Although the project is not a transit project, the

[2] The acoustical average distance is used to represent noise sources that are mobile or distributed over an area (such as the project site); it is calculated by multiplying the shortest distance between the receiver and the noise source area by the farthest distance and then taking the square root of the product.

model provides vibration data for all of the equipment types typically required during conventional construction as well as methods for estimating the propagation of ground-borne vibration over distance. Therefore, it is considered appropriate for use in analyzing the project. Because vibration is of concern at structures, as opposed to areas of outdoor use, the distances used in the analysis are the closest distances from the construction areas to the nearest buildings.

The following equation from the guidance manual was used to estimate PPV for the assessment of potential building damage impacts:

$$PPV_{rec} = PPV_{ref} \times (25/D)^{1.5}$$

where PPV_{rec} is the PPV at a receptor; PPV_{ref} is the reference PPV at 25 feet from the equipment; D is the distance from the equipment to the receiver, in feet; and 1.5 is a default value related to the vibration attenuation rate through the ground.

The following equation from the guidance manual was used to estimate L_v for the assessment of potential annoyance to people:

$$L_{v,rec} = L_{v,ref} - 30 \times \log(D/25)$$

where $L_{v,rec}$ is the L_v at a receptor; $L_{v,ref}$ is the reference L_v at 25 feet from the equipment; and D is the distance from the equipment to the receiver, in feet.

The project would not require high-impact construction methods, such as pile driving or blasting. Therefore, the highest ground-borne vibration levels would be associated with conventional heavy construction equipment such as bulldozers, excavators, and backhoes. FTA provides vibration source data for this type of equipment of 0.089 in/s PPV at a reference distance of 25 feet. FTA also sets vibration thresholds for damage of 0.2 in/s PPV and 0.12 in/s PPV for non-engineered timber and masonry buildings and buildings that are extremely susceptible to vibration, respectively.

Operational Noise

The analysis of traffic noise in the study area was based on data from the Transportation Impact Analysis (TIA) for the project (Chen Ryan 2020). The analysis was conducted using a proprietary traffic noise model, with calculations based on data from the FHWA Traffic Noise Model, Version 2.5, Look-Up Tables (FHWA 2004). The inputs used in the traffic noise modeling included average daily traffic (ADT) volumes, assumed traffic mix and daily distribution (the percentage of automobiles versus medium trucks and heavy trucks during each hour of the day), and traffic speeds based on the posted speed limits. The traffic mix assumed was a generic traffic mix (98.4% automobiles, 0.9% medium trucks, and 0.7% heavy trucks), which is representative of a typical local road. To quantify the effects of the project, traffic noise was analyzed at a reference distance of 50 feet from the roadway centerline using different scenarios: (1) existing, (2) existing with project, (3) near-term future, and (4) near-term future with project.

Noise from onsite operations was analyzed using field measurements of similar type of events, specifically soccer fields (Wieland Acoustics 2009) and skate parks activities presented in Table 4.13-6 and 4.13-7. Soccer fields were measured at two locations, in San Diego and Costa Mesa and included a varying number of spectators, players, and referees (from 50 to 115). It should be noted that the project would not include organized sports, so the noise analysis for soccer fields is considered conservative as the project ~~activity~~ would not conceivably include referees, officials, or a significant number of spectators. Skate parks were measured at two ~~existing~~ locations~~,~~ in Lake Forest and Ladera Ranch~~,~~ in Orange County.

Table 4.13-6. Measured Noise Levels at Soccer Fields

Noise Source	Measured Average (L_{eq}) Noise Level	Acoustical Average Distance[3]
Soccer game[1]	59.9 dBA	115 feet
Soccer game[2]	52.5 dBA	190 feet

[1] Measured at Crusaders Youth Soccer games, Dailard Elementary Joint Use Park, San Diego. Total number of attendees (players on and off the field, referees, other officials, and spectators) varied from approximately 50 to 115 people.
[2] Wieland Acoustics 2009. Little League soccer game, Jack R. Hammett Sports Complex (formerly "The Farm"), Costa Mesa, CA. There were 11 players per team with approximately 35 spectators and a referee and other officials.
[3] The acoustical average distance is used to represent noise sources that are mobile or distributed over an area. It is calculated by multiplying the shortest distance between the receptor and construction area boundary by the farthest distance and then taking the square root of the product.

Table 4.13-7. Measured Noise Levels at Skate Parks

Noise Source	Measured Average (L_{eq}) Noise Level	Acoustical Average Distance[3]
Skate Park (Lake Forest)[1, 4]	66.5 dBA	60 feet
Skate Park (Ladera Ranch)[2]	59.6 dBA	90 feet

[1] Source: ICF 2021.
[1] Measured at Etnies Skate Park, Lake Forest, CA. Maximum number of skaters = 15.
[2] Measured at Ladera Ranch Skate Park, Ladera Ranch, CA. Maximum number of skaters = 5.
[3] The acoustical average distance is used to represent noise sources that are mobile or distributed over an area; it is calculated by multiplying the shortest distance between the receptor and construction area boundary by the farthest distance and then taking the square root of the product.
[4] It should be noted that the Etnies skate park included amplified music, which set the baseline of the noise measurement. Amplified music from the speaker was measured at approximately 57 dBA L_{eq}, approximately 10 dB below the measured noise from active skaters. The amplified music was measured while skating activity was absent. Other noise sources present during this time were automobiles passing along State Route 241. Noise measured as the baseline was 10 dB below the measured skating activity and is considered negligible.

Other land uses that would be included as part of the project, including the dog park, basketball and pickleball courts, the bike ~~park~~skills area, and baseball fields~~,~~ were analyzed using default information included in SoundPlan acoustical software. The SoundPlan modeling platform was used to model the operational noise from the noise sources referenced as well as accurately model the surrounding land uses and any intervening topography, including the proposed berm.

4.13.5.2 Thresholds of Significance

Appendix G of the ~~State~~ CEQA Guidelines

The following significance criteria are based on Appendix G of the ~~State~~ CEQA Guidelines Significance Determination Thresholds and provide the basis for determining significance of impacts associated with noise and vibration resulting from the project. The determination of whether a noise impact would be significant is based on the applicable noise thresholds and the professional judgment of qualified personnel at ICF and based wholly on the substantial evidence in the administrative record.

Impacts are considered significant if the project would result in any of the following:

1. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
2. Generation of excessive groundborne vibration or groundborne noise levels.
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.

County of San Diego Guidelines for Determining Significance

The CEQA thresholds provided by the *County of San Diego Guidelines for Determining Significance for Noise* (County of San Diego 2009) state that a significant impact would occur if project implementation would result in the exposure of any on- or offsite existing or reasonably foreseeable future noise-sensitive land use to exterior or interior noise in excess of any of the following:

1. A construction noise level that exceeds an average sound level of 75 dB for an 8-hour period, between 7 a.m. and 7 p.m., when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is being received, or
2. Operational noise levels that exceed
    a. Exterior Locations:
        1) 60 dB community noise equivalent level (CNEL)
        2) An increase of 10 dB (CNEL) over pre-existing noise
    b. Interior Locations:
        1) 45 dB (CNEL) except for the following cases:
            a) For rooms that are usually occupied only a part of the day (schools, libraries, or similar facilities), the interior 1-hour average sound level due to noise outside should not exceed 50 dBA.
            b) Corridors, hallways, stairwells, closets, bathrooms, or any room with a volume less than 490 cubic feet.

4.13.5.3 Project Impacts and Mitigation Measures

Threshold 1: Implementation of the project would result in the 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.

County Park and Trails

Impact Discussion

Construction

Two types of short-term noise impacts could occur during project construction. First, construction vehicles would incrementally increase noise levels on access roads. This would include construction worker vehicles and haul trucks traveling to and from the project site. Although there would be a relatively high single-event noise level, which could cause an intermittent noise nuisance (e.g., passing trucks at 50 feet would generate up to 77 dBA), the effect on longer-term ambient noise levels would be small. The grading and excavation phase of construction would include up to 3 haul truck trips per day and a maximum of 18 worker trips per day (see Appendix G). Therefore, impacts would be minimal related to the short-term noise associated with commuting construction workers and the transporting of equipment and materials to the project site.

The second category of construction noise would be noise generated during onsite project construction. Construction would occur only during the periods permitted by the County's ~~Municipal Code~~Noise Ordinance (7 a.m. to 7 p.m.) Detailed construction noise analysis RCNM output tables are provided in Appendix G. The list of construction equipment broken down by phase and noise levels at a distance of 50 feet is summarized Table 4.13-8, and the normalized results for the loudest phase of construction are summarized in Table 4-13-9.

Table 4.13-8. Construction Equipment and Noise at 50 Feet

Phases	Equipment Type	Number of Pieces of Equipment	Noise Level at 50 Feet (dBA L_{eq})[1,2]	Absolute Noise Level by Phase at 50 Feet (dBA L_{eq})[1,3]
Grubbing	Dozer	3	78	
	Excavator	1	77	
				84
Grading	Dozer	3	78	
	Excavator	1	77	
	Roller	1	73	
	Front End Loader	1	75	
	Backhoe	1	74	
	Scraper	1	80	
				86

Phases	Equipment Type	Number of Pieces of Equipment	Noise Level at 50 Feet (dBA L_{eq})[1,2]	Absolute Noise Level by Phase at 50 Feet (dBA L_{eq})[1,3]
Drainage	Dozer		78	
	Compressor (air)		76	
	Backhoe		74	
				84
Construction	Dozer	2	78	
	Crane	1	73	
	Compressor (air)	1	76	
	Generator	1	78	
	Front End Loader	3	75	
				85
Construction	Paver	1	74	
	Paver Scarafier	1	83	
	Roller	1	73	
				84
Trenching	Excavator	1	77	
	Front End Loader	1	75	
				79

[1] Values rounded to the nearest whole number.
[2] Values represent noise level for each piece of equipment.
[3] Represents the logarithmic total of all pieces of equipment.

Table 4-13.9. Predicted Construction Noise (Park) at the Closest Noise-Sensitive Land Uses

Analysis Location	Combined Construction 8-Hour Average Noise Level for the Loudest Phase of Construction, L_{eq}[1]
Closest noise-sensitive land uses (residences) north of project site (310 feet)	70 dBA
Closest noise-sensitive land uses (residences) east of project site, across South Grade Road from project site (225 feet)	73 dBA
Closest noise-sensitive land uses (residences) south of project site, across South Grade Road from project site (285 feet)	71 dBA

[1] Values rounded to the nearest whole number.

The loudest phase of construction is predicted to be the grading phase. The construction equipment used to calculate construction noise during this and other phases of construction is detailed in Appendix G. The predicted construction noise level at the noise-sensitive land uses to the north, east, and south would be 70, 73, and 71 dBA respectively. This is below the County's 8-hour L_{eq} standard of 75 dBA and within the range of ambient noise levels measured in the project vicinity. It should be noted that the distance~~s~~ calculated above are to the property lines and that the physical residences are generally located farther from the center of construction. Additionally, as discussed above~~,~~ RCNM uses a more reflective ground type. In actuality additional ground absorption would likely occur, which would further reduce noise levels on the project site.

One additional construction component that could be part of the project would involve the extension of a sewer line to tie into the existing sewer line north or west/northwest of the project site. Sewer line construction would require construction in the middle of South Grade Road and other local roadways and would take place within 50 feet of noise-sensitive land uses. The construction equipment used to calculate construction noise during this phase of construction is included in Appendix G.

Table 4.13-10. Predicted Construction Noise (Sewer Extension) at the Closest Noise-Sensitive Land Uses

Analysis Location	Combined Construction 8-Hour Average Noise Level for the Loudest Phase of Construction, L_{eq}[1]
Noise sensitive receptors (residences) located 50 feet from the roadway	79 dBA

[1] Values rounded to the nearest whole number.

The predicted construction noise level at noise-sensitive land uses located 50 feet off the alignment of South Grade Road or other roadways where construction may occur would be up to 79 L_{eq}. This noise level is based on the assumption that 50 feet of pipe would be installed per day (based on assumptions provided by ~~the~~ County DPR). It should be noted that the physical residences are generally located farther than 50 feet from the roadway alignment. As such, noise levels are considered a conservative estimate. However, as the County's ~~Municipal Code~~Noise Ordinance references, "when measured at the boundary line of the property" or "on any occupied property where the noise is being received" noise levels of this magnitude would exceed the County's 8-hour L_{eq} standard of 75 dBA threshold.

The predicted noise levels for project construction are worst case estimates. Therefore, it is likely that actual construction noise levels will often be lower than those predicted in the tables above. The predicted construction noise levels for the park would comply with the County's 8-hour L_{eq} standard of 75 dBA. However, construction associated with the extension of the sewer system would exceed the County's 8-hour threshold for construction noise~~.~~ (**Impact-NOI-1**).

Operation

The project would generate new vehicle trips that would add to traffic on surrounding streets and change the associated traffic noise. Table 4.13-11 summarizes the predicted noise levels both with and without the project during existing and future near-term conditions. Roadway segments considered in the TIA include South Grade Road west of Via Viejas and east of Via Viejas (refer to Appendix G for the noise modeling). The results indicate that traffic noise levels with the project would not exceed the County's traffic noise impact thresholds (i.e., traffic noise would not exceed 60 dB CNEL or cause any increase of 10 dB or more relative to existing conditions).

Table 4.13-11. Estimated Traffic Noise Levels

	Estimated Traffic Noise Levels at 50 feet from Roadway Centerline (dB CNEL)[1]					
Roadway Segment	Existing	Existing + Project	Increase over Existing (dB)	Near-Term	Near-Term + Project	Increase over Existing (dB)
South Grade Road						
West of Via Viejas	61	62	1	61	62	1
East of Via Viejas	60	60	0	60	61	1

[1] Values rounded to the nearest whole number.

Noise from the proposed athletic fields would consist primarily of human voices, with varying combinations of talking, shouting, and laughing from coaches, players, and parents. For some activities (soccer, baseball), whistles from coaches are also common. ~~Noise from the skate~~While whistles are not anticipated as no organized sports are proposed as part of the project, the soccer analysis referenced above included whistles and is therefore considered to be a conservative analysis. Noise from the all-wheel park would consist primarily of patrons riding skateboards and from voices similar to the proposed athletic fields. Other noise sources would include dogs barking and balls being used on basketball and pickleball courts. As discussed above, the SoundPlan ~~software~~modeling modeled all land uses included on the project site.

Noise measurements were conducted at schools and joint-use fields that were representative of the types of activities that would occur at the athletic fields. Similarly, field measurements were conducted at skate parks that are representative of the types of activities that would occur at the proposed ~~skate~~all-wheel park. Representative noise data from each set of measurements are summarized in Tables 4.13-6 and 4.13-7, above. Noise measured at the fields did not include the use of included amplified speech or music (e.g., bullhorns or PA systems). As discussed above, the skate park measurements included amplified music as the baseline (without skate park attendees); however, this was approximately 10 dB below the measured noise level with skate park attendees. It should be noted that this project would not include any amplified speech or music.

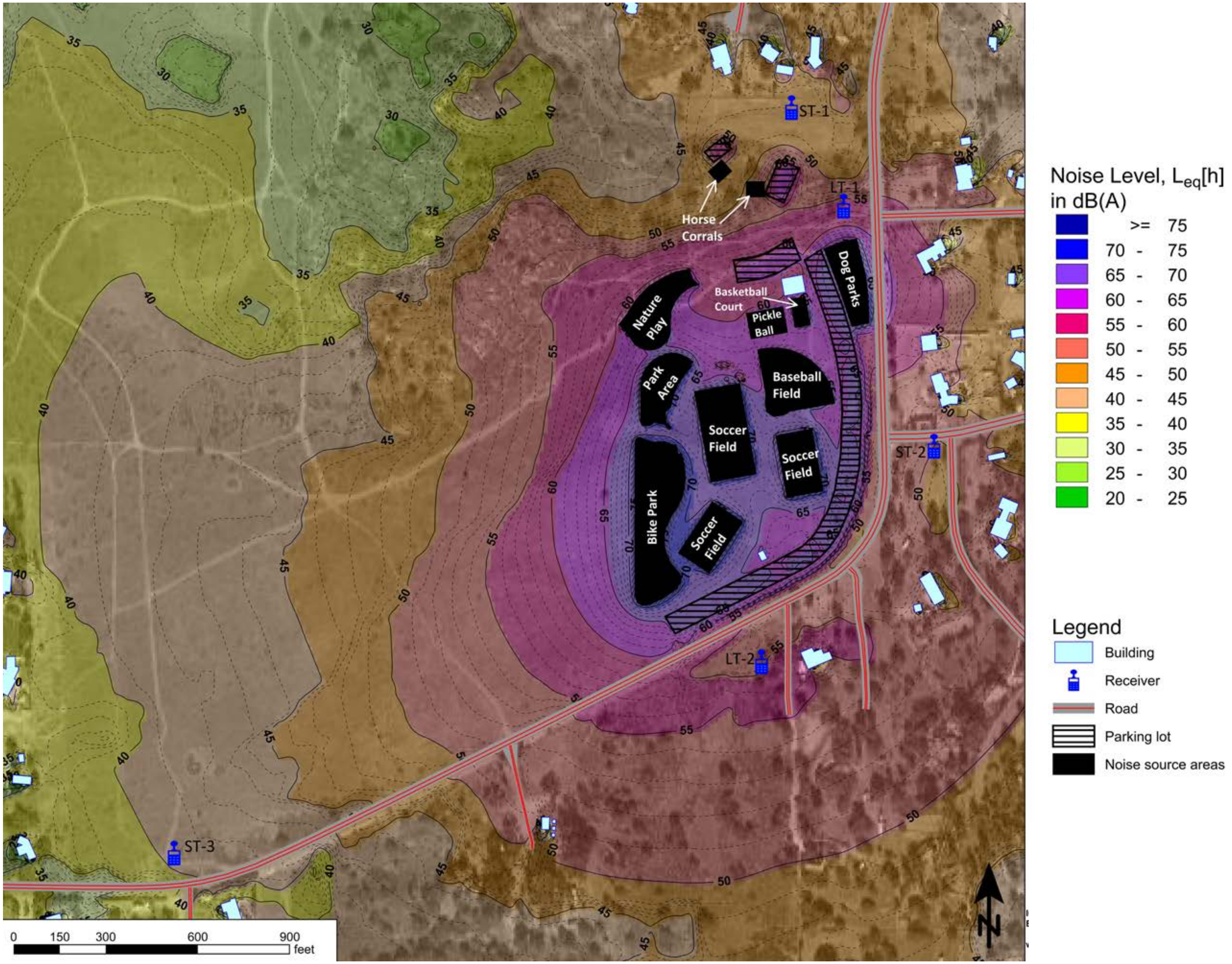
Noise levels for each operational component discussed above were analyzed at the noise measurement locations shown on Figure 4.13-1. The worst-case noise levels for operational noise are summarized in and assessed against the applicable sound level limits. As stated in Section 4.13.4.2 (see Table 4.13-12), the base one-hour average (L_{eq}) daytime sound level limit for all of the neighboring residential uses is 50 dBA. However, because the measured average ambient noise levels at each location (ST-2 and LT-2) were greater than 50 dBA, the actual limits ~~we~~are increased to the ambient level plus 3 dB. Measurement location ST-1 registered a measured noise level of 47 dBA. While LT-1 ranged from 53–65 dBA during the daytime hours, the measured noise level at ST-1 is more conservative~~ and therefore was used in this analysis.~~; however, LT-1 is more representative of homes in the general vicinity. Therefore, both are included. For informational purposes, the predicted noise levels are compared to both the unadjusted and the adjusted sound level limits in Table 4.13-12, but the assessment of impact is based solely on the comparison with the adjusted limits.

Table 4.13-12. Predicted Operational Noise Levels at the Closest Noise-Sensitive Land Use

	1-hour L_{eq}, dBA[1]				Exceeds Sound Level Limits?		
Analysis Location	Predicted	Measured Average Daytime Ambient	Base (Unadjusted) Sound Level Limit	Adjusted Sound Level Limit[2]	Unadjusted[3]	Adjusted	Significant Impact?
Onsite Activity							
ST-1 North of Project Site	48	47	50	50	No	No	No
ST-2 East of Project Site	50	51	50	54	No	No	No
LT-1 North of Project Site	54	57[5]	50	59	Yes	No	No
LT-2 South of Project Site	56	57[4]	50	60	Yes	No	No
ST-3 Southwest of the Project Site	40	46	50	50	No	No	No

[1] Values rounded to the nearest whole number.
[2] Adjusted sound level limit = measured average daytime ambient L_{eq} + 3 dB.
[3] Compliance with the unadjusted noise threshold is included for informational purposes and is only required if the ambient noise levels are below the applicable unadjusted threshold.
[4] Daytime noise levels measured at measurement location LT-2 ranged from 53–65 dBA L_{eq}. ~~Therefore, the~~Therefore, the arithmetic average of the measured daytime level has been included as the representative daytime measured noise level.
[5] Daytime noise levels measured at measurement location LT-1 ranged from 54–64 dBA L_{eq}. Therefore, the arithmetic average of the measured daytime level has been included as the representative daytime measured noise level.

The predicted noise levels for the park activities all comply with adjusted sound level limits. Additionally, the predicted composite operational noise level assumes that all activities (an active ~~skate~~all-wheel park with up to 15 skaters, three soccer games, the basketball court in use, etc.) would occur simultaneously. This analysis is considered conservative as these uses would rarely, if ever, all be active at the same time. Figure 4.13-2 shows the calculated noise contours associated with the project~~.~~ **(Impact-NOI-2)**.



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Source: ICF, 2021.

Figure 4.13-2
Operation Noise Contours

Impact Determination

Construction

Impact-NOI-1: Construction Noise During Installation of the Sewer System. Predicted noise levels associated with construction for the park would comply with the County's 8-hour L_{eq} standard of 75 dBA. However, construction associated with the extension of the sewer system would exceed the County's 8-hour threshold for construction noise. As such~~,~~ mitigation would be required to reduce impacts to less than significant. To address noise impacts from construction of the proposed sewer extension, installation of a barrier that breaks the line of sight between the source and receiver would provide 5 dB noise attenuation (FHWA 2017).

Operation

Impact-NOI-2: Onsite Operational Noise at the Active Park. Although the Noise Impact Analysis did not identify any significant impacts, a number of best practices and operational controls would be in place during the operation of the Alpine Park and were assumed as part of the analysis. These are based on typical rules and regulations enforced at existing County parks. To ensure these best practices and controls are incorporated into the ~~proposed~~ project, **MM-NOI-2** and **MM-NOI-3** would be required to reduce onsite operational noise impacts to less than significant.

Mitigation Measures

For **Impact-NOI-1: Construction Noise During Installation of the Sewer System**

MM-NOI-1: Install Temporary Sound Barriers. Prior to and during construction activities for the proposed sewer line extension, the construction contractor shall install temporary sound barriers that break the line of sight (a minimum ~~height~~ of 10 feet) between construction equipment and noise-sensitive receivers. These soundwalls shall be installed at any location where construction is located within 100 feet of the property line of an occupied residence or other noise-sensitive land use, such as schools.

For **Impact-NOI-2: Onsite Operational Noise at the Active Park**

MM-NOI-2: Enforce Standard Rules and Regulations. County DPR shall enforce all applicable standard rules and regulations for DPR facilities including, but not limited to, the following:

- Quiet Hours are from 10:00 p.m. to 7:00 a.m.
- Dogs must be licensed and restrained on a leash not longer than 6 feet and attended at all times. (~~This~~Leash restriction will not apply to dogs within the designated dog park space.)
- No person shall disturb the peace and quiet of a County ~~p~~Park by any loud or unusual noise, or by the sounding of automobile horns or noise-making devices, or by the use of profane, obscene, or abusive language or gestures.
- No person shall use, transport, carry, fire, or discharge any fireworks, firearm, weapon, air gun, archery device, slingshot, or explosive of any kind across, in, or into a County ~~p~~Park.
- The applicable requirements of DPR Policy Number C-06, Noise Regulation in County Parks will be enforced.

MM-NOI-3: Set Operational Limits and Restrictions. Except for occasional special events conducted pursuant to a specific permit (conditional use permit, special event permit, etc.), ~~County DPR shall~~ enforce the following operational restrictions:

- Prohibit the use of noise-generating equipment (noise-makers, bullhorns, air horns, amplified stereos/radios, etc.) by spectators. The only exception is for official use of the announcer's PA systems or other devices required for proper operation of the intended and approved activities.
- End all onsite events no later than 10:00 p.m.

Level of Significance After Mitigation

With the inclusion of **MM-NOI-1 through MM-NOI-3**, **Impact NOI-1** and **Impact NOI-2** would be reduced to less-than-significant levels.

Open Space~~/Preserve~~

Impact Discussion

Construction

The open space~~/preserve~~ portion of the project would not involve any construction that would result in increases in noise at nearby noise-sensitive land uses.

Operation

The open space~~/preserve~~ portion of the project would not include extensive noise-producing activities. Activities that could occur in association with passive recreation could include people hiking, riding horses, or walking dogs within the recreation area. These activities would not increase noise levels at nearby noise-sensitive land uses.

Impact Determination

Impacts related to increasing ambient noise levels in the open space~~/preserve~~ area would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance After Mitigation

Impacts would be less than significant.

Threshold 2: Implementation of the project <u>would not</u> expose persons to or generate excessive groundborne vibration or groundborne noise levels.

County Park and Trails

Impact Discussion

Construction

Vibration intensive construction equipment such as pile drivers or vibratory rollers would not be used as part of the project. Table 4.13-8 above provides a list of construction equipment that would be used as part of the project. As discussed, typical vibration levels of construction equipment such as bulldozers would be on the order of 0.089 PPV at a distance of 25 feet from the source. Based on the damage criteria set forth by FTA, levels of vibration would be below the threshold of damage at a distance of 25 feet. No vibration-sensitive receptors are located within 25 feet of where construction would occur.

Operations

Once operational, there would be no substantial sources of groundborne vibration at the project site. It is possible that site maintenance would occasionally require mechanized equipment, but such equipment would be no larger than the construction equipment analyzed above. Noting that the construction vibration analysis found vibration levels to be well below adopted thresholds at all sensitive receptors, it is clear that offsite vibration from occasional site maintenance would be negligible.

Impact Determination

Impacts related to groundborne vibration during construction and operation would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance After Mitigation

Impacts would be less than significant.

Open Space~~/Preserve~~

Impact Discussion

Construction

The open space~~/preserve~~ portion of the project would not involve any construction that would result in vibration at nearby sensitive land uses.

Operation

During operations the open space~~/preserve~~ portion of the project would not include vibration producing activities.

Impact Determination

Impacts due to groundborne vibration during construction and operations would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance After Mitigation

Impacts would be less than significant.

Threshold 3: The project would not be 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.

County Park ~~and~~, Trails, and Open Space

Impact Discussion

The closest airport is Montgomery Gibbs executive airport approximately 22-miles west of the project site. Therefore, the project site would not be affected by noise from any airport land use plan. Periodic aircraft flyovers could occur; however, this would not be considered an impact.

Impact Determination

There would be no impact related to being located near an airstrip or airport.

Mitigation Measures

No mitigation is required.

Level of Significance After Mitigation

There would be no impact.

~~Open Space/Preserve~~

~~Impact Discussion~~

~~The closest airport is Montgomery Gibbs executive airport approximately 22 miles west of the project site. Therefore, the project site would not be affected by noise from any airport land use plan. Periodic aircraft flyovers could occur; however, this would not be considered an impact.~~

~~Impact Determination~~

~~There would be no impact related to being located near an airstrip or airport.~~

~~Mitigation Measures~~

~~No mitigation is required.~~

~~Level of Significance After Mitigation~~

~~There would be no impact.~~

4.13.6 Summary of Significant Impacts

Table 4.13-13. Summary of Significant Noise Resource Impacts and Mitigation Measures

Summary of Potentially Significant Impact(s)	Summary of Mitigation Measure(s)	Level of Significance After Mitigation	Rationale for Finding After Mitigation
Impact-NOI-1: Construction Noise During Installation of the Sewer System	**MM-NOI-1 Install Temporary Sound Barriers.**	Less than Significant	Installation of temporary soundwalls would reduce noise from construction by a minimum of 5 dB, which would reduce predicted construction noise levels to below the County's 75 dBA threshold.
Impact-NOI-2: Onsite Operational Noise at the Active Park	**MM-NOI-2: Enforce Standard Rules and Regulations** **MM-NOI-3: Set Operational Limits and Restrictions**	Less than Significant	To control operational noise to the greatest extent practical.