APPENDIX I

Noise Background Information

Noise Impact Assessment for Dana Reserve Specific Plan

NOISE IMPACT ASSESSMENT

FOR

DANA RESERVE SPECIFIC PLAN

NIPOMO, CA

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INTRODUCTION

This report discusses the existing noise setting and identifies potential noise impacts associated with the implementation of the proposed Dana Reserve Specific Plan Project (project). Noise mitigation measures are recommended where the predicted noise levels would exceed applicable noise standards.

PROJECT OVERVIEW

The proposed Dana Reserve Specific Plan will provide a combination of land uses that include residential uses, flex commercial uses, open space, trails, and a public neighborhood park within an approximately 300-acre specific plan area. The plan will include 1,291 residential dwelling units (comprised of 833 single-family units and 458 multi-family units), between 110,000-203,00 square feet of commercial space, and 49.8 acres of open space for recreation. The project site is located in the southern portion of San Luis Obispo County, this property is immediately north of the Urban Reserve Line of the Nipomo community. It is bounded by Willow Road and Cherokee Place to the north, existing residential ranchettes to the south and west and U.S. Highway 101 to the east. The proposed Dana Reserve Specific Plan is depicted in Figure 1.

ACOUSTIC FUNDAMENTALS

Noise is generally defined as sound that is loud, disagreeable, or unexpected. Sound, as described in more detail below, is mechanical energy transmitted in the form of a wave because of a disturbance or vibration.

Amplitude

Amplitude is the difference between ambient air pressure and the peak pressure of the sound wave. Amplitude is measured in decibels (dB) on a logarithmic scale. For example, a 65 dB source of a sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). Amplitude is interpreted by the ear as corresponding to different degrees of loudness. Laboratory measurements correlate a 10 dB increase in amplitude with a perceived doubling of loudness and establish a 3 dB change in amplitude as the minimum audible difference perceptible to the average person.

Frequency

Frequency is the number of fluctuations in the pressure wave per second. The unit of frequency is the Hertz (Hz). One Hz equals one cycle per second. The human ear is not equally sensitive to the sound of different frequencies. Sound waves below 16 Hz or above 20,000 Hz cannot be heard at all, and the ear is more sensitive to sound in the higher portion of this range than in the lower. To approximate this sensitivity, the environmental sound is usually measured in A-weighted decibels (dBA). On this scale, the normal range of human hearing extends from about 10 dBA to about 140 dBA. Common community noise sources and noise levels are depicted in Figure 2.

Addition of Decibels

Because decibels are logarithmic units, sound levels cannot be added or subtracted through ordinary arithmetic. Under the decibel 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, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces a sound level of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB; rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together would produce an increase of 5 dB.

Figure 1. Proposed Dana Reserve Specific Plan & Nearby Land Uses

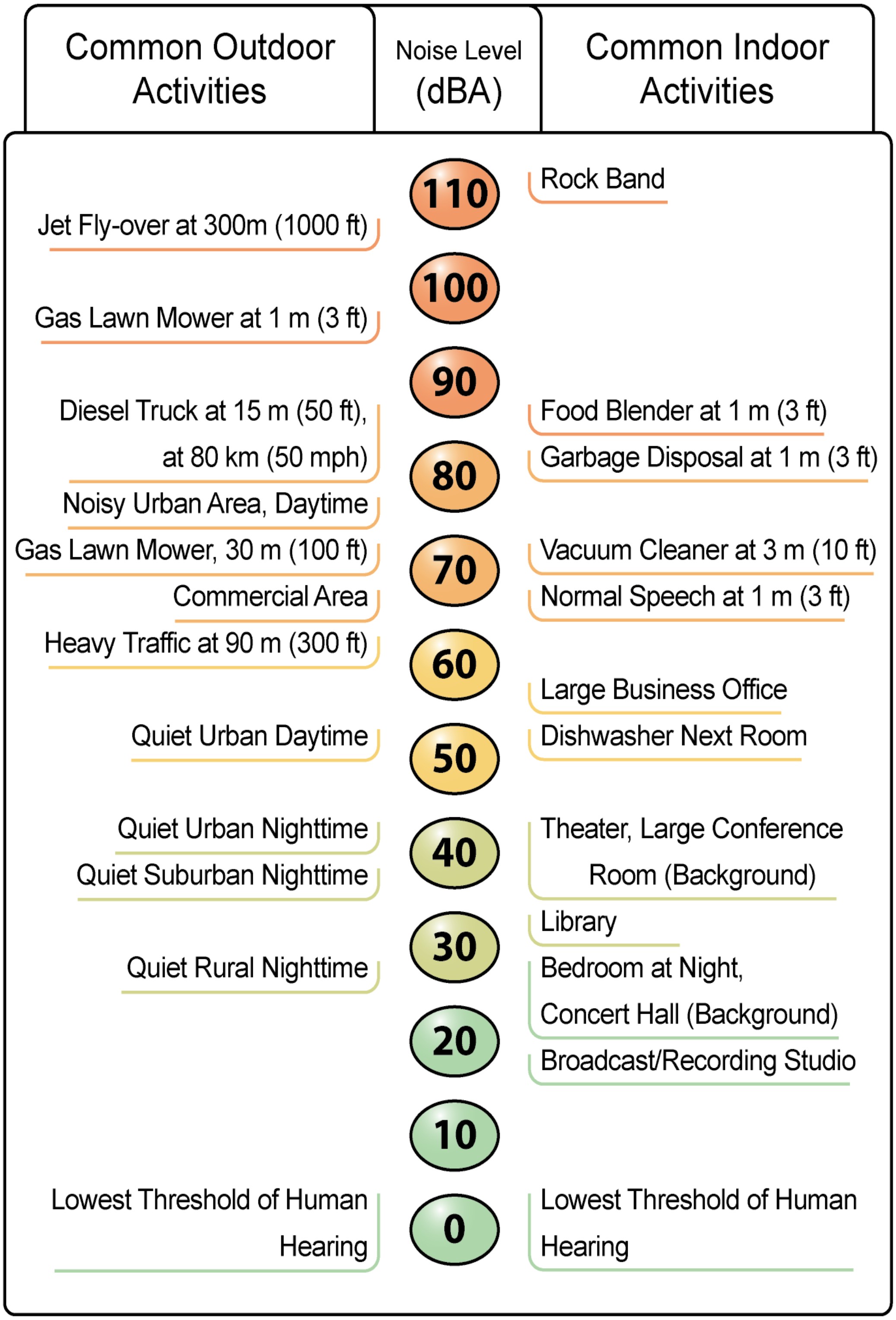
Not to Scale.

Sound Propagation & Attenuation

Geometric Spreading

The sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level decreases (attenuates) at a rate of approximately 6 decibels for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 decibels for each doubling of distance from a line source, depending on ground surface characteristics. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water,), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between a line source and the receiver, such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 decibels per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation for soft surfaces results in an overall attenuation rate of 4.5 decibels per doubling of distance from a line source.

Figure 2. Common Noise Levels



Source: Caltrans 2012

Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in an approximate 5 dB of noise reduction. Taller barriers provide increased noise reduction.

Noise Descriptors

The decibel 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 the 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 1,000–8,000 Hz, and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies, which is referred to as the “A-weighted” sound level (expressed in units of dBA). The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-weighted noise scale. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with environmental noise.

The intensity of environmental noise fluctuates over time, and several descriptors of time-averaged noise levels are typically used. For the evaluation of environmental noise, the most commonly used descriptors are L_{eq}, L_{dn}, and CNEL. The energy-equivalent noise level, L_{eq}, is a measure of the average energy content (intensity) of noise over any given period. Many communities use 24-hour descriptors of noise levels to regulate noise. The day-night average noise level, L_{dn}, is the 24-hour average of the noise intensity, with a 10-dBA “penalty” added for nighttime noise (10 p.m. to 7 a.m.) to account for the greater sensitivity to noise during this period. CNEL, the community equivalent noise level, is similar to L_{dn} but adds an additional 5-dBA penalty for evening noise (7 p.m. to 10 p.m.) Common noise descriptors are summarized in Table 1.

Table 1. Common Acoustical Terms and Descriptors

Descriptor	Definition
Decibel (dB)	A unit-less measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to referenced sound pressure amplitude. The reference pressure is 20 micro-pascals.
A-Weighted Decibel (dBA)	An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
Energy Equivalent Noise Level (L_{eq})	The energy means (average) noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value (in dBA) is calculated.
Minimum Noise Level (L_{min})	The minimum instantaneous noise level during a specific period of time.
Maximum Noise Level (L_{max})	The maximum instantaneous noise level during a specific period of time.
Day-Night Average Noise Level (DNL or L_{dn})	The 24-hour L_{eq} with a 10 dBA “penalty” for noise events that occur during the noise-sensitive hours between 10:00 p.m. and 7:00 a.m. In other words, 10 dBA is “added” to noise events that occur in the nighttime hours to account for increased sensitivity to noise during these hours.
Community Noise Equivalent Level (CNEL)	The CNEL is similar to the L_{dn} described above, but with an additional 5 dBA “penalty” added to noise events that occur between the hours of 7:00 p.m. to 10:00 p.m. The calculated CNEL is typically approximately 0.5 dBA higher than the calculated Ldn.

Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels. When community noise interferes with human activities or contributes to stress, public annoyance with the noise source increases. The acceptability of noise and the threat to public well-being are the basis for land use planning policies preventing exposure to excessive community noise levels.

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

- Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived by humans;
- Outside of the laboratory, a 3-dB change is considered a just-perceivable difference;
- A change in the level of at least 5 dB is required before any noticeable change in community response would be expected. An increase of 5 dB is typically considered substantial;
- A 10-dB change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

Speech Communication

For most noise-sensitive land uses, an interior noise level of 45 dB L_{eq} is typically identified for the protection of speech communication in order to provide for 100-percent intelligibility of speech sounds. Assuming an average 20-dB reduction in sound level between outdoors and indoors (which is an average amount of sound attenuation that assumes windows are closed), this interior noise level would equate to an exterior noise level of 65 dBA L_{eq}. For outdoor voice communication, an exterior noise level of 60 dBA L_{eq} allows normal conversation at distances up to 2 meters with 95 percent sentence intelligibility (U.S. EPA 1974.) Based on this information, speech interference begins to become a problem when steady noise levels reach approximately 60 to 65 dBA. Within more noise-sensitive interior environments, such as educational facilities and places of worship, an average-hourly background noise level of 45 dBA L_{eq} is typically recommended.

Annoyance & Sleep Disruption

With regard to potential increases in annoyance, activity interference, and sleep disruption, land use compatibility determinations are typically based on the use of the cumulative noise exposure metrics (i.e., CNEL or L_{dn}). Perhaps the most comprehensive and widely accepted evaluation of the relationship between noise exposure and the extent of annoyance was one originally developed by Theodore J. Schultz in 1978. In 1978 the research findings of Theodore J. Schultz provided support for L_{dn} as the descriptor for environmental noise. Research conducted by Schultz identified a correlation between the cumulative noise exposure metric and individuals who were highly annoyed by transportation noise. The Schultz curve, expressing this correlation, became a basis for noise standards. When expressed graphically, this relationship is typically referred to as the Schultz curve. The Schultz curve indicates that approximately 13 percent of the population is highly annoyed at a noise level of 65 dBA L_{dn}. It also indicates that the percentage of people describing themselves as being highly annoyed accelerates smoothly between 55 and 70 dBA L_{dn}. A noise level of 65 dBA L_{dn} is a commonly referenced dividing point between lower and higher rates of people describing themselves as being highly annoyed.

The Schultz curve and associated research became the basis for many of the noise criteria subsequently established for federal, state, and local entities. Most federal and state of California regulations and policies related to transportation noise sources establish a noise level of 65 dBA CNEL/L_{dn} as the basic limit of acceptable noise exposure for residential and other noise-sensitive land uses. For instance, with respect to aircraft noise, both the Federal Aviation Administration (FAA) and the State of California have identified a noise level of 65 dBA L_{dn} as the dividing point between normally compatible and normally incompatible residential land use generally applied for the determination of land use compatibility. For noise-sensitive land uses exposed to aircraft noise, noise levels in excess of 65 dBA CNEL/L_{dn} are typically considered to result in a potentially significant increase in levels of annoyance.

Allowing for an average exterior-to-interior noise reduction of 20 dB, an exterior noise level of 65 dBA CNEL/L_{dn} would equate to an interior noise level of 45 dBA CNEL/L_{dn}. An interior noise level of 45 dB CNEL/L_{dn} is generally considered sufficient to protect against long-term sleep interference (U.S. EPA, 1974.) Within California, the California Building Code establishes a noise level of 45 dBA CNEL as the maximum acceptable interior noise level for residential uses (other than detached single family dwellings). Use of the 45 dBA CNEL threshold is further supported by recommendations provided in the State of California Office of Planning and Research's *General Plan Guidelines*, which recommend an interior noise level of 45 dB CNEL/L_{dn} as the maximum allowable interior noise level sufficient to permit "normal residential activity" (OPR 2017).

The cumulative noise exposure metric is currently the only noise metric for which there is a substantial body of research data and regulatory guidance defining the relationship between noise exposure, people's reactions, and land use compatibility. However, when evaluating environmental noise impacts involving intermittent noise events, such as aircraft overflights and train pass by, the use of cumulative noise metrics may not provide a thorough understanding of the resultant impact. The general public often finds it difficult to understand the relationship between intermittent noise events and cumulative noise exposure metrics. In such instances, supplemental use of other noise metrics, such as the L_{eq} or L_{max} descriptor, are sometimes used as a means of increasing public understanding regarding the relationship between these metrics and the extent of the resultant noise impact.

EXISTING SETTING

Noise-Sensitive Receptors

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are also considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

Noise-sensitive land uses in the project vicinity consist predominantly of residential land uses. The nearest residential land uses are located adjacent to the western, southern, and northern project site boundary. Nearby residential land uses are depicted in Figure 1.

Ambient Noise Environment

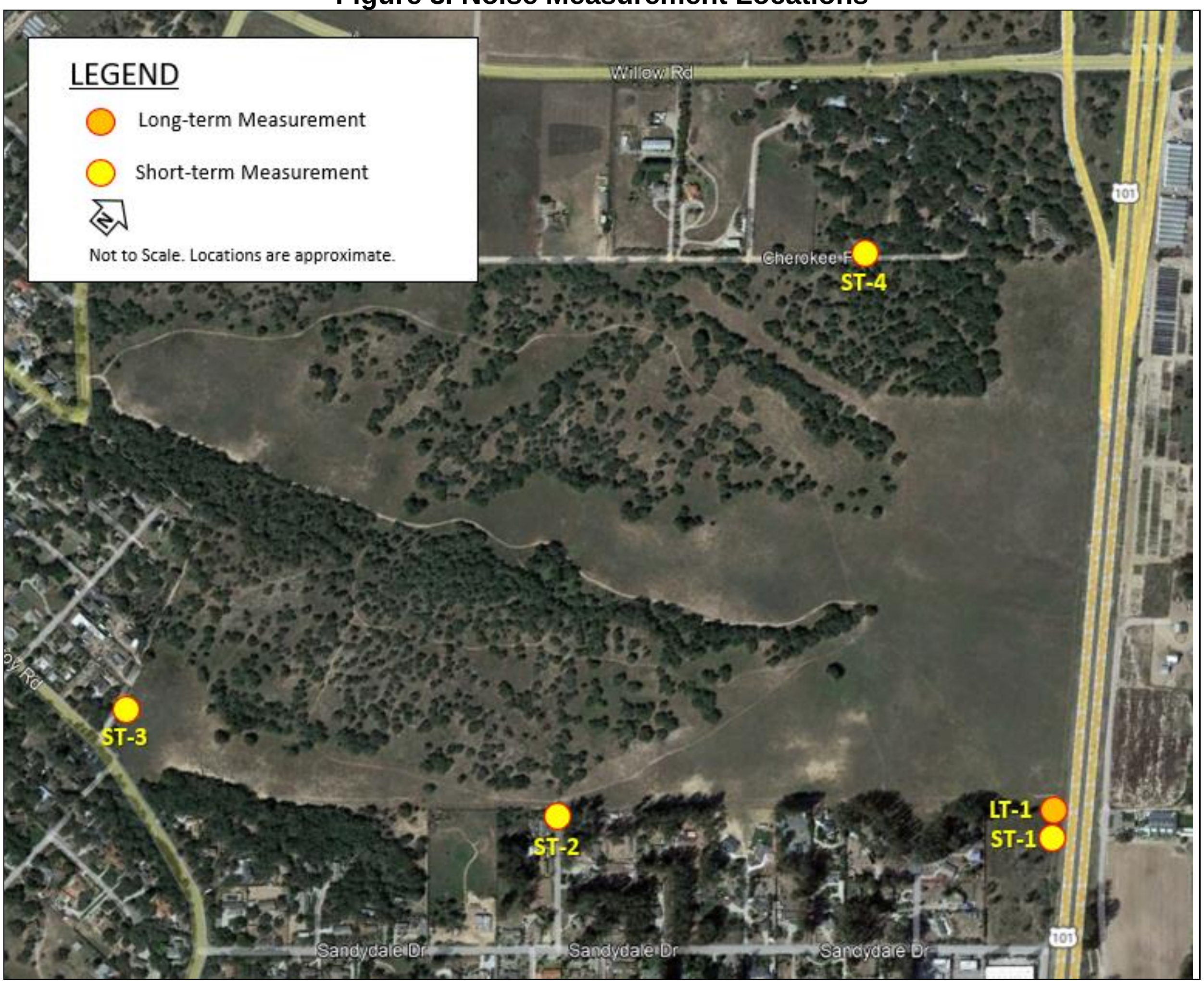
To document the existing noise environment in the project vicinity, four short-term (i.e., 10-minutes) noise measurements and one continuous long-term (i.e., 21 hour) noise measurements were conducted. Ambient noise measurement surveys were conducted on November 15 - 16, 2021, using a Larson Davis LxT Type I sound-level meter. Measured short-term noise measurements are summarized in Table 2. As noted in Table 2, measured short-term daytime average-hourly noise levels in the project area generally range from approximately 41.3 dBA L_{eq} to approximately 70.3 dBA L_{eq}. Measured ambient noise levels in the vicinity of the project site were predominantly influenced by vehicle traffic on U.S. Highway 101 and area roadways.

Table 2. Summary of Measured Short-Term Ambient Noise Levels

Monitoring Location	Monitoring Period	Monitoring Location	Noise Level (dBA)	
			L_{eq}	L_{max}
ST-1	10/16/2021 14:14-13:14	Southeast corner of Project site, approximately 33 yards from the median of U.S. Highway 101.	65.5	84.3
ST-1	10/15/2021 11:13-11:23	Southeast corner of Project site, approximately 33 yards from the median of U.S. Highway 101.	70.3	77.4
ST-2	10/15/2021 11:40-11:50	Southern boundary of project site on Cory Way, approximately 212 yards north of Sandydale Dr.	41.3	57.9
ST-3	10/15/2021 11:56-12:06	West side of project, on Hetrick Ave., approximately 56 yards north of Pomeroy Rd.	56.6	66.6
ST-4	10/15/2021 12:24-12:34	North side of project, on Cherokee Pl., approximately 306 yards south of Willow Rd.	44.3	65.4

Noise measurement surveys were conducted on November 15th and November 16st, 2021 using a Larson Davis Laboratories, Type I, Model 820 integrating sound-level meter positioned at a height of approximately 5 feet above ground level. Refer to Figure 3 for noise measurement locations.
Refer to Figure 3 *for measurement locations.*

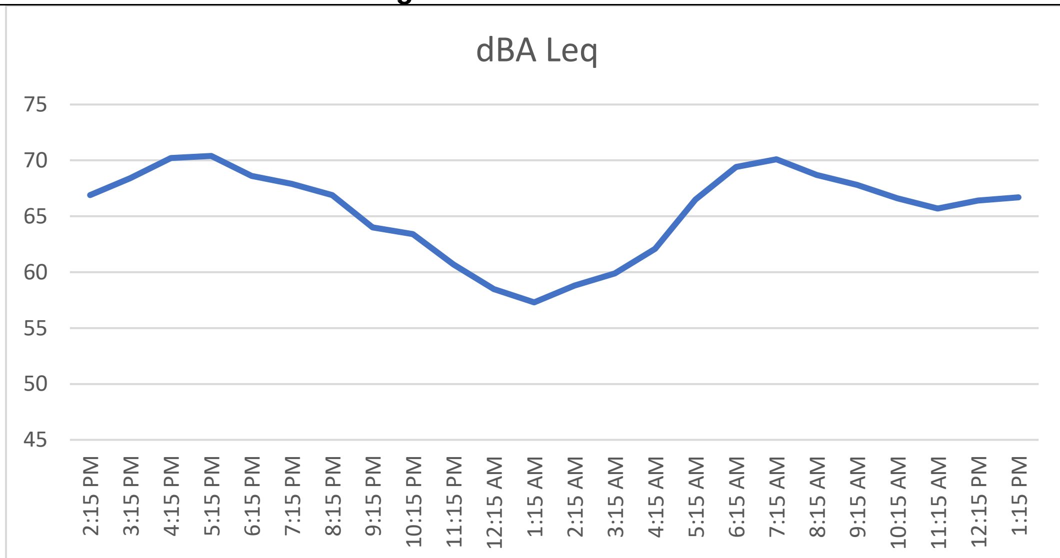
Figure 3. Noise Measurement Locations



Refer to Table 2 for noise measurement data.

In addition to the short-term noise measurement surveys, a long-term (24-hour) noise measurement was conducted near the southeastern boundary of the project site, approximately 33 yards from the median of U.S. Highway 101. Noise levels at this location were primarily affected by vehicle traffic on U.S. Highway 101. Measured long-term noise levels are summarized in Table 3. As noted in Table 3, measured average-hourly noise levels ranged from approximately 57.3 dBA L_{eq} during the nighttime hours to approximately 70.4 dBA L_{eq} during the daytime hours. Measured nighttime noise levels were approximately 13 dBA lower than the highest measured daytime noise level.

Table 3. Long-Term Noise Measurement Data



Hour Beginning	Average (dBA L_{eq}[h])	Difference from Loudest Hour (dB)
14:15	66.9	-3.5
15:15	68.4	-2
16:15	70.2	-0.2
17:15	**70.4**	0
18:15	68.6	-1.8
19:15	67.9	-2.5
20:15	66.9	-3.5
21:15	64.0	-6.4
22:15	63.4	-7
23:15	60.7	-9.7
0:15	58.5	-11.9
1:15	57.3	-13.1
2:15	58.8	-11.6
3:15	59.9	-10.5
4:15	62.1	-8.3
5:15	66.5	-3.9
6:15	69.4	-1
7:15	70.1	-0.3
8:15	68.7	-1.7
9:15	67.8	-2.6
10:15	66.6	-3.8
11:15	65.7	-4.7
12:15	66.4	-4
13:15	66.7	-3.7

Note: Highest hourly noise level is bolded.
Noise measurements were conducted on November 15-16, 2021 using a Larson Davis LxT Type I sound-level meter.
Refer to Figure 3 for measurement locations.

Existing Traffic Noise Levels

As noted above, vehicle traffic on area roadways is the primary source of noise in the project area. Calculated existing traffic noise levels at 50 feet from the near-travel-lane centerline and distances to existing noise contours for area roadways are summarized in Table 4. As shown in Table 4, existing traffic noise levels along nearby roadways range from approximately 61.8 to 66.9 dBA CNEL/L_{dn} at 50 feet from the near-travel-lane centerline.

Table 4. Predicted Existing Traffic Noise Levels

Roadway Segment	Noise Level (dBA CNEL)				
	at 50 Feet from Near-Travel-Lane Centerline	Distance (Feet) to CNEL/L_{dn} Contours From Roadway Centerline			
		70	65	60	55
Willow Rd., State Route 1 to Pomeroy Rd.	68.0	WR	88.8	191	411.2
Willow Rd., Pomeroy Rd.to Hetrick Ave.	67.6	WR	83.5	179.4	386.3
Willow Rd., Hetrick Ave. to U.S. Highway 101 SB Ramp	68.9	WR	101.6	218.5	470.6
Willow Rd., U.S. Highway 101 SB Ramp to NB Ramp	65.2	WR	70.3	147.4	315.6
Pomeroy Rd., Willow Rd. to SW Project Entry	63.4	WR	WR	93.3	200.6
Pomeroy Rd., SW Project Enter to Tefft St.	64.5	WR	51.8	111	238.8
Tefft St., Pomeroy Rd. to Mary Ave.	66.9	WR	96.4	202.8	434.5
Tefft St., Mary Ave. to U.S. Highway 101 SB Ramp	65.6	WR	79.2	164.8	352.1
Tefft St., U.S. Highway 101 SB Ramp to NB Ramp	65.3	WR	83.9	170.9	363.3
Mary Ave., Tefft St. to Juniper St.	61.8	WR	WR	77.9	166.8
N. Thompson Ave., South of Willow Rd.	66.4	WR	69.4	149	320.7
Traffic noise levels were calculated using the FHWA roadway noise prediction model based on traffic data obtained from the traffic analysis prepared for this project. WR = Within Road Right-of-Way					

Groundborne Vibration

No major existing sources of groundborne vibration were identified in the project area. Vehicle traffic on area roadways, particularly heavy-duty trucks, can result in increased groundborne vibration. However, groundborne vibration levels associated with vehicle traffic is typically considered minor and would not exceed applicable criteria at the project site boundaries.

REGULATORY FRAMEWORK

Noise

Noise Control Act of 1972

The Noise Control Act of 1972 establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. The Act also serves to (1) establish a means for effective coordination of Federal research and activities in noise control; (2) authorize the establishment of Federal noise emission standards for products distributed in commerce; and (3) provide information to the public respecting the noise emission and noise reduction characteristics of such products.

Department of Housing and Urban Development (HUD)

HUD guidelines for the acceptability of residential land use are set forth in the Code of Federal Regulations Title 24, Part 51, "Environmental Criteria and Standards." These guidelines parallel those suggested in the FICUN report: noise exposure of 65 dBA CNEL/L_{dn}, or less, is acceptable and between 65 and 75 dBA CNEL/L_{dn} noise exposure is considered normally acceptable provided appropriate sound-reduction measures are provided. Above 75 dBA CNEL/L_{dn} noise exposure is generally considered unacceptable. The guidelines also identify the recommended interior noise levels of 45 dBA CNEL/L_{dn}. These guidelines apply only to new construction supported by HUD grants and are not binding upon local communities.

California Code of Regulations, Title 24

Title 24 of the California Code of Regulations contains standards for allowable interior noise levels associated with exterior noise sources (California Building Code, 1998 edition, Volume 1, Appendix Chapter 12, Section 1208A). The standards apply to new hotels, motels, dormitories, apartment houses, and dwellings other than detached single family residences. The standards state that the interior noise level attributable to exterior sources shall not exceed 45 dBA CNEL in any habitable room. Proposed residential structures to be located where the CNEL exceeds 60 dBA are required to prepare an acoustical analysis showing that the proposed building design would achieve the prescribed allowable interior noise standard. Worst-case noise levels, either existing or future, shall be used as the basis for determining compliance with these standards.

California General Plan Guidelines

The State of California regulates vehicular and freeway noise affecting classrooms, sets standards for sound transmission and occupational noise control, and identifies noise insulation standards and airport noise/land-use compatibility criteria. The "State of California General Plan Guidelines" (OPR 2017), published by the Governor's Office of Planning and Research, also provides guidance for the acceptability of projects within specific CNEL/L_{dn} contours. The guidelines also present adjustment factors that may be used in order to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

2010 California Green Building Standards

The *2010 California Green Building Standards* (California Code of Regulations Title 24, Part 11, Section 5.507) requires that the wall and roof-ceiling assemblies making up a building envelope to have a minimum Sound Transmissions Class (STC) of 50, and exterior windows to have a minimum STC of 30 for any of the following building locations:

- Within 1,000 feet of freeways
- Within 5 miles of airports serving more than 10,000 commercial jets per year;
- Where the sound levels at the property line regularly exceed 65 decibels, other than occasional sound due to church bells, train horns, emergency vehicles, and public warning systems.

The above standards do not apply to buildings with few or no occupants or where occupants are not likely to be affected by exterior noise (as determined by the enforcement authority), such as factories, stadiums, storage, enclosed parking structures, and utility buildings. This section also identifies a minimum STC of 40 for interior walls and floor-ceiling assemblies that separate tenant spaces and public spaces (CBSC 2010).

County of San Luis Obispo

The County of San Luis Obispo's noise standards for non-transportation noise sources are summarized in Table 5. As depicted, the maximum allowable noise exposure standards vary depending on the duration of exposure and time of day. During the daytime hours of 7:00 a.m. to 10:00 p.m., average-hourly noise levels are limited to 50 dBA L_{eq} at the property line of the receiving noise-sensitive land use. Daytime maximum instantaneous noise levels associated with non-transportation noise sources are limited to 70 dBA L_{max} and impulsive noise levels are limited to 65 dBA L_{max} at the property line of noise-sensitive land uses. These daytime noise standards are reduced by 5 dBA for events occurring during the more noise-sensitive nighttime hours (10:00 p.m. to 7:00 a.m.) (San Luis Obispo County 1992).

The County's noises standards for transportation sources are summarized in Table 6. As depicted L_{dn}/CNEL noise levels for outdoor activity areas range from 60 to 70 dB. Interior spaces have an L_{dn}/CNEL standard of 45 dB for residences, hotels, motels, hospitals, and nursing facilities. Interior spaces for public assembly and entertainment type land uses have a 35 L_{eq} dB standard and office, places of worship, and school type land uses have a 45 L_{eq} dB standard (San Luis Obispo County 1992).

Table 5. County of San Luis Obispo Maximum Allowable Noise-Exposure Standards for Stationary Noise Sources

Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly L_{eq}, dB	50	45
Maximum level, dB	70	65
Maximum level, dB-Impulsive Noise	65	60
As determined at the property line of the receiving land use. When determining the effectiveness of noise mitigation measures, the standards may be applied on the receptor side of noise barriers or other property line noise mitigation measures. Applies only where the receiving land use operates or is occupied during nighttime hours.		

Table 6. County of San Luis Obispo Maximum Allowable Noise-Exposure Standards for Transportation Noise Sources

Land Use	Outdoor Activity Areas[1]	Interior Spaces	
	L_{dn}/CNEL, dB	L_{dn}/CNEL, dB	L_{eq} dB[2]
Residential (except temporary dwellings and residential accessory uses)	60[3]	45	--
Bed and Breakfast Facilities, Hotels and Motels	60[3]	45	--
Hospitals, Nursing and Personal Care	60[3]	45	--
Public Assembly and Entertainment (except Meeting Halls)	--	--	35
Offices	60[3]	--	45
Churches, Meeting Halls	--	--	45
Schools-Preschool to Secondary, College and University, Specialized Education and Training Libraries and Museums	--	--	45
Outdoor Sports and Recreation	70	--	--

1. Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.
2. As determined for a typical worst-case hour during periods of use.
3. For other than residential uses, where an outdoor activity area is not proposed, the standard shall not apply. Where it is not possible to reduce noise in outdoor activity areas to 60 dB LDN/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

Groundborne Vibration

There are no federal, state, or local regulatory standards for ground-borne vibration. However, Caltrans has developed vibration criteria based on potential structural damage risks and human annoyance. Caltrans-recommended criteria for the evaluation of groundborne vibration levels, with regard to structural damage and human annoyance, are summarized in Table 7. The criteria apply to continuous vibration sources, which include vehicle traffic, train, and most construction vibrations, with the exception of transient or intermittent construction activities, such as pile driving. All damage criteria for buildings are in terms of ground motion at the buildings' foundations. No allowance is included for the amplifying effects of structural components (Caltrans 2013).

As shown in Table 7, the threshold for architectural damage commonly applied to construction activities is a peak particle velocity (ppv) of 0.3 inches per second (in/sec) for fragile structures and 0.5 in/sec ppv for newer structures. Levels above 0.2 in/sec ppv may result in increased levels of annoyance for people in buildings (Caltrans 2013).

Table 7. Summary of Groundborne Vibration Levels and Potential Effects

Vibration Level (in/sec ppv)	Human Reaction	Effect on Buildings
0.006-0.019	Threshold of perception; possibility of intrusion.	Vibrations unlikely to cause damage of any type.
0.08	Vibrations readily perceptible.	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected.
0.10	Level at which continuous vibrations begin to annoy people.	Virtually no risk of "architectural" damage to normal buildings.
0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relatively short periods of vibrations).	Threshold at which there is a risk of "architectural" damage to fragile buildings.
0.4-0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges.	Potential risk of "architectural" damage may occur at levels above 0.3 in/sec ppv for older residential structures and above 0.5 in/sec ppv for newer structures.

The vibration levels are based on peak particle velocity in the vertical direction for continuous vibration sources, which includes most construction activities, with the exception of transient or intermittent construction activities, such as pile driving. For pile driving, the minimum criterion level is typically considered to be 0.2 in/sec ppv.
Source: Caltrans 2020

IMPACTS AND MITIGATION MEASURES

Significance Criteria

Criteria for determining the significance of noise impacts were developed based on information contained in the California Environmental Quality Act Guidelines (CEQA Guidelines, Appendix G). According to the guidelines, a project may have a significant effect on the environment if it would result in the following conditions:

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

b) Generation of excessive groundborne vibration or groundborne noise levels.

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

Short-Term Construction Noise Impacts

The County has not adopted noise standards that apply to short-term construction activities. However, based on screening noise criteria commonly recommended by federal agencies, construction activities would generally be considered to have a potentially significant impact if average daytime noise levels would exceed 90 dBA L_{eq} when averaged over a 1-hour period ($L_{eq}^{(1)}$), or 80 dBA L_{eq} when averaged over an 8-hour period ($L_{eq}^{(8)}$) (FTA 2018). Because some activities may not occur over a full 8-hour day and to be conservative, construction-generated noise levels would be considered to have a potentially significant impact if predicted noise levels at noise-sensitive land uses would exceed 80 dBA L_{eq} when averaged over a 1-hour period.

Long-Term Operational Noise Impacts

The *CEQA Guidelines* do not define the levels at which increases in ambient noise would be considered "substantial." As discussed previously in this section, a noise level increase of 3 dBA is barely perceptible to most people, a 5 dBA increase is readily noticeable, and a difference of 10 dBA would be perceived as a doubling of loudness. For purposes of this analysis, a substantial increase in ambient noise levels would be defined as an increase of 3 dBA, or greater. Substantial increases in ambient noise levels that would exceed applicable noise standards for existing land uses would be considered to have a potentially significant impact. The compatibility of the future planned land uses were evaluated based on predicted future on-site noise conditions and in comparison to the County's noise exposure standards for determination of impact significance (refer to Table 6). Exposure to non-transportation noise sources would be considered potentially significant if noise levels would exceed the County's noise exposure standards for non-transportation noise sources (refer to Table 5).

Groundborne Vibration Impacts

Groundborne vibration levels would be considered potentially significant if predicted short-term construction or long-term operational groundborne vibration levels attributable to the proposed project would exceed normally applied groundborne vibration criteria at nearby structures (Table 7). No existing historic or fragile structures were identified in the project area. For purposes of this analysis, groundborne vibration levels would be considered to have a potentially significant impact if predicted levels would exceed 0.2 in/sec ppv with regard to human annoyance or 0.5 in/sec ppv for structural damage.

Methodology

Short-Term Construction Noise

Short-term noise impacts associated with construction activities were analyzed based on typical construction equipment noise levels derived from the Federal Highway Administration (FHWA) *Roadway Construction Noise Model* and the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual*. Typical equipment use for various phases of construction were based on default assumptions identified in the *California Emissions Estimator Model* (CAPCOA 2018) for representative development projects. Predicted average-hourly construction noise levels (in dBA L_{eq}) were calculated assuming the two loudest pieces of construction equipment operating simultaneously at 50 feet from source center (FTA 2018). Noise levels were predicted based on an average noise-attenuation rate of 6 dB per doubling of distance from the source.

Long-term Operational Noise

Traffic noise levels were calculated using the Federal Highway Administration (FHWA) roadway noise prediction model (FHWA-RD-77-108) based on California vehicle reference noise levels and traffic data obtained from the traffic analysis prepared for this project. Additional input data included day/night percentages of autos, medium and heavy trucks, vehicle speeds, ground attenuation factors, and roadway widths. The project's contribution to traffic noise levels along area roadways was determined by comparing the predicted noise levels with and without project-generated traffic. Predicted future traffic noise levels for U.S. Highway 101 were calculated based on a maximum predicted increase of 15.23 percent in traffic volumes over an estimated 15-year period, derived from the *U.S. 101/San Luis Bay Drive Intersection Control Evaluation, Step 1, Final Report* (San Luis Obispo County 2019). The estimated percent increase in traffic volumes was applied to the most current traffic volume data available for the adjacent segment of U.S Highway 101, derived from the California Department of Transportation's *2017 Traffic Volumes for all Vehicles on CA State Highways*. Predicted traffic noise modeling assumptions and results are included in Appendix B.

Impact Discussions and Mitigation Measures

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

Long-Term Exposure to Traffic Noise

Increases in Traffic Noise Levels

Implementation of the proposed project would result in increased traffic volumes on area roadways. The increase in traffic volumes resulting from implementation of the proposed project would, therefore, contribute to increases in traffic noise levels.

Predicted increases in traffic noise levels, with and without implementation of the proposed project, are depicted in Table 8. As depicted in Table 8, increases in existing traffic noise levels along area roadways attributable to the proposed project would range from less than 0.1 to 2.9 dBA CNEL/L_{dn}. Implementation of the proposed project would not result in a substantial increase (i.e., 3 dBA, or greater) in existing traffic noise levels along area roadways. As a result, this impact is considered ***less than significant***.

Compatibility of Proposed Land Uses with Traffic Noise Levels

The proposed project includes a mix of residential, hotel, educational, commercial, open space, and outdoor recreational uses. As noted in Table 6, the County's noise standards for exposure to transportation noise sources are 60 dBA CNEL/L_{dn} for residential, commercial office, and hotel uses, and 70 dBA CNEL/L_{dn} for outdoor sports and recreation uses. Noise exposure standards for other land uses considered to be potentially sensitive to noise, such as educational use facilities are based on an interior noise exposure level of 45 dBA CNEL/L_{dn}.

Table 8. Predicted Increases in Traffic Noise Levels

Roadway Segment	Noise Level (dBA CNEL/L_{dn}) at 50 Feet From Near-Travel-Lane Centerline			Significant Impact?[1]
	Existing without Project	Existing with Project	Change	
Willow Rd., State Route 1 to Pomeroy Rd.	68.0	68.5	0.5	No
Willow Rd., Pomeroy Rd.to Hetrick Ave.	67.6	68.1	0.5	No
Willow Rd., Hetrick Ave. to U.S. Highway 101 SB Ramp	68.9	71.6	2.7	No
Willow Rd., U.S. Highway 101 SB Ramp to NB Ramp	65.2	68.1	2.9	No
Pomeroy Rd., Willow Rd. to SW Project Entry	63.4	64.4	1.0	No
Pomeroy Rd., SW Project Enter to Tefft St.	64.5	66.0	1.5	No
Tefft St., Pomeroy Rd. to Mary Ave.	66.9	66.9	0.0	No
Tefft St., Mary Ave. to U.S. Highway 101 SB Ramp	65.6	65.5	-0.1	No
Tefft St., U.S. Highway 101 SB Ramp to NB Ramp	65.3	65.3	0.0	No
Mary Ave., Tefft St. to Juniper St.	61.8	61.6	-0.2	No
N. Thompson Ave., South of Willow Rd.	66.4	67.3	0.9	No

Note: Traffic noise levels were calculated using the FHWA roadway noise prediction model based on traffic data obtained from the traffic analysis prepared for this project.
1. A significant impact is defined as a substantial increase (i.e., 3 dB, or greater) in traffic noise levels.

As previously discussed, ambient noise levels at the project site are primarily influenced by vehicle traffic on U.S. Highway 101, which extends in a general north-to-south direction along the eastern boundary of the project site. Based on the traffic noise modeling conducted for future year 2032 conditions, the predicted 70, 65, and 60 dBA CNEL noise contours would extend to approximately 220 feet, 468 feet, and 1,005 feet from the centerline of U.S. Highway 101, respectively. Predicted distances to future year 2032 onsite traffic noise contours for U.S. Highway are depicted in Figure 4. As depicted, predicted traffic noise levels at proposed multi-family land uses located within the eastern-most portions of the project site would be projected to exceed the County's exterior noise standard of 60 dBA CNEL/L_{dn}. Other land uses, such as the proposed offices or the junior college campus, could potentially exceed the County's interior noise standard of 45 dBA CNEL/L_{dn}. Predicted traffic noise levels at other future planned land uses located along Collector B and Collector C, including proposed residential land uses and the daycare facility, would be approximately 60 dBA CNE/L_{dn}, or less, and would not exceed applicable County noise standards. Because predicted traffic noise levels at planned land uses would exceed applicable County noise standards, this impact is considered ***potentially significant***.

Figure 4. Predicted Future On-Site Traffic Noise Levels (dBA CNEL) – U.S. Highway 101

Long-Term Exposure to Non-Transportation Noise

The proposed project includes the development of residential, commercial, community park/open space, and educational land uses. These land uses would result in non-transportation (stationary) noise sources that could potentially exceed the County's applicable noise standards at nearby noise-sensitive land uses. Noise levels typically associated with these land uses and associated noise impacts are discussed as follows:

Residential Uses

Noise associated with proposed residential dwellings would expose other nearby residences (both existing and project related) to minor increases in ambient noise levels. Noise typically associated with such development includes lawn and garden equipment, voices, air conditioning equipment, and amplified music. Noise generated by these land uses would result in only minor increases in ambient noise levels, primarily during the day and evening hours and less frequently at night. Residential use air conditioning units typically generate noise levels of approximately 60 dBA L_{eq} at 3 feet when operating. Typical operational cycles for residential units occur for periods of approximately 10 minute in 20 to 30 minute intervals. When averaged over an approximate 1-hour period and assuming a setback distance of 5 feet, predicted average-hourly noise levels at nearby residential land uses would not be anticipated to exceed the County's noise standards. As a result, increased noise levels associated with proposed residential land uses would be ***less than significant***.

Parking Lots

The proposed project would include multiple parking lots dispersed throughout the project site, primarily associated with proposed commercial uses and multi-family land uses located within the eastern-most portion of the project site. Noise levels associated with parking lots typically includes vehicle operations, the opening and closing of vehicle doors, and the operation of vehicle sound systems. Parking areas associated with commercial uses, as well as multi-family land uses, would be separated from nearby residential land uses by proposed on-site roadways. Resultant noise levels at the nearest residential land uses would not be projected to exceed the County's noise standards and would be largely masked by vehicular traffic on area roadways, including U.S. Highway 101. This impact would be considered ***less than significant***.

Outdoor Recreational & Special Event Uses

Noise typically associated with neighborhood parks, small playgrounds, trails, and open space areas are typically limited to the voices of adults and children and the occasional opening and closing of vehicle doors. Noise events are typically sporadic and limited primarily to the daytime hours of operation. Parks and open space areas/corridors are typically considered to be an accepted land use within residential developments and generally do not result in noise events that are uncharacteristic of typical residential noise environments. However, some outdoor uses, such as outdoor athletic and temporary event facilities, may incorporate the use of an amplified public address (PA) sound system. Depending on the location of the PA system and speaker orientation, the use of amplified public address systems can generate noise levels of approximately 75 dBA L_{eq} at 100 feet. Based on this noise level, predicted operational noise levels within approximately 1,050 feet and 3,300 feet could potentially exceed the County's daytime and nighttime noise standards of 50 and 45 dBA L_{eq}, respectively. Depending on operational characteristics and location, predicted noise levels at nearby noise-sensitive land uses could potentially exceed the County's noise standards. For this reason, noise-generated by the proposed land uses that involve the use of exterior amplified PA systems would be considered to have a ***potential significant impact***.

Commercial, Hotel, and Retail Uses

Noise sources commonly associated with commercial, hotel, and retail uses include building mechanical systems (e.g., HVAC systems), back-up power generators, vehicle activity within parking lots, and loading dock activities. Noise levels associated with building mechanical systems, such as larger air conditioning units, can range from 60 to 79 dBA L_{eq} at 5 feet. Back-up power generators can generate noise levels of approximately 79 dBA L_{eq} at 50 feet (FTA 2018. FHWA 2008). Assuming a maximum noise level of 79 dBA L_{eq} at 50 feet, predicted operational noise levels associated with back-up power generators could potentially exceed 50 dBA L_{eq} at approximately 1,500 feet and approximately 45 dBA L_{eq} at 2,700 feet. Based on measurements conducted at various commercial uses, noise levels associated with loading dock operations and material handling activities can generate noise levels of approximately 65 dBA L_{eq} at 50 feet. Predicted operational noise levels associated with loading dock operations could potentially exceed 50 dBA L_{eq} at approximately 150 feet and approximately 45 dBA L_{eq} at 265 feet. Other outdoor equipment, such as commercial-use air conditioning condensers and trash compactors, and material handling activities may also result in intermittent increases in operational noise levels.

Depending on the specific uses proposed, site design, and hours of operation predicted noise levels associated with proposed commercial land uses could potentially exceed the County's stationary noise source standards at nearby noise-sensitive land uses (refer to Table 5). Areas where commercial and residential development would occur in close proximity, such as planned mixed-use development, would be of particular concern. As a result, noise generated by planned commercial uses would be considered a ***potentially significant impact***.

Educational Land Uses

Noise generated by the proposed satellite junior college campus and childcare center would be predominantly generated by elevated children's voices, adult voices, building mechanical equipment, parking lots, and exterior PA system speakers. Based on measurement data obtained from similar land uses, noise levels associated with small playgrounds and recreation areas can generate intermittent noise levels of approximately 55-60 dBA L_{eq} at 50 feet. Noise levels associated with outdoor playgrounds would not be anticipated to exceed the County's noise standards at nearby land uses and would be largely masked by traffic noise emanating from area roadways, including U.S. Highway 101. Building mechanical equipment is typically located within the structure, enclosed, or placed on rooftop areas away from direct public exposure. Noise generated by onsite noise sources would be predominantly limited to the daytime hours of operations. However, as discussed above, outdoor equipment such as back-up power generators, trash compactors, and exterior amplified P.A. sound systems may result in increases in ambient noise levels at nearby noise-sensitive land uses in excess of the County's noise standards. As a result, noise generated by the proposed satellite junior college campus would be considered a ***potentially significant impact***.

Mitigation Measures

Noise-1: The following mitigation measures shall be implemented to reduce long-term exposure to transportation and non-transportation noise:

a. The County shall require acoustical assessments to be prepared as part of the environmental review process for future noise-sensitive land uses located within the projected 60 dBA CNEL noise contour of U.S. Highway 101 (i.e., within 1,005 feet from the centerline of U.S. Highway 101, Refer to Figure 4 of this report). The acoustical assessments shall address compatibility with the County's noise standards for transportation noise sources. Where the acoustical assessments determine that transportation noise levels would exceed applicable County noise standards, noise-reduction measures shall be incorporated sufficient to reduce operational noise levels to below applicable noise standards. Such measure may include but are not limited to, the incorporation of setbacks, sound barriers, or berms. The emphasis of such measures shall be placed upon site planning and project design. (Refer to Table 6 of this report for noise-sensitive land uses and corresponding noise standards.)

b. The County shall require acoustical assessments to be prepared as part of the environmental review process for future commercial land uses involving the proposed installation of exterior noise-generating equipment, including, but not limited to, back-up power generators, trash compactors, amplified public address systems, and commercial-use air conditioning condensers. The acoustical assessments shall evaluate potential noise impacts attributable to the proposed project in comparison to applicable County noise standards for stationary noise sources (refer to Table 5). The acoustical assessment shall evaluate impacts to nearby existing off-site, as well as future planned on-site noise-sensitive land uses. Where the acoustical analysis determines that stationary-source noise levels would exceed applicable County noise standards, noise-reduction measures shall be incorporated sufficient to reduce operational noise levels to below applicable noise standards. Such measure may include but are not limited to, the incorporation of setbacks, sound barriers, berms, hourly limitations, or equipment enclosures. The emphasis of such measures shall be placed upon site planning and project design. (Refer to Table 5 of this report for applicable County noise standards.)

Significance After Mitigation

In accordance with Mitigation Measure Noise-1, acoustical assessments would be required for purposes of ensuring compatibility of planned future on-site land uses with the County's noise standards for transportation noise sources. Acoustical assessments would also be required for planned future land uses that would involve the installation of noise-generating non-transportation (stationary) equipment for consistency with applicable County noise standards. Noise-reduction measures, such as the incorporation of setbacks, sound barriers, berms, hourly limitations, or equipment enclosures, would be required sufficient to demonstrate compliance with applicable County noise standards. With mitigation, this impact would be considered ***less than significant.***

Short-Term Exposure to Construction Noise

Construction noise typically occurs intermittently and varies depending upon the nature or phase of construction (e.g., land clearing, grading, excavation, and paving). Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Although noise ranges are generally similar for all construction phases, the initial site preparation phase tends to involve the most heavy-duty equipment having a higher noise-generation potential. Noise levels associated with individual construction equipment are summarized in Table 9.

As depicted in Table 9, maximum noise levels generated by individual pieces of construction equipment typically range from approximately 77 dBA to 90 dBA L_{max} at 50 feet (FTA 2018). Average-hourly noise levels for individual construction equipment generally range from approximately 72 to 82 dBA L_{eq}. Based on these equipment noise levels, equipment commonly associated with community development projects, and assuming the two loudest pieces of equipment operating simultaneously in close proximity, predicted average-hourly noise levels occurring during the loudest phases of construction generally range from approximately 78 to 84 dBA L_{eq} at 50 feet (refer to Table 10). Other construction activities (e.g., painting, landscaping) typically generate lower noise levels (FTA 2018). Short-term increases in vehicle traffic, including worker commute trips and haul truck trips may also result in temporary increases in ambient noise levels at nearby receptors.

Table 9. Construction Equipment Noise Levels

Equipment	Noise Level (dBA at 50 feet)	
	L_{max}	L_{eq}
Backhoes	78	74
Bulldozers	82	78
Compressors	78	74
Cranes	81	73
Concrete Pump Truck	81	74
Drill Rigs	79	72
Dump Trucks	77	73
Excavator	81	77
Generator	81	78
Gradall	83	79
Grader	85	81
Hydraulic Break Rams	90	80
Front End Loaders	79	75
Pneumatic Tools	85	82
Pumps	81	78
Rollers	80	73
Scrapers	84	80
Tractor	84	80

Based on measured instantaneous noise levels (L_{max}), average equipment usage rates, and calculated average-hourly (Leq) noise levels derived from the FHWA Road Construction Noise Model (FHWA 2008)

Table 10. Typical Construction Phase Equipment & Noise Levels

Construction Phase	Typical Equipment	Noise Level (dBA L_{eq}) at 50 feet from Source Center
Demolition	Concrete Saws, Excavators, Dozers	81
Site Preparation	Dozers, Tractors, Loaders, Backhoes	83
Grading	Dozers, Tractors, Loaders, Backhoes, Graders, Scrapers, Excavators	84
Building Construction/Architectural Coating	Cranes, Forklifts, Tractors, Loaders, Backhoes, Generators, Welders	83
Paving	Pavers, Rollers, Paving Equipment (e.g., Compactors)	78

1. Represents equipment typically associated with community development projects derived from the California Emissions Estimator Model.
2. Based on equipment noise levels identified in Table 11. Assumes the two loudest pieces of equipment operating simultaneously.
Sources: FTA 2018, FHWA 2008, CAPCOA 2016

Depending on the location and types of activities conducted (e.g., demolition, site preparation, grading), predicted noise levels at the nearest residences, which are located adjacent to the project site, could potentially exceed 80 dBA L_{eq}, particularly when activities occur within approximately 50 feet of the nearest site boundaries. Furthermore, with regard to residential land uses, activities occurring during the more noise-sensitive evening and nighttime hours could result in increased levels of annoyance and potential sleep disruption. For these reasons, noise-generating construction activities would be considered to have a **potentially significant** short-term noise impact.

Mitigation Measures

Noise-2: The following mitigation measures shall be implemented to reduce exposure to short-term construction noise.

a. Unless otherwise provided for in a validly issued permit or approval, noise-generating construction activities should be limited to the hours of 7:00 a.m. and 7:00 p.m. Noise-generating construction activities should not occur on Sundays or legal holidays.

b. Construction equipment should be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment-engine shrouds should be closed during equipment operation.

c. Equipment shall be turned off when not in use for an excess of five minutes, except for equipment that requires idling to maintain performance.

d. Construction haul truck routes shall be routed away from nearby noise-sensitive land uses, to the extent possible.

e. Staging and queuing areas shall be located at the furthest distance possible from nearby noise-sensitive land use identified in the project area at the time of construction.

f. Stationary equipment (e.g., generators, compressors) shall be located at the furthest distance possible from nearby noise-sensitive land use identified in the project area at the time of construction.

g. A public liaison shall be appointed for project construction and shall be responsible for addressing public concerns related to construction-generated noise, including excessive noise. As needed, the liaison shall determine the cause of the concern (e.g., starting too early, bad muffler) and implement measures to address the concern. Where necessary, additional measures, such as equipment repairs, equipment enclosures, or temporary barriers, shall be implemented to address local concerns.

h. Signage shall be placed at the project site construction entrance(s) to advise the public of anticipated dates of construction. The signage shall include the phone number of the public liaison appointed to address construction-related noise concerns.

Significance After Mitigation

With the implementation of Mitigation Measure Noise-2, construction activities would be limited to the less noise-sensitive daytime hours. The proper maintenance of construction equipment and use of manufacturer-recommended mufflers and engine shrouds would reduce equipment noise levels by approximately 10 dB. The installation of temporary noise barriers, where required, would decrease noise level by approximately 5 to 8 dB. With mitigation, average-hourly construction noise levels would be reduced to less than 80 dBA L_{eq} at nearby noise-sensitive land uses. With mitigation, this impact would be considered **less than significant**.

IMPACT B. Generation of excessive groundborne vibration or groundborne noise levels.

Increases in groundborne vibration levels attributable to the proposed project would be primarily associated with short-term construction-related activities. Construction activities associated with the proposed project would likely require the use of various off-road equipment, such as tractors, concrete mixers, and haul trucks.

Groundborne vibration levels associated with representative construction equipment are summarized in Table 11. Based on the vibration levels presented, ground vibration generated by construction equipment would not exceed approximately 0.09 inches per second ppv at 25 feet. Predicted vibration levels at the nearest offsite structures would not be anticipated to exceed the minimum recommended criteria for structural damage or human annoyance (0.5 and 0.2 in/sec ppv, respectively) at nearby land uses.

In addition, haul trucks traveling along project area roadways may result in perceptible increases in vibration levels. However, these vibration levels would be transient and instantaneous events, which would be typical of existing vibrations along the roadway network. Based on measurements conducted by Caltrans, on-road heavy-duty trucks would not generate substantial increases in groundborne vibration that would be expected to exceed commonly applied criteria for structural damage or annoyance (Caltrans 2020). As a result, this impact would be considered **less than significant**.

Table 11. Representative Vibration Source Levels for Construction Equipment

Equipment	Peak Particle Velocity at 25 Feet (In/Sec)
Large Bulldozers	0.089
Loaded Trucks	0.076
Jackhammer	0.035
Small Bulldozers	0.003
Source: FTA 2018, Caltrans 2020	

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

The project site is not located within two miles of a public airport or private airstrip. The nearest airports include the Santa Maria Airport, which is located approximately nine miles south of the project site, and the Oceano County Airport, which is located approximately seven miles northwest of the project site. The project site is not located within the airport land use planning areas or the projected 65 dBA CNEL contours of these airports (SLOALUC 2007, SBCAG 2019). As a result, the project site is not subject to high levels of aircraft noise. This impact is considered **less than significant**.

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APPENDIX A
Ambient Noise Monitoring Surveys

NOISE MEASUREMENT SURVEY FORM

SHEET	1	OF	2

DATE:	11/15-16/2021
PROJECT:	DANA RESERVE
LOCATION:	SAN LUIS OBISPO COUNTY
MONITORING STAFF:	KURT LEGLEITER, TREVOR BURMESTER

LOCATION MAP: (Include a map of noise measurement locations AND photographs for measurement locations on attached worksheet. Include additional sheets as necessary. Where possible include GPS coordinates.)

NOISE MEASUREMENT CONDITIONS & EQUIPMENT

MET CONDITIONS & MONITORING EQUIPMENT:	TEMP: 70-75 F. | HUMIDITY: 30 % | WIND SPEED: 0-2 MPH | SKY: 2, 3 | GROUND: DRY				
	CLOUD COVER BY CLASS (OC=OVERCAST):	2	(1. HEAVY OC, 2. LIGHT OC, 3. SUNNY, 4. CLEAR NIGHT, 5. OC NIGHT)		
	MET. METER:	KESTREL 5500			
NOISE MONITORING EQUIPMENT:	LARSON DAVIS SLM MODEL:	820			
	CALIBRATOR:	CAL200			
NOISE MONITORING SETUP:	WITHIN 10 FT OF REFLECTIVE SURFACE?:	NO	MICROPHONE HEIGHT AGL (FT):	5	
CALIBRATED PRIOR TO AND UPON COMPLETION OF MEASUREMENTS:		YES	METER SETTINGS:	A-WHT	SLOW

NOISE & TRAFFIC MEASUREMENTS

MEASUREMENT LOCATION	MEASUREMENT DATE/TIME	DURATION (Minutes)	MEASUREMENT LOCATION	PRIMARY NOISE SOURCES NOTED	MEASURED NOISE LEVELS LEQ	LMAX		
ST-1	10/16/2021 14:14-13:14	10	Southeast corner of Project site, approximately 33 yards from the median of U.S. Highway 101.	Traffic	65.5	84.3		
ST-1	10/15/2021 11:13-11:23	10	Southeast corner of Project site, approximately 33 yards from the median of U.S. Highway 101.	Traffic	70.3	77.4		
ST-2	10/15/2021 11:40-11:50	10	Southern boundary of project site on Cory Way, approximately 212 yards north of Sandydale Dr.	Traffic	41.3	57.9		
ST-3	10/15/2021 11:56-12:06	10	West side of project, on Hetrick Ave., approximately 56 yards north of Pomeroy Rd.	Traffic	56.6	66.6		
ST-4	10/15/2021 12:24-12:34	10	North side of project, on Cherokee Pl., approximately 306 yards south of Willow Rd.	Traffic	44.3	65.4		

NOISE MEASUREMENT SURVEY FORM

SHEET	2	OF	2

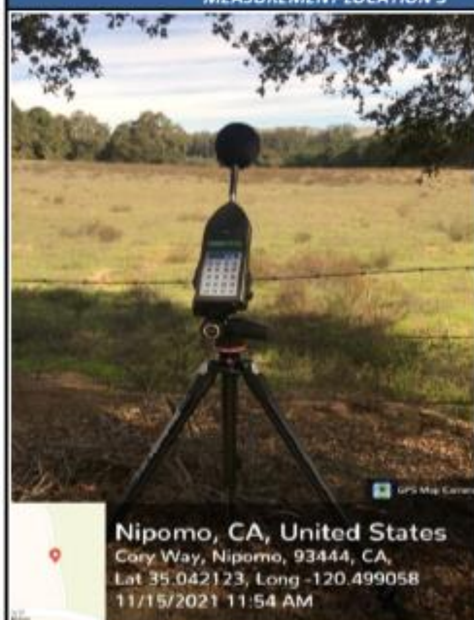
DATE:	11/15-16/2021
PROJECT:	DANA RESERVE
LOCATION:	SAN LUIS OBISPO COUNTY
MONITORING STAFF:	KURT LEGLEITER, TREVOR BURMESTER

SITE PHOTO(S): (Refer to data sheets for noise measurement locations)

MEASUREMENT LOCATION 1

MEASUREMENT LOCATION 2

MEASUREMENT LOCATION 3



MEASUREMENT LOCATION 4

APPENDIX B
Noise Modeling & Supportive Documentation

PREDICTED FUTURE YEAR TRAFFIC VOLUMES FOR HIGHWAY 101

HIGHWAY SEGMENT	YR 2010 VOLUMES	FUTURE YR 2035 VOLUME	CHANGE	PERCENT INCREASE
US 101, SOUTH OF SAN LUIS BAY DRIVE	71355	80447	9092	12.74%
US 101, AT SAN LUIS BAY DRIVE	70760	79911	9151	12.93%
US 101, NORTH OF SAN LUIS BAY DRIVE	77204	86751	9547	12.37%
US 101, NORTH OF HIGUERA	68226	78618	10392	15.23%

Source: County of San Luis Obispo. October 2019. US 101/San Luis Bay Drive Intersection Control Evaluation (ICE), Step 1, Final Report. Website url: https://www.slocounty.ca.gov/Departments/Public-Works/Forms-Documents/Transportation/Previous-Traffic-Studies/San-Luis-Bay-Drive-Interchange-Analysis-Future-I.pdf.

HIGHWAY SEGMENT	YEAR 2017 VOLUMES	PERCENT INCREASE	FUTURE YR 2032 VOLUME
US 101, Tefft St	66000	15.23%	76052.94169

Year 2017 traffic volumes derived from Caltrans. 2017 Traffic Volumes, For All Vehicles on CA State Highways. Website url: https://dot.ca.gov/programs/traffic-operations/census/traffic-volumes.

To be conservative, future year traffic volumes assume an increase of 15.23%, based on data obtained from the ICE report.

Predicted Traffic Noise Levels - Weekdays									
	Existing Noise Level - dBA CNEL/Ldn								
					at 50ft	Distance to Contours			
Roadways	Avg Lanes	Avg Speeds	PM Vol	ADT	NTLCL	55 CNEL	60 CNEL	65 CNEL	70 CNEL
Willow Rd (SR 1 to Pomeroy)	2	55	784	7840	68.03	411.2	191	88.8	0
Willow Rd (Pomeroy to Hetrick)	2	55	714	7140	67.62	386.3	179.4	83.5	0
Willow Rd (Hetrick to US 101 SB ramp)	2	55	960	9600	68.91	470.6	218.5	101.6	0
Willow Rd (US 101 SB Ramp to NB ramp)	4	55	527	5270	65.23	315.6	147.4	70.3	0
Pomeroy Rd (Willow to SW Project Entry)	2	45	443	4430	63.35	200.6	93.3	0	0
Pomeroy Rd (SW Project Enter to Tefft)	2	45	576	5760	64.49	238.8	111	51.8	0
Tefft St (Pomeroy to Mary)	5	45	1,415	14150	66.94	434.5	202.8	96.4	0
Tefft St (Mary to US 101 SB Ramp)	5	35	1,916	19160	65.56	352.1	164.8	79.2	0
Tefft St (US 101 SB ramp to NB ramp)	6	35	2,006	20060	65.29	363.3	170.9	83.9	0
Mary St (Tefft to Juniper)	3	35	624	6240	61.84	166.8	77.9	0	0
N Thompson Ave (South of Willow)	2	55	540	5400	66.41	320.7	149	69.4	0
W Project Entry	2	35							
N Frontag Road	2	35							
SW Project Entry	2	35							
SR 101 (Willow to Tefft)	4	60	5600	67000	75.94	1987.1	923.1	429.9	202.5
SR 101 (Willow to Tefft) - Year 2032	4	60		76052	76.49	2162.2	1004.4	467.5	219.8

NTLCL=Near Travel Lane Centerline

ADT calculated based on pk-hr volumes and a k-factor of 0.10.

Predicted future traffic noise levels for U.S. Highway 101 were calculated based on a maximum predicted increase of 15.23 percent in traffic volumes over an estimated 15-year period, derived from the U.S. 101/San Luis Bay Drive Intersection Control Evaluation, Step 1, Final Report (San Luis Obispo County 2019). The estimated percent increase in traffic volumes was applied to the most current traffic volume data for the adjacent segment of U.S Highway 101, derived from the California Department of Transportation's 2017 Traffic Volumes for all Vehicles on CA State Highways.

	Predicted Traffic Noise Levels - Weekdays								
	Existing Plus Project - dBA CNEL/Ldn								
		Avg			at 50ft	Distance to Contours			
Roadways	Avg Lanes	Speeds	PM Vol	ADT	NTLCL	55	60	65	70
Willow Rd (SR 1 to Pomeroy)	2	55	867	8670	68.47	439.7	204.2	94.9	0
Willow Rd (Pomeroy to Hetrick)	2	55	797	7970	68.1	415.7	193.1	89.8	0
Willow Rd (Hetrick to US 101 SB ramp)	2	55	1,769	17690	71.56	707.1	328.3	152.5	71
Willow Rd (US 101 SB Ramp to NB ramp)	4	55	1008	10080	68.05	485.8	226.1	106.2	0
Pomeroy Rd (Willow to SW Project Entry)	2	45	558	5580	64.35	233.8	108.7	50.7	0
Pomeroy Rd (SW Project Enter to Tefft)	2	45	820	8200	66.02	302.2	140.4	65.4	0
Tefft St (Pomeroy to Mary)	5	45	1,415	14150	66.94	434.5	202.8	96.4	0
Tefft St (Mary to US 101 SB Ramp)	5	35	1,866	18660	65.45	346	161.9	78	0
Tefft St (US 101 SB ramp to NB ramp)	5	35	2,026	20260	65.33	365.7	172	84.3	0
Mary St (Tefft to Juniper)	3	35	588	5880	61.58	160.4	74.9	0	0
N Thompson Ave (South of Willow)	2	55	664	6640	67.31	368.1	171	79.5	0
W Project Entry *NEW*	2	35	395	3950	60.16	123	57.4	0	0
N Frontag Road *NEW*	2	35	715	7150	62.74	182.6	84.9	0	0
SW Project Entry *NEW*	2	35	463	4630	60.85	136.7	63.7	0	0

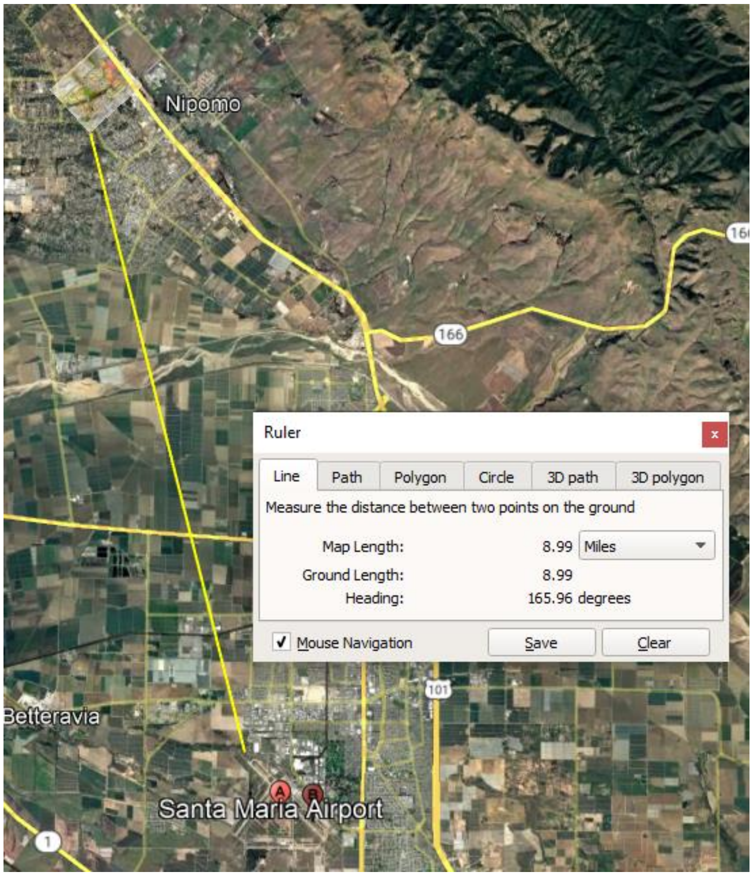
NTLCL=Near Travel Lane Centerline

ADT calculated based on pk-hr volumes and a k-factor of 0.10.

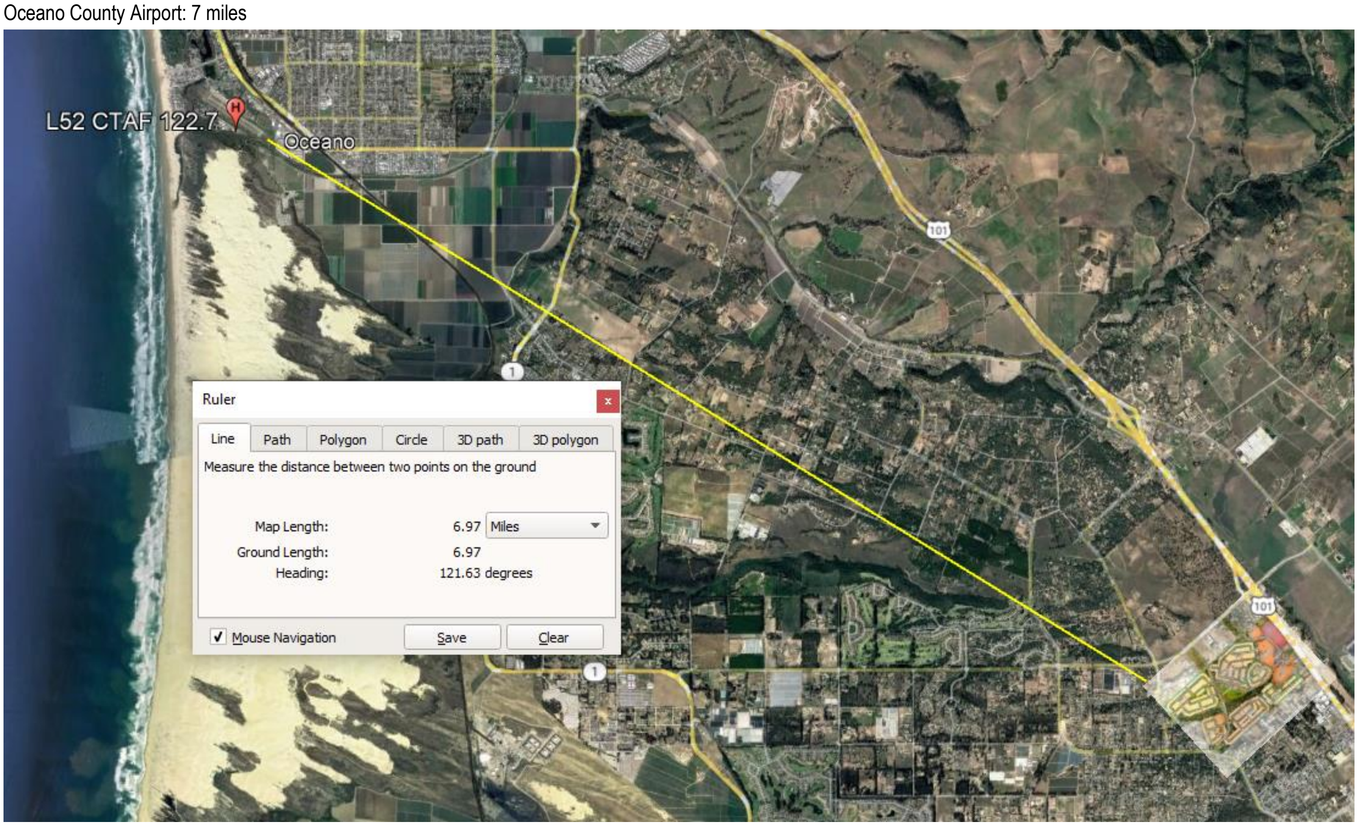
Predicted future traffic noise levels for U.S. Highway 101 were calculated based on a maximum predicted increase of 15.23 percent in traffic volumes over an estimated 15-year period, derived from the U.S. 101/San Luis Bay Drive Intersection Control Evaluation, Step 1, Final Report (San Luis Obispo County 2019). The estimated percent increase in traffic volumes was applied to the most current traffic volume data for the adjacent segment of U.S Highway 101, derived from the California Department of Transportation's 2017 Traffic Volumes for all Vehicles on CA State Highways.

DISTANCES TO NEARBY AIRPORTS

Santa Maria Airport: 9 miles

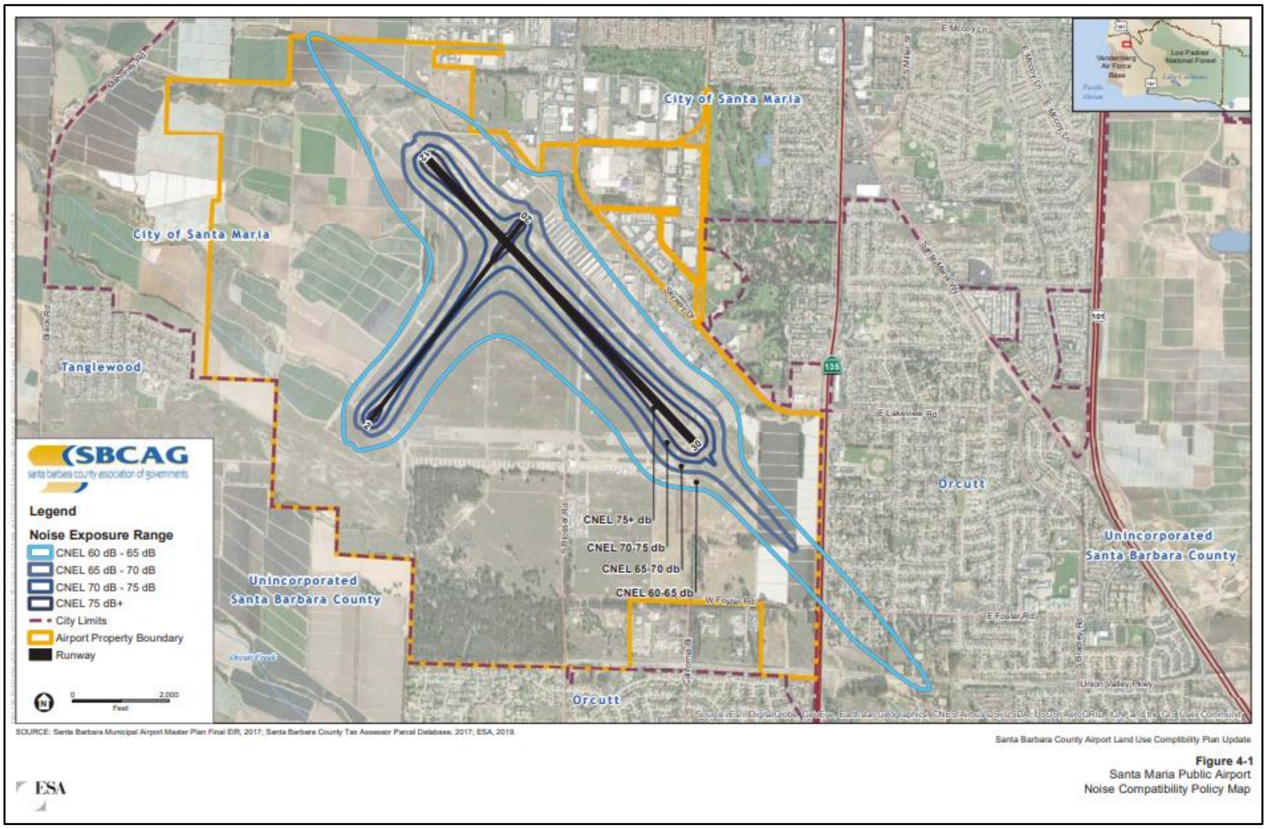


Oceano County Airport: 7 miles



AIRPORT LAND USE COMPATIBILITY PLANNING AREAS

Santa Maria Airport



Oceano County Airport