

A P P E N D I X H

N O I S E D A T A





Environmental Noise Assessment

The Mosaic Project

Alameda County, California

May 21, 2020

Project # 181006

Prepared for:

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A handwritten signature in blue ink, appearing to read "Luke Saxelby".



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INTRODUCTION

Saxelby Acoustics was retained by NorthStar Engineering to perform a noise study for proposed children's camp referred to as "The Mosaic Project." The project is located in Alameda County at 17015 Cull Canyon Road, Castro Valley, CA. The project includes two outdoor activity areas which will operate during daytime (7 a.m. to 10 p.m.) hours. The first outdoor activity area consists of a recreational field for sports and outdoor games. The second outdoor activity area, referred to as the "Campfire Area," consists of a small stage for non-amplified music and performances.

Figure 1 shows the proposed project site plan. **Figure 2** shows an aerial photo of the project site and nearby existing sensitive receptors.

ENVIRONMENTAL SETTING

BACKGROUND INFORMATION ON NOISE

Fundamentals of Acoustics

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

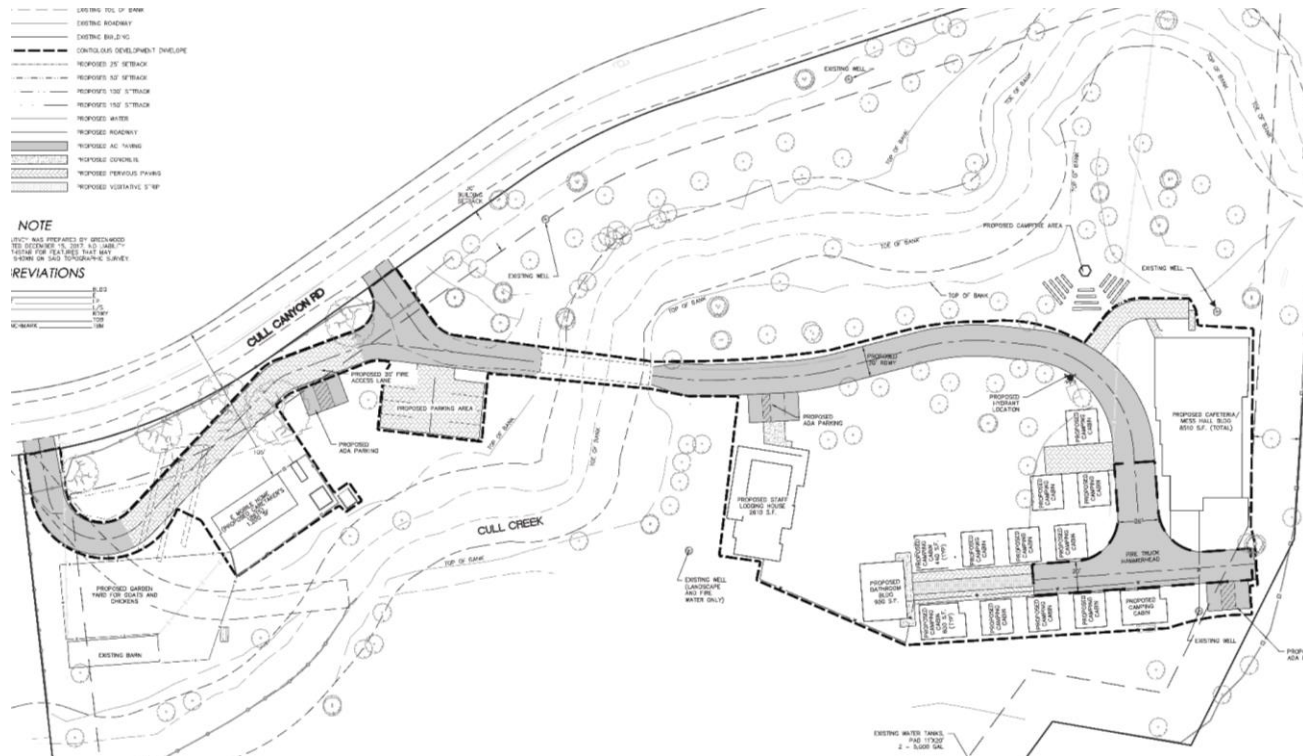
The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

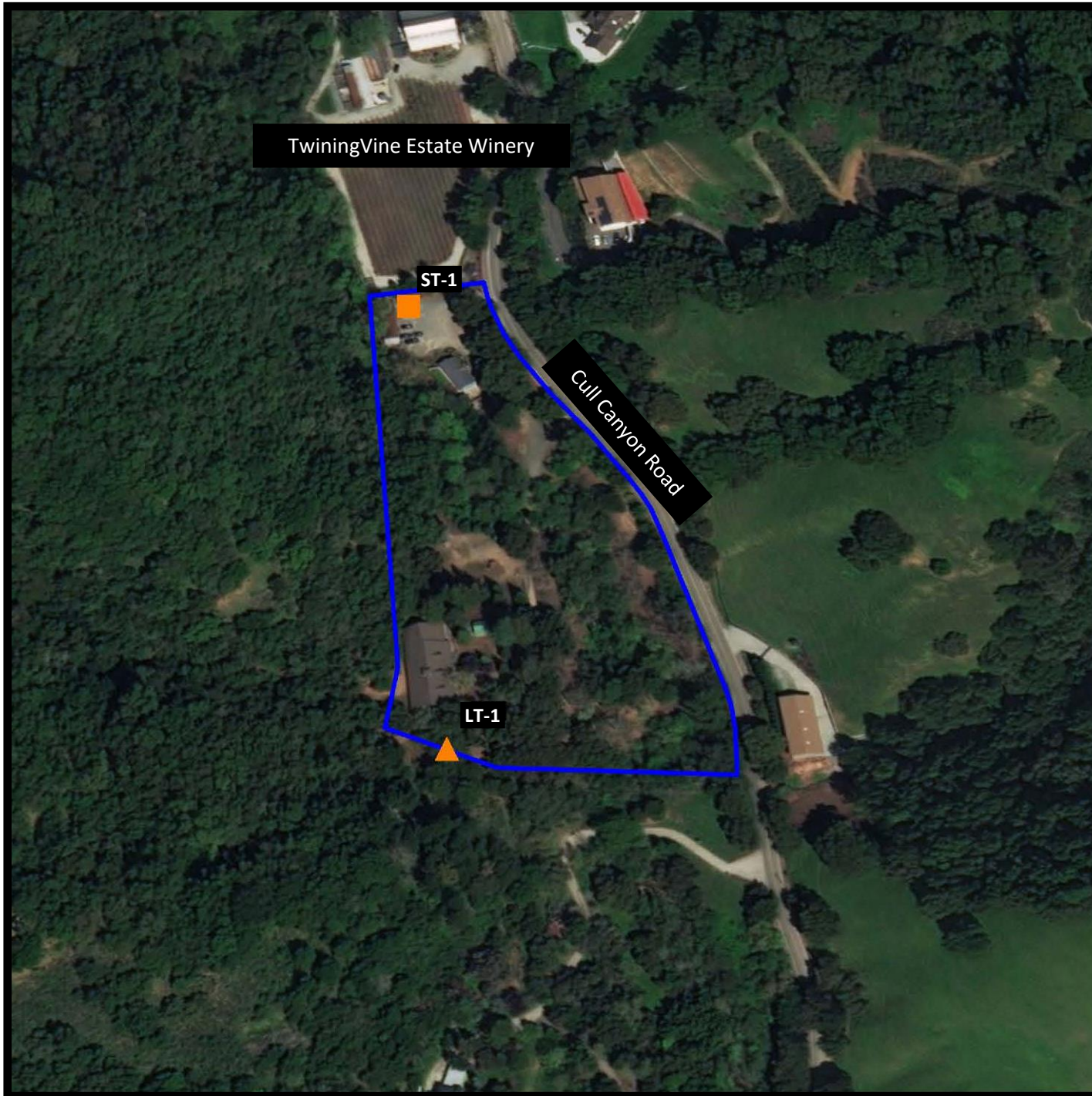
The Mosaic Project

Alameda County, California

Figure 1

Project Site Plan







The Mosaic Project

Alameda County, California

Figure 2

Noise Measurement Sites

Legend

-  Project Site
-  Noise Measurement - Long Term
-  Noise Measurement - Short Term



25 m 75 m 125 m

Projection: Geographic (Latitude/Longitude) / WGS84 / arc degrees
Rev. Date: 11/15/2018



The decibel scale is logarithmic, not linear. In other words, two sound levels 10-dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10-dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn} , and shows very good correlation with community response to noise.

The day/night average level (L_{dn}) is based upon the average noise level over a 24-hour day, with a +10-decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. The Community Equivalent Noise Level (CNEL) is similar to L_{dn} , but also includes an evening (7:00 a.m. to 7:00 p.m.) with a +5 dB penalty applied to noise occurring during this timeframe.

Table 1 lists several examples of the noise levels associated with common situations. **Appendix A** provides a summary of acoustical terms used in this report.

Table 1: Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft.)	--100--	
Gas Lawn Mower at 1 m (3 ft.)	--90--	
Diesel Truck at 15 m (50 ft.), at 80 km/hr. (50 mph)	--80--	Food Blender at 1 m (3 ft.) Garbage Disposal at 1 m (3 ft.)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft.)	--70--	Vacuum Cleaner at 3 m (10 ft.)
Commercial Area Heavy Traffic at 90 m (300 ft.)	--60--	Normal Speech at 1 m (3 ft.)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

Source: Caltrans, *Technical Noise Supplement, Traffic Noise Analysis Protocol*. September, 2013.

EFFECTS OF NOISE ON PEOPLE

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1-dBA cannot be perceived;
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference;
- A change in level of at least 5-dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6-dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

EXISTING AND FUTURE NOISE AND VIBRATION ENVIRONMENTS

EXISTING NOISE RECEPTORS

Some land uses are considered more sensitive to noise than others. Land uses often associated with sensitive receptors generally include residences, schools, libraries, hospitals, and passive recreational areas. Sensitive noise receptors may also include threatened or endangered noise sensitive biological species, although many jurisdictions have not adopted noise standards for wildlife areas. Noise sensitive land uses are typically given special attention in order to achieve protection from excessive noise.

Sensitivity is a function of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities involved. In the vicinity of the project site, sensitive land uses include existing single-family residential uses located north, east, and south of the project site.

EXISTING GENERAL AMBIENT NOISE LEVELS

The existing noise environment in the project area is primarily defined by traffic on Cull Canyon Road east of the project site.

To quantify the existing ambient noise environment in the project vicinity, Saxelby Acoustics conducted a continuous (24-hr.) noise level measurement at one location on the project and a short-term noise level measurement at one location on the project.

Noise measurement locations are shown on **Figure 2**. A summary of the noise level measurement survey results is provided in **Table 2**. **Appendix B** contains the complete results of the noise monitoring.

The sound level meters were programmed to record the maximum, median, and average noise levels at each site during the survey. The maximum value, denoted L_{max} , represents the highest noise level measured. The average value, denoted L_{eq} , represents the energy average of all of the noise received by the sound level meter microphone during the monitoring period. The median value, denoted L_{50} , represents the sound level exceeded 50 percent of the time during the monitoring period.

Larson Davis Laboratories (LDL) model 831 and 812 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and after use with a B&K Model 4230 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

Table 2: Summary of Existing Background Noise Measurement Data

Site	Date	Average Measured Hourly Noise Levels, dBA						
		CNEL/L _{dn}	Daytime (7:00 am - 10:00 pm)			Nighttime (10:00 pm – 7:00 am)		
			L _{eq}	L ₅₀	L _{max}	L _{eq}	L ₅₀	L _{max}
LT-1	4/09/20 - 4/10/20	49	45	38	60	42	40	52
ST-1	4/09/20 - 10:00 a.m.	N/A	48	37	63	N/A	N/A	N/A

Source: Saxelby Acoustics – 2020

REGULATORY CONTEXT

6.60.040 - Exterior noise level standards.

- A. It is unlawful for any person at any location within the unincorporated area of the county to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the exterior noise level when measured at any single- or multiple-family residential, school, hospital, church, public library or commercial properties situated in either the incorporated or unincorporated area to exceed the noise level standards as set forth in Table 6.60.040A or Table 6.60.040B following:

Table 3: Receiving Land Use — Single- or Multiple-Family Residential, School, Hospital, Church or Public Library Properties Noise Level Standards, dB(A) (Table 6.60.040a)

Category	Cumulative Number of Minutes in any one-hour time period	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
1	30	50	45
2	15	55	50
3	5	60	55
4	1	65	60
5	0	70	65

Table 4: Receiving Land Use — Commercial Properties Noise Level Standards, dB(A) (Table 6.60.040b)

Category	Cumulative Number of Minutes in any one-hour time period	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
1	30	65	60
2	15	70	65
3	5	75	70
4	1	80	75
5	0	85	80

- B. In the event the measured ambient noise level exceeds the applicable noise level standard in any category above, the applicable standard shall be adjusted so as to equal said ambient noise level.

- C. Each of the noise level standards specified in Tables 6.60.040A and B shall be reduced by five dB(A) for simple tone noises, noises consisting primarily of speech or music or for recurring impulsive noises.
- D. If the intruding noise source is continuous and cannot reasonably be discontinued or stopped for a time period whereby the ambient noise level can be measured, the noise level measured while the source is in operation shall be compared directly to the applicable noise level standards in Table 6.60.040A and Table 6.60.040B.
- E. Notwithstanding the noise level standards set forth in this section, the noise level standard applicable to the emission of sound from transformers, regulators, or associated equipment in electrical substations shall be 60 dB(A).

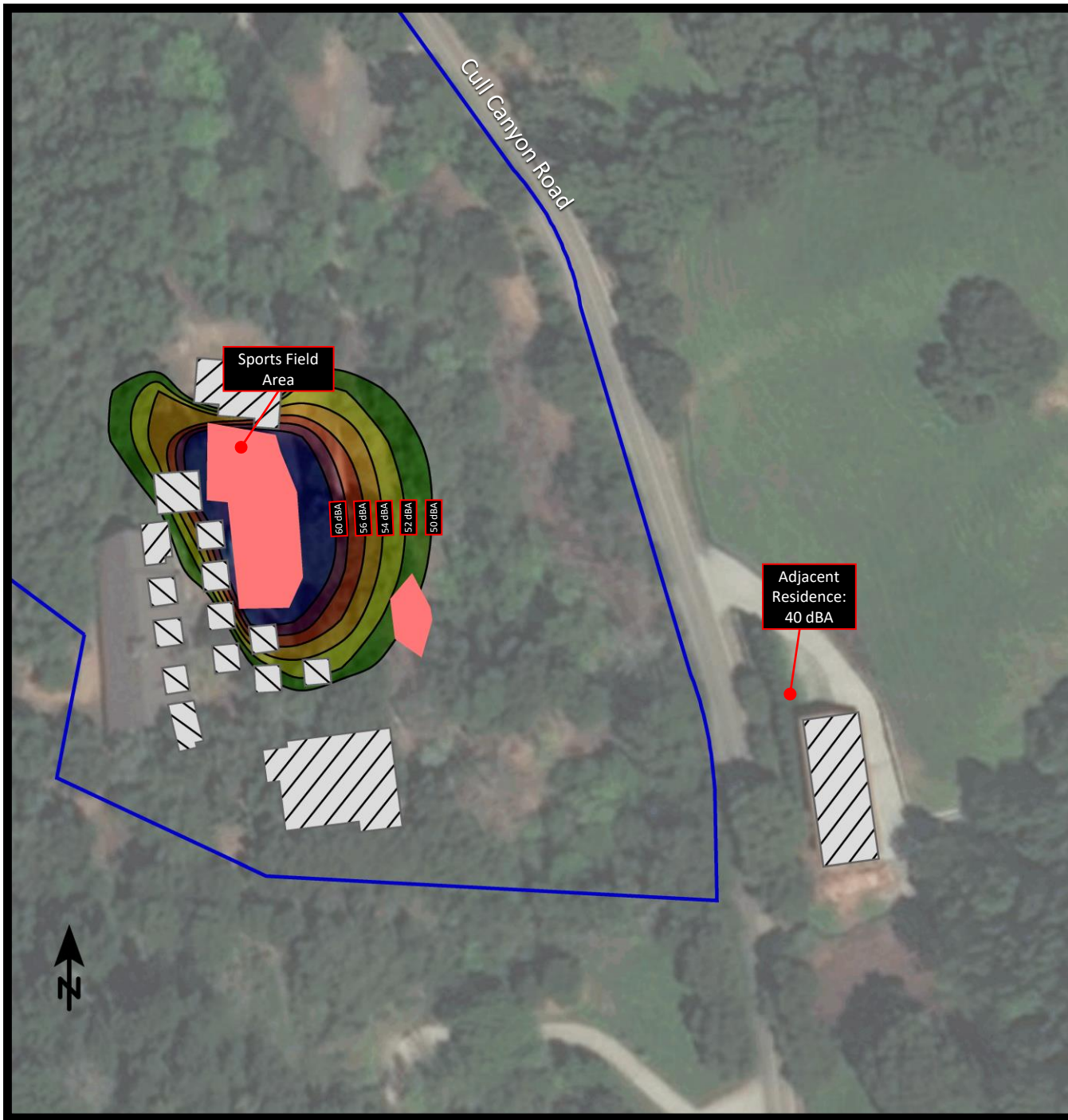
FUTURE TRAFFIC NOISE ENVIRONMENT

Traffic increases associated with the operation of the proposed project are expected to increase traffic noise levels along Cull Canyon Road. Saxelby Acoustics obtained the project traffic study from W-Trans Traffic Engineering Consultants. Existing traffic volumes for Cull Canyon Road were found to be approximately 420 vehicle trips per day. The proposed project is expected to increase traffic by a maximum of 51 vehicle trips per day. Given this increase in traffic volume, a noise level increase of approximately 0.5 dBA is expected. This is below the threshold of perception and will not substantially affect the ambient noise environment at sensitive receptors along Cull Canyon Road.

EVALUATION OF PROJECT NOISE EXPOSURE

Saxelby Acoustics prepared noise contour graphics showing median (L_{50}) and maximum (L_{max}) noise contours for the proposed project at both of the proposed outdoor activity areas. Noise contours were prepared using the SoundPLAN noise prediction model. Inputs to the model included sound power levels for noise-generating outdoor activity areas, existing and proposed buildings, topography, terrain type, and locations of sensitive receptors. These predictions are made in accordance with International Organization for Standardization (ISO) standard 9613-2:1996 (Acoustics – Attenuation of sound during propagation outdoors). ISO 9613 is the most commonly used method for calculating exterior noise propagation. Noise levels are predicted at the outdoor activity areas of sensitive receptors according to the requirements of Alameda County for stationary noise sources.

Figures 3 and 4 show the median (L_{50}) and maximum (L_{max}) noise contours for daytime noise at the proposed sports field. **Figures 5 and 6** show the median (L_{50}) and maximum (L_{max}) noise contours for daytime noise at the proposed campfire area. **Table 3** summarizes noise levels at the closest adjacent receptors.



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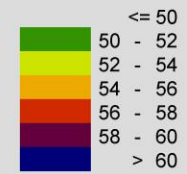
Figure 3

L50 Outdoor Activity Noise Contours
(dBA L₅₀)

Signs and symbols

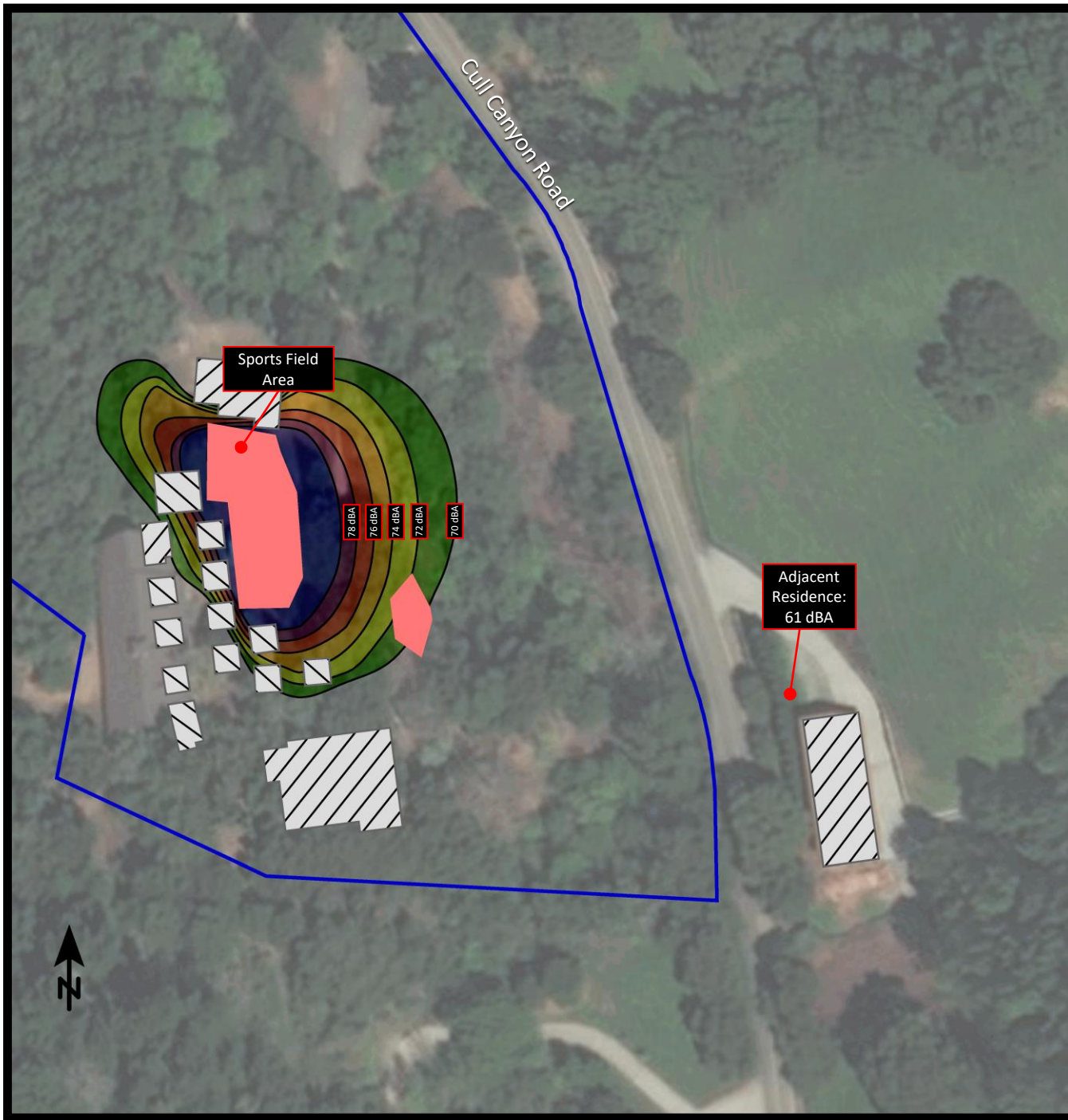
— Project Site

Levels in dB(A)



1 : 1219





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Figure 4

Lmax Outdoor Activity Noise Contours
(dBA L_{max})

Signs and symbols

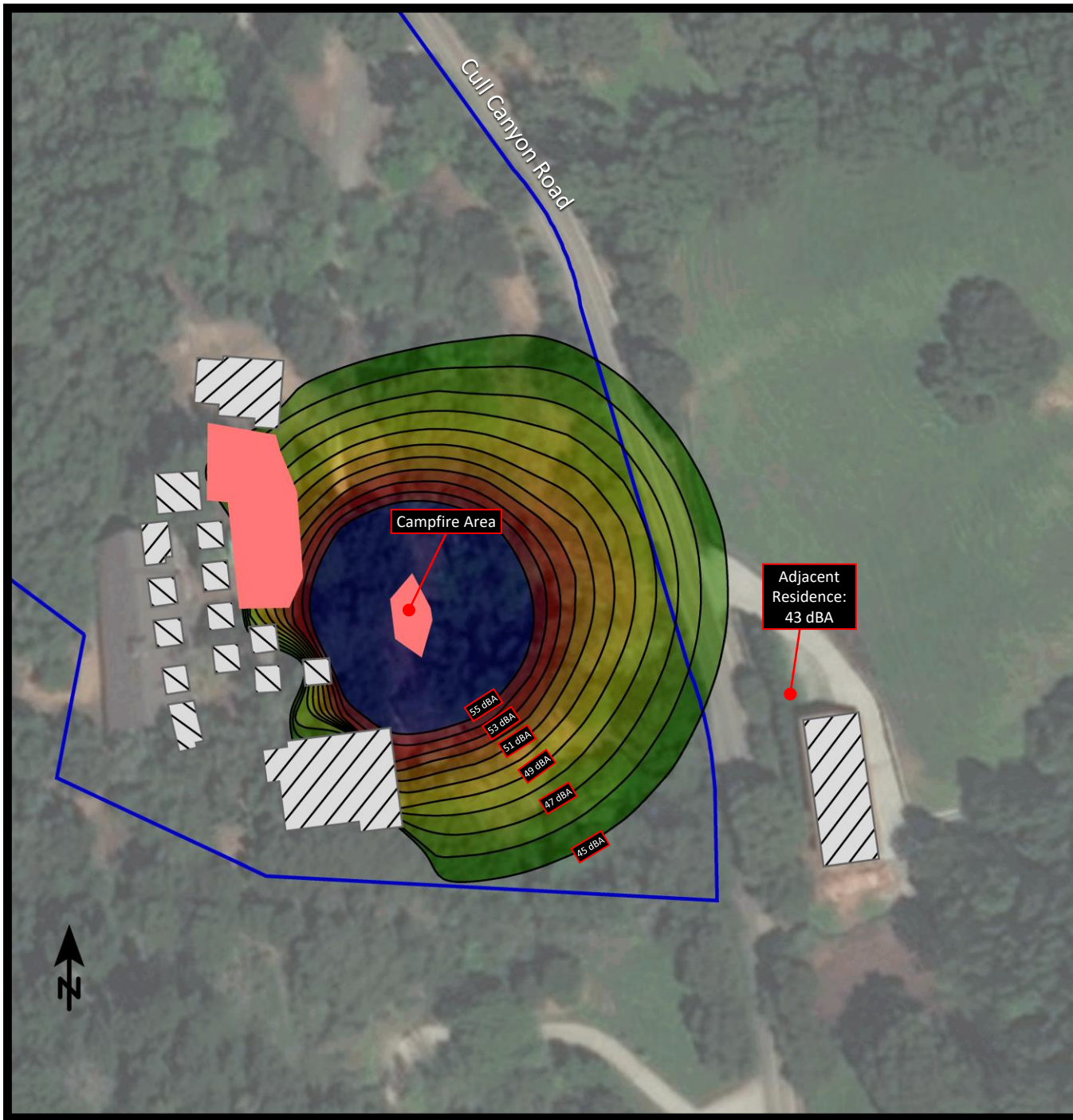
— Project Site

Levels in dB(A)

Green	<= 70
Light Green	70 - 72
Yellow	72 - 74
Orange	74 - 76
Red	76 - 78
Dark Red	78 - 80
Blue	> 80

1 : 1219





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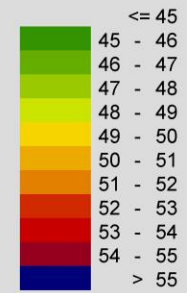
Figure 5

L50 Campfire Activity Noise Contours
(dBA L₅₀)

Signs and symbols

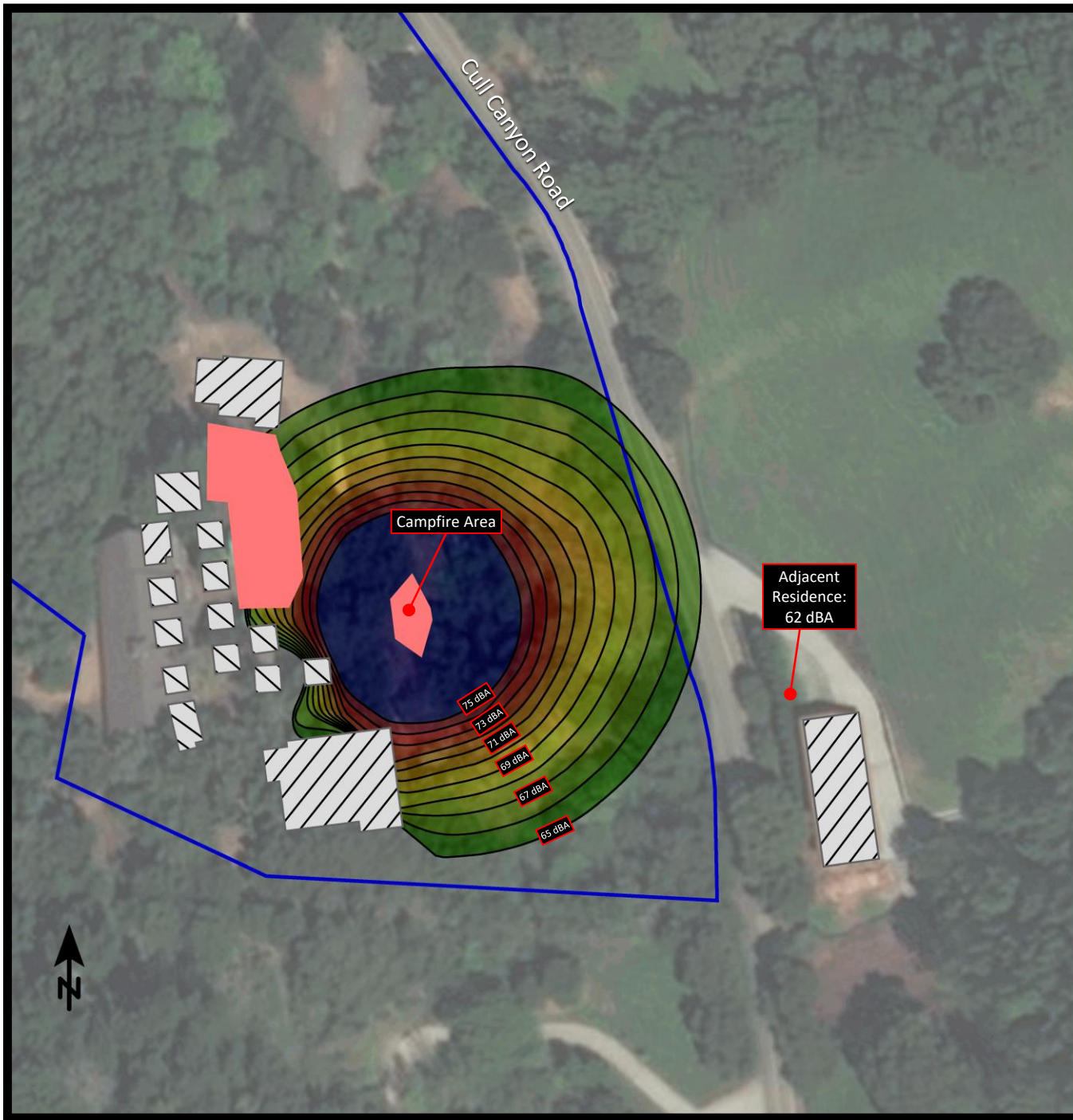
— Project Site

Levels in dB(A)



1 : 1219





The Mosaic Project

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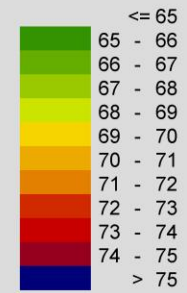
Figure 6

Lmax Campfire Activity Noise Contours
(dBA L_{max})

Signs and symbols

— Project Site

Levels in dB(A)



1 : 1219



Based upon the SoundPLAN noise modeling, **Table 3** shows the predicted project noise levels at the adjacent noise-sensitive receptors for the proposed sports field and campfire activity area.

TABLE 3: PROJECT NOISE LEVELS AT ADJACENT RECEPTORS

Activity Area	Time	Predicted Noise Levels	Noise Standard	Complies with Standards?
Sports Field	Day (7 a.m. to 10 p.m.)	40.4 dBA L ₅₀ 61.4 dBA L _{max}	50 dBA L ₅₀ 70 dBA L _{max}	Yes
Campfire Area	Day (7 a.m. to 10 p.m.)	42.8 dBA L ₅₀ 61.8 dBA L _{max}	45 dBA L ₅₀ * 65 dBA L _{max} *	Yes

**Noise standards are reduced by 5 dBA for noise consisting of music per Alameda County General Plan requirements*

As shown in **Table 3**, the project noise levels are predicted to comply with the Alameda County General Plan Noise Element standards. This conclusion is based upon the following assumptions for project-generated noise:

Activity Area 1 (Sports Field)

- Daytime (7:00 a.m. to 10:00 p.m.) sound levels emanating from the sports field shall not exceed 61 dBA L₅₀ and 80 dBA L_{max} at a distance of 50 feet to the east of the sports field boundary.

Activity Area 2 (Campfire Area)

- Daytime (7:00 a.m. to 10:00 p.m.) sound emanating from the campfire activity area shall not exceed 58 dBA L₅₀ and 77 dBA L_{max} at a distance of 50 feet to the east of the campfire area as measured from the rear of the campfire area stage.

CONCLUSIONS

The proposed project is predicted to comply with the Alameda County exterior noise standards assuming the following project noise limits at each activity area:

Activity Area 1 (Sports Field)

- Daytime (7:00 a.m. to 10:00 p.m.) sound levels emanating from the sports field shall not exceed 61 dBA L_{50} and 80 dBA L_{max} at a distance of 50 feet to the east of the sports field boundary.

Activity Area 2 (Campfire Area)

- Daytime (7:00 a.m. to 10:00 p.m.) sound emanating from the campfire activity area shall not exceed 58 dBA L_{50} and 77 dBA L_{max} at a distance of 50 feet to the east of the campfire area as measured from the rear of the campfire area stage.

REFERENCES

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Appendix A: Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
ASTC	Apparent Sound Transmission Class. Similar to STC but includes sound from flanking paths and correct for room reverberation. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by +5 dBA and nighttime hours weighted by +10 dBA.
DNL	See definition of Ldn.
IIC	Impact Insulation Class. An integer-number rating of how well a building floor attenuates impact sounds, such as footsteps. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
L(n)	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one-hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
NIC	Noise Isolation Class. A rating of the noise reduction between two spaces. Similar to STC but includes sound from flanking paths and no correction for room reverberation.
NNIC	Normalized Noise Isolation Class. Similar to NIC but includes a correction for room reverberation.
Noise	Unwanted sound.
NRC	Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.
RT60	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 Sabin.
SEL	Sound Exposure Level. SEL is a rating, in decibels, of a discrete event, such as an aircraft flyover or train pass by, that compresses the total sound energy into a one-second event.
SPC	Speech Privacy Class. SPC is a method of rating speech privacy in buildings. It is designed to measure the degree of speech privacy provided by a closed room, indicating the degree to which conversations occurring within are kept private from listeners outside the room.
STC	Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations. The STC rating is typically used to rate the sound transmission of a specific building element when tested in laboratory conditions where flanking paths around the assembly don't exist. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

Appendix B1 : Continuous Noise Monitoring Results

Site: LT-1

Project: The Mosaic Project

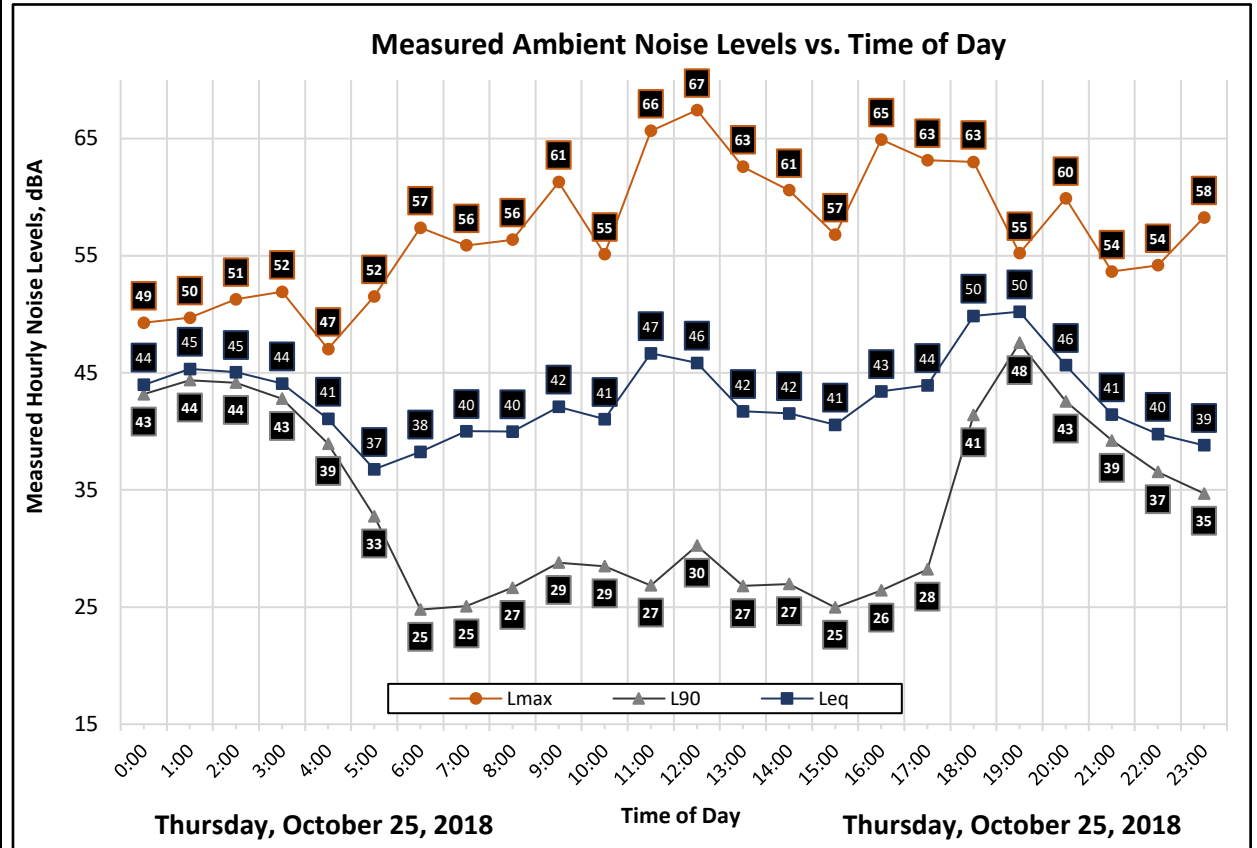
Meter: LDL 812-1

Location: Southern Project Boundary

Calibrator: B&K 4230

Coordinates: 37.7410835°, -122.0552801°

Date	Time	Measured Level, dBA			
		L _{eq}	L _{max}	L ₅₀	L ₉₀
Thursday, October 25, 2018	0:00	44	49	44	43
Thursday, October 25, 2018	1:00	45	50	45	44
Thursday, October 25, 2018	2:00	45	51	45	44
Thursday, October 25, 2018	3:00	44	52	44	43
Thursday, October 25, 2018	4:00	41	47	41	39
Thursday, October 25, 2018	5:00	37	52	36	33
Thursday, October 25, 2018	6:00	38	57	29	25
Thursday, October 25, 2018	7:00	40	56	32	25
Thursday, October 25, 2018	8:00	40	56	31	27
Thursday, October 25, 2018	9:00	42	61	34	29
Thursday, October 25, 2018	10:00	41	55	37	29
Thursday, October 25, 2018	11:00	47	66	36	27
Thursday, October 25, 2018	12:00	46	67	36	30
Thursday, October 25, 2018	13:00	42	63	34	27
Thursday, October 25, 2018	14:00	42	61	35	27
Thursday, October 25, 2018	15:00	41	57	33	25
Thursday, October 25, 2018	16:00	43	65	36	26
Thursday, October 25, 2018	17:00	44	63	35	28
Thursday, October 25, 2018	18:00	50	63	49	41
Thursday, October 25, 2018	19:00	50	55	50	48
Thursday, October 25, 2018	20:00	46	60	45	43
Thursday, October 25, 2018	21:00	41	54	41	39
Thursday, October 25, 2018	22:00	40	54	38	37
Thursday, October 25, 2018	23:00	39	58	36	35



Statistics	Leq	Lmax	L50	L90
Day Average	45	60	38	31
Night Average	42	52	40	38
Day Low	40	54	31	25
Day High	50	67	50	48
Night Low	37	47	29	25
Night High	45	58	45	44
Ldn	49	Day %		75
CNEL	50	Night %		25



Appendix B2 : Short Term Noise Monitoring Results

Site: ST-1

Project: The Mosaic Project

Order: LDL 831-3

Location: Northern Project Boundary

Contractor: B&K 4230

Coordinates: 37.7431197 -122.0554551°

Start: 2018-10-24 14:16:56

Stop: 10/24/2018 14:26:56 PM

SLM: Model 831

Serial: 1329

Measurement Results, dBA

Duration: 0:10

L_{eq}: 48

L_{max}: 63

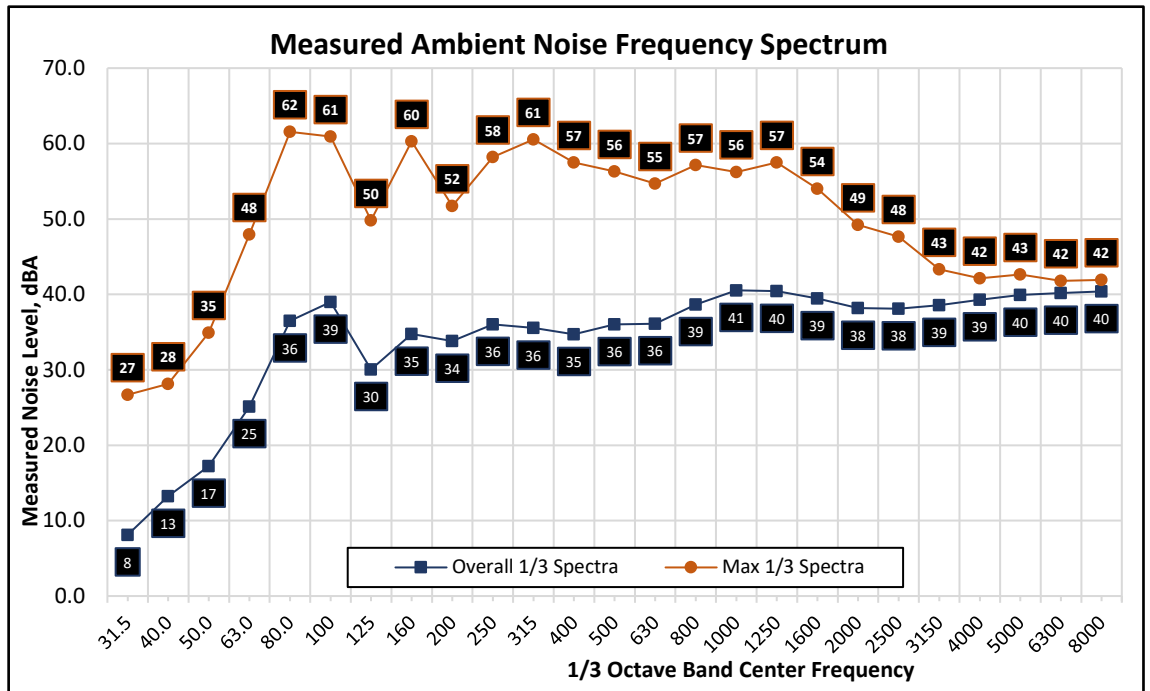
L_{min}: 25

L₅₀: 37

L₉₀: 28

Notes

Primary noise source is traffic on Cull Canyon Road



LOCAL REGULATIONS AND STANDARDS

Chapter 6.60 - NOISE

Sections:

6.60.010 - Declaration of policy.

In order to control unnecessary, excessive and annoying noise in the county, it is hereby declared to be the policy of the county to prohibit such noise generated from or by all sources as specified in this chapter. It shall be the policy of the county to maintain quiet in areas which exhibit low noise levels and to implement programs aimed to reduce noise in those areas within the county where noise levels are above acceptable values.

It is determined that certain noise levels are detrimental to the public health, welfare and safety, and are contrary to public interest. Therefore, the Board of Supervisors does ordain and declare that creating, maintaining, causing or allowing to be created, caused or maintained, any noise in a manner prohibited by or not in conformity with the provisions of this chapter, is a public nuisance and shall be punishable as such.

(Prior gen. code 3-107.101)

6.60.020 - Definitions.

"Ambient noise level" means the all encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

"A' weighted sound level" means the total sound level in decibels of all sound as measured with a sound level meter with a reference pressure of twenty (20) micropascals using the 'A' weighted network (scale) at slow response. The unit of measurement shall be defined as dB(A).

"Church" means any building or portion thereof regularly used by people as a place to worship God and known by those familiar with the neighborhood to be so used.

"Commercial properties" means any building, structure, premise or portion thereof used for wholesale or retail purposes on which the property user or employees are engaged in work for which it is intended that compensation be received for goods or services.

"Construction" means construction, erection, enlargements, alteration, conversion or movement of any building, structures or land together with any scientific surveys associated therewith.

"Cumulative period" means an additive period of time composed of individual time segments which may be continuous or interrupted.

"Decibel (dB)" means a unit for measuring the amplitude of sounds, equal to twenty (20) times the logarithm to the base ten of the ratio of the pressure of the sound measured to the reference pressure, which is twenty (20) micropascals.

"Director" means the director of environmental health of the county or his duly authorized deputy.

"Dwelling unit" means a single unit providing complete independent living facilities for one or more persons including permanent provisions for living, sleeping, eating, cooking and sanitation.

"Emergency work" means the use of any machinery, equipment, vehicle, manpower or other activity in a short term effort to protect or restore safe conditions in the community, or work by private or public utilities when restoring utility service.

"Hospital" means any building or portion thereof used for the accommodation and medical care of the sick, injured or infirm persons and includes rest homes and nursing homes.

"Impulsive noise" means a noise of short duration usually less than one second and of high intensity with an abrupt onset and rapid decay.

"Intruding noise level" means the total sound level in decibels, created, caused, maintained or originating from an alleged offensive source at a specified location while the alleged offensive source is in operation.

"Noise disturbance" means any sound as judged by any person empowered to enforce this chapter, which (A) endangers or injures the safety or health of human beings or animals, or (B) endangers or injures personal or real property, or (C) annoys or disturbs a reasonable person of normal sensitivity. The factors which shall be considered in determining whether a violation of (C) exists shall include, but not be limited to the following:

1. The relative sound level of the objectionable noise to the ambient noise;
2. The proximity of the objectionable noise to residential sleeping facilities or public camping facilities;
3. The number of persons affected by the objectionable noise;
4. The day of the week and time of day or night the objectionable noise occurs;
5. The duration of the objectionable noise and its tonal, informational or musical content;
6. Whether the objectionable noise is continuous, recurrent or intermittent;
7. The nature and zoning of the area within which the objectionable noise emanates.

"Person" means a person, firm, association, partnership, joint venture, corporation or any entity, public or private in nature.

"Recreational motor vehicle" means any motor vehicle (as that term is defined in the California Vehicle Code) and shall also include, but not be limited to, motorcycles, go-carts, campers, dune buggies and commercial or noncommercial racing vehicles. A "recreational motor vehicle" does not include a motorboat.

"Residential property" means a parcel of real property which is developed and used either in whole or in part for residential purposes.

"School" means public or private institutions, including vocational schools, conducting regular academic instruction at preschool, kindergarten, elementary, secondary or collegiate levels.

"Simple tone noise" means any sound which is distinctly audible as a single pitch or a set of single pitches as judged by any person empowered to enforce this chapter.

"Sound level meter" means an instrument used for measurement of sound levels, which meets the American National Standard Institute's Standard S14-1971 or most recent revision thereof for Type 1 or Type 2 sound level meters or an instrument and the associated recording and analyzing equipment which will provide equivalent data.

"Sound pressure level" of a sound, in decibels, means twenty (20) times the logarithm to the base ten of the ratio of the pressure of the sound to a reference pressure which is twenty (20) micropascals.

(Prior gen. code §§ 3-107.201—3-107.221)

6.60.030 - Noise measurement criteria.

- A. Any noise measurement made pursuant to the provisions of this chapter shall be made with a sound level meter using the 'A' weighted network (scale) at slow meter response. Fast meter response shall be used for an impulsive

noise. Calibration of the measurement equipment, utilizing an acoustic calibrator, shall be performed immediately prior to recording any noise date.

- B. The exterior noise levels shall be measured at any point on the affected residential property, school, hospital, church, public library or commercial property. Where practical, the microphone shall be positioned three to five feet above the ground and away from reflective surfaces.

(Prior gen. code §§ 3-107.301, 3-107.302)

6.60.040 - Exterior noise level standards.

- A. It is unlawful for any person at any location within the unincorporated area of the county to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the exterior noise level when measured at any single- or multiple-family residential, school, hospital, church, public library or commercial properties situated in either the incorporated or unincorporated area to exceed the noise level standards as set forth in Table 6.60.040A or Table 6.60.040B following:

Table 6.60.040A

**RECEIVING LAND USE — SINGLE- OR MULTIPLE-FAMILY RESIDENTIAL, SCHOOL, HOSPITAL, CHURCH OR PUBLIC LIBRARY PROPERTIES
NOISE LEVEL STANDARDS, dB(A)**

Category	Cumulative Number of Minutes in any one hour time period	Daytime <u>7</u> a.m. to <u>10</u> p.m.	Nighttime <u>10</u> p.m. to <u>7</u> a.m.
1	30	50	45
2	15	55	50
3	5	60	55
<u>4</u>	1	65	60
5	0	70	65

Table 6.60.040B

**RECEIVING LAND USE — COMMERCIAL PROPERTIES
NOISE LEVEL STANDARDS, dB(A)**

Category	Cumulative Number of Minutes in any one hour time period	Daytime <u>7</u> a.m. to <u>10</u> p.m.	Nighttime <u>10</u> p.m. to <u>7</u> a.m.

1	30	65	60
2	15	70	65
3	5	75	70
4	1	80	75
5	0	85	80

- B. In the event the measured ambient noise level exceeds the applicable noise level standard in any category above, the applicable standard shall be adjusted so as to equal said ambient noise level.
- C. Each of the noise level standards specified in Tables 6.60.040A and B shall be reduced by five dB(A) for simple tone noises, noises consisting primarily of speech or music or for recurring impulsive noises.
- D. If the intruding noise source is continuous and cannot reasonably be discontinued or stopped for a time period whereby the ambient noise level can be measured, the noise level measured while the source is in operation shall be compared directly to the applicable noise level standards in Table 6.60.040A and Table 6.60.040B.
- E. Notwithstanding the noise level standards set forth in this section, the noise level standard applicable to the emission of sound from transformers, regulators, or associated equipment in electrical substations shall be 60 dB(A).

(Prior gen. code §§ 3-107.401—3-107.405)

6.60.050 - Prohibited noise disturbances.

- A. No person shall make or cause to be made any noise disturbance as defined in Section 6.60.020 of this chapter.
- B. Notwithstanding any of the provisions of this chapter, the following acts are prohibited within the unincorporated area of the county of Alameda, subject only to the exceptions of Section 6.60.070:
 1. Radio, Television Sets, Musical Instruments and Similar Devices. Operating, playing or permitting the operation or playing of any radio, stereo, television set, audio equipment, electronic equipment, drum, musical instrument, or device which produces or reproduces sound at any time of day plainly audible at a distance of fifty (50) feet from such device. This section does not apply to places of public entertainment or to events for which a lawful permit has been obtained, provided that the activities producing sound are being conducted in compliance with the permit. This section does not apply to the operation of sound amplification systems in vehicles to the extent those systems are subject to California Vehicle Code Section 27007.
 2. Animals and Birds. The keeping of any animal or bird, as pet or livestock, which causes frequent or continuous noise plainly audible at a distance of fifty (50) feet from such animal. For the purposes of this subsection, the animal noise shall not be deemed a disturbance or nuisance if the noise is in response to a person trespassing or threatening to trespass upon private property in or upon which the animal is situated or if the noise is in response to someone teasing or provoking the animal.

However, any person teasing or provoking the animal noise shall be guilty of a violation of this chapter.

3. Electric/Gas Powered Tools in Residential Areas: Vehicle Maintenance.
 - a. Operation or use in residential areas between the hours of seven p.m. and seven a.m. on a weekday or between the hours of seven p.m. and eight a.m. on a weekend, of any electric or gasoline powered leaf blower, sweeper, vacuum, lawn mower, trimmer, edger, hedger or similar tool or device which produces sound which is plainly audible at a distance of fifty (50) feet from such device.
 - b. Repairing, rebuilding, modifying or testing any vehicle in residential areas between the hours of seven p.m. and seven a.m., in such a manner as to produce sound which is plainly audible at a distance of fifty (50) feet from the vehicle.
 4. Emergency Signaling Devices. The intentional sounding or permitting the sounding outdoors of any fire, burglar, or civil defense alarm, siren, whistle, or similar stationary emergency signaling device, except for emergency purposes or for testing; provided such testing is conducted as follows:
 - a. The testing of a stationary emergency signaling device shall not occur before seven a.m. or after seven p.m. Any such testing shall use only the minimum cycle test time, in no case shall such test time exceed sixty (60) seconds.
 - b. The testing of the complete emergency signaling system, including the functioning of the signaling device, and the personnel response to the signaling device, shall not occur more than once in each calendar month. Such testing shall not occur before seven a.m. or after ten p.m. The time specified in subsection (B) (4)(a) of this section shall not apply to such complete system testing;
 5. Sounding or permitting the sounding of any exterior burglar or fire alarm or any motor vehicle burglar alarm unless such alarm is terminated within fifteen (15) minutes of activation. Pre-existing installations will be allowed a period of ninety (90) days for correction;
 6. Stationary Nonemergency Signaling Devices.
 - a. Sounding or permitting the sounding of any electronically amplified signal from any stationary bell, chime, siren, whistle, or similar device, intended primarily for nonemergency purposes, from any place, for more than ten seconds in any hourly period,
 - b. Churches shall be exempt from the operation of this provision,
 - c. Sound sources covered by this provision and not exempted under subsection (B)(6)(b) of this section may be exempted by a variance issued by the director of environmental health;
 7. Loading and Unloading. Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects between the hours of nine p.m. and six a.m. in such a manner as to cause a noise disturbance across a residential real property line or at any time to violate the provisions of Section 6.60.040.
 8. Vibration. Operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty (150) feet (forty-six (46) meters) from the source if on a public space or public right-of-way.
- C. Notwithstanding the provisions of Section 6.60.040, where the intruding noise source, as measured pursuant to Section 6.60.030, is a residential air conditioning or refrigeration system or associated equipment installed prior to July 1, 1980, the exterior noise level shall not exceed fifty-five (55) dB(A). The exterior noise level shall not exceed fifty (50) dB(A) for such equipment installed after July 1, 1980.
- D. "Plainly audible" means any sound that can be detected by a person using his or her unaided hearing faculties. As

an example, if the sound source under investigation is a portable or personal vehicular sound amplification or reproduction device, the enforcement officer need not determine the title of a song, specific words, or the artist performing the song. The detection of the rhythmic base component of the music is sufficient to constitute a plainly audible sound.

- E. The restrictions contained in Section 6.60.050(B)(1), (2) and (3) shall not apply to:
1. Activities which are governed by conditional use permits or other permits issued by the county, if those permits expressly regulate or control the amount of noise or sound which may be generated by the activities which are governed by the permit;
 2. Unincorporated areas of the county within the east county area plan; or
 3. Unincorporated areas of the county outside the urban growth boundary, as defined by "Measure D" ("Save Agricultural and Open Space Lands Initiative of 2000").

(Ord. 2005-16 §§ 1-4; prior gen. code §§ 3-107.501—3-107.503)

6.60.060 - Vehicle noise limits.

- A. Recreational Motorized Vehicles Operating Off A Public Highway. No person shall operate or cause to be operated any recreational motorized vehicle off a public highway in such a manner as to create a noise disturbance or exceed the standards set forth in Section 6.60.040 of this chapter.
- B. Vehicle, Motorboat or Aircraft Repair and Testing. No person shall repair, rebuild, modify or test any vehicle, motorboat, or aircraft in such a manner as to create a noise disturbance or exceed the standards set forth in Section 6.60.040 of this chapter.

(Prior gen. code §§ 3-107.601—3-107.602)

6.60.070 - Special provisions or exceptions.

- A. Emergency Exception. The provisions of this chapter shall not apply to:
 1. The emission of sound for the purpose of alerting persons to existence of an emergency; or
 2. The emission of sound in the performance of emergency work.
- B. Warning Devices. Warning devices, necessary for the protection of public safety as, for example, police, fire and ambulance sirens and train horns shall be exempted from the provisions of this chapter.
- C. Federal or State Preempted Activities. The provisions of this chapter shall not apply to any other activity to the extent regulation thereof has been preempted by state or federal law.
- D. Public Health, Welfare and Safety Activities. The provisions of this chapter shall not apply to construction or maintenance and repair operations conducted by public agencies and/or utility companies or their contractors which are deemed necessary to serve the best interests of the public and to protect the public health, welfare and safety, including, but not limited to street sweeping, debris and limb removal, removal of downed wires, restoring electrical service, repairing traffic signals, unplugging sewers, vacuuming catch basins, repairing of water hydrants and mains, gas lines, oil lines, sewers, storm drains, roads, sidewalks, etc.
- E. Construction. The provisions of this chapter shall not apply to noise sources associated with construction, provided said activities do not take place before seven a.m. or after seven p.m. on any day except Saturday or Sunday, or before eight a.m. or after five p.m. on Saturday or Sunday.
- F. Maintenance of Residential Property. The provisions of this chapter shall not apply to noise sources associated with

the maintenance of residential property provided said activities take place between the hours of seven a.m. and nine p.m. on any day except Saturday or Sunday, or between the hours of nine a.m. and eight p.m. on Saturday or Sunday.

- G. Proviso. Notwithstanding the provisions of subsections D, E and F of this section, no exemptions from the provisions at this chapter shall be granted for activities specified in said sections where equipment used for those activities, including mufflers, is not maintained in the condition for which it was designed or intended and thereby unnecessarily increases noise levels so as to cause a noise disturbance or exceed the standards set forth in Section 6.60.040 of this chapter.

(Prior gen. code §§ 3-107.701—3-107.707)

6.60.080 - Zone change.

Prior to the approval of any zone change, general plan amendment, precise development plan, conditional, use permit, zone variance or specific plan; upon request

- A. The director shall review the noise impact of the proposed action by identifying existing and projected noise sources and the associated sound levels.
- B. The director shall recommend usage of adequate control measures on noise sources identified in subsection A of this section which will be in violation of any provision of this chapter or the noise quality standards of the noise element of the county general plan.

(Prior gen. code § 3-107.801)

6.60.090 - Violations.

- A. Any violation of this chapter is an infraction punishable by (1) a fine of one hundred dollars (\$100.00) for a first violation; (2) a fine of two hundred dollars (\$200.00) for a second violation of this chapter within one year; (3) a fine of five hundred dollars (\$500.00) for each additional violation of this chapter within one year.
- B. As an additional remedy, the operation or maintenance of any device, instrument, vehicle or machinery in violation of any provision of this chapter, so as to cause a noise disturbance, shall be deemed and is hereby declared to be a public nuisance and may be subject to abatement summarily by a restraining order or injunction issued by a court of competent jurisdiction.

(Ord. 2005-16 § 5: prior gen. code §§ 3-107.901—3-107.903)

6.60.100 - Manner of enforcement.

- A. The director is directed to enforce the provisions of this chapter except for Section 6.60.050(B)(1), (2) and (3) which shall be enforced by peace officers. The director and peace officers may jointly enforce Sections 6.60.050(A) and 6.60.060 of this chapter.
- B. No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this chapter while such person is engaged in the performance of his duties.

(Ord. 2005-16 § 6: prior gen. code § 3-107.904)

6.60.110 - Variances.

- A. The owner or operator of a noise source which the director has determined violates any of the provisions of this

chapter may file an application with the director for variance from strict compliance with any particular provision of this chapter where such variance will not result in a hazardous condition or a nuisance and strict compliance would be unreasonable in view of all the circumstances. Said owner or operator shall set forth all actions taken to comply with said provision(s) and the reasons why immediate compliance cannot be achieved. A separate application shall be filed for each noise source; provided, however, that several mobile sources under common ownership or fixed sources under common ownership on a single property may be combined into one application.

Upon receipt of said application and within thirty (30) days thereof, the director shall either approve such request, in whole or in part, or deny the request. In the event the variance is approved, reasonable conditions may be imposed which may include restrictions on noise level, noise duration and operating hours, an approved method of achieving compliance and a time schedule for its implementation.

Factors which the director must consider shall include but not be limited to the following:

1. Uses of property within the area affected by the noise;
 2. Factors related to initiating and completing all remedial work;
 3. Age and useful life of the existing noise source;
 4. The general public interest, welfare and safety;
 5. Conditions, policies, or guidelines imposed by other agencies or other commissions including the planning commission conditions and planning commission or ALUC policies and guidelines.
- B. Within thirty (30) days following the decision of the director on an application for a variance, the applicant may appeal the decision to the Board of Supervisors for a hearing de novo by filing a notice of appeal with the clerk of the Board of Supervisors. The Board of Supervisors shall either affirm, modify or reverse the decision of the director. Such decision shall be final and shall be based upon the considerations set forth in this section.

(Prior gen. code § 3-107.905)

6.60.120 - Construction.

This chapter shall be liberally construed so as to effectuate its purposes.

(Prior gen. code § 3-107.906)

CONSTRUCTION NOISE MODELING

TMP-01 - Construction Noise Modeling Attenuation Calculations

Levels in dBA Leq

Phase	RCNM			
	Reference Noise Level	Residences to North/Northeast	Residences to East	Residences to South
<i>Distance in feet</i>	50	640	430	450
Demolition	85	63	67	66
<i>Distance in feet</i>	50	160	340	450
Site Prep	85	74	68	66
Grading	85	74	68	66
<i>Distance in feet</i>	50	120	270	280
Building Construction	83	75	68	68
Architectural Coating	74	66	59	59

Attenuation calculated through Inverse Square Law: $L_p(R2) = L_p(R1) - 20\text{Log}(R2/R1)$

TMP-01 - Vibration Damage Attenuation Calculations

Levels in in/sec PPV

<i>Distance in feet</i>	Vibration	Residences to	
	Reference Level at 25 feet	Northeast 190	
Vibratory Roller	0.21	0.010	
Clam shovel	0.202	0.010	
Hoe Ram	0.089	0.004	
Large Bulldozer	0.089	0.004	
Caisson Drilling	0.089	0.004	
Loaded Trucks	0.076	0.004	
Jackhammer	0.035	0.002	
Small Bulldozer	0.003	0.000	

TMP-01 - Vibration Annoyance Attenuation Calculations

Levels in VdB

Equipment <i>Distance in feet</i>	Vibration @ 25 ft	Residential to northeast <i>190</i>
Clam shovel	94.0	68
Vibratory Roller	94.0	68
Hoe Ram	87.0	61
Large Bulldozer	87.0	61
Caisson Drilling	87.0	61
Loaded Trucks	86.0	60
Jackhammer	79.0	53
Small Bulldozer	58.0	32