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Environmental Noise Assessment

Viaggio Estate and Winery

Acampo, California

November 30, 2020

Project #201008

Prepared for:

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INTRODUCTION

Saxelby Acoustics was retained by Viaggio Estate and Winery to perform a noise study for proposed outdoor activities which may include the use of amplified sound or live music (i.e. wedding receptions, etc.). The project is located at 100 East Taddei Road in San Joaquin County, California. This study analyzes three potential locations where amplified sound or live music could occur.

Figure 1 shows the project site plan. **Figure 2** shows an aerial photo of the project site and 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 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.

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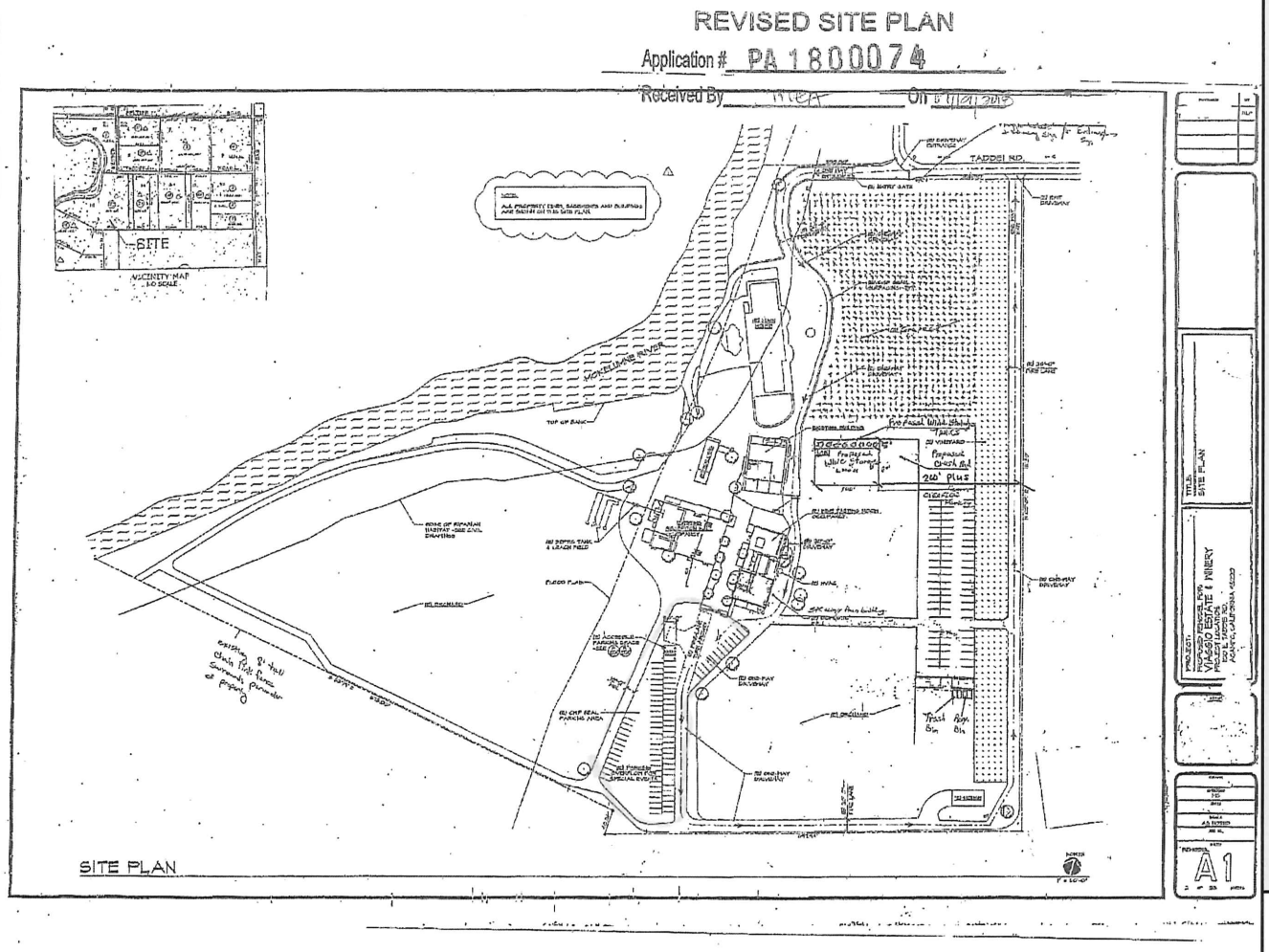

Figure 1

Project Site Plan

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Figure 2

Noise Measurement Sites

Legend

▲ Noise Measurement - Long Term

0 ft 1000 ft 2000 ft 3000 ft 4000 ft

Projection: State Plane (California Zone 3) / NAD83 / meters
Rev. Date: 11/20/2020

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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.

REGULATORY CONTEXT

The San Joaquin County Development Regulations, Section 9-1025.9(b) establishes land use noise level standards for new non-transportation or "stationary" noise sources, as outlined below that would be applicable to the proposed activities under the new permit.

9-1025.9(b) Stationary Noise Sources.

TABLE 2: STATIONARY NOISE SOURCE NOISE STANDARDS

PART II
STATIONARY NOISE SOURCES

	Outdoor Activity Areas[1] Daytime[2] (7 a.m. to 10 p.m.)	Outdoor Activity Areas[1] Nighttime[2] (10 p.m. to 7 a.m.)
Hourly Equivalent Sound Level (Leq), dB	50	45
Maximum Sound Level (Lmax), dB	70	65

1 Where the location of outdoor activity areas is unknown or is not applicable, the noise standard shall be applied at the property line of the receiving land use. When determining the effectiveness of noise mitigation measures, the standards shall be applied on the receiving side of noise barriers or other property line noise mitigation measures.

2 Each of the noise level standards specified shall be reduced by 5 dB for impulsive noise, single tone noise, or noise consisting primarily of speech or music.

(Ord. 3675; Ord. 4036 § 2(part), 1999)

Proposed projects that will create new stationary noise sources shall be required to mitigate the noise levels from these stationary noise sources so as not to exceed the noise level standards specified in **Table 9-1025.9(b),** Part II.

The proposed music activities will occur during daytime and evening hours. Therefore, the project will be required to comply with the daytime (7 a.m. to 10 p.m.) noise level standards shown in **Table 9-1025.9(b)**, Part II. If activities continue past 10 p.m., the nighttime (10 p.m. to 7 a.m.) noise level standards will apply.

The noise level standard of 45 dB(A) L_{eq} and 65 dB(A) L_{max} (corrected for noise consisting primarily of music) would apply at the outdoor activity areas of lands designated for noise sensitive uses during daytime hours. The noise level standard of 40 dB(A) L_{eq} and 60 dB(A) L_{max} would apply during nighttime hours.

EXISTING NOISE AND VIBRATION ENVIRONMENT

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, south, and east of the project site.

EXISTING GENERAL AMBIENT NOISE LEVELS

The existing noise environment in the project area is primarily defined by traffic on West Peltier Road and operational noise from the Viaggio Estate Winery.

To quantify the existing ambient noise environment in the project vicinity, Saxelby Acoustics conducted continuous (24-hr.) noise level measurements at two locations on the project site. 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 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 812 and 820 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 3: SUMMARY OF EXISTING BACKGROUND NOISE MEASUREMENT DATA

Site	Location	Date	L_{dn}	Daytime L_{eq}	Daytime L_{50}	Daytime L_{max}	Nighttime L_{eq}	Nighttime L_{50}	Nighttime L_{max}
LT-1	Northern Boundary	11/16/20 to 11/17/20	50	45	40	64	44	38	58
LT-2	Southern Boundary	11/16/20 to 11/17/20	52	50	44	64	43	37	58

Notes:
- All values shown in dBA
- Daytime hours: 7:00 a.m. to 10:00 p.m.
- Nighttime Hours: 10:00 p.m. to 7:00 a.m.
- Source: Saxelby Acoustics 2020

EVALUATION OF PROJECT NOISE EXPOSURE

Saxelby Acoustics prepared noise contour graphics showing average (L_{eq}) noise contours for the proposed project at both of the potential activity areas. Noise contours were prepared using the SoundPLAN noise prediction model. Inputs to the model included sound system typical output, existing 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 San Joaquin County for stationary noise sources.

Figure 3 shows the average (L_{eq}) noise contours for daytime noise at Activity Area 1 (Lower Lawn).

Figure 4 shows the average (L_{eq}) noise contours for daytime noise at Activity Area 2 (Upper Lawn).

Figure 5 shows the average (L_{eq}) noise contours for daytime noise at Activity Area 3 (Patio).

Due to the number of potential activity areas and the different times of day that activities may occur, noise contour graphics are not shown for each potential operating scenario. However, noise levels for each operating scenario are shown in **Table 3** for the closest noise-sensitive receptor to the project site.

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Figure 3

Daytime Project Noise Contours (dBA Leq) - Lower Lawn

Noise Level, dB(A)

	<= 45
45 <	<= 46
46 <	<= 47
47 <	<= 48
48 <	<= 49
49 <	<= 50
50 <	

Scale 1:300

0 50 100 200 300 400 500 feet

N

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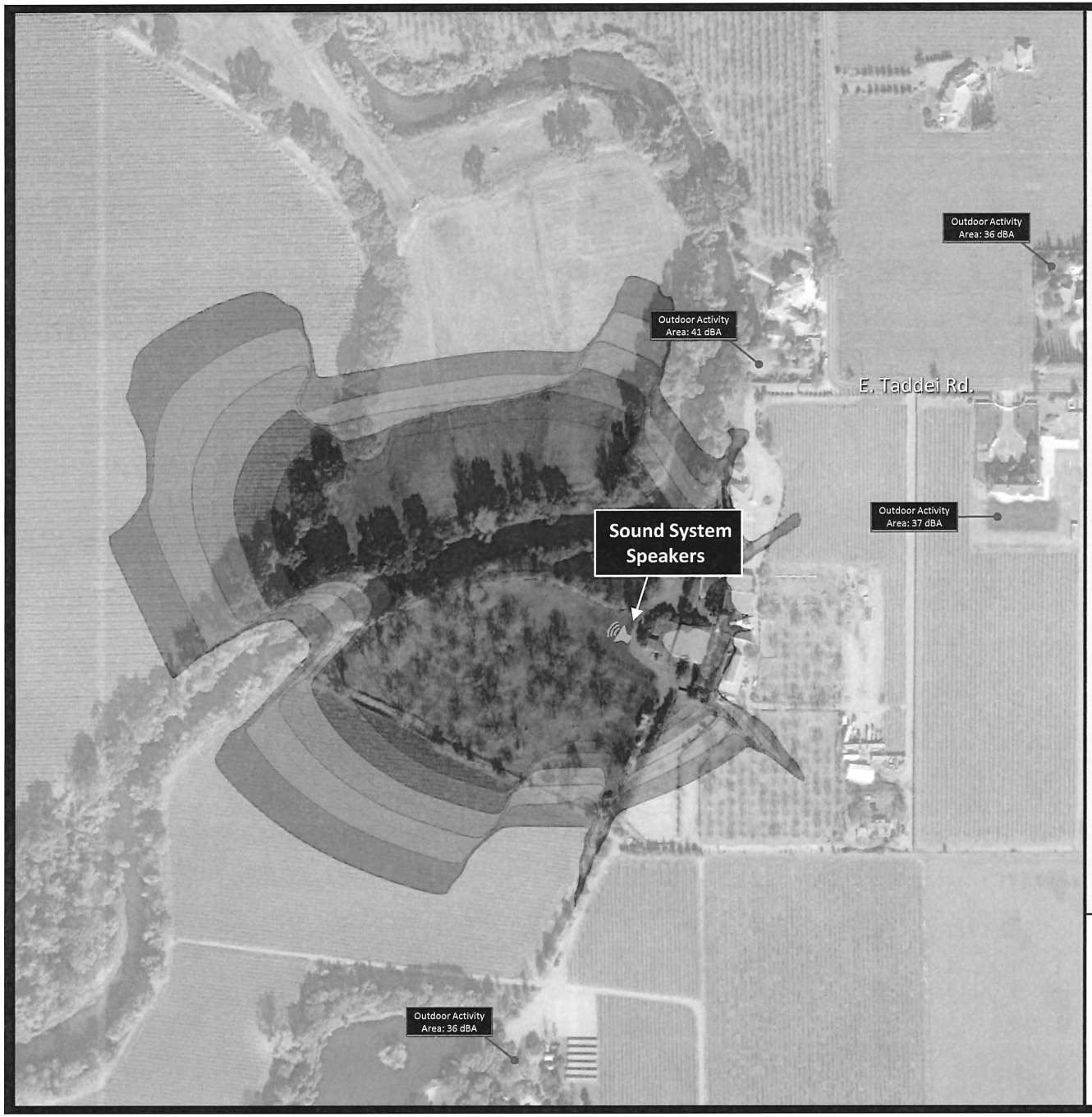

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Figure 4

Daytime Project Noise Contours (dBA Leq) - Upper Lawn

Noise Level, dB(A)

	<=	45
45 <	<=	46
46 <	<=	47
47 <	<=	48
48 <	<=	49
49 <	<=	50
50 <		

Scale 1:350

0 50 100 200 300 400 500 feet

N

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Figure 5

Daytime Project Noise Contours (dBA Leq) - Patio

Noise Level, dB(A)

	<= 45
45 <	<= 46
46 <	<= 47
47 <	<= 48
48 <	<= 49
49 <	<= 50
50 <	

Scale 1:300

0 50 100 200 300 400 500 feet

N

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Based upon the SoundPLAN noise modeling **Table 3** shows the predicted project noise levels at the adjacent noise-sensitive receptors for the proposed activity areas.

TABLE 3: PROJECT NOISE LEVELS AT ADJACENT RECEPTORS

Location	Time	Predicted Noise Levels	Noise Standard	Complies with Standards?
Lower Lawn	Day	44.5 dBA L_{eq} 64.5 dBA L_{max}	45 dBA L_{eq} 65 dBA L_{max}	Yes
Upper Lawn	Day	41.1 dBA L_{eq} 61.1 dBA L_{max}	45 dBA L_{eq} 65 dBA L_{max}	Yes
Patio	Day	39.0 dBA L_{eq} 55.0 dBA L_{max}	45 dBA L_{eq} 65 dBA L_{max}	Yes

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

Activity Area 1 (Lower Lawn): Daytime (7:00 a.m. to 10:00 p.m.) sound system output shall not exceed 75 dBA L_{eq} and 95 dBA L_{max} at a distance of 50 feet.

Activity Area 2 (Upper Lawn): Daytime (7:00 a.m. to 10:00 p.m.) sound system output shall not exceed 80 dBA L_{eq} and 100 dBA L_{max} at a distance of 50 feet.

Activity Area 3 (Patio): Daytime (7:00 a.m. to 10:00 p.m.) sound system output shall not exceed 78 dBA L_{eq} and 98 dBA L_{max} at a distance of 50 feet.

No nighttime (10:00 p.m. to 7:00 a.m.) operation shall occur.

Conclusions

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

Activity Area 1 (Lower Lawn): Daytime (7:00 a.m. to 10:00 p.m.) sound system output shall not exceed 75 dBA L_{eq} and 95 dBA L_{max} at a distance of 50 feet from the sound system speakers. This assumes the sound system is placed on the west side of the lawn facing towards the east, as shown on **Figure 3**.

Activity Area 2 (Upper Lawn): Daytime (7:00 a.m. to 10:00 p.m.) sound system output shall not exceed 80 dBA L_{eq} and 100 dBA L_{max} at a distance of 50 feet from the sound system speakers. This assumes the sound system is placed on the east side of the lawn facing towards the west, as shown on **Figure 4**.

Activity Area 3 (Patio): Daytime (7:00 a.m. to 10:00 p.m.) sound system output shall not exceed 78 dBA L_{eq} and 98 dBA L_{max} at a distance of 50 feet from the sound system speakers. This assumes the sound system is placed in the central courtyard/patio area facing towards the south, as shown on **Figure 5**.

No nighttime (10:00 p.m. to 7:00 a.m.) operation shall occur.

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.

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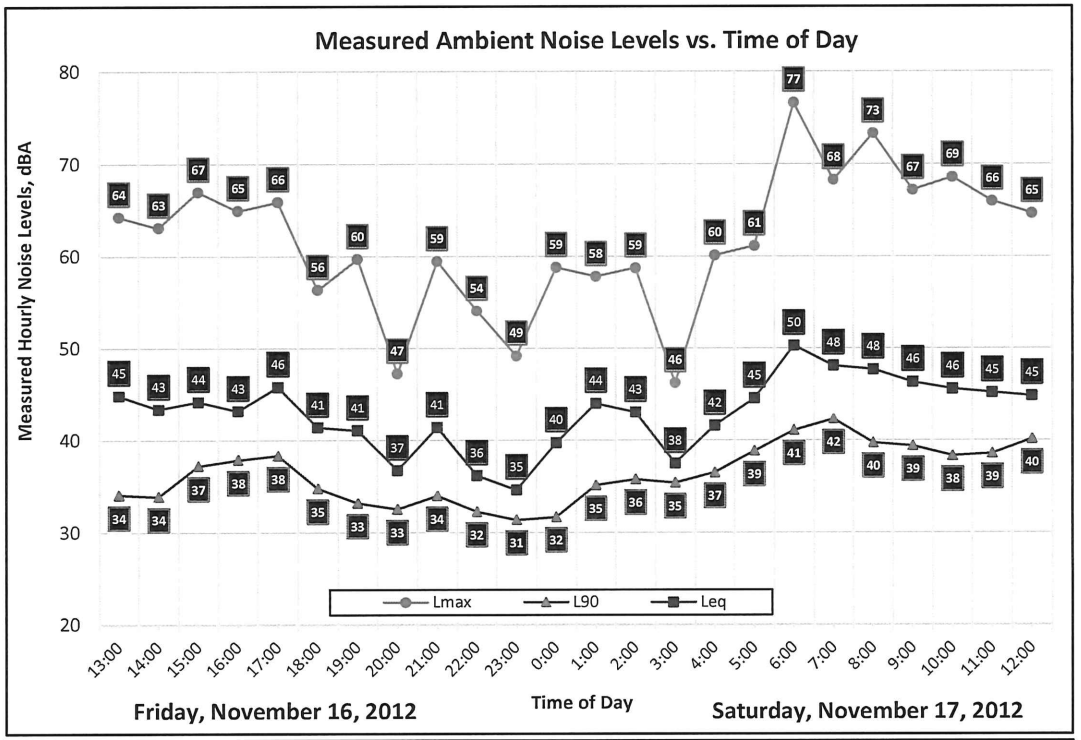
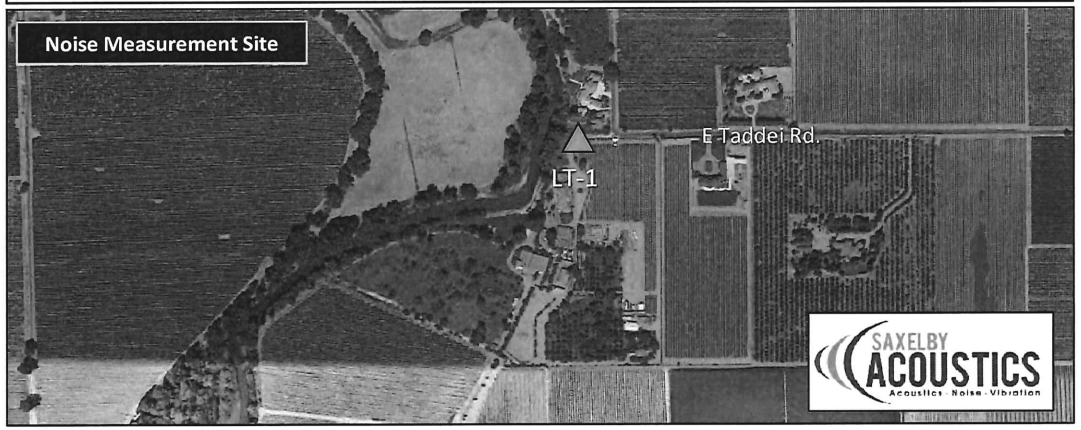
Appendix B1: Continuous Noise Monitoring Results

Site: LT-1
Project: Viaggio Estate and Winery
Location: Northern Project Boundary
Coordinates: 38.1859612°, -121.3179157°
Meter: LDL 812-2
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Friday, November 16, 2012	13:00	45	64	37	34
Friday, November 16, 2012	14:00	43	63	38	34
Friday, November 16, 2012	15:00	44	67	40	37
Friday, November 16, 2012	16:00	43	65	41	38
Friday, November 16, 2012	17:00	46	66	41	38
Friday, November 16, 2012	18:00	41	56	39	35
Friday, November 16, 2012	19:00	41	60	37	33
Friday, November 16, 2012	20:00	37	47	36	33
Friday, November 16, 2012	21:00	41	59	37	34
Friday, November 16, 2012	22:00	36	54	35	32
Friday, November 16, 2012	23:00	35	49	34	31
Saturday, November 17, 2012	0:00	40	59	34	32
Saturday, November 17, 2012	1:00	44	58	42	35
Saturday, November 17, 2012	2:00	43	59	41	36
Saturday, November 17, 2012	3:00	38	46	37	35
Saturday, November 17, 2012	4:00	42	60	39	37
Saturday, November 17, 2012	5:00	45	61	41	39
Saturday, November 17, 2012	6:00	50	77	43	41
Saturday, November 17, 2012	7:00	48	68	45	42
Saturday, November 17, 2012	8:00	48	73	42	40
Saturday, November 17, 2012	9:00	46	67	42	39
Saturday, November 17, 2012	10:00	46	69	41	38
Saturday, November 17, 2012	11:00	45	66	41	39
Saturday, November 17, 2012	12:00	45	65	42	40

Statistics	Leq	Lmax	L50	L90
Day Average	45	64	40	37
Night Average	44	58	38	35
Day Low	37	47	36	33
Day High	48	73	45	42
Night Low	35	46	34	31
Night High	50	77	43	41
Ldn	50	Day %		67
CNEL	50	Night %		33





Appendix B2: Continuous Noise Monitoring Results

Site: LT-2
Project: Viaggio Estate and Winery
Location: Southern Project Boundary
Coordinates: 38.1829975°, -121.3187700°

Meter: LDL 812-1
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Monday, November 16, 2020	13:00	49	62	48	46
Monday, November 16, 2020	14:00	50	62	49	47
Monday, November 16, 2020	15:00	55	72	51	48
Monday, November 16, 2020	16:00	55	75	51	48
Monday, November 16, 2020	17:00	52	67	46	36
Monday, November 16, 2020	18:00	39	55	36	33
Monday, November 16, 2020	19:00	40	59	36	33
Monday, November 16, 2020	20:00	35	49	34	32
Monday, November 16, 2020	21:00	40	57	36	33
Monday, November 16, 2020	22:00	35	52	34	32
Monday, November 16, 2020	23:00	37	58	34	32
Tuesday, November 17, 2020	0:00	38	58	33	31
Tuesday, November 17, 2020	1:00	43	61	40	34
Tuesday, November 17, 2020	2:00	43	60	40	35
Tuesday, November 17, 2020	3:00	36	44	35	33
Tuesday, November 17, 2020	4:00	40	59	37	36
Tuesday, November 17, 2020	5:00	44	60	39	37
Tuesday, November 17, 2020	6:00	50	68	45	40
Tuesday, November 17, 2020	7:00	47	67	44	41
Tuesday, November 17, 2020	8:00	49	75	42	39
Tuesday, November 17, 2020	9:00	50	69	44	41
Tuesday, November 17, 2020	10:00	49	66	49	44
Tuesday, November 17, 2020	11:00	51	66	50	49
Tuesday, November 17, 2020	12:00	51	63	50	49

Statistics	Leq	Lmax	L50	L90
Day Average	50	64	44	41
Night Average	43	58	37	34
Day Low	35	49	34	32
Day High	55	75	51	49
Night Low	35	44	33	31
Night High	50	68	45	40
Ldn	52	Day %		89
CNEL	51	Night %		11