

**Sound Level Assessment  
Cantinas Ranch Camp  
Lynch Canyon Road  
Paso Robles, CA**

**for  
Kirk Consulting  
8830 Morro Road  
Atascadero, CA 93422**

August 15, 2013

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# Sound Level Assessment Cantinas Ranch Camp Lynch Canyon Road Paso Robles, CA

## 1.0 Description and Criteria

The location and plans used in this noise analysis are taken from a boundary survey, site plan and architectural drawings supplied by Jim Duffy Architecture and North Coast Engineering. The overall site plan is shown in “Figure 1. Overall Site Plan” on page 7. The proposed project will generate sounds which originate from a few well-defined sources. Transportation sounds will come from regulated camp vehicle traffic. Other on-site sources of sound will come from camp participants engaging in outdoor recreational activities, for example at the Equestrian Barns and at the Mill Barn and Recreation Area. Outdoor recreation on site is limited to the hours of 9 a.m. to 9 p.m. Additional potential sound sources are from Camper Lodging, the Chapel, the Mission or Celebration of the Arts Village and Staff Housing. Each potential source has been evaluated, and most are at a sufficient distance that they are not audible or measurable at the northern, eastern or western boundary of the property. To the south of the property lies Lake Nacimiento, which is itself an existing source of recreational sounds.

An explanation of technical terms is found in “8.0 APPENDIX: Notes, Definitions” on page 16. With regard to land use, potential noise conflict and noise mitigation measures, the following criteria were used to evaluate the site:

*County of San Luis Obispo Noise Ordinance.* The Noise Ordinance is shown in “6.0 Appendix: Exterior Noise Level Standards, County of San Luis Obispo” on page 14.

## 2.0 Existing Sound Levels

The Cantinas Ranch Camp is located in the Oak Shores area north of Lake Nacimiento. Access to Cantinas Camp is provided via Lynch Canyon Road, which connects to Interlake Road on the north side of Lake Nacimiento.

Proposed outdoor activities at the site are limited to daytime hours. The camp will be operated as a “reservation only” facility. There will be no activities or events open to the general public. Cantinas Camp will accommodate up to 200 campers and provide programs in music, drama and arts. The camp program setting will facilitate the development of an awareness and appreciation of nature and outdoors. Weekly camp programs will begin on Sunday and end on the following Saturday. The program will require administrative, maintenance and support staff numbering approximately 100 during peak periods. Along Lynch Canyon Road access to the site, approximately 70 average daily trips (ADT) are expected with a peak of 104 trips on Saturday and Sunday, using camp vans for transport.

The potential sound levels from activities at camp facilities are attenuated by distance to potential sensitive receptors. Representative distances are shown below:

- (a) Camp facilities to the Greene residence = 1820 ft
- (b) Nankivell residence west of Christmas Cove = 3800 ft
- (c) From Mission due east to Oak Shores residence = 6500 ft
- (d) From Mission southeast to the closest Oak Shores residence = 3920 ft
- (e) From Staff Housing laundry building to the closest Oak Shores residence = 2900 ft
- (f) From equestrian barn to Christmas Cove residences = 870 ft
- (g) From Mill Barn to Christmas Cove residences = 1,250 ft

The attenuation of sound level is inversely proportional to the square of the distance from the sound source. This has a dramatic effect on reduction of sound levels over the distances shown above. Stated another way, for each doubling of distance, the sound level is reduced by 6 decibels. Therefore, if sound level measured 100 feet from an activity is 60 dBA, then at 200 feet distance it will be  $(60 - 6 = 54 \text{ dBA})$ . Activities at Cantinas Ranch will be shown in the following pages to result in sound levels at the boundary that are below existing ambient sound levels. Therefore, sounds from the project are not measurable or audible at the surrounding potential sensitive receptor locations.

Existing sound level contours for daytime (defined in the County of San Luis Obispo as 7 a.m. to 10 p.m.) are based on previous sound level measurements at the interior of the site and near Christmas Cove on the Lake Nacimiento side. A graph of those measurements is shown in “Figure 3. Existing Measured Sound Level” on page 9. Existing ambient sound level contours, including natural, mechanical and human contribution, including existing water activities on Lake Nacimiento, are shown in “Figure 7. Existing Sound Levels” on page 4.

The site plan for the area near the west boundary of Cantinas Ranch Camp, nearest the adjacent Christmas Cove residential area, is shown in “Figure 2. Detail Site Plan” on page 8. The site plan for the specific location of outdoor activities nearest Christmas Cove is shown in “Figure 5. Site Plan of Activity Area” on page 11.

### **3.0 Sound Level Analysis**

Known sound levels derived from the traffic study of Average Daily Traffic data and contribution from sources of sound at swimming pools and playgrounds are used for modeling the acoustic simulations. Therefore, acoustic modeling of the site is based on the sound level measurement data and the known sound level propagation patterns in relation to terrain and sources of sound. The sound level is measured and modeled at five feet six inches above grade. Sound level contours change with the topography, and with the addition of the proposed activities on site and with sound generating activities at adjacent properties and the public area of Lake Nacimiento. The resulting contours are shown in a series of figures that follow.

Sound levels at the equestrian center result from a maximum use of 15 horses with no arena, preparing and saddling horses for dispersed trail ride activities. Because of the location of the equestrian center and its distance from potential sensitive receptors, it is judged by inspection not to be a potential sound source across the site boundary.

Mill Barn and Recreation Area sounds are modeled in “Figure 6. Sound Level Studies” on page 12. The swimming pool area is first described for average use with 45 people speaking at a normal volume, then for maximum use, with a total of 200 people talking.

The sound level contours from the project are shown across the two sides of the boundary with Christmas Cove, along with existing sound in “Figure 7. Combined Activities near Boundary.” on page 13. The conclusion is that sound contribution from activities in the proposed project does not result in any increase in existing sound level at the boundary with Christmas Cove. Sound level at the boundary remains around 56 to 57 dBA both before and after the sound level contribution from the proposed project.

#### **4.0 Construction Sound and Vibration Level**

Construction would occur over approximately 36 to 60 months, divided into two basic ongoing activities:

- (1) site preparation, and
- (2) construction and installation of the facilities.

An estimated 20 pieces of construction equipment would be utilized at various locations throughout the project site during construction and would be brought to the site at the beginning of the construction process and would remain on site for the duration of each construction activity.

During the construction phase, noisy construction work at the project site shall be restricted to Monday through Friday 7:00 a.m. to 5:00 p.m. and Saturday and Sunday 8:00 a.m. to 5:00 p.m. Activities occurring outside these typical work hours would comply with County standards for construction noise levels.

Noisy construction refers to any on-site construction noise that would be likely to exceed the County’s limits for daytime noise levels (maximum noise level of 70 dBA, maximum impulsive noise level of 65 dBA, hourly noise level of 50 dBA Leq) at the project’s property line. Any on site security/ surveillance activities, however, are not limited to these hours.

Prior to using noisy stationary equipment (e.g., generators, compressors or impact pile drivers) during construction activities, the applicant or the construction contractor shall install adequate temporary noise barriers such as noise attenuating shields, shrouds, or portable barriers or enclosures around the construction staging areas as necessary to reduce noise levels associated with deliveries to these areas and construction equipment staging, in order to meet County thresholds (nighttime - daytime maximum noise level of 65 - 70 dBA; maximum impulsive noise level of 60 - 65 dBA, hourly noise level of 45 -50 dBA Leq) at the project’s property line.

The County's Environmental Monitor or qualified designee shall monitor noise levels during construction at the closest residence to the construction staging areas. Should maximum, impulsive, or hourly noise level thresholds be exceeded, all noise-related work shall stop until adequate noise attenuation measures are installed to meet these thresholds. Any measure installed shall remain in good working order during the duration of the noise-making activity.

#### 4.1 Implementation of noise-reducing features

Prior to construction or ground disturbing activities, the Applicant shall employ and clearly specify in its contractors' specifications the following noise suppression techniques to minimize the impact of temporary noise associated with construction and decommissioning activities:

- (a) Trucks and other engine-powered equipment shall include noise reduction features such as mufflers and engine shrouds that are no less effective than those originally installed by the manufacturer.
- (b) Trucks and other engine-powered equipment shall be operated in accordance with posted speed limits and limited engine idling requirements (see Air Quality mitigation measures)
- (c) Truck engine exhaust ('jake') brake use shall be limited to emergencies.
- (d) Back-up beepers for all construction equipment and vehicles shall be adjusted to the lowest sound levels feasible, consistent with safety, provided that OSHA and Cal/OSHA's safety requirements are not violated. These settings shall be retained for the life of the project.
- (e) Vehicle horns shall be used only when absolutely necessary, as specified in the contractors' specifications.
- (f) Radios and other "personal equipment" shall not be allowed on site.

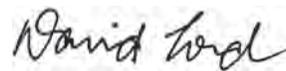
It should be noted that county standards state that construction noise sources are excepted from the Noise Ordinance under footnote "d": "Noise sources associated with construction, provided such activities do not take place before seven a.m. or after nine p.m. any day except Saturday or Sunday, or before eight a.m. or after five p.m. on Saturday or Sunday."

#### 5.0 Discussion and Conclusion

The existing and future sound levels at the boundaries of the proposed development are typical of this area of Lake Nacimiento. Under the operating conditions stated in this report, and with required construction noise mitigation, the sound levels from Cantinas Ranch Camp outdoor activity areas do not exceed the County of San Luis Obispo sound level standards at the property line boundaries.

by David Lord, August 15, 2013

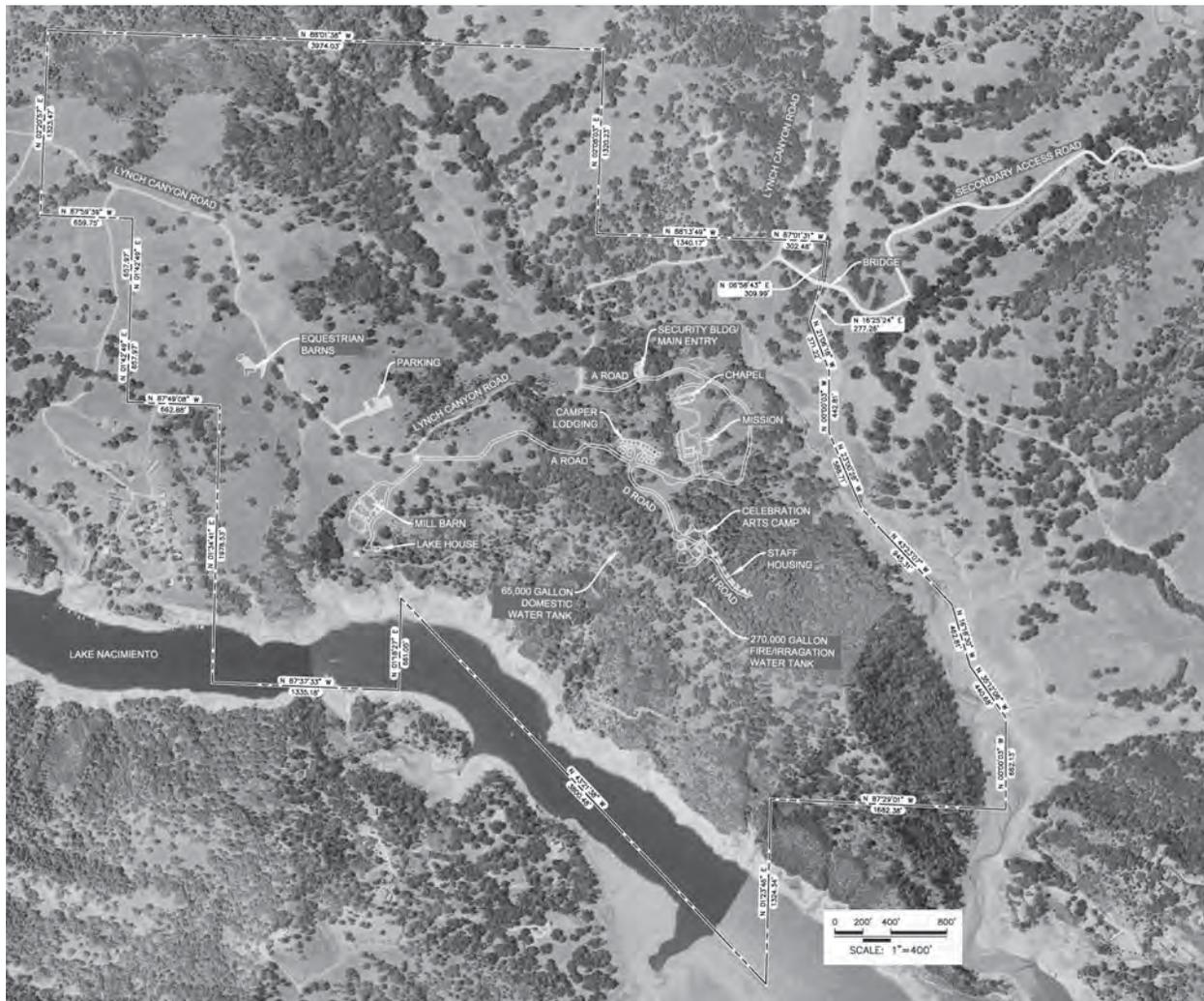
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## Figure 1. Overall Site Plan

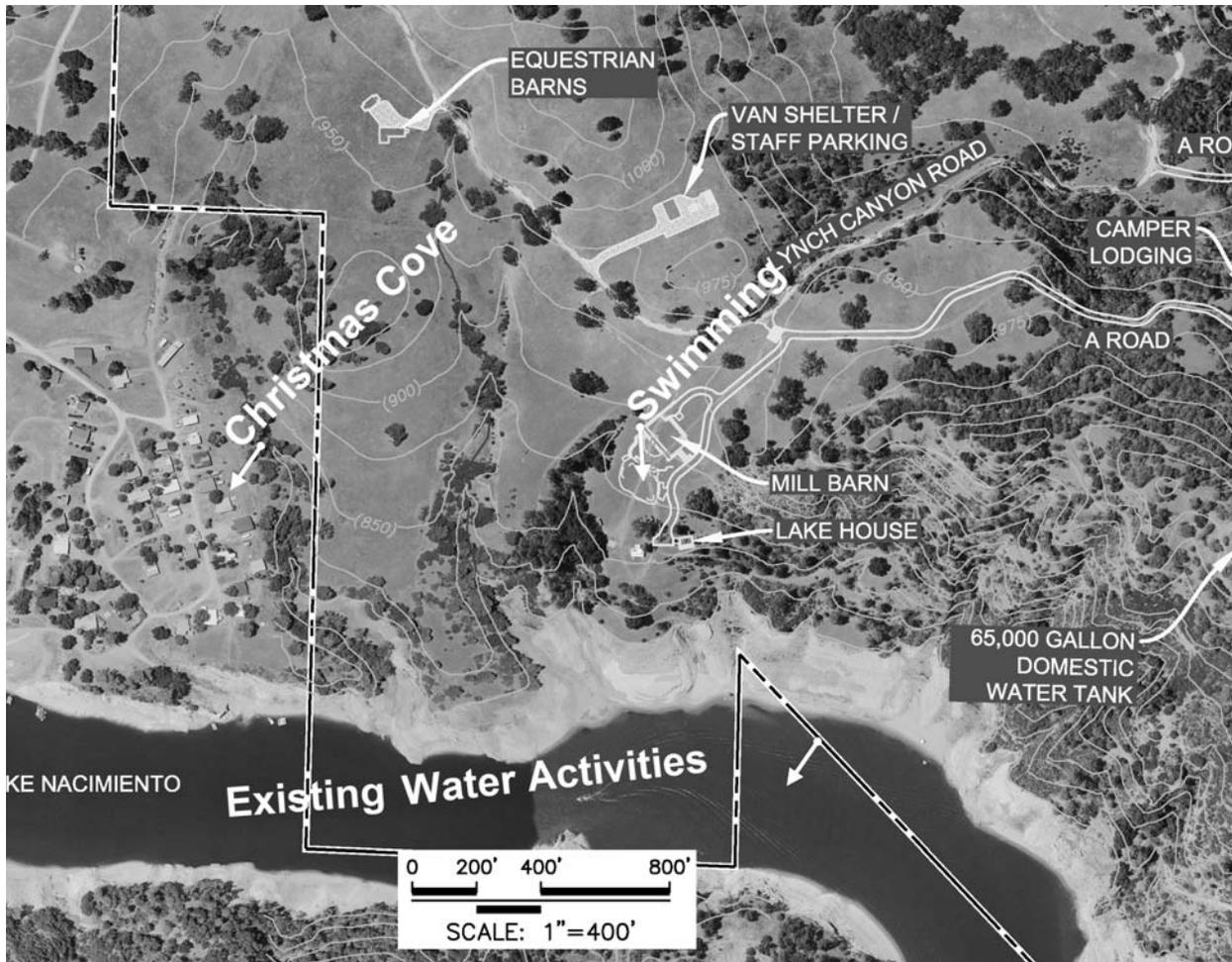
Overall Site Plan showing boundaries of Cantinas Ranch Camp. Shown are the locations of operations and activity areas, including traffic circulation on the site. Most operations and activities within Cantinas Ranch Camp are at a significant distance from potential sensitive receptors on adjacent or neighboring properties.

After evaluating all potential sources of sound, the activity area at the southwestern corner has been selected for more detailed study, including the swimming area near Mill Barn. This area was studied with reference to the potential sensitive residential receptors in the Christmas Cove area to the west of the proposed site.



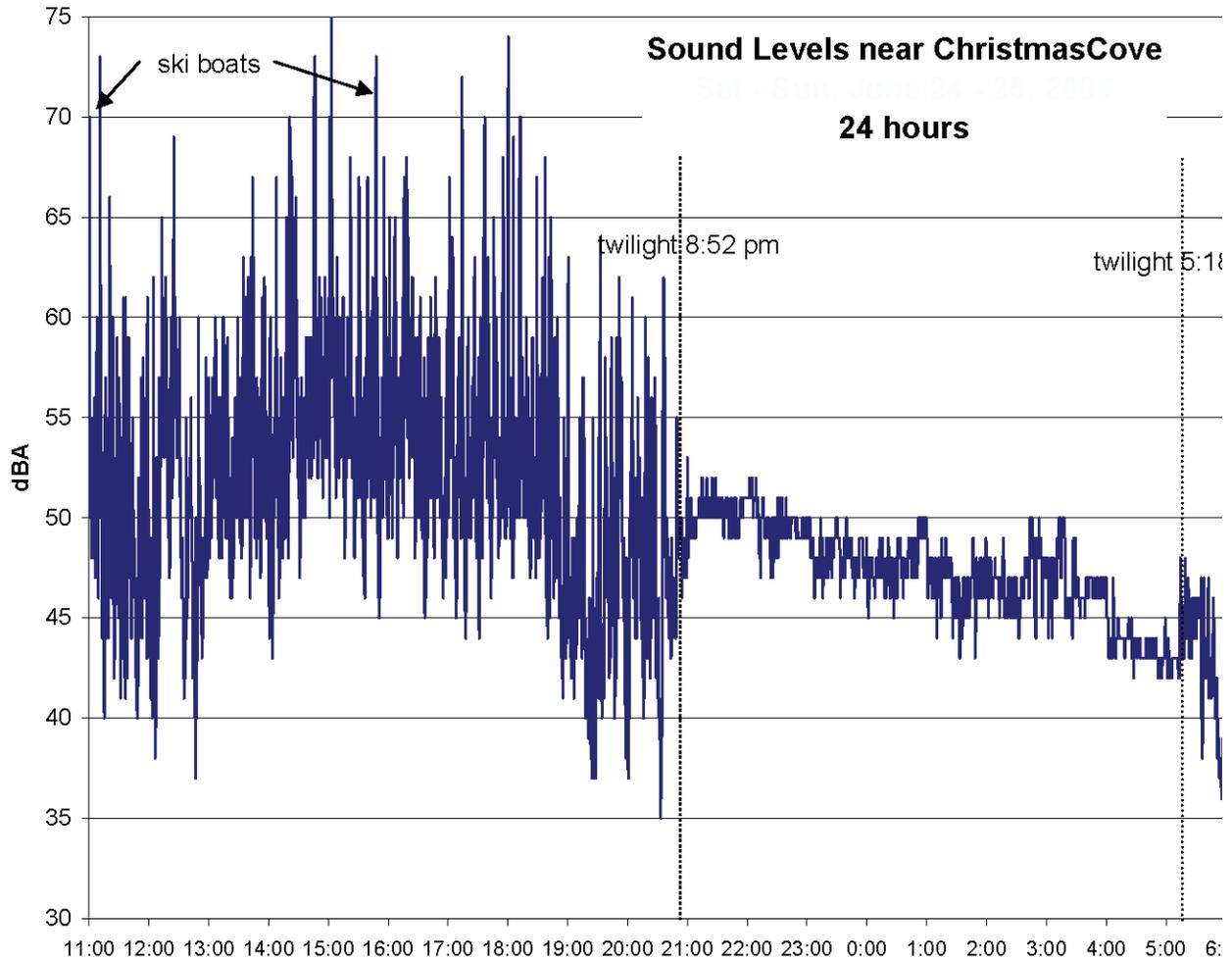
## Figure 2. Detail Site Plan

Plan showing a specific area of interest, which includes the swimming area near Mill Barn, the potential sensitive residential receptors in the Christmas Cove area to the west of the proposed site and Existing Water Activities area on and adjacent to Lake Nacimiento at the south end of the site.



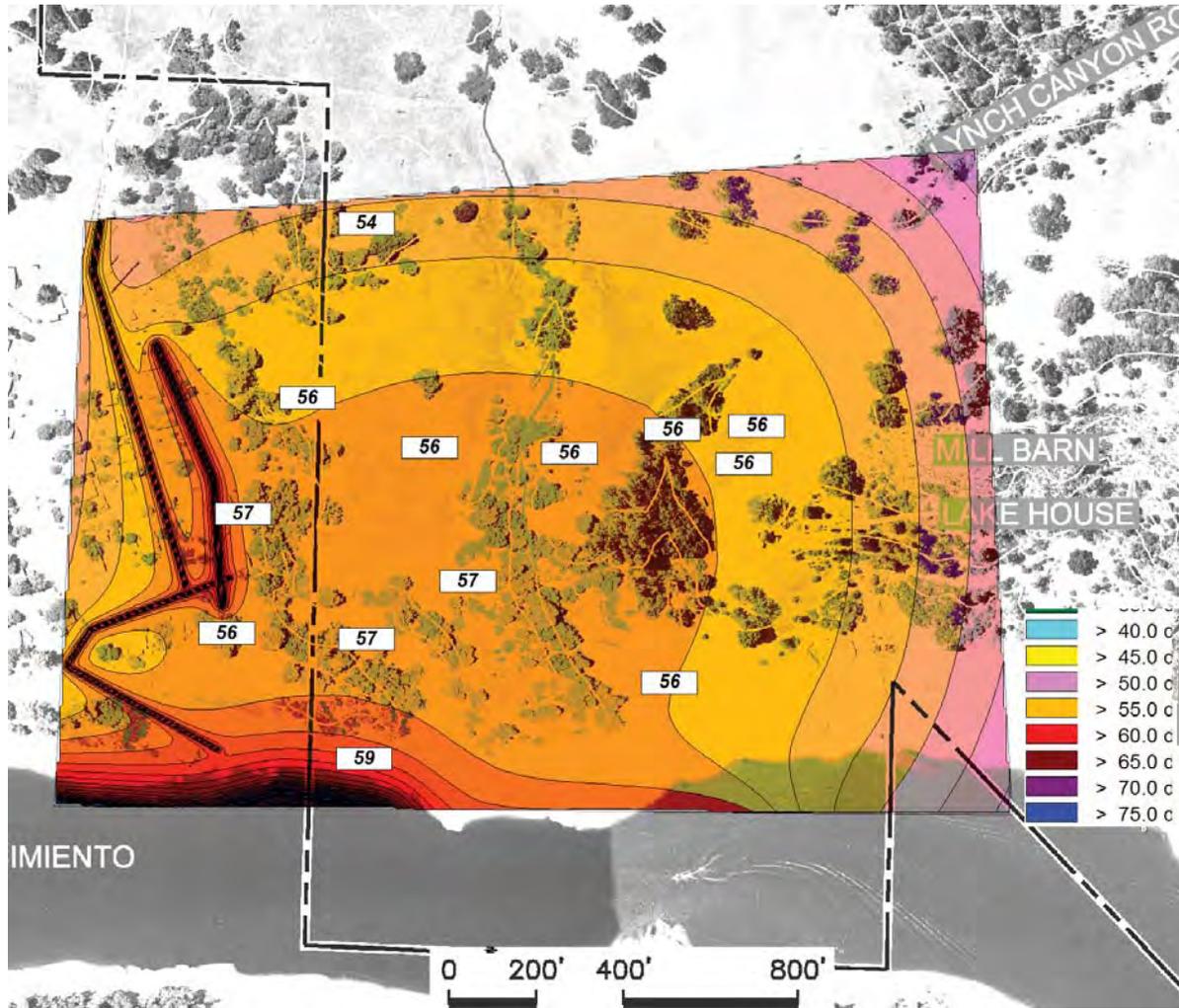
### Figure 3. Existing Measured Sound Level

Existing measured sound level at Christmas Cove area, near the water's edge of Lake Nacimiento, June 25-26, 2006. Sound level during daytime hours (7 a.m. to 9 p.m.) averages between 55 and 60 dBA.



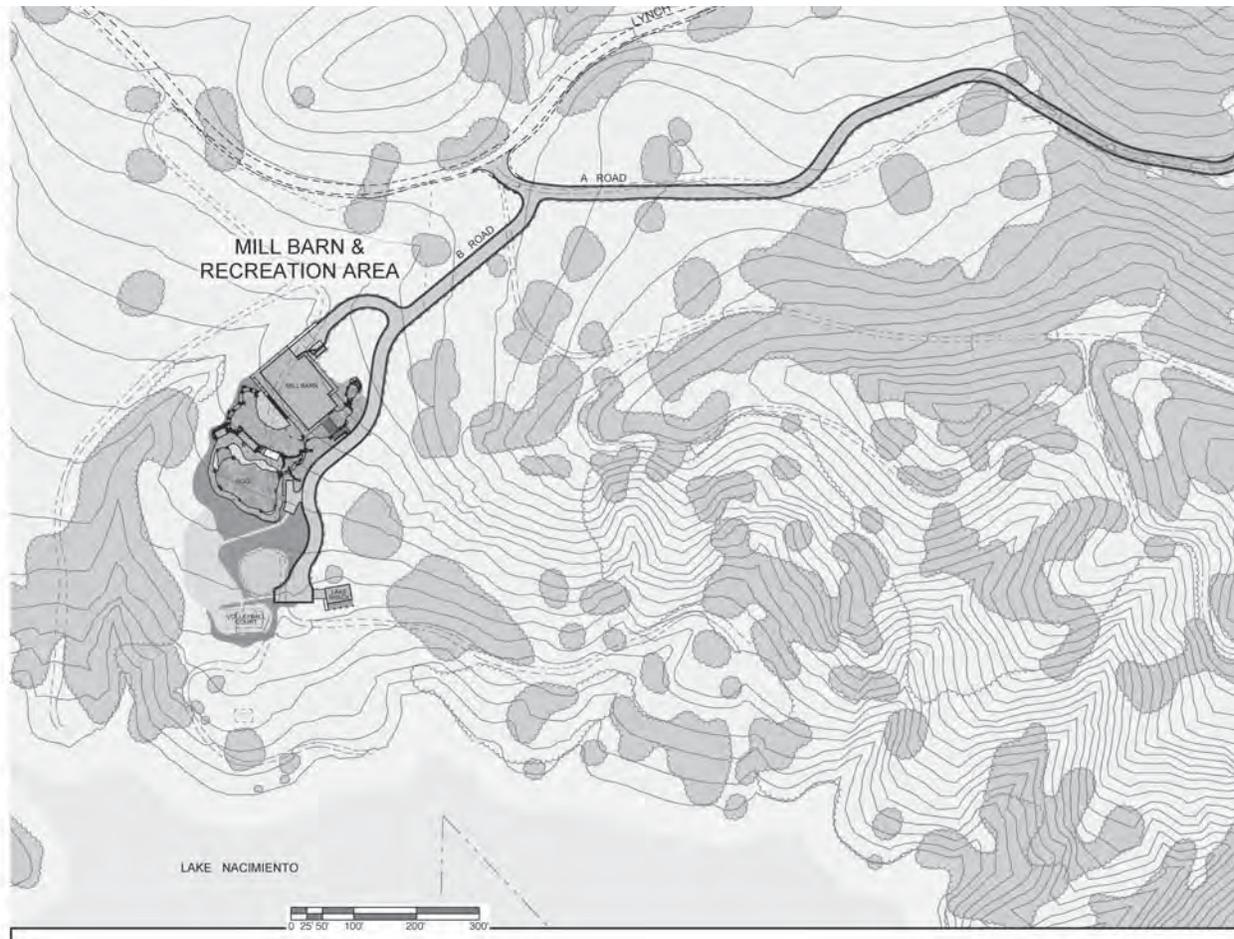
### Figure 4. Existing Ambient Sound Level

Existing ambient sound level contours, average hourly dBA, including Christmas Cove to the west and the proposed building site of the Mill Barn and Recreation Area to the east.



### Figure 5. Site Plan of Activity Area

The Mill Barn and Recreation Area selected for detailed study will accommodate as many as 200 users at one time. There is no amplified music, and outdoor activities are limited in this area from 9 a.m. to 9 p.m. This is the activity area that is closest to potential sensitive receptors in Christmas Cove, and is chosen for more detailed study.

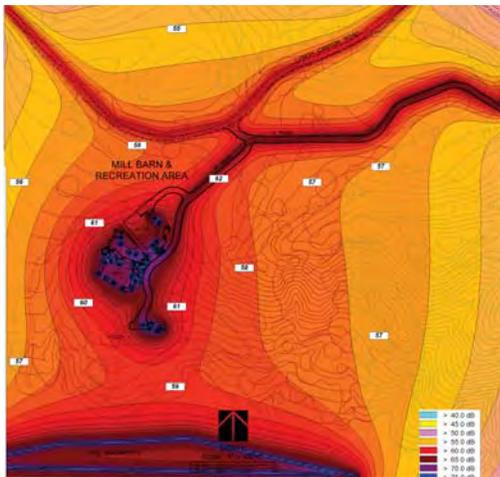


## Figure 6. Sound Level Studies

Sound level studies of the Mill Barn and Recreation Area. The number of participants involved in recreational activities is varied in two different scenarios described below, from 45 users to 200 users, no amplified music. These activities might occur between the hours of 9 a.m. to 9 p.m. Existing water activities are shown at the lake's edge to the south of the site.

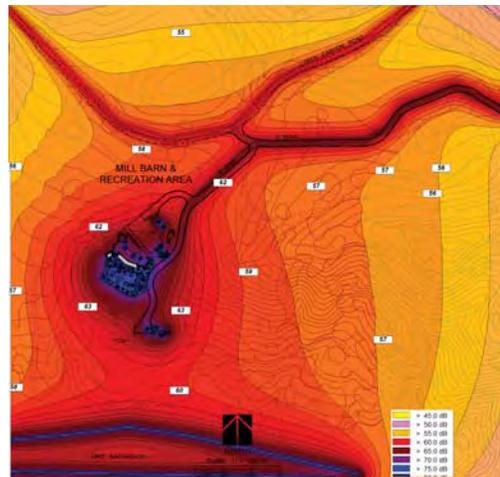
### Swimming Pool, Average Use

Sound level contours, dBA Leq, for Mill Barn and Recreation Area. In this scenario, 45 users are talking simultaneously at normal sound level; no amplified music. This might occur between the hours of 9 a.m. to 9 p.m. Existing water activities are shown at the lake's edge to the south of the site.



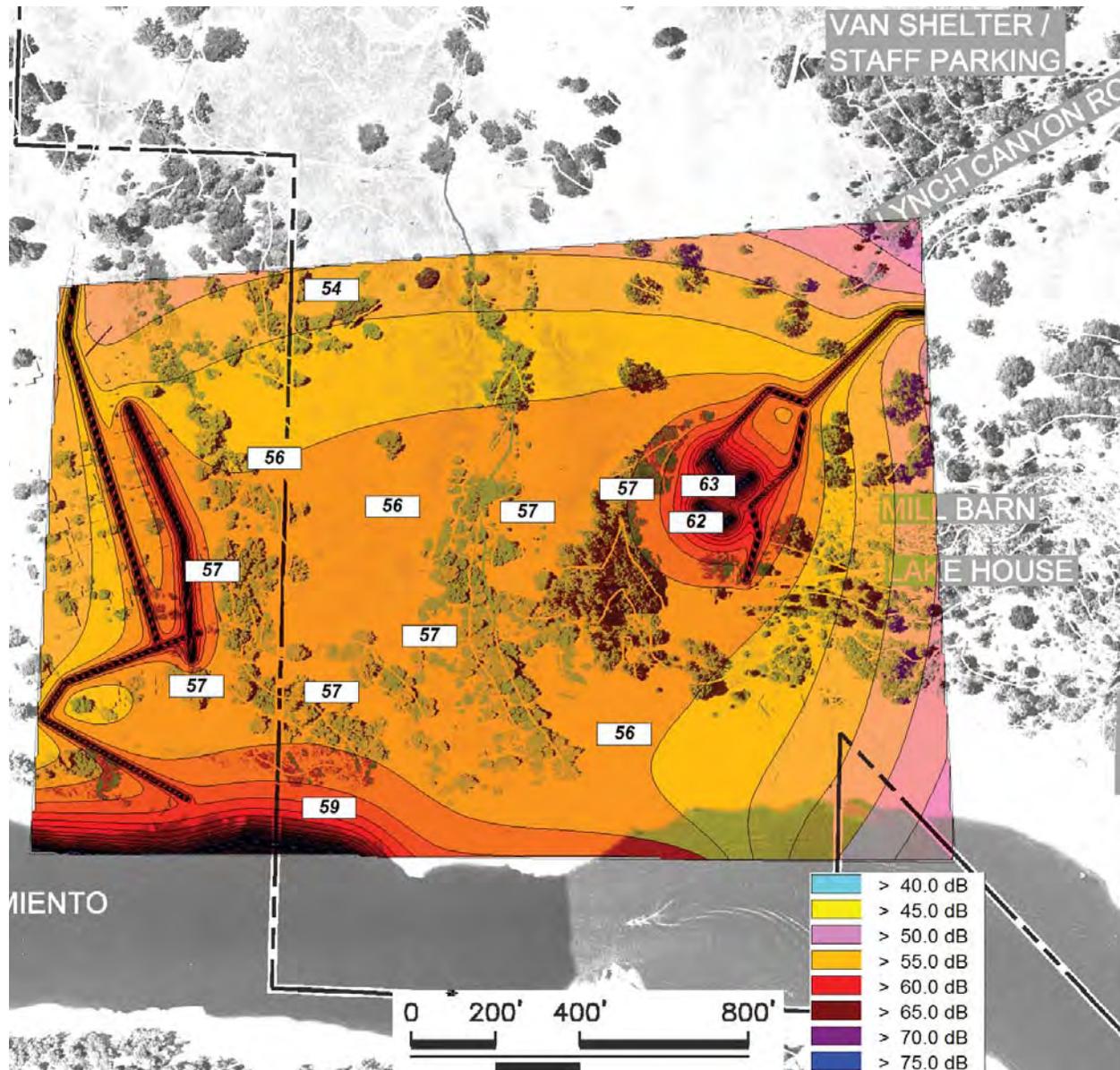
### Swimming Pool, Maximum Use

Sound level contours, dBA Leq, for Mill Barn and Recreation Area. In this scenario, 100 users are talking at high sound level plus 100 users at a normal sound level. This might occur between the hours of 9 a.m. to 9 p.m. Existing water activities are shown at the lake's edge to the south of the site.



**Figure 7. Combined Activities near Boundary.**

Existing sound level contours from activities at Christmas Cove and sound contribution from maximum activities in the Mill Barn area of the proposed project. Sound contribution from activities on Lake Nacimiento is also shown. Sound level contribution from the proposed project does not result in any increase in existing sound level at the boundary with Christmas Cove. Sound level at the boundary remains around 56 to 57 dBA both before and after the sound level contribution from the proposed project.



## 6.0 Appendix: Exterior Noise Level Standards, County of San Luis Obispo

### 23.06.044 - Exterior Noise Level Standards:

The exterior noise level standards of this section are applicable when a land use affected by noise is one of the following noise-sensitive uses which are defined in the Land Use Element and Local Coastal Plan: residential uses listed in Table O, Framework for Planning, except for residential accessory uses and temporary dwellings; health care services (hospitals and similar establishments only); hotels and motels; bed and breakfast facilities; schools (pre-school to secondary, college and university, specialized education and training); churches; libraries and museums; public assembly and entertainment; offices, and outdoor sports and recreation.

(a) No person shall create any noise or allow the creation of any noise at any location within the unincorporated areas of the county on property owned, leased, occupied or otherwise controlled by such person which causes the exterior noise level when measured at any of the preceding noise-sensitive land uses situated in either the incorporated or unincorporated areas to exceed the noise level standards in the following table. When the receiving noise-sensitive land use is outdoor sports and recreation, the following noise level standards shall be increased by 10 dB.

EXTERIOR NOISE LEVEL STANDARDS		
	Daytime 7a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
Hourly Equivalent Sound Level (Leq, dB)	50	45
Maximum level, dB	70	65

(b) In the event the measured ambient noise level exceeds the applicable exterior noise level standard in subsection (a), the applicable standard shall be adjusted so as to equal the ambient noise level plus one dB.

(c) Each of the exterior noise level standards specified in subsection (a) shall be reduced by five dB 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 exterior noise level standards.

[Amended 1992, Ord 2556]

## 7.0 REFERENCES

1. American National Standards Institute, Inc. 2004. *ANSI 1994 American National Standard Acoustical Terminology*. ANSI S.1.-1994, (R2004) , New York, NY.
2. American Society for Testing and Materials. 2004. *ASTM E 1014 - 84 (Reapproved 2000) Standard Guide for Measurement of Outdoor A-Weighted Sound Levels*.
3. Berglund, Birgitta, World Health Organization. 1999. *Guidelines for Community Noise* chapter 4, Guideline Values.
4. Bolt, Beranek and Newman. 1973. *Fundamentals and Abatement of Highway Traffic Noise*, Report No. PB-222-703. Prepared for Federal Highway Administration.
5. California Department of Transportation (Caltrans). 1982. *Caltrans Transportation Laboratory Manual*.
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7. \_\_\_\_\_. 2006. *California Transportation Plan 2025*, chapter 6.
8. California Resources Agency. 2007. *Title 14. California Code of Regulations Chapter 3. Guidelines for Implementation of the California Environmental Quality Act Article 5. Preliminary Review of Projects and Conduct of Initial Study Sections, 15060 to 15065*.
9. Federal Highway Administration. 2006. *FHWA Roadway Construction Noise Model User's Guide Final Report*. FHWA-HEP-05-054 DOT-VNTSC-FHWA-05-01.
10. Harris, Cyril.M., editor. 1979 *Handbook of Noise Control*.

## 8.0 APPENDIX: Notes, Definitions

TERM	DEFINITION
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise or sound at a given location. The ambient level is typically defined by the LEQ level.
Background Noise Level	The underlying, ever-present lower level noise that remains in the absence of intrusive or intermittent sounds. Distant sources, such as traffic, typically make up the background. The background level is generally defined by the L90 percentile noise level.
Sound Level, dB	Sound Level. Ten times the common logarithm of the ratio of the square of the measured A-weighted sound pressure to the square of the standard reference pressure of 20 micropascals, SLOW time response, in accordance with ANSI S1.4-1971 (R1976) Unit: decibels(dB).
dBA or dB(A):	A-weighted sound level. The ear does not respond equally to all frequencies, but is less sensitive at low and high frequencies than it is at medium or speech range frequencies. Thus, to obtain a single number representing the sound level of a noise containing a wide range of frequencies in a manner representative of the ear's response, it is necessary to reduce the effects of the low and high frequencies with respect to the medium frequencies. The resultant sound level is said to be A-weighted, and the units are dBA. The A-weighted sound level is also called the noise level.
Hourly Equivalent Sound Level LEQ	Because sound levels can vary markedly in intensity over a short period of time, some method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, one describes ambient sounds in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called LEQ. In this report, an hourly period is used.
Day-Night Sound Level LDN	LDN is the A-weighted equivalent sound level for a 24 hour period with an additional 10 dB imposed on the equivalent sound levels for night time hours of 10 p.m. to 7 am.
Percentile Sound Level (Ln)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (e.g., L90)
Subjective Loudness Changes.	In addition to precision measurement of sound level changes, there is a subjective characteristic which describes how most people respond to sound: <ul style="list-style-type: none"> <li>•A change in sound level of 3 dBA is <i>barely perceptible</i> by most listeners.</li> <li>•A change in level of 6 dBA is <i>clearly perceptible</i>.</li> <li>•A change of 10 dBA is perceived by most people as being <i>twice</i> (or <i>half</i>) as loud.</li> </ul>
Time weighting	Different, internationally recognized, meter damping characteristics are available on sound level measuring instruments: Slow (S), Fast (F) and Impulse (I). In this community sound level measurement, the Fast (F) response time is used.

## **9.0 APPENDIX II: Calculation and Modeling**

Noise contours incorporating the measured sound level values were generated using CADNA/A, an acoustical modeling program that incorporates the TNM 2.5 algorithms, and which was developed to predict hourly Leq values for free-flowing traffic conditions. This computer modeling tool, made by Datakustik GmbH, is an internationally accepted acoustical modeling software program, used by many acoustics and noise control professional offices in the U.S. and abroad.

The software has been validated by comparison with actual values in many different settings. The program has a high level of reliability and follows methods specified by the International Standards Organization in their ISO 9613-2 standard, “Acoustics – Attenuation of sound during propagation outdoors, Part 2: General Method of Calculation.” The standard states that, “this part of ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level ... under meteorological conditions favorable to propagation from sources of known sound emissions. These conditions are for downwind propagation ... under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night.”

The computer modeling software takes into account source sound power levels, surface reflection and absorption, atmospheric absorption, geometric divergence, meteorological conditions, walls, barriers, berms, and terrain variations. The CADNA/A software calculates sound level on a grid of receivers covering the project site, spaced less than one meter apart.