

# Environmental Noise Assessment

## Homewood Snowmaking

Placer County, California

Job # 2008-232

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## INTRODUCTION

This section analyzes the existing noise environment associated with snowmaking operations at the Homewood Mountain Resort and Ski Area. Homewood Mountain Resort encompasses 1260 acres, utilized for downhill snow recreation in winter months, and full service event facilities year round. Figure 1 shows the project site.

The intent of this report is to establish the existing noise environment, general ambient background noise levels, and existing snowmaking noise levels on the project site. This section also discusses the applicable regional and local noise level criteria.

## ACOUSTICAL TERMINOLOGY<sup>1</sup>

### *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: one person's music is another's headache.

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.

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<sup>1</sup> For an explanation of these terms, see Appendix A: "Acoustical Terminology"

**Figure 1**  
**Homewood Mountain Resort**  
**Project Site and Noise Measurement Locations**



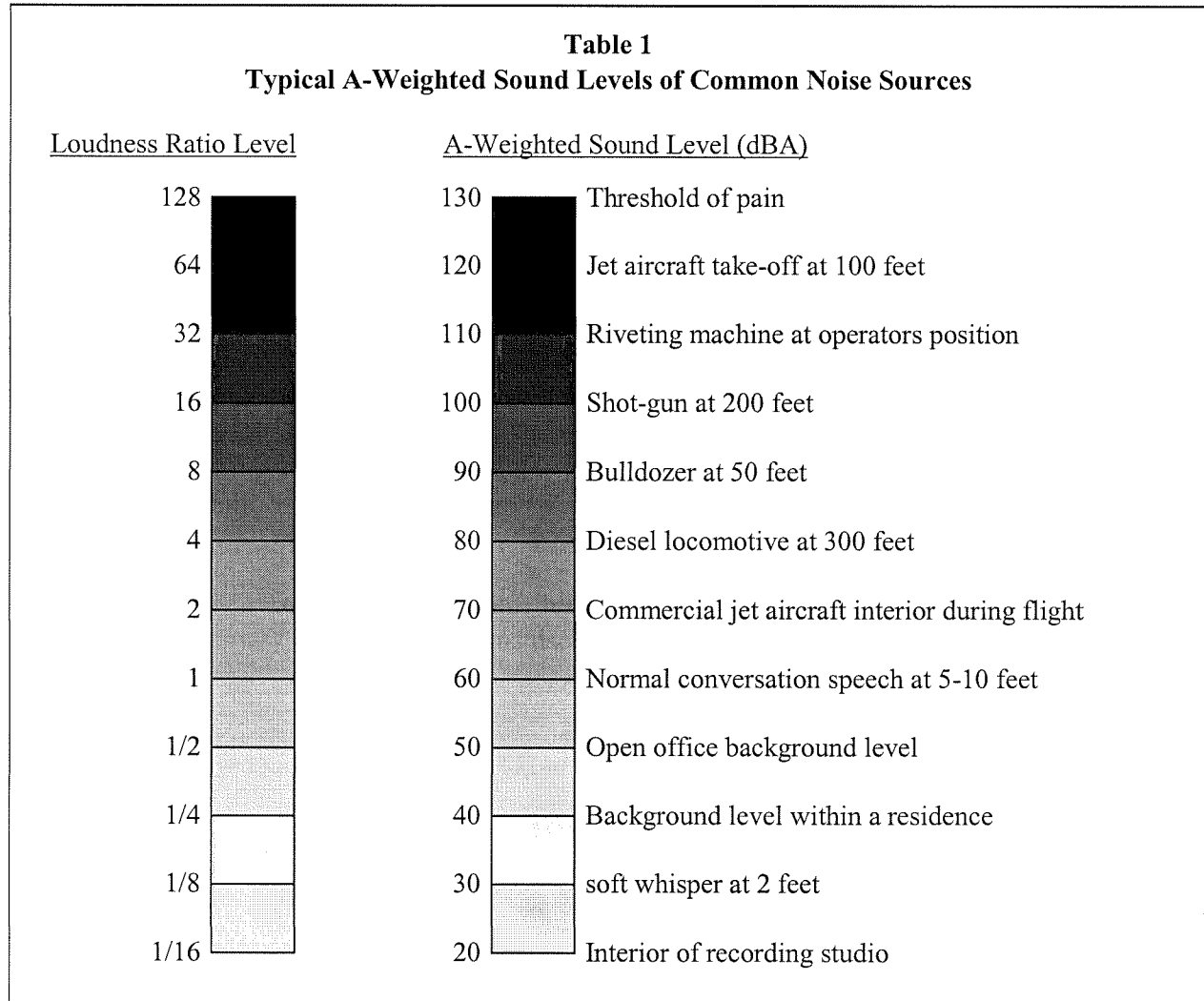
- △ : Short Term Noise Measurement Location
- : Continuous Noise Measurement Location



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 to measure the ambient noise level 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 Community Noise Equivalent Level (CNEL) descriptor is used by the TRPA for determining a significant noise impact. The CNEL is defined as the 24-hour average noise level with noise occurring during evening hours (7:00 p.m. – 10:00 p.m.) weighted by a factor of three, and nighttime hours (10:00 p.m. – 7:00 a.m.) weighted by a factor of 10, prior to the averaging.

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.



## REGULATORY SETTING

### Tahoe Regional Planning Agency Criteria:

The Tahoe Regional Planning Agency (TRPA) has adopted environmental thresholds for the Lake Tahoe Region. The noise standards, or "Thresholds" as they are commonly referred to, are numerical CNEL values for various land use categories and transportation corridors.

As a form of zoning, the TRPA has divided the Lake Tahoe Region into more than 175 separate Plan Areas. Boundaries for each of the Plan Areas have been established based on similar land uses and the unique character of each geographic area. For each Plan Area, a "Statement" is made as to how that particular area should be regulated to achieve regional environmental and land use objectives. As a part of each Statement, an outdoor CNEL standard is established. The project site is located within Plan Area 157 (Homewood/Tahoe Ski Bowl). The project site is bordered to the south and east by Plan Area 156 (Chambers Landing) and to the north and northeast by Plan Area 160 (Homewood/Residential). The Plan Area Statement noise level criteria are shown in Table 2.

Plan Area #	Plan Area Name	TRPA Noise Level Criteria
157	Homewood/Tahoe Ski Bowl	55 dB CNEL for entire Plan Area
156	Chambers Landing	55 dB CNEL for entire Plan Area
160	Homewood/Residential	55 dB CNEL for entire Plan Area

### Placer County General Plan

The Placer County General Plan Policies pertaining to noise are designed to protect County residents from the harmful and annoying effects of exposure to excessive noise. Those policies which would be applicable to this project are reproduced below:

- 1. The County shall not allow development of new noise-sensitive uses where the noise level due to non-transportation noise sources will exceed the noise level standards of Table 3 (Table 9-1 of the Placer County General Plan Noise Element) as measured immediately within the property line of the new development, unless effective noise mitigation measures have been incorporated into the development design to achieve the standards specified in Table 3.*

2. *The County shall require that noise created by new non-transportation noise sources be mitigated so as not to exceed the noise level standards of Table 3 (Table 9-1 of the Placer County General Plan) as measured immediately within the property line of lands designated for noise-sensitive uses.*
  
3. *Impulsive noise produced by blasting should not be subject to the criteria listed in Table 3 (Table 9-1 of the Placer County General Plan). Single event impulsive noise levels produced by gunshots or blasting shall not exceed a peak linear overpressure of 122 dB, or a C-weighted Sound Exposure Level (SEL) of 98 dBC. The cumulative noise level from impulsive sounds such as gunshots and blasting shall not exceed 60 dB LCDN or CNEL on any given day. These standards shall be applied at the property line of a receiving land use.*

<b>Table 3</b> <b>(Table 9-1 of the Placer County General Plan)</b> <b>Allowable Ldn Noise Levels Within Specified Zone Districts</b> <b>Applicable to New Projects Affected by or Including Non-Transportation Noise Sources</b>		
Zone District of Receptor	Property Line of Receiving Use	Interior Space
Residential adjacent to industrial	60 dBA	45 dBA
Other Residential	50 dBA	45 dBA
Office/Professional	70 dBA	45 dBA
Neighborhood Commercial	70 dBA	45 dBA
Notes for Table 10-4: 1. Except where noted otherwise, noise exposures will be those which occur at the property line of the receiving use. 2. Interior spaces are defined as any locations where some degree of noise-sensitivity exists. Examples include all habitable rooms of residences, and areas where communication and speech intelligibility are essential, such as classrooms and offices.		

## **EXISTING LAND USES IN THE PROJECT VICINITY**

The Homewood Mountain Resort is located on the west shoreline of Lake Tahoe, six miles south of Tahoe City along Highway 89, in Placer County. Existing land uses in the immediate Project vicinity include limited commercial/retail areas to the east, and residential uses along the north, south and southeast. Highway 89 is directly adjacent to the North Lodge Building, on the Resort site.

## **EXISTING NOISE ENVIRONMENT IN THE PROJECT VICINITY**

### **Snowmaking Operations**

Snowmaking operations can be separated into two categories. The first is the air/water guns which consist of high pressure air and water which are mixed at the nozzle. These types of snowmaking guns can be fairly loud, with the primary noise source being the compressed air at the nozzle. In addition, this requires fairly large compressors and in some cases diesel generators. In the late 1980's and early 1990's, Homewood ski area used this type of snowmaking equipment. The air/water nozzle fleet was generally made up of Omichron and Ratnik brand air/water nozzles. Each nozzle has varying performance characteristics for snowmaking and noise emissions. Most of the nozzles are mounted to skids, and can be connected to any of the snowmaking hydrants on the mountain.

The other type of snowmaking equipment is characterized as fan-gun technology. The fan guns are electrically powered, with either compressors located in a main building or small compressors located on each fan gun. This technology is significantly quieter than the air/water nozzles. With the recent reconfiguration, the Homewood snowmaking fleet consists exclusively of fan guns, such as the Super Polecat, the Super Wizzard, and the Viking Snowtower. In general, fan gun snowmaking equipment is 10dB to 20dB quieter than the air/water nozzle equivalent.

### **Existing Ambient Noise Environment**

To quantify existing snowmaking noise levels and background noise levels in the vicinity of the Ski Area, j.c. brennan & associates, Inc. conducted continuous noise monitoring for 4 consecutive days at three locations between the dates of December 18-21, 2008. Table 4 shows a summary of the continuous hourly noise monitoring results. Appendix B graphically shows the continuous 24-hour ambient noise measurement data.

Noise measurement equipment consisted of Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters. The measurement systems were calibrated using a LDL Model CAL200 acoustical calibrator before testing. The measurement equipment meets all of the pertinent requirements of the American National Standards Institute (ANSI) for Type 1 (precision) sound level meters.

