

Environmental Noise Assessment

Wise Villa Winery Community Center

Lincoln, California (Placer County)

BAC Job # 2012-047

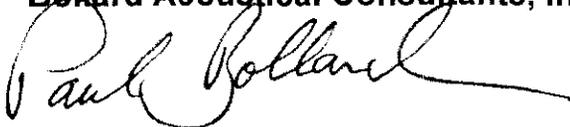
Prepared For:

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ATTACHMENT G

Introduction & Project Description

Bollard Acoustical Consultants, Inc. has completed an environmental noise assessment for the proposed Wise Villa Winery Community Center in Placer County, California. The project site is located at 4100 Wise Road in Lincoln, California. Figure 1 shows an aerial photograph of the project site location and surrounding rural residences.

The property is approximately 20 acres and is currently developed with a 3,590 square foot main winery building, approximately 2,100 square foot tasting room, parking areas to accommodate 32 vehicles, and an overflow parking area for an additional 40 vehicles. The property is bordered by Wise Road to the north and single-family ranchette to the west and south and open 10 acre undeveloped land to the west. The closest residence to the wine-tasting building is located approximately 430 feet to the southeast. The topography of the site consists mainly of rolling hillsides, and the parking areas, along with the winery and tasting room buildings are located downhill from the nearest residence.

Wise Villa Winery plans on utilizing the newly constructed wine-tasting building for events accommodating up to 100 people. Until construction of the new wine-tasting building, wine tasting occurred within the existing winery building. To be clear, the building being proposed for use as a community center is the existing, recently constructed, wine-tasting building located just south of the older winery building. No new building construction is being proposed as part of this "community center" application.

The project applicant is requesting to expand the uses allowed at the site to enable the new tasting room building to function as a "community center". A "community center" is defined in the Placer County Zoning Ordinance as including a multipurpose meeting facility typically consisting of one or more meeting or multipurpose rooms and a kitchen that are available for use by various groups for such activities as meetings, parties, receptions, etc. During the regular business hours of 11:00 a.m. to 8:30 p.m., the applicant proposes to have small group agricultural, vineyard or wine/food pairing educational events of 20-50 people 4 times a week and events for 51-100 people 2 times a month.

According to the project applicant, the events proposed at this location would primarily be held indoors, within the wine tasting/proposed community center building, and there would be no outdoor amplified speech or music whatsoever. When events within the proposed community center building will include amplified speech or music, ceiling-mounted speakers installed within that building will be used, and the facility doors would typically remain closed. Although there would be no outdoor amplified speech or music at the site, non-amplified music (such as a string quartet or classical guitarist), could occur between the existing winery building and the recently constructed tasting room/proposed community center. In addition, persons attending events at this facility could periodically congregate outdoors between the winery building and the recently constructed tasting room/proposed community center building.

Due to the proximity of existing residences to the project site, Placer County has required an acoustical analysis for this project. In response to this requirement, the applicant has retained Bollard Acoustical Consultants, Inc. (BAC) to prepare this noise study for the project.

Background on Noise and Acoustical Terminology

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), 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, called Hertz (Hz). 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 of pressure), as a point of reference, defined as 0 dBA. Other sound pressures are then compared to the 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 dBA. Another useful aspect of the decibel scale is that changes in decibel levels correspond closely to human perception of relative loudness. Table 1 provides common noise levels associated with various sources.

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 weighing the frequency response of a sound level meter by means of the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. 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.

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 noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}). The L_{eq} is the foundation of the day/night average noise descriptor, L_{dn} , and shows very good correlation with community response to noise. For an explanation of these terms, see Appendix A.

Figure 1
Wise Villa Winery Community Center Project - Lincoln, California
Project Vicinity & Noise Measurement Locations

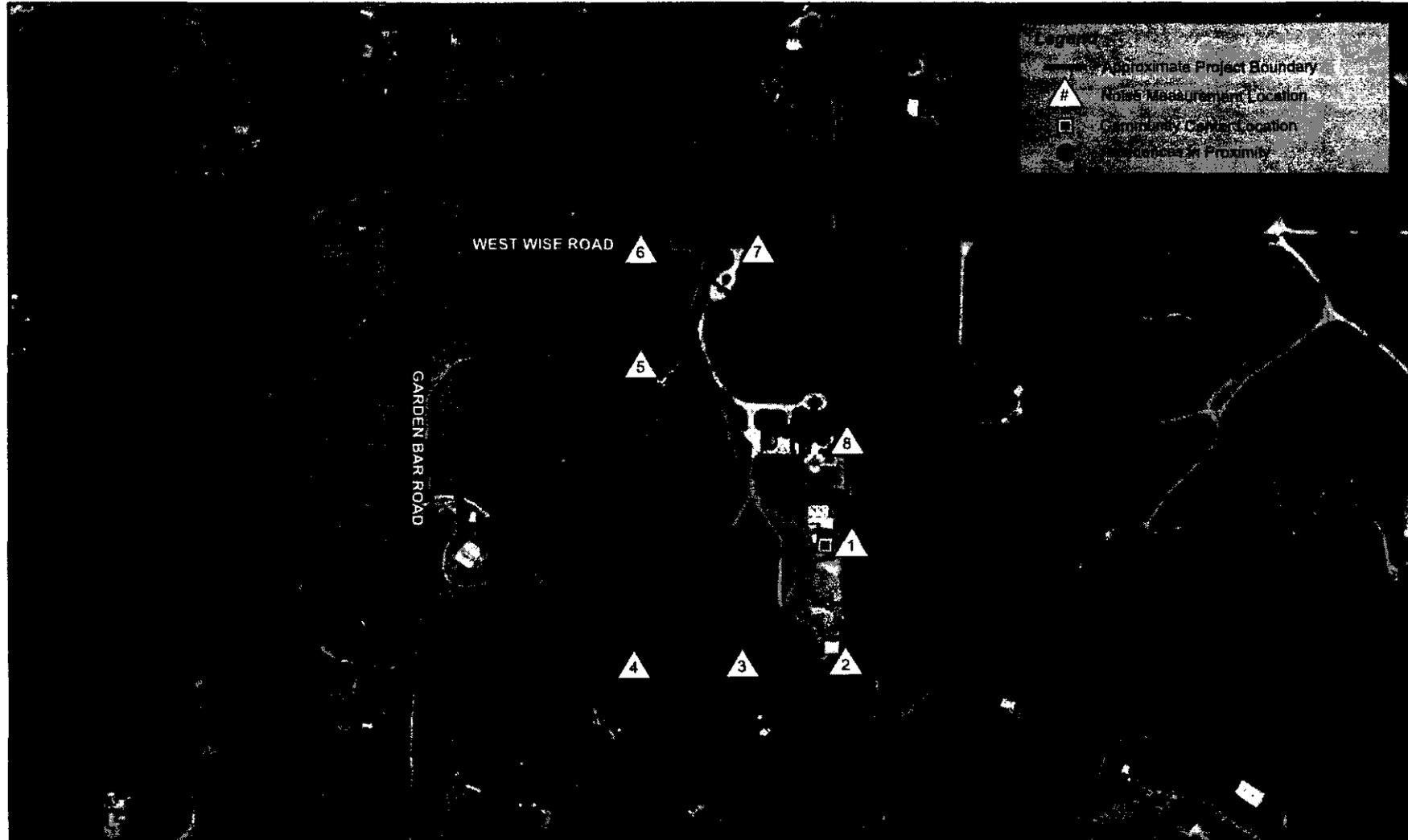


Table 1
Typical A-Weighted Sound Levels of Common Noise Sources

Loudness Ratio	dBA	Description
128	130	Threshold of pain
64	120	Jet aircraft take-off at 100 feet
32	110	Riveting machine at operators position
16	100	Shotgun at 200 feet
8	90	Bulldozer at 50 feet
4	80	Diesel locomotive at 300 feet
2	70	Commercial jet aircraft interior during flight
1	60	Normal conversation speech at 5-10 feet
1/2	50	Open office background level
1/4	40	Background level within a residence
1/8	30	Soft whisper at 2 feet
1/16	20	Interior of recording studio

Criteria for Acceptable Noise Exposure

The Placer County Noise Element of the General Plan establishes hourly noise exposure limits for non-transportation (stationary) noise sources affecting community residential land uses. These limits are summarized in Table 2. Although speech and music generated during events at this facility will occur indoors, and will largely be contained within the building, the County noise level criteria have, nonetheless, been reduced by 5 dB to account for the speech/music component of the project noise sources. Noise standards applicable to on-site traffic and parking lot activity would be 5 dB higher, as the speech/music penalty would not apply to those sources.

Table 2
Exterior Noise Exposure Criteria (Adjusted for Speech/Music)
Applicable at Property Lines of Residential Land Uses
Placer County Noise Element of the General Plan

Noise Level Descriptor	Daytime	Nighttime
	(7 a.m. - 10 p.m.)	(10 p.m. - 7 a.m.)
Hourly L_{eq} , dB	50	40
Maximum Level, dB (L_{max})	65	60

Note: Levels have been reduced by 5dB due to the speech/music nature of the project noises.

Analysis of Project Noise Generation

The noise-producing components of the proposed project include on-site traffic and parking lot activities, sound generated by amplified speech or music within the proposed community center building, and sound generated by non-amplified speech and music in the area between the winery building and proposed community center building. Recall that the proposed community center events will primarily occur within the existing tasting room. The proposed community center building location is identified on Figure 1.

Amplified Speech & Music Within Proposed Community Center Building

To quantify amplified speech and music sound levels generated within the proposed community center building at the property lines of the nearest residences to the project site, an event simulation and noise measurement survey was conducted at the project site on August 1, 2012. Specifically, BAC generated amplified music within the proposed community center building (new tasting room building), using a pair of Yamaha MSR 400 portable speakers with built-in amplifiers and an MP3 player as the music source. The sound system was placed inside the building at the location where musicians would reportedly be located. Figure 2 shows the speaker locations during the event simulation.

Figure 2 – Event simulation speaker placement



Working with the project applicant, it was determined that maximum comfortable interior sound levels generated by amplified speech or music within the proposed community center would be approximately 75 dB L_{eq} and 80 dB L_{max} . Therefore, the volume output of the speakers was set to produce these levels in the approximate center of the room.

With music playing in the proposed community center, and the front doors of the proposed community center building open (they had not been installed as of the time of the testing), sound level monitoring was concurrently conducted at eight (8) locations along the project property lines. Because the main doors where patrons will enter and exit the building had not been installed as of the time of the testing, the test results represent reasonable worst-case sound levels which would result from the proposed community center doors opening and closing over the normal course of the events held there.

The noise measurement locations are identified on Figure 1. It should be noted that noise measurements were intentionally not conducted along the western project property line between measurement sites 4 and 5 (see Figure 1), even though there is an existing residence located to the west (near Garden Bar Road). The reason for not monitoring this location is the considerable distance from the western property line to that residence and the fact that music was completely inaudible along that property line as BAC staff walked along the western site boundary.

Larson Davis Laboratories model 820 precision integrating sound level meters were used for the noise level survey. The meters were calibrated before use with a LDL model CA200 acoustical calibrator to ensure the accuracy of the noise measurements. The results of the noise measurements conducted while amplified music was played within the proposed community center building are provided in Table 3.

Table 3
Summary of Amplified Music Noise Level Measurements
Wise Villa Winery – Lincoln, California (Placer County) - August 1, 2012

Site & Description	Distance	L _{eq} , dB	L _{max} , dB	Music	Observations
				L _{max} , dB	
Reference position in center of community center building.	25'	75	80	80	Clear view of speaker – no interference
1 – Property line to the east	50'	41	54	50	Music audible but faint
2 - Property line to southeast	350'	42	51	<40 dB	Music inaudible
3 - Property line to south	400'	45	57	<40 dB	Music inaudible
4 – Property line to southwest	650'	36	46	<40 dB	Music inaudible
5 – Property line to the west	700'	45	55	<40 dB	Music inaudible
6 – Property line to the northwest	1,000'	51	61	<40 dB	Music inaudible – traffic dominant
7 – Property line to the north	850'	60	74	<40 dB	Music inaudible – traffic dominant
8 – Property line to the northeast	300'	47	59	<40 dB	Music inaudible
County Property Line Noise Standard	--	50	65	65	County standards not exceeded by music at any site.

Note: Noise measurement locations are shown in Figure 1.

It should be noted that the L_{max} and L_{eq} values reported in the 3rd and 4th columns of Table 3 were not generated by the music playing within the proposed community center building. The noise levels reported in those columns were observed to be generated by distant and local traffic, aircraft overflights, property maintenance, etc. The column labeled "Music L_{max}, dB" (5th column), contains the highest sound levels observed or estimated by BAC staff to have been caused by music playing within the proposed community center building. As can be seen by comparison of the two L_{max} columns, the sound generated by music was well below measured maximum noise levels attributable to sources of noise other than music within the proposed community center building.

The Table 3 data specifically indicate that music played within the proposed community center building was inaudible at all locations except for the property line to the immediate east, located 50 feet from the façade of the proposed community center (Site 1). At Site 1, which was the only site where music was audible, the measured music sound levels were well below the applicable Placer County noise standards identified in Table 2. The primary reason for the inaudibility of the music at the project site property lines was the fact that the music was generated indoors, with the proposed community center structure containing the sound. As a result, this analysis concludes that amplified speech or music occurring during events within the proposed community center building will be inaudible at all of the existing residences located in the immediate project vicinity. Therefore, no additional noise mitigation measures would be warranted for amplified speech or music occurring within the proposed community center building.

Non-Amplified Speech Inside of the Proposed Community Center

Persons engaged in conversation with raised voices generally produce noise levels of approximately 70 dB L_{max} at a distance of 5 feet. Based on 100 people speaking in elevated voices at any given time, the reference voice level at a distance of 25 feet would be approximately 75 dB L_{max} .

When guests are conversing within the proposed community center building, sound generated by guests conversing in elevated voice would be at or below sound levels generated by amplified speech or music. Because the previous section of this analysis concluded that amplified music generated within the proposed community center would be inaudible and well below county noise standards at the nearest residences, it can similarly be concluded that guests conversing inside the proposed community center building would be inaudible at the nearest residences. Therefore, no additional noise mitigation measures would be warranted for guests conversing within the proposed community center.

Non-Amplified Speech and Music Outside of the Proposed Community Center

When guests are conversing outside of the proposed community center, the level of noise generated by such conversations would depend on the number of people conversing and the sound level at which the conversations take place. Persons engaged in conversation with normal voices generally produce noise levels of approximately 65 dB L_{max} at a distance of 5 feet.

Given that persons conversing outside of the proposed community center building would not have to compete with amplified speech or amplified music to be heard, it is reasonable to assume that normal voice levels would be used during outdoor conversations. In addition, because outdoor conversations would occur as event patrons move between the winery building and the recently constructed tasting room/proposed community center, it is also reasonable to assume that there would be fewer people conversing outside than inside. Based on 50 people conversing outside at any given time, the reference voice level at a distance of 25 feet would be approximately 68 dB L_{max} . Sound generated by non-amplified music, such as a string quartet or classical guitarist, would be expected to generate maximum sound levels in this same range.

Combined sound levels associated with non-amplified music and patrons conversing outside would be expected to be approximately 70 dB L_{max} or less at a reference distance of 25 feet.

Table 4 shows the distances to the project property lines from the outdoor area where non-amplified music may occur and where guests may temporarily congregate and converse during events, and the resulting noise levels associated with those outdoor activities. It should be noted that such conversations would be shielded from the residences located along the eastern and northern project property lines by both the existing winery building and the proposed community center building, as well as intervening topography. However, non-amplified outdoor speech and music would not necessarily be shielded at all existing residences located beyond the southern and western site boundaries. The Table 4 data has been adjusted to account for shielding in the easterly and northerly directions.

**Table 4
Predicted Outdoor, Non-Amplified, Music and Speech Noise Levels
Wise Villa Winery Property Lines – Lincoln, California (Placer County)**

Site & Description	Distance	Shielding	L _{max} , dB	Conclusions
Reference position	25'	N/A	70	Close to outdoor source(s).
1 – Property line to the east	100'	-10 dB	48	Music/speech would be audible but faint
2 – Property line to southeast	450'	-10 dB	35	Music/speech likely inaudible
3 – Property line to south	450'	0 dB	45	Music/speech would be audible but faint
4 – Property line to southwest	700'	0 dB	41	Music/speech likely inaudible
5 – Property line to the west	700'	0 dB	41	Music/speech likely inaudible
6 – Property line to the northwest	1,000'	-10 dB	28	Music/speech inaudible
7 – Property line to the north	850'	-10 dB	29	Music/speech inaudible
8 – Property line to the northeast	300'	-10 dB	38	Music/speech likely inaudible
County Property Line Noise Standard	–		65	County standards not exceeded by non-amplified outdoor music/speech at any site.

Source: Bollard Acoustical Consultants, Inc.

The Table 4 data indicate that non-amplified music and/or speech occurring outside of the proposed community center building would range from faint to inaudible at all of the project property lines. In addition, such sound levels would be well below the applicable Placer County noise standards identified in Table 2. As a result, this analysis concludes that non-amplified speech or music occurring outside of the proposed community center building will be within acceptable limits, and no additional noise mitigation measures would be warranted for this aspect of the project.

261

On Site Traffic and Parking Lot Noise Assessment

According to the project applicant, the proposed project would have parking for approximately 72 vehicles. Although the distances from each parking space to the nearest residences varies, for computational purposes the approximate noise center of the parking area was scaled to be 350 feet from the nearest residence to the southeast. The nearest distance from the project on-site access road to the nearest residence is 250 feet.

As a means of determining the noise levels associated with parking lot activities, Bollard Acoustical Consultants, Inc. conducted repeated noise measurements of vehicles passing and parking on a gravel area. The mean sound exposure level (SEL) resulting from the gravel-surface passby tests simulating automobile arrivals and departures, including car doors closing and people conversing, was 72 dB SEL at a distance of 50 feet from the passby area. For a conservative assessment of project noise generation, a SEL of 75 dB was used to model on-site vehicle arrivals and departures, and parking lot activities. Assuming that all 72 parking spaces in the parking area would empty or fill during a peak hour of parking lot usage, the peak hour parking lot L_{eq} can be determined using the following formula:

$$\text{Peak Hour } L_{eq} = 75 + 10 * (\log N_{eq}) - 35.6, \text{ dB where:}$$

75 is the assumed sound exposure level (SEL) for a typical automobile arrival and departure on the gravel surface, N_{eq} is the number of automobile arrivals or departures during the peak hour, and 35.6 is 10 times the logarithm of the number seconds in an hour.

Based upon the equation above, and accounting for distance from the parking areas to the existing residential areas, the L_{eq} associated with worst-case parking lot activities (lot filling or emptying in any given hour), would be approximately 47 dB L_{eq} at the nearest residences to the project site. The predicted worst-case level of 47 dB L_{eq} or less would satisfy the Placer County daytime exterior noise level hourly standard of 55 dB L_{eq} , and thus no additional noise mitigation would be required for on-site traffic or parking lot-generated noise.

Conclusions & Recommendations

Noise generated during events at the proposed Wise Villa Winery community center, including amplified speech and music, sound generated by guests, and on-site traffic circulation and parking, is predicted to satisfy the Placer County noise standards at the project property lines and nearest existing residences. Nonetheless, the following specific measures are recommended to minimize the propagation of noise levels generated during events at this facility at the nearest residences.

1. All events and on-site activities shall be completed by 10 p.m., including amplified speech and music.
2. Amplified speech and amplified music should be limited to the interior of the community center building as proposed.

3. Non-amplified speech and non-amplified music should be limited to the outdoor area located between the existing winery building and the recently constructed tasting room/proposed community center.
4. While the main doors of the proposed community center building may open and closed over the course of events held within the community center, the southern and eastern doors of the community center building should remain in the closed position during events.

This concludes our environmental noise assessment for the Wise Villa Winery in Lincoln, California. Please contact me at (916) 663-0500 or paulb@bacnoise.com if you have any questions or require additional information.

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.
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 a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the Maximum level, which is the highest RMS level.
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	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.
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.

