



November 28, 2017

Mr. Dean Parsons
Project Review Manager
Sonoma County Permit & Resource Management Department

Transmitted Via Email to: Dean.Parsons@sonoma-county.org

Subject: Recommendations for General Noise Standards for Winery Events.

Dear Mr. Parsons,

Bollard Acoustical Consultants, Inc. (BAC) has prepared these recommendations for screening applications for winery events to ensure compliance with Sonoma County General Plan noise standards.

1. Noise Standards Applicable to Winery Events

Table NE-2 of the Sonoma County General Plan establishes maximum allowable noise exposure levels at noise-sensitive uses, applied at the property line. The County’s noise standards are reduced by 5 dB for noise sources consisting of speech or music. Because sound generated by winery events include these types of noise sources, the -5 dB offset to the County’s noise standards is appropriate when evaluating compliance of winery events relative to those standards. The County’s General Plan noise standards are reproduced below as Table 1, adjusted to include the -5 dB offset for speech and music. The County requires that all winery events and clean up end by 10 p.m. to meet the adjusted daytime noise standards provided in Table 1.

Table 1 Maximum Allowable Exterior Noise Exposures for Event Noise Sources Sonoma County General Plan (Table NE-2) (Adjusted by -5 dBA for noise sources consisting of speech and/or music)	
Hourly Noise Metric¹, dBA	Daytime (7 am – 10 pm)
L ₅₀ (30 minutes in any hour)	45
L ₂₅ (15 minutes in any hour)	50
L ₀₈ (4 minutes and 48 seconds)	55
L ₀₂ (72 seconds)	60

¹ The sound level exceeded n% of the time in any hour. For example, the L50 is the value exceeded 50% of the time or 30 minutes in any hour; this is the median noise level. The L02 is the sound level exceeded 2% of the time in any hour.

Note: -5 dB adjustment applied to all noise standards for noise sources consisting primarily of speech and music. Standards applied at property line.

2. Typical Noise Source Levels for Winery Events

Sound levels generated during winery events can vary considerably depending on the nature of the event. For example, wedding receptions tend to generate higher noise levels than winery dinners where amplified background music is present. Typical source levels for a range of activities are shown below in Table 2.

Table 2 Typical Sound Sources Levels for Winery / Ag Promotional Events	
Event or Activity	Typical Noise Level at 50 feet (dBA L₅₀)
Amplified speech / music at louder event (i.e. wedding reception or events with non-amplified drums and cymbals and/or brass instruments such as trumpets or other types of horns)	75
Amplified speech/music at quieter event (i.e. wine industry dinner)	72
Amplified speech only (no amplified music)	71
Non-amplified music (i.e. acoustic)	67
Raised conversations	64

Source: Illingworth & Rodkin & Bollard Acoustical Consultants.

3. Setback Distances Required to Achieve Consistency with Applicable Noise Standards

Sound radiating away from a fixed location decays at a rate of approximately 6 dB for each doubling of distance from the noise source. So for a sound source (i.e. amplified music), that generates a median noise level of 75 dB at a distance of 50 feet from the speakers, the sound level at a distance of 100 feet from that same source would be 6 dB lower, or 69 dB. At a distance of 200 feet from the speakers (a doubling of distance from the 100 foot location), the expected sound level would be 6 dB lower still, or approximately 63 dB.

This 6 dB per doubling of distance attenuation rate assumes a direct line of sight between the noise source and receiver (i.e. no shielding by intervening buildings, topography, or vegetation), and does not include further decreases in sound which occur over distance with atmospheric absorption of sound. This 6 dB per doubling of distance attenuation rate was used to provide a conservative estimate of the distance to the critical (most restrictive) 45 dB L₅₀ noise contours for the various types of sound sources identified in Table 2. The results of those noise contours are provided in Table 3.

Table 3 Distances Required to Attenuate Typical Sound Levels for Ag Promotional Events to a State of Compliance with Sonoma County's 45 dB L₅₀ Daytime Noise Standard	
Event or Activity	Distance to 45 dBA L₅₀ Contour (feet)
Amplified speech / music at louder event (i.e. wedding reception or events with non-amplified drums and cymbals and/or brass instruments such as trumpets or other types of horns)	1,580
Amplified speech/music at quieter event (i.e. wine industry dinner)	1,125
Amplified speech only (no amplified music)	1,000
Non-amplified music (i.e. acoustic)	625
Raised conversations	450
Source: Table 2 data with 6 dB decrease in sound levels per doubling of distance from the source. Note: These distances do not include any additional attenuation which would result from shielding by intervening topography, structures, or vegetation.	

4. Requirement for Project-Specific Noise Study

When reviewing applications for new winery event permits, Sonoma County shall compare the appropriate Table 3 setback requirements to the actual distances between the noise proposed sound source location and nearest sensitive receptors property line. If the actual setback distances are greater than those identified in Table 3 for the proposed type of sound source(s), then no additional acoustical analysis shall be required. If, however, the actual distances between the proposed sound source locations and nearest sensitive receptor locations are less than those shown in Table 3, then a site-specific noise analysis shall be required to evaluate compliance with the County's noise standards.

5. Factors to be Considered in Site-Specific Noise Analyses

As noted previously, the distances to the noise contours shown in Table 3 do not include any attenuation of sound caused by intervening structures, vegetation, or topography, or absorption of sound by the atmosphere. As a result, the Table 3 data should be considered worst-case. As a result, it is likely that in most cases, the actual distances to the noise contours will be less than those shown in Table 3. It is the function of the site-specific noise analysis to quantify the additional sound attenuation which would result from natural features, such as intervening topography (i.e. hills), structures, or vegetation, which are specific to the location for which the event permit is being processed. Specific information which should be included in project-specific noise analyses is as follows:

Shielding by Barriers, Structures or Topography

Shielding of noise sources, which results in reduced sound levels at locations affected by such shielding, can result from intervening noise barriers, structures or topography. Site specific noise studies should include an evaluation of such shielding. If needed for compliance with the County's noise standards, additional shielding of sound sources can be obtained by placing walls or other structures between the noise source and the receiver. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increasing the distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "path length difference," and is the basis for calculating barrier noise reduction.

Barrier effectiveness depends upon the relative heights of the source, barrier and receiver. In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path-length-difference for a given increase in barrier height than does a location closer to either source or receiver.

As a rule of thumb, sound barriers located relatively close to the source or sensitive receptor generally provide an initial noise reduction of 5 dB once line of sight between the noise source and receiver has been interrupted by the barrier, and an additional noise reduction of approximately 1 dB per foot of barrier height after the barrier intercepts line of sight.

Shielding and Absorption Provided by Vegetation

Trees and other vegetation are often thought to provide significant noise attenuation. However, approximately 100 feet of dense foliage (so that no visual path extends through the foliage) is required to achieve a 5 dB attenuation of noise. Thus the use of vegetation as a noise barrier is, therefore, frequently an impractical method of noise control unless large tracts of dense foliage are part of the existing landscape. However, in cases where such vegetation exists between the proposed events and nearby sensitive receptors, an evaluation of the sound attenuation provided by such vegetation should be included in the project-specific noise analysis.

Vegetation can be used to acoustically "soften" intervening ground between a noise source and receiver, increasing ground absorption of sound and thus increasing the attenuation of sound with distance. Planting of trees and shrubs is also of aesthetic and psychological value, and may reduce adverse public reaction to a noise source by removing the source from view, even though noise levels will be largely unaffected.

In summary, the effects of vegetation upon noise transmission are minor unless there is considerable intervening vegetation between the source and receptor. Where the amount of intervening vegetation is not substantial, the benefits may be limited to some increased absorption of high frequency sounds and in reducing adverse public reaction to the noise by providing aesthetic benefits.

Sound Travel in Uphill / Downhill Directions

Sound travel is not affected by gravity. As a result, the sound travels uphill similar to sound traveling downhill, provided all other variables are equal. In cases where sensitive receptors are located above or below a noise source with no intervening structures, topography, or substantial vegetation, no additional shielding offsets shall be applied for these features.

Other Sound Mitigation Options

Other options for sound attenuation which should be considered when evaluating permit applications for winery events include the following:

- Locating the events or loudest components of those events indoors.
- Orienting speakers in directions which provide the maximum distances to the nearest noise-sensitive receptors.
- Using a larger number of speakers with lower individual output arranged in such a manner as to focus the sound at the desired locations rather than fewer speakers with higher sound output.

6. Conclusions

It is BAC's professional opinion that the data and computations contained within this letter will provide the County with suitable information to conduct initial screening evaluations for winery event applications with respect to noise.

Because nearly every venue where events are proposed will have varying degrees of sound attenuation due to distance, shielding by intervening buildings, topography or vegetation, it is difficult to apply a "one size fits all" approach to the evaluation of potential noise impacts from winery events, such as wedding receptions. However, the noise contour distances contained within this letter can be used to evaluate whether or not additional acoustical evaluation is warranted for a particular application.

This concludes BAC's evaluation. Please contact BAC at (916) 663-0500 or paulb@bacnoise.com with any questions or requests for additional information.

Sincerely,
Bollard Acoustical Consultants, Inc.



Paul Bollard
President