

Noise Impact Assessment

# The Fruit Yard Amphitheater Events vs. Proposed General Plan Amendment

Stanislaus County, California

BAC Job # 2020-084

Prepared For:

## **The Fruit Yard Amphitheater**

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## Introduction

The Fruit Yard Amphitheater is located at the southwest quadrant of the intersection of Yosemite Boulevard (SR 132) and Geer Road, in unincorporated Stanislaus County, California. The use permit application for the Fruit Yard Amphitheater was approved in 2017 and included conditions related to amplified sound levels.

The project conditions of approval, which are discussed in greater detail later in this report, restrict sound levels at the amphitheater mixing board to levels below those commonly generated during concerts at similarly-sized venues. More specifically, the amphitheater conditions restrict average sound levels at the Fruit Yard mixing board to approximately 10 dB below levels typically generated during concerts at similar venues.

The Fruit Yard mixing board sound restrictions were developed prior to the opening of the amphitheater based on analytical modelling of sound propagation from the amphitheater to the nearest residences in the amphitheater vicinity. Given the considerable public interest in the project, care was taken to apply sufficiently restrictive noise standards to the initial events held within the amphitheater to ensure compliance with the County noise standards. The intent was to allow the collection of data at the nearest residences during the initial events to determine if the mixing board sound level limits were appropriately developed.

Sound level data collected at the nearest residences during the initial concert events indicated that the sound levels were satisfactory relative to the County's noise standards at those nearest residences. Analysis of the monitoring results indicate that the sound mixing board restrictions could likely be relaxed by approximately 5 dB without causing exceedance of the County's general plan noise standards at those nearest residences.

Because many acts reportedly are unwilling or unable to perform at the Fruit Yard amphitheater due to the atypically restrictive mixing board sound level limits, a modification to the County's General Plan noise standards is being requested by the Fruit Yard for a limited number of events each year. Specifically, a General Plan Amendment (GPA) is being proposed which would allow the County's average noise level standards to essentially be increased by approximately 10 dB at outdoor venues with a capacity of 2,000 attendees or more up to 7 days per year.

Bollard Acoustical Consultants, Inc. (BAC) was retained by the Fruit Yard to evaluate whether the proposed Fruit Yard events could comply with the proposed GPA if adopted. This report contains the results of BAC's evaluation.

## Acoustic Fundamentals & Terminology

Noise is often defined simply as unwanted sound. Loudness is the human impression of the strength of a sound pressure waves impacting the eardrum. The loudness of a noise does not necessarily correlate with its sound level. Appendix A contains definitions of Acoustical Terminology.

The human ear does not perceive all frequencies equally. For sound levels in the normal range of human hearing, the human ear does not perceive very low and very high frequencies as well as mid-range frequencies. In other words, for two sounds of equal intensity in the normal range of human hearing, a mid-frequency sound is perceived as being louder than a low-frequency or very high frequency sound. This may seem counterintuitive as often times we may hear only low-frequency sounds, such as the bass of music being played in a nearby car or the sound of a distant concert. But this phenomenon is due to the fact that, due to their longer wavelengths, low-frequency sounds pass through barriers more efficiently than mid and high-frequency sounds, as well as the fact that low frequency sounds are not absorbed into the atmosphere as readily as higher frequency sounds (i.e., low frequency sound “carries” further over distance).

To account for the differences in perception of human hearing to different frequencies, the A-weighting scale was developed. A-weighted noise levels are basically linear, or flat, sound pressure levels shaped by a filter. The A-weighting filter adjusts the linear measurement to account for the way in which the ear responds to different frequencies of sound. Measurements in dBA are decibel scale readings that have been adjusted using the A-weighting filter to attempt to take into account the varying sensitivity of the human ear to different frequencies of sound. Researchers have generally agreed that A-weighted sound pressure levels (sound levels) are very well correlated with community reaction to noise for sound levels in the normal range of human hearing.

At very high noise levels, the human ear perceives very low and very high frequency sounds better than at the more moderate ranges of noise levels commonly encountered in society. To better represent the loudness of very high noise levels, the C-weighting scale was developed. The C-weighting scale is quite flat, and therefore includes much more of the low-frequency range of sounds than the A scale. The effect of using a C-weighting scale vs. an A-weighting scale is that the C-weighting scale will report higher noise levels (due to less low-frequency sound being filtered as compared to the A-weighting filter).

The decibel notation used for sound levels describes a logarithmic relationship of acoustical energy, so that sound levels cannot be added or subtracted in the conventional arithmetic manner. For example, a doubling of acoustical energy results in a change of 3 decibels (dB), which is usually considered to be barely perceptible. A 10-fold increase in acoustical energy yields a 10 decibel change, which is subjectively like a doubling of loudness.

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## Current Noise Standards for Events Held in the Amphitheater

Following extensive analysis of potential noise impacts related to Fruit Yard Amphitheater events involving amplified speech or music, multiple project noise mitigation measures were developed. Those mitigation measures which pertain to amphitheater sound generation limits are summarized as follows:

### Development Standards Applicable to Amphitheater Event Noise Levels

13. All noise generated on the 43.86 acre project site shall be subject to the following:
  - a. In accordance with the Noise Element of the Stanislaus County General Plan, noise levels associated with all on-site activities shall not exceed the maximum allowable noise levels as allowed by the Noise Element. The property owner shall be responsible for verifying compliance and for any costs associated with verification.
  - b. Any outdoor use of amplified sound at the amphitheater shall comply with the development standards of this Permit addressing noise levels, as analyzed in the December 30, 2016 Environmental Noise Analysis prepared by Bollard Acoustical Consultants, Inc., unless otherwise amended by the County.
  - c. An acoustical analysis shall be prepared in accordance with the Noise Element of the Stanislaus County General Plan prior to the use of any outdoor blasting devices, including fireworks, to ensure noise levels do not exceed the maximum allowable noise levels as allowed by the Noise Element.

(Note: No blasting devices, including fireworks, have been utilized at any concerts)

### Mitigation Measures Applicable to Amphitheater Event Noise Levels

4. All amphitheater events shall maintain compliance with the noise levels limits established by the Noise Element of the Stanislaus County General Plan, as described in Table IV-2 – Maximum Allowable Noise Exposure – Stationary Noise Sources, and any subsequent amendments. In addition, low-frequency noise shall be limited to:
  - a. Daytime and nighttime C-weighted noise level limits of 80 dBC  $L_{eq}$  and 70 dBC  $L_{eq}$  shall be applied for all amphitheater events. These standards may be adjusted upwards or downwards following C-weighted ambient noise level data collected during noise monitoring, as described in Mitigation Measure No. 8. Before any adjustments are made, a report documenting existing C-weighted ambient noise levels shall be reviewed by a noise consultant, as described in Mitigation Measure No. 14, and approved by the Planning Department. Should the Noise Element be amended to include C-weighted standards, the current standards set forth in the Noise Element shall be met.
5. To ensure compliance with County noise standards, amphitheater sound system output shall be limited to an average of 90 dBA  $L_{eq}$  averaged over a five minute period and a maximum of 100 dBA  $L_{max}$  at a position located 100 feet from the front of the amphitheater

stage.

6. To control low-frequency sound in the surrounding neighborhood during amphitheater events, C-weighted sound levels shall be limited to 100 dBC  $L_{eq}$  averaged over a five minute period and a maximum of 110 dBC  $L_{max}$  at a position located 100 feet from the front of the speakers.
  
8. During the first two large concerts (with 500 or more in attendance) held at the amphitheater and any of the first two events held at the amphitheater (if less than 500 in attendance), on-site and off-site noise levels shall be monitored by a qualified noise consultant, to be procured by the operator/property owner. The on-site monitoring shall be conducted continuously, 100-feet from the front of the stage for the amphitheater. Periodic off-site noise monitoring shall be conducted at the Long-term Ambient Noise Measurement Locations identified on Figure 1 of the December 30, 2016, Environmental Noise Analysis, conducted by Bollard Acoustical Consultants, Inc. (included as Figure 1 in this report). The noise measurements shall include the sound check prior to the concert so the event promoters understand the noise thresholds to be satisfied during the event. The purpose of the measurements is to verify compliance with the project's noise standards, as set forth in Mitigation Measures 4, 5, and 6.

## Current Stanislaus County General Plan Criteria

The Stanislaus County General Plan Noise Element establishes acceptable noise level limits for both transportation and non-transportation noise sources. The primary objective of the Noise Element is to prescribe policies that lead to the preservation and enhancement of the quality of life for the residents of Stanislaus County by securing and maintaining an environment free from excessive noise.

For stationary noise sources, such as events held at the Fruit Yard Amphitheater, Stanislaus County regulates the level of noise that may impact adjacent noise-sensitive uses. For this project, the evaluation period is considered to be the worst-case hour during which amplified music or speech would be in use. Noise generated by the project which exceeds the County's noise exposure limits at the closest noise-sensitive uses would require noise mitigation. The County's General noise exposure limits applicable to this project are reproduced below in Table IV-2.

<b>Table IV-2</b>		
<b>Maximum Allowable Noise Exposure for Stationary Noise Sources<sup>1</sup></b>		
<b>Stanislaus County Noise Element of the General Plan</b>		
<b>Descriptor</b>	<b>Daytime (7:00 a.m. to 10:00 p.m.)</b>	<b>Nighttime (10:00 p.m. to 7:00 a.m.)</b>
Hourly $L_{eq}$ , dBA	55	45
Maximum Level ( $L_{max}$ ), dBA	75	65
<p>Notes:</p> <p><sup>1</sup> Each of the noise level standards specified in Table IV-2 shall be reduced by five (5) dBA for pure tone noises, noise consisting primarily of speech or music, or for recurring impulsive noises. The standards in Table IV-2 should be applied at a residential or other noise-sensitive land use and not on the property of a noise-generating land use. Where measured ambient noise levels exceed the standards, the standards shall be increased to the ambient levels.</p> <p>Source: Stanislaus County Noise Element of the General Plan</p>		

As noted in the Table IV-2 footnote, a -5 dB adjustment is applied to the County’s noise standards for sounds consisting of music. In addition, in areas with elevated ambient conditions, the noise standards are increased to match ambient conditions. While it is clear that a -5 dB offset to the Table IV-2 standards is warranted because the noise source being evaluated in these surveys consists of amplified speech and / or music, an ambient noise survey is required to determine if existing ambient conditions are sufficiently elevated so as to warrant increasing the noise level standards. Ambient conditions in the immediate project vicinity are described in the following section.

It should be noted that the average ( $L_{eq}$ ) noise standards contained in Table IV-2 are averaged over a 1-hour period. By comparison, the noise standards applicable at the sound board of the amphitheater are specified in terms of 5-minute periods. For consistency, the sound board standards should be revised to be expressed in terms of hourly periods.

In addition to the noise standards applied to stationary noise sources (Table IV-2 above), the County General Plan also include a figure depicting “Normally Accepted Community Noise Environments” (General Plan Figure IV-2). That figure is reproduced below.

The noise exposure described by General Plan Figure IV-2 is defined in terms of Day/Night Average noise levels ( $L_{dn}$ ).  $L_{dn}$  is computed as the average of the daytime noise exposure plus the average of the nighttime noise exposure after adding 10 dB. As a result, an  $L_{dn}$  of 60, which is the normally acceptable noise environment for residential uses in the County, equates to a daytime average of 60 dB and a nighttime average of 50 dB. As a result, the Table IV-2 daytime noise standard applicable to stationary noise sources is more restrictive than the Figure IV-2 criteria shown below. The proposed GPA, which is described later in this report, is essentially requesting a daytime average of 60 dBA during 7 concert events per year, which is consistent with the noise environment considered normally acceptable in Figure IV-2.

**FIGURE IV-2: NORMALLY ACCEPTED COMMUNITY NOISE ENVIRONMENTS**

Land Use Category	Exterior Noise Exposure Ldn or CNEL, dBA					
	55	60	65	70	75	80
*Residential – Low Density Single Family, Duplex, and Mobile Homes				■	■	■
*Multi-Family Residential				■	■	■
Hotels and Motels				■	■	■
Schools, Libraries, Museums, Hospitals, Personal Care, Meeting Halls, Churches				■	■	■
Auditoriums, Concert Halls, and Amphitheaters				■	■	■
Sports Arena and Outdoor Spectator Sports				■	■	■
Playgrounds and Neighborhood Parks				■	■	■
Golf Courses, Riding Stables, Water Recreation, and Cemeteries				■	■	■
Office Buildings, Business Commercial, and Professional				■	■	■
Industrial, Manufacturing, Utilities, and Agriculture				■	■	■

*\* Residential development sites exposed to noise levels exceeding 60 Ldn shall be analyzed following protocols in Appendix Chapter 12, Section 1208A, Sound Transmission Control, California Building Code.*



**NORMAL ACCEPTABLE**

Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special insulation requirements.



**CONDITIONALLY ACCEPTABLE**

Specified land use may be permitted only after detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.



**NORMALLY UNACCEPTABLE**

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.



**CLEARLY UNACCEPTABLE**

New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

## **Baseline Ambient Noise Environment in Amphitheater Vicinity**

The ambient noise environment in the immediate project vicinity is primarily defined by traffic on Yosemite Boulevard and Geer Road, as well as by local agricultural-related activities. Baseline ambient noise level measurements were conducted immediately prior to the first two concerts held at the Fruit Yard amphitheater in 2019 to determine whether adjustments to the County's noise standards provided in Table IV-2 were warranted. Those measurements indicated that such adjustments were appropriate for several of the monitoring sites, particularly those located in close proximity to Yosemite Boulevard and Geer Road, as baseline traffic noise at those residences significantly masked amphitheater concert sound. At the residences on Weyer Road, however, baseline ambient conditions were lower and fewer adjustments to the standards were warranted.

## **Initial Concert Sound Monitoring Results**

Noise monitoring was conducted by BAC staff during the initial two concerts held at the amphitheater. Those concerts were Amy Grant and Willie Nelson. The monitoring indicated that the sound levels measured during those concerts were within compliance with the county's noise standards at the nearest residences to the amphitheater. Reports documenting the detailed results of those sound monitoring programs were prepared by BAC and submitted to the County.

During the concerts, the sound level measurement results indicated that, due to the substantial noise generation by traffic on Geer Road and Yosemite Boulevard, it was infeasible to measure concert sound levels at 4 of the 9 monitoring sites. At the residences on Weyer Road which are removed from both Geer Road and Yosemite Boulevard, traffic noise levels were significantly lower and it was possible to hear sound generated during the concerts. However, at the Weyer Road residences there was still sufficient background sound from distant traffic, periodic local traffic, and natural sounds (dogs, birds, wind, etc.), to make capturing acoustically "clean" readings of concert sound in the absence of background sounds very difficult. As stated previously, however, the measurement results indicated that the concert sound levels were within compliance with the applicable County noise standards.

Noise level measurements conducted by another acoustical consultant during a third concert held at the amphitheater revealed similar results.



# Proposed General Plan Amendment

The proposed General Plan Amendment is indicated below.

**TABLE IV-2**

**MAXIMUM ALLOWABLE NOISE EXPOSURE – STATIONARY NOISE SOURCES<sup>1</sup>**

	<b>Daytime 7 a.m. to 10 p.m.</b>	<b>Nighttime 10 p.m. to 7 a.m.</b>
<b>Hourly L<sub>eq</sub>, dBA</b>	55	45
<b>Maximum level, dBA</b>	75	65

Each of the noise level standards specified in Table IV-2 shall be reduced by five (5) dBA for pure tone noises, noise consisting primarily of speech or music, or for recurring impulsive noises. Each of the noise level standards specified in Table IV-2 may be increased by five (5) dBA for pure tone noises, noise consisting primarily of speech or music, at an outdoor venue with capacity of 2,000 attendees or greater for no more than seven (7) days per year upon Board of Supervisors approval. The standards in Table IV-2 should be applied at a residential or other noise-sensitive land use and not on the property of a noise generating land use. Where measured ambient noise levels exceed the standards, the standards shall be increased to the ambient levels.

Table As indicated above, the requested change in the stationary noise standards is the application of a +5 dB offset to the Table IV-2 standards for sound consisting of speech or music (amphitheater sound), versus the current standard which applies a -5 dB offset for sound consisting of speech or music.

## Implications of the GPA on Fruit Yard Amphitheater Events

The adoption of the proposed GPA would effectively allow sound generation 10 dB greater than is currently allowed under the current General Plan language. The increased sound would only be allowed for outdoor venues with 2,000 attendees or more and for only 7 days per year. As a practical matter, musical acts typically perform for approximately 3 hours or less during each concert event at the Fruit Yard amphitheater, so the total duration of the period during which the increase over the current noise standards would be approximately 20 hours per year or less.

The higher noise standard would allow the Fruit Yard greater flexibility in booking various performers for a limited number of events per year. Sound levels at nearby residences would increase during such events, with average sound levels anticipated to be approximately 60 dBA on average at the residences on Weyer Road during the 7 annually permitted events. The increase would result in greater audibility of music for the duration of the concert. The increase would be less noticeable at residences located along Yosemite Avenue and Geer Road due to the higher background traffic noise environment, but would likely equate to a more noticeable increase at the residences on Weyer Road (i.e. approximately 5 dB increase relative to background ambient conditions despite a 10 dB increase at the mixing board).

The noise standards would still decrease during nighttime hours (i.e. after 10 pm), so the events would either need to reduce the sound output by 10 dB after 10 pm or conclude the events prior to 10 pm.

The Fruit Yard has demonstrated that it can comply with the existing sound level limits enumerated within the current project conditions of approval, but that compliance is difficult. The relaxation of the noise standards which would result from adoption of the GPA would make compliance with the standards during those 7 annual events considerably more feasible to achieve.

## Conclusions

This evaluation concludes that the Fruit Yard has demonstrated the ability to comply with the current project conditions of approval pertaining to sound level limits. However, the mixing board sound level limits appear to currently be 5 dB more restrictive than necessary to comply with the County's noise standards, so a 5 dB increase in sound limits at the mixing board could be applied without necessarily resulting in exceedance of the current General Plan noise standards. The adoption of the GPA would allow an additional 5 dB margin under limited circumstances, which would be more consistent with standards applied at similar venues and with General Plan Table IV-2, thereby allowing a wider range of entertainment options at this venue. During the 7 events per year during which this GPA would take effect, overall sound levels at the nearest residences would increase by various amounts depending on the levels of background (non-concert) sound present during the concert events. The change would likely range from barely perceptible to clearly audible, again depending on location. Given the limited number of events per year permitted by the proposed GPA (7), and the limited duration of each concert, the effects of the GPA would be limited to a relatively small duration.

This concludes BAC's evaluation of the effects of adopting the proposed GPA on events held at the Fruit Yard Amphitheater in Stanislaus County, California. Please contact Paul Bollard at (916) 663-0500 or [paulb@bacnoise.com](mailto:paulb@bacnoise.com) with any questions regarding this report.

## Appendix A Acoustical Terminology

<b>Acoustics</b>	The science of sound.
<b>Ambient Noise</b>	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.
<b>Attenuation</b>	The reduction of an acoustic signal.
<b>A-Weighting</b>	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
<b>Decibel or dB</b>	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.
<b>CNEL</b>	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.
<b>Frequency</b>	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
<b>IIC</b>	Impact Insulation Class (IIC): A single-number representation of a floor/ceiling partition's impact generated noise insulation performance. The field-measured version of this number is the FIIC.
<b>L<sub>dn</sub></b>	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
<b>L<sub>eq</sub></b>	Equivalent or energy-averaged sound level.
<b>L<sub>max</sub></b>	The highest root-mean-square (RMS) sound level measured over a given period of time.
<b>Loudness</b>	A subjective term for the sensation of the magnitude of sound.
<b>Masking</b>	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
<b>Noise</b>	Unwanted sound.
<b>Peak Noise</b>	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.
<b>RT<sub>60</sub></b>	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
<b>STC</b>	Sound Transmission Class (STC): A single-number representation of a partition's noise insulation performance. This number is based on laboratory-measured, 16-band (1/3-octave) transmission loss (TL) data of the subject partition. The field-measured version of this number is the FSTC.