

Appendix J Environmental Noise Assessment Supplement

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Jesuit High School Stadium Lights Project – Night Game Noise Monitoring Results

Sacramento County, California

BAC Job # 2022-128

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Introduction

Jesuit High School (JHS) is located at 1200 Jacob Lane in the unincorporated community of Carmichael within Sacramento County, California. JHS is proposing to install lighting at their existing stadium to make the stadium playing field available for use during evening hours which are not currently available due to darkness.

The JHS stadium is bordered by residential uses to the immediate west / southwest on Piccadilly Circle with additional residences located beyond those nearest residences. The stadium is bordered to the south by a JHS practice field beyond which is American River Drive and residential neighborhoods. The stadium is bordered to the east by JHS baseball diamonds beyond which are residential neighborhoods along Jacobs Lane. The stadium is bordered to the north by the JHS campus with the nearest residences located approximately 500 feet to the north along Lantern Court. Figure 1 shows an aerial image of the JHS stadium and nearby residential uses.

A noise analysis was prepared for this project by Bollard Acoustical Consultants, Inc. (BAC Job #2022-128, March 6, 2023). The BAC noise analysis was used in the development of the Noise and Vibration section of the project Draft Environmental Impact Report (DEIR), (State Clearinghouse Number: 2022100645, September 2023).

This analysis has been prepared to present supplemental noise level data collected during two Jesuit High School football games held on the evenings of August 25, 2023 and September 1, 2023. Portable lighting systems were utilized during these two games to permit the games to occur during evening hours when the field would otherwise be dark. The supplemental noise surveys were requested during these evening games to allow comparison of noise levels generated during evening football games held under the lights against the noise levels measured during daytime football games which were used in the DEIR noise impact analysis. This report contains the results of the supplemental noise measurements and a comparison of daytime against evening noise levels generated during varsity football games held at Jesuit High School.



Noise Monitoring Locations

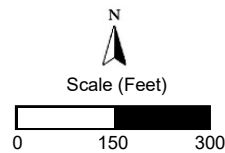
Figure 1 shows the locations where noise monitoring occurred for the original noise analysis (shown as Sites 1-6), as well as the locations monitored during the evening football games (shown as Sites A, B and C). As shown on Figure 1, the six locations which were monitored for the original analysis consisted of front or rear yard areas of residences located in close proximity to the Jesuit stadium, as well as a location further into the neighborhood to the south (Site 4).

Three locations were selected for the supplemental evening football game noise measurements. The sites were selected on the Jesuit High School property to facilitate meter placement, to be generally representative of the noise levels received at the nearest residences to the west, south and east, and to provide access to the equipment for observations and sound level meter checking during the evening football games.



Legend

-  Noise Measurement Locations during Daytime Football Games
-  Noise Measurement Locations during Evening Football Games



Jesuit High School Stadium
Sacramento County, California

Project Area & Noise Monitoring Sites

Figure 1



As indicated in Figure 1, monitoring Site A is near previous monitoring Site 2, which represents one of the nearest residences on Piccadilly Circle to the Stadium. Monitoring Site B was selected to be generally representative of front-yard noise exposure at residences located along American River Drive (i.e. Site 3), and Monitoring Site C was selected to be representative of noise exposure at residences located along Jacob Lane (i.e. Site 6).

Larson Davis Laboratories (LDL) Model 831 precision (Type 1), integrating sound level meters were used to complete the supplemental noise level measurement surveys during the evening football games. The meters were calibrated before and after use with an LDL Model CA200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all specifications of the American National Standards Institute requirements for Type 1 sound level meters (ANSI S1.4). Weather conditions were typical for the period with no anomalous atmospheric conditions present which would have adversely affected the integrity of the measurement results. Figures 2-4 show photographs of the locations monitored during the evening football games.

Figure 2: Site A



Figure 3: Site B

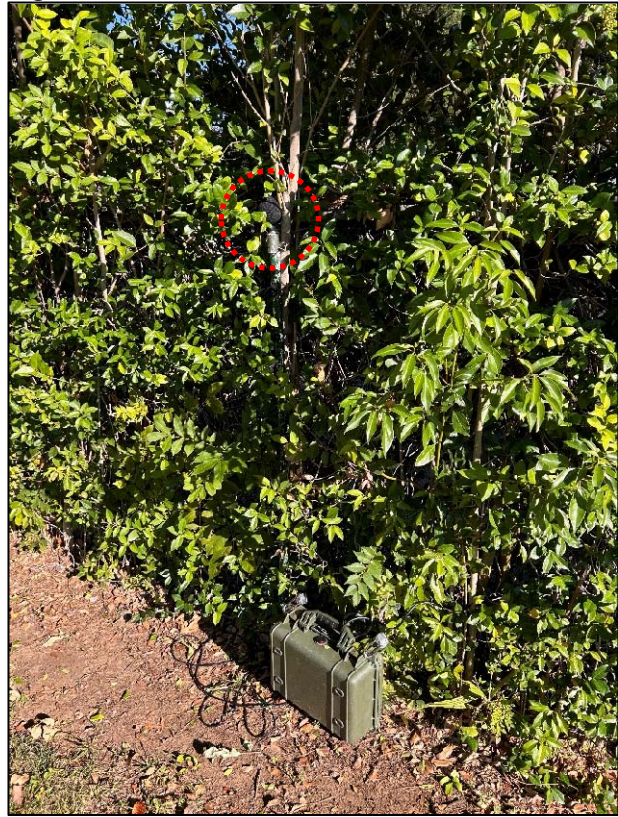


Figure 4: Site C

Measured JHS Stadium Evening Football Game Noise Levels

The two evening football games monitored for this supplemental analysis occurred on August 25th and September 1st, 2023. The varsity football games occurred on these dates between the hours of 7 pm and 9:30 pm. Two lighting trucks were positioned behind the home and visiting team's bleachers to provide light during the evening varsity football games.

The noise level data collected during the evening varsity football games were compared against the noise level data collected during the October 8th, 2022 daytime varsity football game. That game occurred between the hours of 1 pm and 3:30 pm. Specifically, noise level data collected during the evening game at Sites A, B and C were compared against noise level data collected during the day game at Sites 2, 3, and 6 (see Figure 1 for monitoring site locations)

Although the noise measurement sites utilized for the evening (lighted) football game (Sites A - C), were in close proximity to the sites monitored during the daytime (unlighted) football game (Sites 2, 3 and 6), some differences in the locations required the application of offsets to allow a normalized comparison of the noise measurement results. Specifically, offsets were applied to the data collected at Sites A and C to account for the fact that Sites 2 and 6 were partially shielded from view of the football stadium by intervening fencing, whereas Sites A and C were unshielded. In addition, the crowd sizes present during the evening football games were reportedly larger than the crowd present during the day game, necessitating an offset to normalize the data to reflect comparable crowd sizes. Finally, the portable lighting systems utilized during the nighttime games were powered by large generators located on the lighting trucks. Those generators, which will not be required for the permanent lighting installation, resulted in elevated baseline evening noise

levels relative to baseline levels present during the daytime football game. After accounting for the different conditions present during the daytime and nighttime varsity football games, a comparison of noise levels measured during those two periods was conducted. The results of that comparison are provided in Table 1 below.

Table 1 Comparison of Measured Noise Levels During Daytime and Evening Varsity Football Games Jesuit High School Football Stadium				
Noise Monitoring Site ¹	Hour of Varsity Football Game	Measured 10/8/22 Daytime Game Noise Levels, L50 dBA	Normalized Evening Game Noise Levels, L50 dBA ²	Difference between Evening and Daytime Levels
October 8, 2022 Daytime Game vs. August 25, 2023 Evening Game				
2	1	48	52	4
	2	51	52	1
	3	51	49	-2
	Average	50	51	1
3	1	56	56	0
	2	56	55	-1
	3	58	55	-3
	Average	57	55	-2
6	1	51	50	-1
	2	50	50	0
	3	49	49	0
	Average	50	48	0
October 8, 2022 Daytime Game vs. September 1, 2023 Evening Game				
2	1	48	53	5
	2	51	51	1
	3	51	54	3
	Average	50	53	3
3	1	56	60	4
	2	56	58	2
	3	58	59	1
	Average	57	59	2
6	1	51	52	1
	2	50	52	2
	3	49	52	3
	Average	50	52	2
1. Noise measurement locations are indicated on Figure 1 2. Offsets were applied to measured evening noise levels to account for shielding by property line fencing, crowd size, and generators used for portable lighting.				
Source: BAC 2023				

The Table 1 results indicate that noise levels measured during the nighttime games (with lights), were reasonably comparable to noise levels measured during the daytime game (without lights). During the first evening game held on August 25, 2023, noise levels were effectively similar to levels measured at the nearest residences during the daytime football game.

During the second evening football game held on October 1st, 2023, noise levels were slightly higher than the first evening football game, but overall levels were still within 2 to 3 dBA of levels measured during the 2022 day game. BAC staff observations indicated that the slightly higher noise levels measured during the second game may have been due to the game being very closely contested until the last play of the game (with Jesuit losing to rival Saint Ignatius by 1 point).

Conclusions

Noise levels measured during two evening games held under portable lighting were generally within 1-3 dBA of noise levels measured during the day game without lighting. This degree of difference in sound levels is typically considered to be imperceptible to barely perceptible.

Because the noise levels measured during the 2022 day game were used to assess project noise impacts, and because the measured 2023 nighttime game noise levels were within 1-3 dBA of measured day game noise levels, the DEIR conclusions regarding noise impacts are considered to be valid. That is, noise impacts at the nearest residences continue to be identified as significant and unavoidable during home football games held under the lights during evening hours. In addition, noise impacts would not be identified as being substantially more severe using noise level data collected during the evening football games versus using the data collected during the daytime football game.

This concludes BAC's supplemental assessment of noise generated by the proposed Jesuit High School Stadium Lighting Improvements. Please contact BAC at (530) 537-2328 or paulb@bacnoise.com with questions or comments on this assessment.

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.
IIC	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.
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.
STC	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.

