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SUBJECT: Sound Levels for proposed Sycamore Farms Special Events MCUP

## BACKGROUND

Two possible, entertainment sites are proposed at the Sycamore property. These sites are on either side of the existing barn. Santa Barbara county has a regulation to limit the sound levels at the property line to 65 dBA. This report contains the results of sound level predictions of the location of the predicted 65 dBA sound level contours and the sound levels at the property lines for each proposed site.

## ANALYSIS

The DJ positions are located at the northwest end of the existing barn and the southeast end of the existing barn. In each case, the barn will block some sound radiating to areas of the property. Sound radiated from the loudspeaker system will be reflected back into the loudspeaker area from the barn and increase the sound levels in the areas of reflection.

A loudspeaker system (JBL Professional PRX635, Ref. 1) was used in the analysis. This loudspeaker has known sound directivities at the octave-band center frequencies. The venue proposes two loudspeakers to be separated by 26 feet and located at 10 feet above the ground. The sound level on the center-line between the speakers and 10 feet from the front of the loudspeakers is calculated to be 95 dBA. The sound spectrum 10 feet in front of a single loudspeaker used in the analysis is listed in Table I.

The propagated sound is attenuated by spherical spreading of the sound. Spherical spreading of sound reduces the level by 6 dB for every doubling of distance from the source. In addition, atmospheric attenuation of the sound levels is included for the propagating sound (Ref. 2). There is little atmospheric attenuation at low frequencies and the atmospheric attenuation increases with frequency. Absorption of the sound by the ground and the sound absorption by foliage were not taken into account. The reflection and blocking of sound by the barn is taken into account. The blocking and reflection of sound by the pole barn is not taken into account, as this barn has minimal effect on sound transmission when it is empty.

Frequency [Hz]	Sound Pressure Level [dB re. 20 $\mu$ Pa] at 10 ft
63	90
125	95
250	97
500	96
1000	92
2000	82
4000	78
8000	72

Table I: Sound pressure level spectrum of a single JBL Professional PRX635 loudspeaker. (With two JBL Professional PRX635 loudspeakers operating and separated by 26 feet a 95 dBA sound level will be measured on the center-line of the loudspeakers at 10 feet in front the loudspeakers.)

Figure 1 is an illustration of the calculated sound levels for Site 1 in the area southeast of the present barn. The calculated 65 dBA sound level contour does not reach the property lines in any direction. (Sound levels were not calculated for the insides of buildings.) Reflection and shielding effects by the building were accounted for in calculating the 65 dBA contour line and the sound levels at the property lines. The closest property line is to the east of the barn. The property lines to the south, west, and north are much farther away from the Site 1, and, as a result, the sound levels will be less than 65 dBA at those property lines.



Figure 1: Predicted, 65 dBA sound level contour in the area around Site 1, southeast of the existing barn.

Figure 2 is an illustration of the calculated sound levels at the property lines for the entire property. The sound levels at the property lines are all less than the 65 dBA county limits. At the closest property line location from the loudspeakers at the DJ position the sound level is 60 dBA, due east of Site 1.



Figure 2: Predicted, property line sound levels from Site 1, southeast of the existing barn.

Figure 3 is an illustration of the calculated sound levels for Site 2 in the area northwest of the present barn. The calculated 65 dBA sound level contour does not reach the property lines in any direction. (Sound levels were not calculated for the insides of buildings.) Reflection and shielding effects by the building were accounted for in calculating the 65 dBA contour line and the sound levels at the property lines. The property lines to the south, west, and north are much farther away from Site 2, and, as a result, the sound levels will be less than 65 dBA at those property lines.

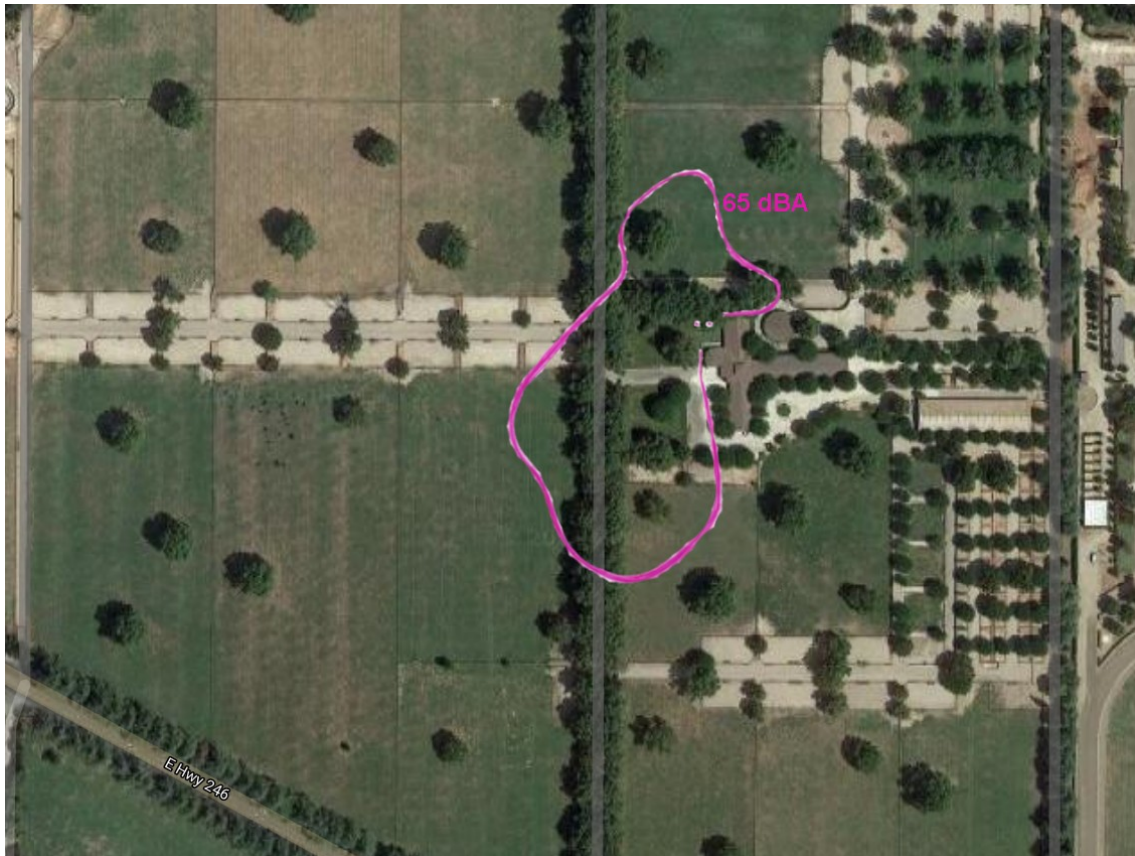


Figure 3: Predicted 65 dBA sound level contour in the area around Site 2, northwest of the existing barn.

Figure 4 is an illustration of the calculated sound levels at the property lines for the entire property. The sound levels at the property lines are all less than the 65 dBA county limits. The highest sound level at any property line is 57 dBA, south-southwest of Site 2 at Highway 246. (Roadside sound levels measured at the Highway 246 property line are in the 80 to 85 dBA range.) The next highest sound level is 55 dBA, north-northeast of Site 2.



Figure 4: Predicted, property line sound levels from Site 2, northwest of the existing barn.

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## CONCLUSIONS

The A-weighted sound level of 95 dBA at 10 feet should be considered as an average, upper limit to the music. This sound level is high enough sound level which can be easily heard over the dance floor and still not exceed the 65 dBA sound level at the property lines.

In order to minimize the sound levels at the surrounding property lines, it is suggested that the DJ be located at Site 2.

## REFERENCES

1. [https://www.princeton.edu/3D3A/Directivity/JBL%20Professional%20PRX635/index\\_H.html](https://www.princeton.edu/3D3A/Directivity/JBL%20Professional%20PRX635/index_H.html)
2. ANSI S1.26-1995, "American National Standard method for calculation of the absorption of sound by the atmosphere (Acoustical Society of America, New York, 1995), 59F and 70%RH.