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SUBJECT: Sound levels predicted for proposed music entertainment venue at Kessler-Haak Vineyards.

BACKGROUND

Kessler-Haak Vineyards is proposing having amplified music for entertainment of guests. The location for this music is to be to the west of the existing home and near the base of a group of trees. The proposed music is to be generated by two loudspeakers and controlled by a DJ.

Santa Barbara county has a regulation to limit the sound levels at the property line to a CNEL of 65 dB (Ref. 1). This report contains the results of A-weighted sound level predictions at various perimeter line locations, two examples of CNEL predictions at the two highest property line sound levels, and the predicted 65 dBA sound level contour.

ANALYSIS

The DJ position is located west of the existing home and near the base of a group of trees. The home will block some sound radiating to the east of the property. The effects of the house blocking and reflecting the sound is ignored in this analysis. A loudspeaker system (JBL Professional PRX635, Ref. 2) 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 20 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 92 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 a source. In addition, atmospheric attenuation of the sound levels is included for the propagating sound (Ref. 3). 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 house has not been taken into account.

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Frequency [Hz]	Sound Pressure Level [dB re. 20 μPa] at 10 ft
63	84
125	90
250	92
500	91
1000	88
2000	78
400	74
8000	68

Table I: Sound pressure level spectrum of a single JBL Professional PRX635 loudspeaker at 10 feet in front of the loudspeaker. (With two JBL Professional PRX635 loudspeakers operating and separated by 20 feet a 92 dBA sound level will be measured on the center-line of the loudspeakers at 10 feet in front the loudspeakers.)

The CNEL sound level weightings are 5 dB during the hours from 7 PM to 10 PM and 10 dB during the hours of 10 PM to 7 AM. The calculated CNEL will depend on the amplitude and duration of the music. The ambient, or background, sound levels affect the CNEL. The ambient sound level is estimated to be 40 dBA, though, in this rural area, it may be lower. Traffic sounds from Highway 246 will affect all measurements, but are ignored in this analysis. Traffic sounds will be minimal at the northern end of the property. (In a 24 hour period with a sound level at 40 dBA, the CNEL would be 47 dB.)

Figure 1 shows the predicted, property line sound levels which result from the Table I spectrum with two loudspeakers separated by 10 feet and radiating sound toward the southwest (indicated by the arrow) corner of the property. These data are plotted on a photo from Google Maps (Ref.4).

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Figure 1: Predicted, A-weighted sound levels at the property line caused by the music levels generated with the spectrum of Table I.

The two locations of importance are to the north and the east of the loudspeakers. To the north, the property line sound level is 58 dBA. To the east, in the direction of the nearest neighbor home, the property line sound level is 49 dBA.

These two cases are considered under the assumption that the music plays constantly from 12 Noon until 10 PM.

The first case is:

Ambient sound level: 40 dBA
Music sound level: 58 dBA (Due north of the music at the property line)
Evening, corrected sound level: 63 dBA
Nightime, corrected sound level (ambient, no music): 50 dBA
CNEL: 57 dB

The second case is:

Ambient sound level: 40 dBA
Music sound level: 49 dBA (Due east of the music at the property line)
Evening, corrected sound level: 54 dBA
Nighttime, corrected sound level (ambient, no music): 50 dBA
CNEL: 50 dB

These two cases indicate that the CNEL does not exceed the 65 dB property line limit set for in the county regulations.

Figure 2 shows the A-weighted sound level contour for the sound system.

Figure 2: Sound level contour around the loudspeaker system.

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CONCLUSIONS

The CNEL and A-weighted sound levels do not exceed the 65 dBA sound level limits at the property line of the Kessler-Haak Vineyard property.

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REFERENCES

1. Environmental Thresholds and Guidelines Manual, County of Santa Barbara, Planning and Development (January 2021), Section 13.B.3.

2. https://www.princeton.edu/3D3A/Directivity/JBL%20Professional%20PRX635/index_H.html

3. 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), 59 F and 70% RH.

4. Google Maps: https://www.google.com/maps/place/1700+Gypsy+Canyon+Rd,+Lompoc,+CA+93436/@34.6666722,-120.3543486,537m/data=!3m1!1e3!4m5!3m4!1s0x80ec1ccf5bd4d6c7:0xa47cd5e99d4eb7fd!8m2!3d34.666442!4d-120.354708!5m1!1e4