Verizon Wireless • Proposed Base Station (Site No. 269257 "Arrowbee Lake")
4131 Birdseye View Lane • El Dorado County, California

Statement of Hammett & Edison, Inc., Consulting Engineers

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained on behalf of Verizon Wireless, a personal telecommunications carrier, to evaluate the base station (Site No. 269257 "Arrowbee Lake") proposed to be located on 4131 Birdseye View Lane in the Placerville area of El Dorado County, California, for compliance with appropriate guidelines limiting sound levels from the installation.

Executive Summary

Verizon proposes to install a new base station, consisting of an equipment shelter, a back-up generator, and a tall pole, at 4131 Birdseye View Lane in the Placerville area of El Dorado County, California. Noise levels from the equipment operations will be below the County's permitted limits.

Prevailing Standard

The County of El Dorado sets forth limits on sound levels in Chapter 6.5 (Acceptable Noise Levels) of the El Dorado County General Plan as amended March 2009. The Public Health, Safety, and Noise Element includes in Table 6-2 the following limits for hourly average noise caused by non-transportation sources:

Zone	Daytime	Evening	Night	Assessment Location
	7 am to 7 pm	*7 pm to 10 pm*	*10 pm to 7 am*	*on adjacent property*
Community	55 dBA	50 dBA	45 dBA	at property line
Rural	50 dBA	45 dBA	40 dBA	100 ft from residence

Figure 1 attached describes the calculation methodology used to determine applicable noise levels for evaluation against the prevailing standard.

The operation of the back-up power generator during an emergency, when commercial power is unavailable, is considered to be exempt from these limits; for the purpose of this study, the generator's operation during periodic, no-load testing is evaluated for compliance.

General Facility Requirements

Wireless telecommunications facilities ("cell sites") typically consist of two distinct parts: the electronic base transceiver stations ("BTS" or "cabinets") that are connected to traditional wired telephone lines, and the antennas that send wireless signals created by the BTS out to be received by individual subscriber units. The BTS are often located outdoors at ground level and are connected to the antennas by coaxial cables. The BTS typically require environmental units to cool the electronics

inside. Such cooling is often integrated into the BTS, although external air conditioning may be installed, especially when the BTS are housed within a larger enclosure.

Most cell sites have back-up battery power available, to run the base station for some number of hours in the event of a power outage. Many sites have back-up power generators installed, to run the station during an extended power outage.

Site & Facility Description

Based upon information provided by Verizon, including zoning drawings by Borges Architectural Group, dated January 5, 2015, that carrier proposes to place an equipment shelter on a steel platform to be constructed on the property zoned "estate residential" located at 4131 Birdseye View Lane in the Placerville area of unincorporated El Dorado County. The BTS equipment in the shelter would be cooled by two air conditioning units, assumed for the purpose of this study to be Bard Model WA4S1 units, installed on the east face of the shelter. They are typically installed as a pair for redundancy and alternate their operation, so that both do not operate simultaneously.

A Generac Model SD030 back-up diesel generator, configured with the manufacturer's Level 2A sound enclosure, is to be installed to the west of the shelter, for emergency use in the event of an extended commercial power outage. The generator is typically operated with no load for a single 15-minute period once a week during daytime hours on a weekday, to maintain its readiness for emergency operation.

Several directional panel and microwave dish antennas are proposed to be installed on a tall pole, configured to resemble a pine tree, next to the platform; this portion of the base station is passive, generating no noise. The nearest residences on adjacent parcels are located to the east, south, and west, about 417, 272, and 379 feet away, respectively, from the pole; the residence to the north is much farther away.

Based on review of the pertinent map in the County's General Plan, the proposed site is not within an identified "Community" area, so the "Rural" noise limits are used for this assessment.

Study Results

Based on data from the manufacturers, the maximum noise level from an air conditioning unit is 65.0 dBA, measured at a reference distance of 10 feet in front, and the maximum noise level from the generator is 63.0 dBA, measured at a reference distance of 23 feet.

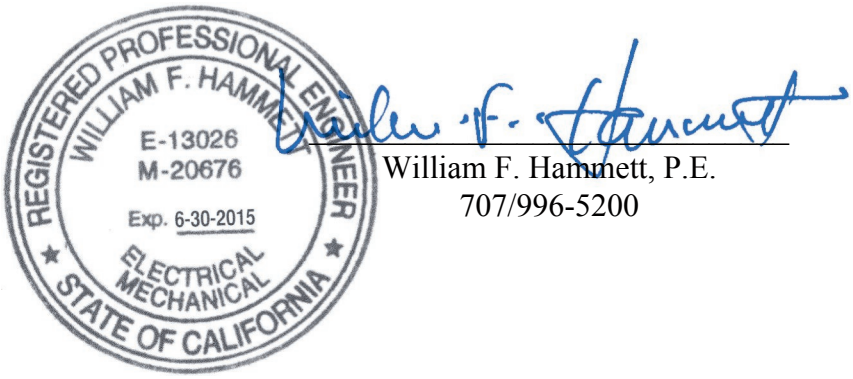
The maximum calculated noise levels at 100 feet from the nearest residences* for continuous operation of the air conditioners, even before considering the attenuating effects of intervening terrain and vegetation, are 34.7, 40.6, and 34.5 dBA at the east, south, and west, respectively, all meeting the County's daytime noise limit of 45 dBA. At night, when the air conditioners do not need to run continuously, these calculated noise levels drop to 33.5, 39.3, and 33.3 dBA, respectively, meeting the County's most restrictive, nighttime noise limit of 40 dBA. On the day on which the generator is tested, during daytime hours, the calculated noise levels are 36.4, 43.1, and 38.4 dBA, respectively, all still below the County's daytime limit.

Conclusion

Based on the information and analysis above, it is the undersigned's professional opinion that the operation of the Verizon Wireless base station proposed to be located at 4131 Birdseye View Lane in the Placerville area of El Dorado County, California, will comply with the County's requirements for limiting acoustic noise emission levels.

Authorship

The undersigned author of this statement is a qualified Professional Engineer, holding California Registration Nos. E-13026 and M-20676, which expire on June 30, 2015. This work has been carried out under his direction, and all statements are true and correct of his own knowledge except, where noted, when data has been supplied by others, which data he believes to be correct.



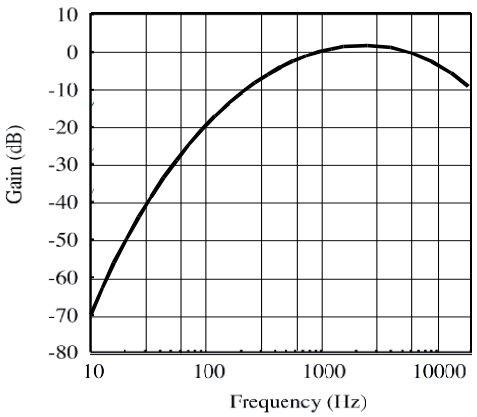
William F. Hammett, P.E.
707/996-5200

April 30, 2015

* As specified by the County's General Plan.

Noise Level Calculation Methodology

Most municipalities and other agencies specify noise limits in units of dBA, which is intended to mimic the reduced receptivity of the human ear to Sound Pressure ("L_P") at particularly low or high frequencies. This frequency-sensitive filter shape, shown in the graph to the right as defined in the International Electrotechnical Commission Standard No. 179, the American National Standards Institute Standard No. 5.1, and various other standards, is also incorporated into most calibrated field test equipment for measuring noise levels.



30 dBA	library
40 dBA	rural background
50 dBA	office space
60 dBA	conversation
70 dBA	car radio
80 dBA	traffic corner
90 dBA	lawnmower

The dBA units of measure are referenced to a pressure of 20 µPa (micropascals), which is the threshold of normal hearing. Although noise levels vary greatly by location and noise source, representative levels are shown in the box to the left.

Manufacturers of many types of equipment, such as air conditioners, generators, and telecommunications devices, often test their products in various configurations to determine the acoustical emissions at certain distances. This data, normally expressed in dBA at a known reference distance, can be used to determine the corresponding sound pressure level at any particular distance, such as at a nearby building or property line. The sound pressure drops as the square of the increase in distance, according to the formula:

$$L_P = L_K + 20 \log(D_K/D_P),$$

where L_P is the sound pressure level at distance D_p and L_K is the known sound pressure level at distance D_K.

Individual sound pressure levels at a particular point from several different noise sources cannot be combined directly in units of dBA. Rather, the units need to be converted to scalar sound intensity units in order to be added together, then converted back to decibel units, according to the formula:

where L_T is the total sound pressure level and L_1, L_2, etc are individual sound pressure levels.

$$L_T = 10 \log \left(10^{L_1/10} + 10^{L_2/10} + \ldots\right),$$

Certain equipment installations may include the placement of barriers and/or absorptive materials to reduce transmission of noise beyond the site. Noise Reduction Coefficients ("NRC") are published for many different materials, expressed as unitless power factors, with 0 being perfect reflection and 1 being perfect absorption. Unpainted concrete block, for instance, can have an NRC as high as 0.35. However, a barrier's effectiveness depends on its specific configuration, as well as the materials used and their surface treatment.