Statement of Hammett & Edison, Inc., Consulting Engineers

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained on behalf of AT&T Mobility, a personal telecommunications carrier, to evaluate the base station (Site No. CCL04011) proposed to be located at 21111 Stevens Creek Boulevard in Cupertino, California, for compliance with appropriate guidelines limiting sound levels from the installation.

Executive Summary

AT&T proposes to install a new base station at 21111 Stevens Creek Boulevard in Cupertino, consisting of equipment cabinets at ground and antennas on a tall pole. Noise levels from the equipment operations will comply with the City's permitted limits.

Prevailing Standards

The City of Cupertino sets forth limits on sound levels in its Municipal Code. Section 10.48.040 "Daytime and Nighttime Maximum Noise Levels" sets forth the below maximum allowed noise levels at receiving properties, according to land use:

Land Use at Point of Origin	Daytime *7 am to 10 pm*	Nighttime *10 pm to 7 am*
Residential	60 dBA	50 dBA
Nonresidential	65	55

Section 10.48.030 provides an "emergency exception" from these noise limits "in the performance of emergency work," which §10.48.010 defines to include "restoration of conditions … to their status prior to the emergency," such as the use of a back-up generator to restore wireless telecommunications services in the event that commercial power is lost; for the purpose of this study, just the generator's operation during periodic, no-load testing is evaluated for compliance. Figure 1 attached describes the calculation methodology used to determine applicable noise levels for evaluation against the prevailing standard.

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 AT&T, including zoning drawings by Interlocity, LLC, dated August 23, 2018, that carrier proposes to place several equipment cabinets within a new fenced compound to be constructed on the west side of North Stelling Road, about 260 feet north of the intersection with Stevens Creek Boulevard, east of the Cupertino Sports Center tennis courts located at 21111 Stevens Creek Boulevard in Cupertino; its land use is "Parks and Open Space," which is nonresidential. The six equipment cabinets with active cooling fans are two Emerson Model F2016064 and four Purcell Model FLX16WS.*

AT&T also proposes to install a Polar Power Model 8340Y-3TNV88-001 back-up diesel generator, on a concrete slab, about 20 feet north of the equipment compound, 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 antennas are proposed to be installed on a tall pole near the equipment compound, this portion of the base station is passive, generating no noise. The nearest neighboring parcels are located to the located to the east across North Stelling Road, about 110 feet from the cabinets, and to the north, about 205 feet from the closest cabinet. Neighboring properties in other directions are farther away.

Study Results

The manufacturers provide the following maximum noise levels from their equipment:

Equipment	Maximum Noise Level	Reference Distance
(2) Emerson F2016064	71.0 dBA†	1.5 meters
(4) Purcell FLX16WS	64.7 dBA	5 feet
Polar Power 8340Y-3TNV88-001	65.1 dBA	23 feet

It is assumed that there are no other installed noise sources nearby.

The maximum calculated noise levels at the neighboring properties to the east and north, for the combined operation of all fans in all six cabinets, are 48.9 and 43.1 dBA, respectively, meeting the

* This model assumed for the limited purpose of this study.

† This is the noise when this cabinet is in the "emergency mode," conservatively assumed for the limited purpose of this study. Noise under normal operation is 64.7 dBA.

City's applicable 65 dBA daytime and 55 dBA nighttime limits for noise emanating from a non-residential property. On the day the generator is tested, the levels at those locations rise to 53.5 and 48.4 dBA, respectively, still well below the City's applicable daytime limit.

Conclusion

Based on the information and analysis above, it is the undersigned's professional opinion that the operation of the AT&T Mobility base station proposed to be located at 21111 Stevens Creek Boulevard in Cupertino, California, will comply with that City's requirements for limiting acoustic noise emission levels.

Authorship

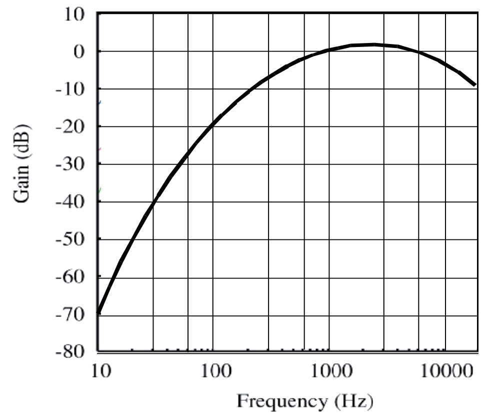
The undersigned author of this statement is a qualified Professional Engineer, holding California Registration Nos. E-13026 and M-20676, which expire on June 30, 2019. This work has been carried out under his direction, and all statements are true and correct of his own knowledge except, where noted, when data has been supplied by others, which data he believes to be correct.

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

October 30, 2018

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:

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

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

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.