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January 29, 2025

Attn: Jim Golden, Director- Strategic Programs
Network Towers II, LLC
6095 Marshalee Drive, Suite 300
Elkridge, MD 21075

Re: RF Safety FCC Compliance of Proposed Communications Facility
Site Name: Castle Cliff, Proposed 179' Monopole
Site Address: 14335 Cape May Road, Silver Spring, MD 20904 (Montgomery County)
Latitude 39° 05' 23.388" N, Longitude 76° 59' 46.482" W (NAD83), G.E. 454' +/- A.M.S.L.

Dear Mr. Golden,

I have performed an analysis to provide an independent determination and certification that the proposed Verizon Wireless communications facility at the above referenced property will comply with Federal Communications Commission (FCC) exposure limits and guidelines for human exposure to radiofrequency electromagnetic fields (Code of Federal Regulation 47 CFR 1.1307 and 1.1310). As a registered professional engineer, I am under the jurisdiction of the State Registration Boards in which I am licensed to hold paramount the safety, health, and welfare of the public and to issue all public statements in an objective and truthful manner.

The proposed communications facility consists of a new 179' monopole at the above referenced property. The proposed antenna configuration consists of 9 total antennas (3 per sector) as follows:

- (6) multiband directional panel antennas (JMA Wireless MX06FHG865-HG or equivalent), (2) per sector at a centerline of 174 ft, azimuth of 5-115-240; transmitting from these antennas will be (1) 700 MHz LTE wideband channel, (1) 850 MHz LTE & 5G wideband channel, (1) 1900 MHz LTE wideband channel, (1) AWS 2100 MHz LTE wideband channel, and (2) AWS3 2100 MHz LTE wideband channels

- (3) LS6 5G panel antennas (Samsung MT6413-77A or equivalent), (1) per sector at a centerline of 174; azimuth of 5-115-240; transmitting from these antennas will be (1) LS6 3700 MHz (TX 3700-3860; RX 3700-3860) 5G wideband channel

The following assumptions are made for reasonable upper limit radiofrequency operating parameters for the proposed facility due to the Verizon Wireless antennas alone:

- (2) 700/850/1900/2100 MHz (LTE) multiband directional transmit antennas per sector
- (1) 3700 MHz 5G directional transmit antenna per sector
- (1) 700 MHz LTE wideband channel at 4x40W max power/face before cable loss/antenna gain
- (1) 850 MHz LTE wideband channel at 4x40W max power/face before cable loss/antenna gain
- (1) 1900 MHz LTE wideband channel at 4x40W max power/face before cable loss/antenna gain

- (1) 2100 MHz LTE AWS wideband channel at 4X40W max power/face before cable loss/antenna gain
- (2) 2100 MHz LTE AWS3 wideband channels at 4x40W max power/face before cable loss/antenna gain
- (1) 3700 MHz 5G wideband channel at 320W max power/face before cable loss/antenna gain
- The facility would be at or near full capacity during busy hour

ERP Calculation
700: 4X40W = 160W = 52 dBm + 17.1 dB = 69.1 dBm = 8128W ERP
850: 4X40W = 160W = 52 dBm + 17.3 dB = 69.3 dBm = 8511W ERP
1900: 4X40W = 160W = 52 dBm +19.2 dB = 71.2 dBm = 13183W ERP
2100: 4X40W = 160W = 52 dBm + 19.7 dB = 71.7 dBm = 14791W ERP
3700: 8X40W = 320W = 55 dBm + 19.9 dB = 74.9 dBm = 30903W ERP
Note: the above ERP calculation is total ERP across each entire band and does not break down into W/MHz

Using the far-field power density equations from FCC Bulletin OET 65, the power density at any given distance from the antennas is equal to $0.360(ERP)/R^2$ where R is the distance to the point at which the exposure is being calculated. The given equation is a conversion of the OET 65 power density equation for calculating power density given the distance in feet and the result in metric units (mW/cm^2). This calculated power density assumes the location is in the main beam of the vertical pattern of the antenna. After making an adjustment for the reduction in power density due to the vertical pattern of the transmit antenna, the calculated ground level power density is well below 1 % of the FCC general population exposure limit at any distance from the antenna system of Verizon Wireless.

The 700 MHz transmit frequencies which Verizon Wireless is licensed by the FCC to operate, have an uncontrolled/general population maximum permissible exposure (MPE) FCC limit of 500 $\mu W/cm^2$ or 0.5 mW/cm^2. The 850 MHz transmit frequencies, which Verizon Wireless is licensed by the FCC to operate, have an uncontrolled/general population maximum permissible exposure (MPE) FCC limit of 587 $\mu W/cm^2$ or 0.587 mW/cm^2. The 1900 MHz transmit frequencies which Verizon Wireless is licensed by the FCC to operate, have an uncontrolled/general population maximum permissible exposure (MPE) FCC limit of 1000 $\mu W/cm^2$ or 1 mW/cm^2. The 2100 MHz which Verizon Wireless is also licensed by the FCC to operate, have an uncontrolled/general population MPE FCC limit of 1000 $\mu W/cm^2$ or 1 mW/cm^2. The 3700 MHz C-Band transmit frequencies have an uncontrolled/general population MPE FCC limit of 1000 $\mu W/cm^2$ or 1 mW/cm^2.

Therefore, the exposure at ground level at any distance from the structure would be substantially below 1 % of the FCC general population exposure limits due to Verizon Wireless antennas alone. The extremely low ground exposure levels are due to the elevated positions of the antennas in the structure and the low power which these systems operate. See Figures 1 and 2 in back of this report which discusses the relationship between height, proximity or distance, and orientation to level of electromagnetic field exposure.

In summary, the proposed communications facility will comply with all applicable exposure limits and guidelines adopted by the FCC governing human exposure to radiofrequency electromagnetic fields (FCC Bulletin OET 65). Federal law (FCC Rule Title 47 CFR 1.1307 and 1.1310) sets the national standard for compliance with electromagnetic field safety. The FCC exposure limits are based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP) and, over a wide range of frequencies, the exposure limits developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI). **Thus, there is full compliance with the standards of the IRPA, FCC, IEEE, ANSI, and NCRP.**

General Information on Electromagnetic Field Safety

Verizon Wireless facilities transmit and receive low power electromagnetic fields (EMF) between base station antennas and handheld devices (smart phones, ipads, laptops, jetpacks, etc.). The radiofrequency energy from these facilities and devices is non-ionizing electromagnetic energy. Non-ionizing, unlike X-Rays or other forms of potentially harmful energy in the microwave region, is not cumulative over time nor can the energy change the

chemical makeup of atoms (e.g. strip electrons from ions). “Non-ionizing” simply means that the energy is not strong enough to break ionic bonds.

Safe levels of electromagnetic fields were determined by numerous worldwide organizations, such the International Committee for Non-Ionizing Radiation Protection, a worldwide multi-disciplinary team of researchers and scientists studying the effects of non-ionizing radiofrequency energy such as that emitted by base stations or cell phones. The FCC did not arbitrarily establish their own standards, but rather adopted the recommendations of all leading organizations that set standards and research the subject such as the Institute of Electrical and Electronics Engineers (IEEE), American National Standards Institute (ANSI), and National Council on Radiation Protection and Measurements (NCRP).

When Verizon Wireless, or any commercial wireless communications licensee, is located on an antenna structure such as a self-supporting lattice type tower, monopole, guyed tower, watertank, etc. the antennas are typically 10 meters or more above ground level (10 meters = 32.81 feet). With the relatively low power and elevated positions of the antennas on the structure with respect to ground level, the maximum ground level exposure can rarely approach 1 % of the applicable FCC exposure limit regardless of how many sets of antennas are collocated on the structure. For this reason, the FCC considers the facilities “categorically excluded” from routine evaluation at antenna heights above 10 meters (or above 32.81 feet). Categorical exclusion exempts a site from routine on-site evaluation. However, the facility is not excluded from compliance with the federal exposure limits and guidelines. The types of facilities used by Verizon Wireless typically elevated on antenna structures (away from access to close proximity, i.e. greater than 10 meters or 32.81 feet) simply cannot generate ground level exposure levels that approach the limits under any circumstances.

From a regulatory perspective, the FCC has sole jurisdiction over the regulation of electromagnetic fields from all facilities and devices. The FCC has established guidelines and limits over emissions and exposure to protect the general public. The FCC also has certain criteria that trigger when an environmental evaluation must be performed. The criteria are based on distance from the antennas (accessibility) and transmit power levels.

CONCLUSIONS:

1) **The proposed Verizon Wireless communications facility will comply with electromagnetic field safety standards by a substantial margin (well below 1 %) in all publicly accessible areas. This includes the base of the proposed structure and any areas in proximity to the structure.**

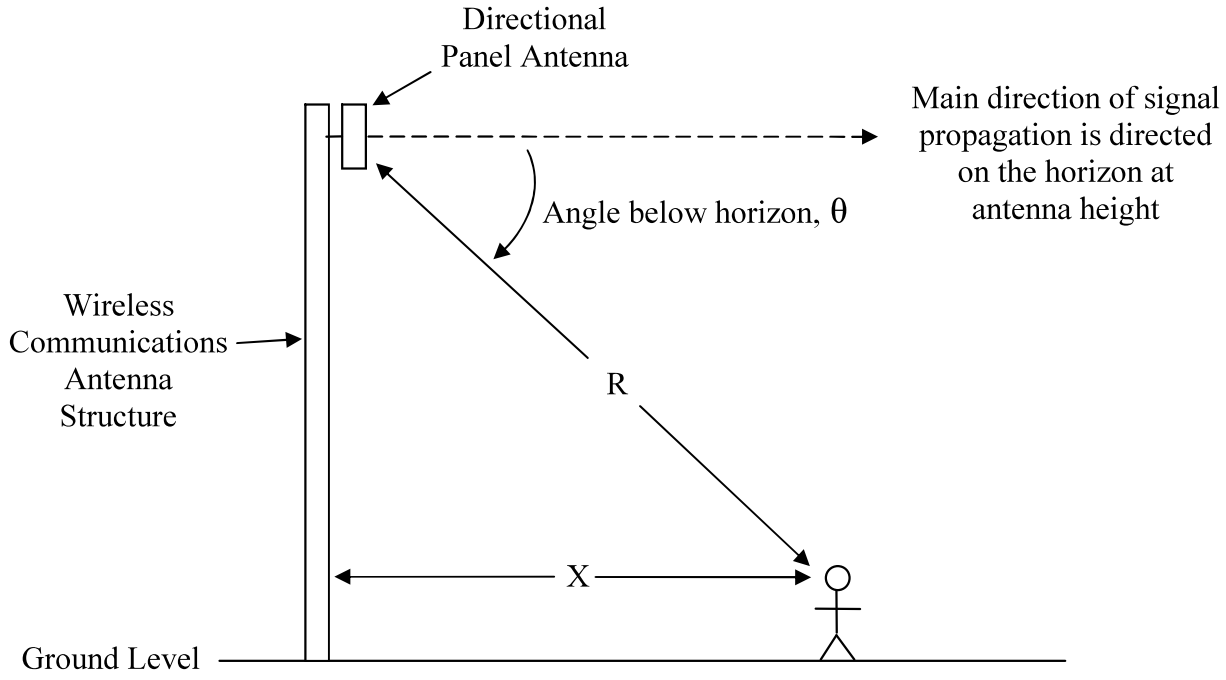
2) **Verizon Wireless takes appropriate measures to ensure that all telecommunications facilities (including this proposed facility) comply with applicable exposure limits and guidelines adopted by the FCC governing human exposure to radiofrequency electromagnetic fields (FCC Bulletin OET 65).**

3) **In cases where such compliance exists, the subject of electromagnetic field safety is preempted**. The Telecommunications Act of 1996 states that: “No state or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the [FCC’s] regulations concerning such emissions.” Telecommunications Act of 1996, § 332[c][7][B][iv].

Respectfully,

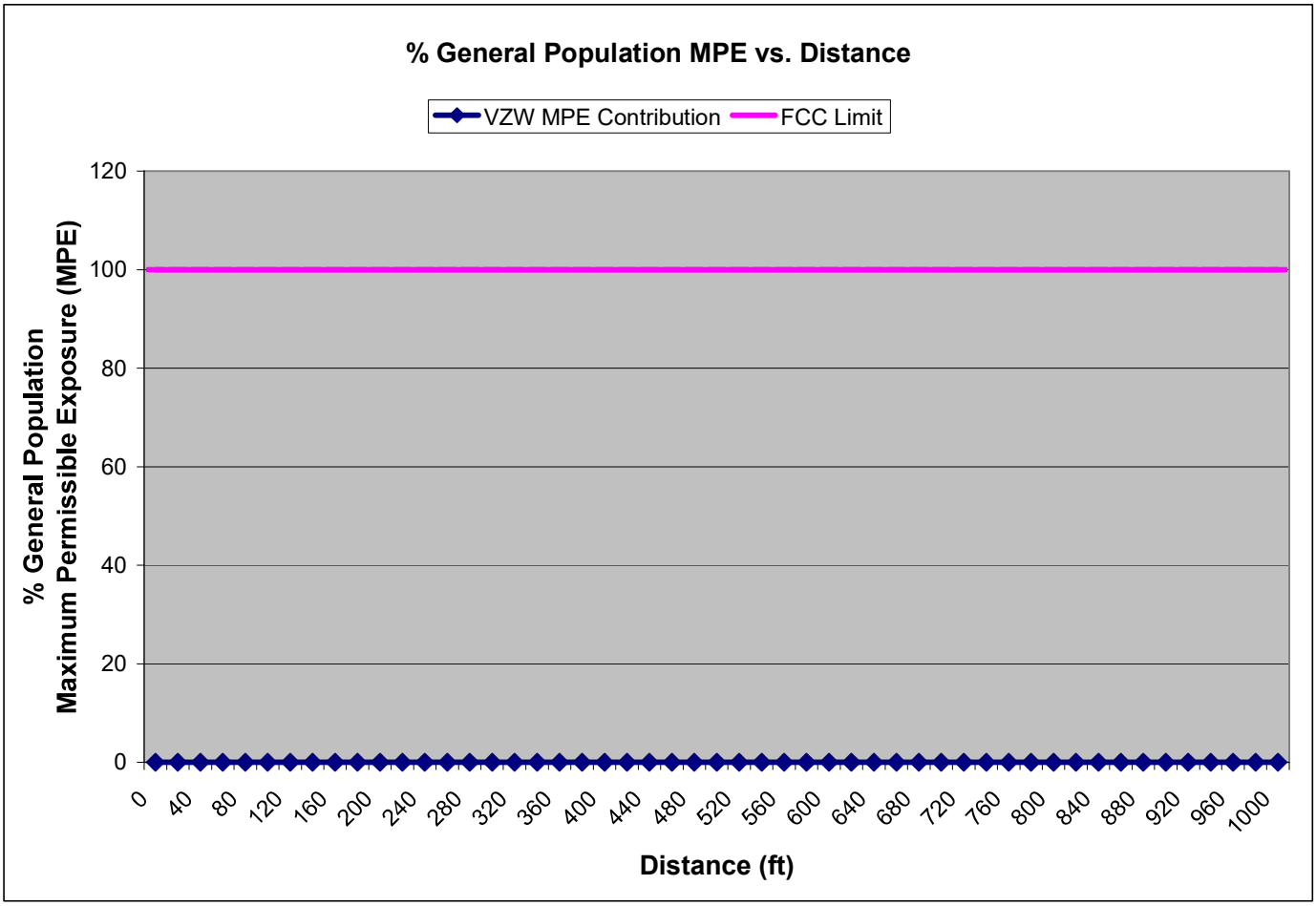
Paul Dugan, P.E.
Registered Professional Engineer
Maryland License Number 24211

FIGURE 1: Diagram of Electromagnetic Field Strength as a Function of Distance and Antenna Orientation



The above diagram illustrates the conceptual relationship of distance and orientation to directional panel antennas used in wireless communications. At the base of the structure (x = 0), the distance R is a minimum when the angle of the direction of propagation θ is a maximum. As one moves away from the antenna structure, the horizontal distance X increases as well as the distance R to the antennas while the angle below the horizon decreases. For this reason, electromagnetic fields from these facilities remain fairly uniform up to a few hundred feet and continue to taper off with distance. As noted in the report, the electromagnetic fields from these types of facilities are hundreds of times below safety standards at any distance from the antenna structure, making them essentially indistinguishable relative to other sources of electromagnetic fields in the environment due to the elevated heights of the antennas and the relatively low power at which these systems operate.

FIGURE 2: Graph of MPE Contribution vs. Distance



The above graph represents the contribution of VZW to the composite electromagnetic field exposure level at any distance from the base of the structure. The contribution of VZW will remain well under 1% of the FCC general population maximum permissible exposure (MPE) at any distance as shown.

DECLARATION OF ENGINEER

Paul Dugan, P.E., declares and states that he is a graduate telecommunications consulting engineer (BSE/ME Widener University 1984/1988), whose qualifications are a matter of record with the Federal Communications Commission (FCC). His firm, Millennium Engineering, P.C., has been retained by Network Towers II LCC to perform power density measurements or calculations for an existing or proposed communications facility and analyze the data for compliance with FCC exposure limits and guidelines for human exposure to radiofrequency electromagnetic fields.

Mr. Dugan also states that the calculations or measurements made in the evaluation were made by himself or his technical associates under his direct supervision, and the summary letter certification of FCC compliance associated with the foregoing document was made or prepared by him personally. Mr. Dugan is a registered professional engineer in the Jurisdictions of Pennsylvania, New Jersey, Delaware, Maryland, Virginia, New York, Connecticut, District of Columbia, West Virginia, Puerto Rico, and Colorado with 40 years of engineering experience. Mr. Dugan is also an active member of the Association of Federal Communications Consulting Engineers, the National Council of Examiners for Engineering, the National Society of Professionals Engineers, the Pennsylvania Society of Professional Engineers, and the Radio Club of America. Mr. Dugan further states that all facts and statements contained herein are true and accurate to the best of his own knowledge, except where stated to be in information or belief, and, as to those facts, he believes them to be true. He believes under penalty of perjury the foregoing is true and correct.

Paul Dugan, P.E.

Executed this the 29th day of January, 2025.

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EDUCATION:

Widener University, Chester, Pennsylvania
Master of Business Administration, July 1991
Master of Electrical Engineering, December 1988
Bachelor of Science, Electrical Engineering, May 1984

PROFESSIONAL ASSOCIATIONS:

Registered Professional Engineer in the following jurisdictions:

Pennsylvania, License Number PE-045711-E
New Jersey, License Number GE41731
Maryland, License Number 24211
Delaware, License Number 11797
Virginia, License Number 36239
West Virginia, License Number 20258
Connecticut, License Number 22566
New York, License Number 079144
District of Columbia, License Number PE-900355
Puerto Rico, License Number 18946
Colorado, License Number PE.0065295

Full member of **The Association of Federal Communications Consulting Engineers** (www.afcce.org) January 1999 to Present
Elected and served on the Board of Directors for five year term 2006-2011

Full member of **The National Society of Professional Engineers** (www.nspe.org) and the **Pennsylvania Society of Professional Engineers** (www.pspe.org) June 2003 to Present
Currently serving as PSPE State Director and Past President on the Board of Directors of the Valley Forge Chapter and the South East Region Vice-Chair for the "Professional Engineers in Private Practice" Executive Committee. Actively participated in NSPE Annual Conferences 7/2005 to Present.

Actively participate in **Chester County ARES/RACES Amateur Radio** (CCAR www.w3eoc.org) which prepares and provides emergency backup communications for Chester County Department of Emergency Services, March 2005 to Present

Full member of **The National Council of Examiners for Engineering** (www.ncees.org) May 2001 to Present

Full Member of **The Radio Club of America** (www.radio-club-of-america.org) December 2003 to Present

Pennsylvania Real Estate License Number RS347405 Keller Williams 2/2019 to Present

PROFESSIONAL EXPERIENCE:

Millennium Engineering, P.C., West Chester, Pennsylvania
Position: **President**, August 1999 to Present (www.millenniumeng.com)

Verizon Wireless, Plymouth Meeting, Pennsylvania
Position: **Cellular RF System Design/Performance Engineer**, April 1990 to August 1999

Communications Test Design, Inc., West Chester, Pennsylvania
Position: **Electrical Engineer,** May 1984 to April 1990

PERSONAL:

Date/place of birth: November 21, 1961, West Chester, Pennsylvania; United States Citizen