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November 3, 2023

Mr. Bruce Flower, Chair via email
Town of Wappinger Planning Board
20 Middlebush Rd
Wappingers Falls Wappingers Falls 12590-4004

RE: Telecommunications Facility RF Site Review
Verizon Wireless "Diddell Road" Site
Alternate Site and Minimum Height Analysis

Dear Chairman Flower and Members of the Planning Board,

We have been retained by the Town of Wappinger planning board to provide a review of the subject macro-cell wireless facility. This supplemental report addresses the new/updated radio-frequency (RF) materials submitted by Verizon Wireless ("Applicant") dated November 1, 2023. The update addresses the RF issues related to possible use of two nearby alternate sites denoted "C" and "E" in the earlier materials. The materials also contain the minimum height analysis for the proposed site. The updated materials were transmitted via email to the town from Mr. Olson, attorney for Applicant, yesterday morning. We will limit discussion here to the essential information regarding the location and proposed height of the subject site. Background technical information applicable to the proposed site was included in the August 31, 2023, "Diddell Road" preliminary report.

In addition to previously submitted materials, the following materials form the basis for this report:

1. "Verizon Wireless Communications Facility Engineering Necessity case – Diddell Rd." dated November 1, 2023 (the "ENC")

Summary of Findings

1. Applicant has shown by RF propagation analysis that alternate "E" is not technically viable.
2. Applicant has shown by RF propagation analysis that alternate "C" is not technically viable.
3. Applicant has shown that the proposed tower height is at or near the minimum height required for adequate RF performance.

The information in this report concerns the RF engineering issues related to the proposed project to assist the board in weighing the alternatives and planning for the future of the community. Engineering design choices may also implicate aesthetic and legal issues. However, this report must not be relied upon for any legal advice or direction. Legal advice about action on these issues must be obtained from the board's counsel. The remainder of this report addresses the details that support the findings.

Site Details

Applicant proposes a new 120' galvanized monopole (4' lightning rod for overall height of 124') with an antenna array positioned at 116' antenna center line (ACL) and ancillary ground equipment cabinets to provide low-band and mid-band wireless services to the local area. The antenna array consists of four (4) panel antennas per sector (three sectors) mounted on 8' horizontal booms. Ground equipment consists of an ice bridge, utility connection equipment, and two cabinets that will house battery backup and a wireless transceiver electronics. The site is intended to provide wireless signals to the nearby area to enhance reliable service in the area as well as draw wireless traffic away from existing neighbor sites to relieve congestion at those sites and utilize the mid-band frequencies for wireless traffic in the local area

RF Coverage and Capacity for Alternate Sites

Applicant considered several alternate sites in the initial permit application materials. The planning board expressed interest in knowing the reason(s) why two alternate sites, namely "C" and "E" were rejected. Alternate site "C" is to the south-west and features a higher elevation location. Alternate site "E" is south-east on lower ground. The new ENC contains a new section titled "Location Justification" that starts on page 20. A new macro site, like the one proposed, is generally intended to provide new low-band and mid-band RF coverage sufficient to provide new area coverage where previously lacking and, as is the case here, traffic off-load from existing neighbor sites. Traffic off-load requires that the new macro site coverage intrude to some degree on the existing coverage area so that subscribers in that overlap area will be drawn to the new site rather than the overloaded and usually more distant existing sites. When alternate sites are considered, technical viability is determined by whether the alternate site can provide one or both of those objectives. In the present case, the alternate sites "C" and "E" both fail on one or both objectives.

Considering alternate site "E," the ENC page 21 shows the terrain profile from the proposed site to the candidate site. Ground elevation drops by about 30 feet and the site moves away from both the "New Hackensack" and "Ehmer" existing sites. For comparison, the propagation plot for proposed mid-band coverage on ENC page 22 shows that the proposed RF mid-band coverage from the proposed site will provide some RF coverage into the existing "New Hackensack" "Ehmer" gamma sectors' low-band coverage. The overlap area will provide some traffic relief to the extent Applicant's subscribers are in those areas. When the location is moved to candidate "E" as shown on

ENC page 22 the mid-band RF coverage no longer intrudes into the low-band footprint of the existing sites. This means that mid-band service cannot effectively off-load traffic from the existing sectors that are exhausted. Recall that due to FCC licensed spectrum allocation that about 7% of Applicant's service bandwidth is found in the low-band while about 93% of the service bandwidth is allocated in the mid-band spectrum. The lack of mid-band intrusion into the existing footprints of the existing neighbor sectors means that candidate "E" is not a viable site location for RF purposes in addition to other land use issues annunciated elsewhere by Applicant. We therefore conclude based on the evidence presented in Applicant's ENC that alternate site "E" is not technically viable.

Considering alternate site "C" we note that the property is owned by the same party as the proposed site location. We have been informed that the candidate location was rejected for RF reasons, but also that the site is not available to Applicant. We requested Applicant to provide documentation as to why alternate site "C" would not work to meet RF objectives. Those materials begin in the ENC on page 25.

On ENC page 26 the propagation plot shows low-band RF coverage from the two existing neighbor sites. Unlike the analysis for the other alternate site candidate, only low-band coverage is considered. Low-band RF signals are able to propagate further than mid-band signals. If an alternate site fails for low-band coverage it will necessarily fail for mid-band. Keeping this relationship in mind, we see on ENC page 27 that moving the site south-west to alternate site "C" even at the higher elevation causes two undesirable effects. First, the RF coverage intended to draw traffic from the exhausted "Ehmer" gamma sector is pulled to the south-west away from the existing footprint of "Ehmer." The reduction in overlap translates to reduction in traffic off-load capability to the extent Applicant's subscribers are in that area needing service. Those subscribers would then be left with the already exhausted "Ehmer" site as their only option. Second, but not discussed by Applicant in the ENC, we note that moving a macro site closer to an existing site has potential for causing undesirable interference to both the existing site and the new site. Applicant has not discussed this a aspect, and in our opinion it is not necessary to do so, but we simply note it for the board's information here. As mentioned above, mid-band RF coverage (not shown in the current ENC for candidate "C") would necessarily show more pronounced reduction in service to the target area when the site is moved south-west from the proposed location. Even though the higher ground elevation in other scenarios might have provided some RF coverage advantage, the propagation plots for alternate site "C' show that it would not provide the necessary capacity relief to "Ehmer" due to failure to provide significant RF coverage to the existing "Ehmer" footprint area. We therefore conclude based on the evidence presented in Applicant's ENC that alternate site "C" is not technically viable.

Proposed Tower Height

Minimum height analysis starts on ENC page 29. Several "focus" areas are identified on the propagation plots. Focus areas are selected by Applicant and represent areas such as residences, roadways and other critical locations where they expect subscriber traffic to originate. The sequential height analysis from the proposed antenna centerline

(ACL) of 116' for mid-band RF coverage is presented on ENC pages 33 and following for ACL's from 136' to 76' in 20' increments. The analysis shows that a 20' reduction in height from the proposed 116' ACL to 96' ACL deprives minimal RF coverage to several of the focus areas. We therefore conclude based on the evidence presented in Applicant's ENC that the proposed 116' ACL (a 120' tower with 4' lighting rod) is at or near the minimum height required to provide RF coverage and wireless services to the focus areas surrounding the proposed site.

Conclusion

The information in this report concerns the RF engineering issues related to the proposed project to assist the board in weighing the alternatives and planning for the future of the community. Engineering design choices implicate aesthetic and legal issues as well. However, this report must not be relied upon for any legal advice or direction. Legal advice about action on these issues must be obtained from the board's counsel.

Thank you for the continued opportunity to assist the Town of Wappinger. Please feel free to call if there are additional questions or other concerns at this time.

Sincerely,

William P Johnson
Consultant

cc Malcolm Simpson via email
Beatrice Ogunti via email