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REPLY TO:

TARRYTOWN OFFICE

February 15, 2018

Honorable Chairman William Rice and
Members of the Zoning Board
Village of Nelsonville
258 Main Street
Nelsonville, NY 10516

RE: Homeland Towers, LLC, New York SMSA Limited Partnership d/b/a Verizon Wireless and New Cingular Wireless PCS LLC d/b/a AT&T, Proposed Public Utility Personal Wireless Communication Facility
15 Rockledge Road, Nelsonville, NY

Dear Hon. Chairman Rice and
Members of the Zoning Board of Appeals:

We are the attorneys for Homeland Towers, LLC ("Homeland Towers") and New York SMSA Limited Partnership d/b/a Verizon Wireless ("Verizon Wireless") in connection with the above referenced matter. New Cingular Wireless PCS LLC ("AT&T") is represented by Daniel Laub, Esq., of Cuddy & Feder LLP.

In reply to comments from the public that were received by the Village by the February 9, 2018 deadline, we respectfully submit (7) copies of the enclosed reply from PierCon Solutions, dated February 14, 2018.

We look forward to the February 27, 2018 Zoning Board and Planning Board continued joint public hearing. As previously mutually agreed, the FCC Shot-Clock has been extended to February 28, 2018. We respectfully request approval of the project.

If you have any questions or require additional information, please do not hesitate to call me at (914) 333-0700.

Respectfully submitted,
SNYDER & SNYDER, LLP

By:_____
Robert D. Gaudioso

Enclosures
RDG:dac
cc: Planning Board (7 copies)
Ron Gainer (1 copy)
Ron Graiff (1 copy)
Daniel Laub, Esq.
z:\ssdata\wpdata\ss3\rdg\homelandtowers\nelsonville\zba cover letter 2-15-18.docx

PierCon Solutions L.L.C.
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February 14, 2018

William Rice, Chairman
Village of Nelsonville Zoning Board of Appeals
258 Main Street
Nelsonville, NY 10516

Re: Homeland Towers/AT&T/Verizon Wireless application for a proposed cell tower at 15 Rockledge Road, Nelsonville, NY

On behalf of Verizon Wireless, the following provides details in regard to recent submissions by Philipstown Cell Solutions (PCS) and Richard Comi. The submissions will be referred to by the following:

- PCS DAS Report – This report contains a one page cover letter and attached numerous examples of small cells and distributed antenna systems (DAS).
- PCS Responses – This report contains replies to certain comments made in application submissions and comments made at the Nelsonville hearings as well as some references to the recent application at 50 Vineyard Road in Philipstown.
- PCS Call Tests – This report contains a two page cover letter identifying the call logs which were also included in their submission.
- Comi Report – This is the letter which Richard Comi sent regarding issues raised at the January 10th hearing.

Sample DAS Installations Provided by PCS

The PCS DAS Report provided several examples of various small cells and DAS designed by Crown Castle, Stealth, ConcealFab, and Dewberry. The pictures which are attached are identified as being located in various locations throughout the country. The example photos attached in that submission in no way accurately characterize a similar location like Nelsonville. The pictures which were submitted with the PierCon February 5th, 2018 letter accurately reflect the topography and foliage. Nelsonville, NY presents unique challenges which are specific to itself and areas like Nelsonville. The difficult topography and high density of tall trees in the Village of Nelsonville are very different than the examples attached in the PCS DAS Report. While DAS or small cell solutions may be applicable in other areas as provided in the PCS submission, they are not feasible alternatives to the proposed tower at 15 Rockledge Road.

DAS Coverage (Comi Report)

The Comi Report speaks to DAS and its applicability to the Village of Nelsonville. On the first page of the Comi Report, Mr. Comi states that, "Nelsonville is approximately one (1) square mile. The coverage area for a DAS node can be approximately ¼ mile. The placement of a few DAS nodes on existing utility poles or other eligible opportunity sites would provide wireless service within the Village". Coverage radiuses of ¼ mile for a DAS node in the Village of Nelsonville would not be possible. Based on my personal experience with DAS, which includes designing and testing their coverage in varying environments (included heavily wooded), I believe the actual expected coverage for a DAS node in this environment would be approximately 800' – 1200' on the street with a typical utility pole, at most. This does not include the distance off the roadways, which will invariably be much less. This has already been stated in the February 2nd, PierCon letter. Mr. Comi's statements, although not explicit, give the misleading impression that the Village of Nelsonville could be covered by a mere 4 or 5 DAS nodes.

That is simply not possible, because the tall trees, topography and buildings would prevent the signal from covering very far off of the street on which a node is located.

References to Mr. Menkes' Reports in Philipstown

The PCS Responses contain references to Mr. Menkes' reports for an application for a separate tower application in Philipstown. Mr. Menkes did not provide any review of a need for the Village of Nelsonville. Any conclusions regarding the need for Philipstown that were made in his reports are irrelevant to the need in Nelsonville. He did however make two conclusions regarding DAS and customer call testing. He concluded that "(DAS) or small cell deployment would not be a viable alternative in this challenging RF environment" in his executive summary. He also says later in one of his reports regarding small cells and DAS that, "It is this author's professional opinion that these technologies are not a viable solution to the coverage gaps that Verizon's is attempting to address in this application." PierCon agrees with Mr. Menkes report regarding small cells and DAS in this area. Please see a copy of this report by Mr. Menkes dated November 10th, 2017 attached to this letter.

Mr. Menkes also provides a response to a customer call test and measurements performed by the Rockwald Road Association. The Rockwald Road association submitted a report which contained customer call/text testing and measurements with mobile phones in test mode. The customer call/text testing performed was very similar to PCS Call Tests methodology except for signal measurements in test mode. Mr. Menkes speaks of the Rockwald Road Associations report as containing a, "lack of credible methodology." Mr Menkes states the following in reference to the customer call tests, "More troubling, however, is the fact that the data is not statistically significant; establishing and holding a small number of calls is insufficient to determine the reliability of coverage in a network that targets a 98% call success rate. Thousands of calls would have to be made along the route to be able to confidently determine that the network either fails or meets its quality objective." PierCon also agrees with the Mr. Menkes regarding the insignificance regarding customer call testing. Please see a copy of an additional report by Mr. Menkes dated December 6th, 2017.

The Village of Nelsonville is Significant

The PCS Responses refer to Nelsonville as too small by number of people and area to be considered significant stating that, "Nelsonville, a small village of one square mile with a population of approximately 600, is by any measure a sparsely populated rural area." Given the quantity of individuals in Nelsonville, and the businesses located within, PierCon asserts that the coverage gap is clearly significant as already established in past RF reports by PierCon. There are also two major roadways which traverse through and to the Village of Nelsonville. These two roadways are Routes 301 and 9D and have an average of 5,372 and 6,232 vehicles per day respectively according to the New York State Department of Transportation. The quantity of individuals in the coverage gap referenced in the 1st PierCon RF report (2,803 individuals), many local businesses, schools, and travelers through the area clearly demonstrate the significance of this gap in coverage.

Increasing the Height of McKeels Corner

The PCS Responses also refer to Mr. Menkes report from Philipstown which references the existing McKeels Corners site and the possibility of increasing the height in order to satisfy the gap in Philipstown (not Nelsonville). Again, nowhere in Mr. Menkes reports does he comment on the need in the Village of Nelsonville. Please see attached to this letter a map which demonstrates the coverage that would result from hypothetically increasing the McKeels Corners site to 190'. As clearly seen in that plot, raising the height of that existing site has no effect to the significant gap in the Village of Nelsonville.

Alternate Location at the Philipstown Landfill

The PCS Responses also refer to an additional alternate site location which was considered in the Philipstown application at 59 Lane Gate Road (known as the Philipstown Landfill). That location was not considered as an alternate to 15 Rockledge Road because it cannot provide coverage to the Village of Nelsonville due to a large hill between the two locations. Nevertheless, attached to this letter is a map which demonstrates the coverage which can be obtained by utilizing the 59 Lane Gate Road site at 210'. As clearly seen in that plot, utilizing the Philipstown Landfill site has no effect to the significant gap in the Village of Nelsonville.

All Verizon Wireless' FCC Licensed Frequencies

The PCS Responses also speaks to the multiple FCC licenses which Verizon Wireless holds. As already demonstrated by the coverage maps prepared in the first PierCon RF Report, it is clear that a significant coverage gap exists in all frequency bands. Coverage maps for 700 and 2100 MHz have been prepared and since these are the best and worst possible coverage plots, the other two remaining frequency bands (850 and 1900 MHz) fall between the best and worst coverage maps. Therefore all frequency bands have a gap in the Village of Nelsonville and need to be remedied.

In addition to remedying the gaps in coverage, all frequency bands provide personal wireless service to users. It is important to understand that the amount of usage of wireless devices has dramatically increased in the last 10 years. The usage includes voice/video calls, text/image/video messaging, application usage, and more as functionality continues to develop every day. Designing the Verizon Wireless network to accommodate only one of its frequency bands would be improper from an engineering standpoint considering the dramatic increase of usage among all wireless customers. Failure to utilize FCC licenses could result in the forfeiture of such licenses. For this reason, the proposed site at 15 Rockledge Road is designed to accommodate all Verizon Wireless FCC licensed frequencies.

Sincerely,

Adam Feehan, Sr. RF Engineer
PierCon Solutions, LLC

Menkes Associates, LLC

Homeland Towers, LLC and Verizon Wireless
Cell Site Application
50 Vineyard Road, Philipstown, NY

Radio Frequency Evaluation and Recommendations
Relative to Suitability of 59 Lane Gate Road Site
With Consideration for Alternative Sites and Technologies

November 10, 2017

Introduction

At the request of Mr. Ronald Gainer, P.E. and Town Engineer for the Town of Philipstown, NY, Menkes Associates, LLC reviewed the Homeland Tower/Verizon Wireless applicable documentation for proposed alternative cell sites at 59 Lane Gate Road, or increasing the antenna height at the McKeel's Corners site, or the use of alternative technologies. Specifically, the following documents were reviewed:

- Philipstown Zoning Ordinance, Section 175-46: Communications Towers
- RF Report by PierCon Solutions, prepared by Adam Feehan and dated September 6, 2017 entitled, "Independent Radio Frequency Report Regarding a Proposed Wireless Communications Facility for New York SMSA Limited Partnership, Site ID: Philipstown"
- Report to the Chairman and Members of the Zoning Board of Appeals, Town of Philipstown, NY, prepared by Ronald E. Graiff, P.E., dated September 8, 2017, commenting on the PierCon Report of September 6, 2017
- RF Report by PierCon Solutions, dated October 27, 2017 by Adam Feehan entitled, "Independent Radio Frequency Report Regarding Alternative Location and DAS"

Executive Summary

The viability of a higher elevation alternative site at 59 Lane Gate Road was considered relative to Verizon's coverage requirements, and the coverage performance of the originally proposed site at 50 Vineyard Road. Regardless of whether a 180 foot, or a 210 foot antenna height is considered, or the physical location of the tower on the property, the RF coverage from 59 Lane Gate Road does not, in all circumstances, meet Verizon's objective of providing reliable coverage along Route 9 north of Route 301and along Route 301 west of Route 9. Additionally, the coverage from this location is inferior to the coverage provided, in the primary areas of concern, by the originally proposed site at 50 Vineyard Road.

It is unclear from the data presented whether raising the antenna elevation at the McKeel's Corners site would totally satisfy Verizon's coverage objective.

A Distributed Antenna System (DAS) or small cell deployment would not be a viable alternative in this challenging RF environment.

The remainder of this report addresses the data submitted and the methodology employed to obtain these conclusions.

Methodology

The applicant was asked to consider an alternate tower siting on the town land at 59 Lane Gate Road to determine whether positioning the tower at a higher elevation would provide acceptable coverage in the areas that Verizon targeted for improvement – specifically along Route 301 west of Route 9 and along Route 9 north of Route 301. The applicant had already considered this location and produced coverage plots accordingly, but these plots clearly showed that the coverage from the original lower elevation siting on this property (latitude 41.425943,

longitude -73.917628, elevation 597 feet) did not meet Verizon's coverage objectives. Mr. Graiff, in his letter to the Board, agreed with the applicant's findings. Consequently a second site, at a higher elevation on this property (latitude 41.423939, longitude -73.918605, elevation 700 feet), was proposed in the hope that the coverage would improve. The PierCon RF report dated October 27, 2017, addresses the coverage performance from the latter site. This PierCon report plotted the coverage from this second site at two antenna heights, 180 feet and 210 feet, to determine if there was any solution that would provide acceptable coverage in the area of interest.

Before comparing and contrasting the coverage plots from the two PierCon RF reports, it is necessary to establish a labeling convention to avoid confusion between the plots in the original report, dated September 6, 2017, and the second report, dated October 27, 2017, since both reports repeat the same alpha-numeric identifiers for the plots. For the purposes of comparison in this discussion, all plots from the second PierCon report will have a "prime" designator after the alphabetic identifier to indicate that these plots are from the second, more current PierCon report. For example, plots from the October 27th PierCom report will be designated A'1, A'2, B'1, B'2, etc., where plots from the original September PierCon report will be designated A1, A2, B1, B2, etc.

The applicant was particularly prolific in producing coverage plots; between the two RF reports there are approximately 65 computer generated plots. To reach a conclusion on the coverage performance of a tower located at 59 Lane Gate Road, by simplifying the problem, only a small number of these plots need to be evaluated.

The baselines for comparison are first established, these being the existing coverage of the Verizon network as shown by the plots A1-A4, and the coverage provided by the proposed cell site at 50 Vineyard Road shown in plots C1-C4. The objective is identified; that being Verizon's requirement that coverage be improved along Route 9 north of Route 301, and Route 301 west of Route 9, as stated on page 5 of the September 6th PierCon report. Then it is only necessary to consider whether a particular scenario is sufficient to meet the objective, and is it necessary. For example, if the coverage sufficiently satisfies Verizon's objective at 700 MHz for in-building signals with an antenna height of 210 feet, is it necessary to have an antenna height of 210 feet or would 180 feet be sufficient? Alternatively, if the coverage does not satisfy Verizon's objectives for the 210 foot scenario, there is no purpose in considering lesser scenarios (lower antenna heights) since they will surely not meet the coverage objective.

It is important to understand that achieving reliable coverage at 2100MHz at a -95 dBm Reference Signal Receive Power (RSRP) level is a significant challenge in any environment because of the reduced signal propagation at this high frequency. It is particularly difficult with an irregular topography as in the Philipstown area. This can be seen in plot A3 for the existing network, and plot C3 for the composite coverage from the existing network and the proposed coverage from the site at 50 Vineyard Road. Since Verizon appears to recognize and accept the reduced coverage at this frequency; reliable coverage at 700 MHz will be given priority, for this report, over coverage at 2100 MHz in making judgement on the viability of a cell site at 59 Lane Gate Road.

Review and Comparison of Coverage Plots

59 Lane Gate Road Alternative Site

With the plots A1-A4 and C1-C4 established as the baseline, it is appropriate to consider the best-case scenario for this alternative, higher base elevation, tower siting at 59 Lane Gate Road, this being a 210 foot antenna height (although not in compliance with the town ordinance). Plots B'1 –B'4 show the coverage for this configuration.

Plot A1 and plot B'1 represent the performance of Verizon's existing network at 700 MHz and -95 dBm RSRP, and the composite performance of the proposed alternative tower site at 59 Lane Gate Road at a comparable frequency and signal level. Plot B'1 shows that there is improved coverage immediately around the cell site and portions of Route 9 south of Route 301, as expected; however outages still remain along Route 9 north of Route 301. Additionally, outages remain along Route 301 west of Route 9 which may be mitigated in the future if the Nelsonville cell site comes on air. The higher elevation cell site at 59 Lane Gate Road with a 210 foot antenna height is not sufficient to meet Verizon's coverage objective and it is certain that going to a lower antenna height would not improve the coverage. Comparing plot B'1 with the coverage plot of the proposed cell site at 50 Vineyard Road, plot C1, shows that the performance of the Vineyard Road location is superior.

Plot A2 and plot B'2 represent the performance of Verizon's existing network at 700 MHz and -105 dBm RSRP, and the composite performance of the proposed alternative tower site at 59 Lane Gate Road at a comparable frequency and signal level. The existing Verizon network exhibits reliable coverage over the area of concern at this frequency and low signal level; and even though the McKeel's Corners cell site is not radiating in the B'2 plot, the addition of a cell site at 59 Lane Gate Road continues to show reliable coverage.

The A3 and B'3 plots compare the network performance at 2100 MHz and -95 dBm RSRP of the existing Verizon network with the composite performance of the network with a cell site at 59 Lane Gate Road. The McKeel's Corners site is not radiating, and its effect on coverage at the Routes 9 and 301 intersection is clearly visible in plot B'3. The alternative cell site at 59 Lane Gate Road does not make up for the loss of the McKeel's Corners site and leaves all of Route 9 and Route 301 without reliable coverage. Similarly, when the network performance is considered with the addition of the originally proposed tower at 50 Vineyard Road, it does not indicate any significant reliable coverage that addresses Verizon's areas of concern along Routes 9 and 301. Both of these limited coverage results are not unexpected, as discussed above, at this frequency and signal level.

Continuing with a 210 foot antenna height, plots A4 and B'4 compare the coverage at 2100 MHz and -105 dBm. In plot A4 the McKeel's Corners cell site is radiating and its effect can be seen in the coverage offered around the intersection of Routes 9 and 301, but reliable coverage is lacking on portions of Route 301 further west of Route 9. In plot B'4, where the cell site at 59 Lane Gate Road is radiating in place of McKeel's Corners, the coverage is further degraded on both Route 9 and Route 301. By comparison, the proposed cell site at 50 Vineyard Road would provide improved coverage along both Route 9 and Route 301 as shown in plot C4.

McKeel's Corners Antenna Elevation Change

The baseline for comparison for antenna elevation changes at the McKeel's Corners site are the C1-C4 plots from the original PierCon report of September 6, 2017. These plots show the performance of the proposed cell site at 50 Vineyard Road at 180 foot antenna height. To be considered a viable alternative site, the coverage from the modified McKeel's Corners site must equal or exceed the coverage from the Vineyard Road site.

Plot C1 and plot C'1, which represent the composite coverage at 700 MHz and -95 dBm compare the performance of the proposed site at 50 Vineyard Road to the McKeel's Corners site with an antenna height of 190 feet, **approximately 90 feet higher than the current antennas**. The McKeel's Corners site leaves a gap along Route 9 north of Route 301. Increasing the antenna height to 210 feet does not eliminate the gap. It is, however, difficult to determine the significance of this gap to Verizon's network quality performance. This is because the plots do not show a graduated level of RSRP such that the signal strength can be determined in the gap. All that can be determined from the data presented is that the signal is somewhere less than -95 dBm and equal to or greater than -105 dBm (from C'-2). For example, if the RSRP measured -96 dBm in the gap, this would not have a significant impact on network performance. It would also be beneficial to understand the antenna azimuths and down tilts used in the recent McKeel's Corners plots.

Plot C2 and plot C'2 represent the composite performance of Verizon's existing network at 700 MHz and -105 dBm RSRP with the Vineyard Road site, and the composite performance of the McKeel's Corners site at 190 feet and at a comparable frequency and signal level. The McKeel's Corners site meets Verizon's coverage objective and performs as well as the Vineyard Road site.

Plot C3 and plot C'3 represent the composite performance of Verizon's existing network at 2100 MHz and -95 dBm RSRP with the Vineyard Road site, and the composite performance of the McKeel's Corners site at 190 feet and at a comparable frequency and signal level. For both cell sites, the coverage at this frequency and signal level is spotty with numerous gaps. However, the McKeel's Corners site provides better coverage in the Route 301 target area west of Route 9.

Plot C4 and plot C'4, which represent the composite coverage at 2100 MHz and -105 dBm compare the performance of the proposed site at 50 Vineyard Road to the McKeel's Corners site with an antenna height of 190 feet. Both the Vineyard Road site and the McKeel's Corners site show spotty coverage in the area of interest with gaps along Route 9 north of Route 301. It is impossible to judge which of the gaps is more impactful on network performance.

Alternative Technologies

The most often considered alternative technologies to macro-cellular sites are small cells and DAS. Both of these alternatives typically consist of low power radiators mounted on utility poles, advertising billboards, sides of buildings, or lamp poles. These technologies provide very limited coverage and require a large number of radiators to blanket a large area. They are more suited for urban areas, as coverage-hole fillers or for added network capacity. They are also used in

large public venues such as convention centers, arenas, and stadiums. More recently they are being deployed in anticipation of the forthcoming 5G technology. Except in very limited cases are these technologies used to service a large suburban area. PierCon correctly identified many of the shortcomings of these technologies in their October 27th report. It is this author's professional opinion that these technologies are not a viable solution to the coverage gaps that Verizon's is attempting to address in this application.

Conclusions

Menkes Associates, LLC examined the coverage performance of a proposed cell tower on either of two distinct sites at 59 Lane Gate Road, Philipstown, NY relative to Verizon's objective of alleviating coverage gaps on Route 9 north of Route 301 and Route 301 west of Route 9. Additionally, the performance of the McKeel's Corners site with higher antenna elevation was considered as well as the viability of alternative technologies. The Lane Gate Road property and the McKeel's Corners site coverage analyses were performed by comparing their coverage to the existing Verizon network coverage. These analyses used the predictive computer generated coverage plots from the two PierCon reports to compare the coverage for all cases.

For the alternative sites on the Lane Gate Road property, the scenario with the highest antenna elevation was examined first, since if this did not meet Verizon's coverage objectives, lower antenna heights certainly would not. 700 MHz, Verizon's primary LTE frequency, coverage was the main focus since coverage at 2100MHz is always a challenge.

In the most likely to succeed scenario at 700 MHz with an antenna elevation of 210 feet above ground level and a tower base at approximately 700 feet elevation, the coverage from 59 Lane Gate Road does not meet Verizon's objectives at -95 dBm RSRP and would not perform as well as the originally proposed site at 50 Vineyard Road. Both Verizon and Mr.Graiff dismissed the originally considered alternative tower site on Lane Gate Road at an elevation of 597 feet for not meeting coverage objectives. This author agrees with Verizon's and Mr. Graiff's conclusion for the lower elevation site.

Raising the antenna elevation to 190 feet at the McKeel's Corner site does improve the coverage, however a gap remains along Route 9 north of Route 301. The significance of this gap and the suitability of this configuration as an alternative for the Vineyard Road site are not immediately apparent without additional data.

Prepared and submitted by:

H. E. Menkes, President

Attachment:

Menkes Associates, LLC

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Hank Menkes

BACKGROUND SUMMARY: Strong wireless system and radio frequency engineering experience acquired by working closely with wireless service providers, global standards organizations, and major wireless infrastructure development enterprises. RF consultant to numerous Zoning Boards, and legal firms. Bell Labs Fellow.

EXPERIENCE:

2010 to	President and founder of Menkes Associates, LLC, a consultancy providing wireless telecommunications expertise to municipalities and legal teams. Accepted as an expert-witness before numerous planning boards on proposed cell tower siting and the use of alternative technologies.
12/06 to 12/07	CTO, Alcatel-Lucent Wireless Business Group. Responsible for technology guidance, RF system capacity and throughput projections, global wireless standards strategy and implementation, and development organization quality objectives and adherence. Managed the creation of Alcatel-Lucent's 4G wireless strategy. Provided customer support and was the interface to the technical press and analyst community.
5/00 to 12/06	Vice President, Lucent Technologies Global Wireless Systems Engineering and Architecture. Managed the architecture and systems engineering efforts for all digital wireless products. Provided customer support for the deployment of wireless infrastructure, challenging RF issues, and system optimization.
3/94 to 5/00	Director, Wireless Systems Engineering. Responsible for overseeing the development of the systems requirements for the analog, and digital hardware and software infrastructure products, and RF engineering tools. Managed the specialized RF engineering groups tasked with assisting service providers address challenging RF and system optimization issues. Responsible for negotiating the RF performance requirements for all wireless contracts.
10/92 to 3/94	Head, Wireless Development Project Planning and Management Department. Established and ran the Work Program Planning and project management for the teams that developed Lucent Network Systems hardware and software products. Provided project management support for the early stages of the digital technology air interface development programs.
11/89 to 10/92	Technical Manager, AT&T Bell Labs, Cell Site Systems and RF Engineering Group. Responsible for generating the hardware requirements for all analog and digital base station products. Conducted specialized RF engineering studies for carriers to add coverage and capacity to existing systems and to plan initial transition to digital technologies. Developed RF engineering guidelines for early digital systems.

9/87 to 11/89	Supervisor, AT&T Bell Labs, DC Plant Design Group. Managed the development of the industry's first microprocessor-controlled telecommunications battery plant. This new plant tripled the energy density of previous offerings and provided control, monitoring, and customer interfacing through menu driven firmware and high-quality speech synthesis. Awarded Bell Labs Fellow for this achievement.
4/78 to 9/87	Supervisor, AT&T Bell Labs, Rectifier and Battery Plant Design Group. Developed central office power equipment including battery charging rectifiers, battery plants, dc distribution systems, inverters, uninterruptible power supplies and custom power supplies.
6/69 to 4/78	Member of Technical Staff, AT&T Bell Labs Radio Protection Switching Department. Developed digital signaling protocols and circuits for use in microwave radio protection switching systems. Designed the control logic and insertion modulator for the single sideband radio protection switching system as well as the monitoring system logic for the initial trials of Data Under Voice on microwave radio systems. Taught in-hours courses in digital and microprocessor design, and fundamentals of electronic switching systems.
EDUCATION:	Carnegie Mellon University, Pittsburgh, PA Graduate School of Industrial Administration Certificate, Business Program for Executives Northeastern University, Boston, MA B.S.E.E., M.S.E.E., Communications Theory Major
PUBLICATIONS AND PRESENTATIONS:	"IMS in Support of Terrestrial and Satellite Based Communications Systems" NASDAQ, September 2007. "The Road to 4G" Alcatel-Lucent Analysts Conference, March 2007. "Building the Next Generation UMTS Wireless Networks" CDMA World Focus Annual 2001. "Wireless Mobile Communications at the Start of the 21st Century" IEEE Communications Journal, January 2001. "CDMA Network Infrastructure Evolution" CDG World Congress, June 1997. "CDMA–The State of the Technology" Network Wireless Systems Technical Seminar, September 1996. "An Adaptive AC Input Monitoring Algorithm for Microprocessor Controlled Parallel Processing UPSs," Proceedings of the IEEE International Telecommunications Energy Conference, June1987. "A Microprocessor Controlled System Battery Plant: A New Concept in Central Office Power," Proceedings of the IEEE International Telecommunications Energy Conference, November 1984. "A Stored Program Controlled Triport UPS," Proceedings of the IEEE International Telecommunications Energy Conference, May 1981.
PATENTS:	Five U.S. Patents

Menkes Associates, LLC

Hank Menkes, President
menkesassoc@gmail.com

December 6, 2017

Mr. Robert Dee, Chairman
Philipstown Zoning Board of Appeals
238 Main Street
P. O. Box 155
Cold Spring, New York 10516

Re: Rockwald Road Association Letter dated December 4, 2017 regarding the Homeland Towers/ Verizon Wireless application for a proposed cell tower at 50 Vineyard Road, Philipstown, NY

As requested, this letter is in response to the letter submitted by the Rockwald Road Association (the Association) of December 4, 2017 by Mr. Paul Eldridge and Mr. Joel Cooper regarding the proposed cell tower at 50 Vineyard Road in Philipstown, NY. The Association's letter questions the methodology employed in evaluating the applicants' data, the impartiality of the conclusions, and reasserts the validity of the Association's measured data.

It is important for the Board to understand that Menkes Associates, LLC is solely focused on providing technical services to municipal zoning boards and objectors in matters associated with cell site placement and wireless telecommunications. We have never provided any services to the wireless carriers and would not compromise our objectivity by doing so. Our methodologies, recommendations, and testimony in such matters are based on over 30 years of experience in the international telecommunication industry. We follow industry best-practices in our analyses, and will never compromise our integrity in support of a case. To imply otherwise is inappropriate.

It is not our position to make the applicants' case, but it is also inappropriate to allow erroneous technical assumptions and faulty science from the objectors to go unchallenged. The Association's presentation, submissions, and letter contain both.

The Association sites numerous legal rulings that they believe applicable in this case. Since we are not lawyers, we are not qualified to comment on these references. However it is appropriate to comment on the technical errors in their material.

The Association's letter expressed concern that only the 700 MHz and 2100 MHz coverage plots were presented by the applicants rather than also including the 800 MHz and 1900 MHz coverage plots. They claim that voice calls are carried in the latter spectrum, and that LTE high speed data is carried in the 700 MHz and 2100 MHz spectrum. This assumption is incorrect. The majority of Verizon's wireless voice traffic is, in fact, currently being carried over LTE at 700 MHz and 2100 MHz using a technology called Voice Over LTE (VOLTE). The 800 MHz and

1900 MHz spectrum are being reclaimed from their 2G and 3G technologies and converted to LTE. The 1900 MHz spectrum is already clear in most, if not all, of the country and only a portion of the 800 MHz spectrum is still being used for 2G and 3G. Verizon has publicly stated that they expect that they will turn down their 2G and 3G service by the end of 2019 making LTE their dominant service for voice and data.

In choosing to present coverage plots at 700 MHz and 2100 MHz, the applicants have appropriately bracketed their spectrum by showing coverage at a frequency (700 MHz) that results in the smallest gaps, and a frequency that results in the largest gap (2100 MHz). Presenting plots at 800 MHz and 1900 MHz is therefore unnecessary.

The Association's letter raised issues with the independence of the analyses of the submitted data relative to Verizon's involvement. Menkes Associates, LLC was specifically tasked with analyzing the RF data accompanying the application; there is no way to do so without relying on Verizon's submissions of its proprietary network parameters. The coverage plots could not have been produced without cooperation from Verizon. This data includes such information as the latitude and longitude of all of their towers in the area, the antenna types, heights, gain, azimuth orientation, and down-tilts, the cable loss, and transmit power. Menkes Associates, LLC as previously stated, does not have a business relationship with Verizon and consequently does not have access to their proprietary data. PierCon Solutions/Homeland Towers does have such a relationship, and therefore access to such data. To suggest that Verizon would submit fraudulent source data is a bold assumption.

The use of predictive, computer generated coverage plots is well established in the wireless industry. The commercial software tools employed to generate these plots are mature and accepted as sufficiently accurate for RF analysis once calibrated via measured field data (measured field data was supplied in the PierCon September 6, 2017 RF report). In subsequent information supplied by PierCon Solutions, they provided the propagation model, the geographic bin size, and the terrain database that they utilized in producing the plots. All of the supplied inputs are consistent with industry practices. There is no reason to doubt the use of the supplied coverage plots for predicting the RF performance for this application.

The Association's letter also asserts that we simply employed Verizon's quality objectives for reliable coverage in determining the viability of a potential site. This is correct; however this is also technically appropriate. There is no FCC specified numerical RF performance requirement for any common carrier cellular communication system. Additionally, there is no requirement from any of the international telecommunications standards bodies. The industry, as a result of competitive pressures, technical performance of the air interface (LTE, in this case), and years of service, has been able to establish realistic coverage objectives. These coverage objectives are based on analyzing network performance statistics and correlating them to RF signal strength. The industry typically has targeted about a 98% reliability objective for wireless network performance. This means that, on average, of the millions of calls handled, whether voice or data, less than 2% will be unsuccessful. Call reliability is a function of received signal strength – the stronger the signal the higher the probability of a successful call or data session. Verizon has determined that an on-street value of -95 dBm Reference Signal Receive Power (RSRP) for LTE is required to meet their network quality objective for in-building coverage in the Philipstown area. This number allows for an additional 15 to 20 dB of path loss as a result of entering a building. The RSRP objectives Verizon is employing in the Philipstown application are quite reasonable and, to their detriment, lower than they have used in other similar municipalities where they have sought to erect a new tower.

Contrary to the claim in the Association's letter, the data in their earlier Memorandum of November 13, 2017 does not prove that there is reliable coverage in the identified areas. We do concede, however, that a methodology producing statistically relevant calibrated field measurements can be more reliable than predicted data. However that is not what you have in the Association's Memorandum.

There are two critical requirements for collecting RF field measurements – the measurement system must be calibrated to ensure accuracy, and the data must be collected in sufficient quantity to have a high statistical confidence level. Regarding the accuracy of the measurements, the Association's Memorandum indicates that consumer cell phones were used to take the measurements by placing the phones in the test mode. There is no indication that these phones were calibrated against a precision RF standard to determine their accuracy. As with any mass produced product, there are variations from unit to unit. The same applies to cell phone performance and without calibration, the measurement accuracy is uncertain. Further, many of the measurements appear to have been made while traveling in a vehicle. To be able to determine the correct on-street RSRP, the additional path loss (typically about 6 dB) associated with the vehicle would have to be accurately determined and subtracted from each measurement. No proof of calibration or vehicle path loss was provided.

More troubling, however, is the fact that the data is not statistically significant; establishing and holding a small number of calls is insufficient to determine the reliability of coverage in a network that targets a 98% call success rate. Thousands of calls would have to be made along the route to be able to confidently determine that the network either fails or meets its quality objective at the measured RSRP.

Similarly, if Verizon's received signal level of -95 dBm is accepted as being required for reliable in-building service and the purpose was to measure the signal level; hundreds, if not thousands, of measurements along the route would be required to determine with confidence the appropriate mean value of RSRP. This is because radio signals are constantly varying due to fast and slow fading from seasonal changes, reflections, refraction, and diffraction, and are best expressed as the average of many measurements.

It is interesting to note, even without calibration and with the small number of calls, the majority of the LTE measured signals in the Memorandum fail to achieve a level of -95 dBm RSRP even when corrected for the typical vehicle path loss.

The Memorandum also indicates that a Wilson Pro cellular broad-band signal meter, model number 460018 (correct number is presumed to be 460118) was used to confirm all the cell signal readings. This meter measures total received signal strength at 800 MHz and 1900 MHz for 2G and 3G systems, and RSRP at 700 MHz and 2100 MHz for LTE. The data recorded from this meter is shown in Exhibit E of the Memorandum. Although not specified, the readings appear to align with the 2G or 3G technology measurements rather than LTE, because they are all much higher than the LTE RSRP measurements in the Memorandum.

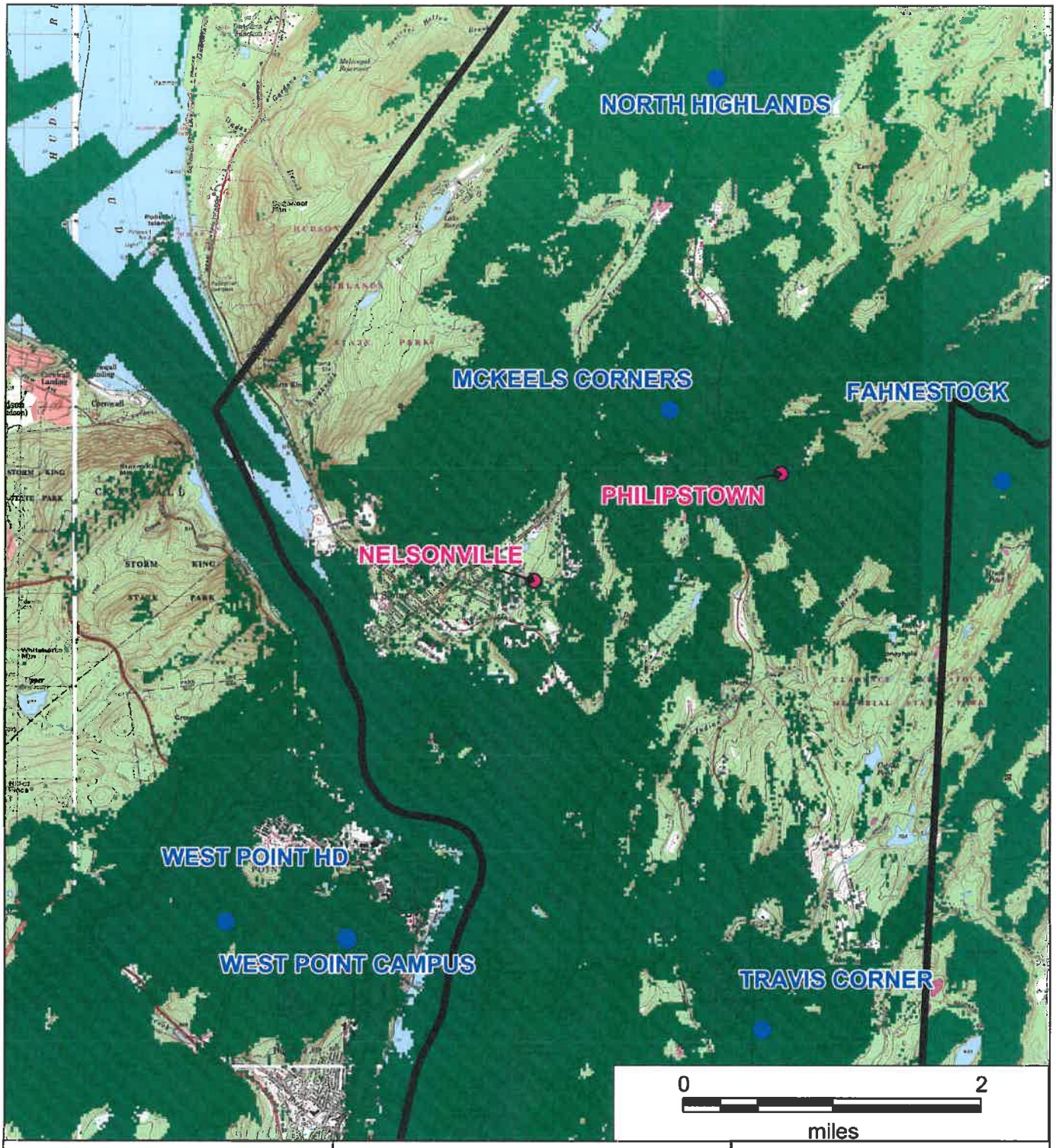
Although the Association's effort to compile field data is laudable, the lack of a credible methodology, the ambiguity and insufficiency of the data, and the fact that the majority of their LTE measurements fall below -95 dBm RSRP compromises the value of the Memorandum's data in proving their case.

The Association's letter also suggests further analysis of the number of people affected in the gap areas. This matter was addressed in our previous report dated November 28, 2017.

Menkes Associates, LLC firmly believes that the analyses we performed, and methodology utilized followed industry best-practices without compromise. Further, we believe that the allegations regarding bias in the Association's letter of December 4, 2017 are without merit.

Prepared and submitted by:

H. E. Menkes
President



Nelsonville

Existing
Verizon Wireless
700 MHz LTE In-Building
Suburban Coverage With
McKeels Corners @ 190'

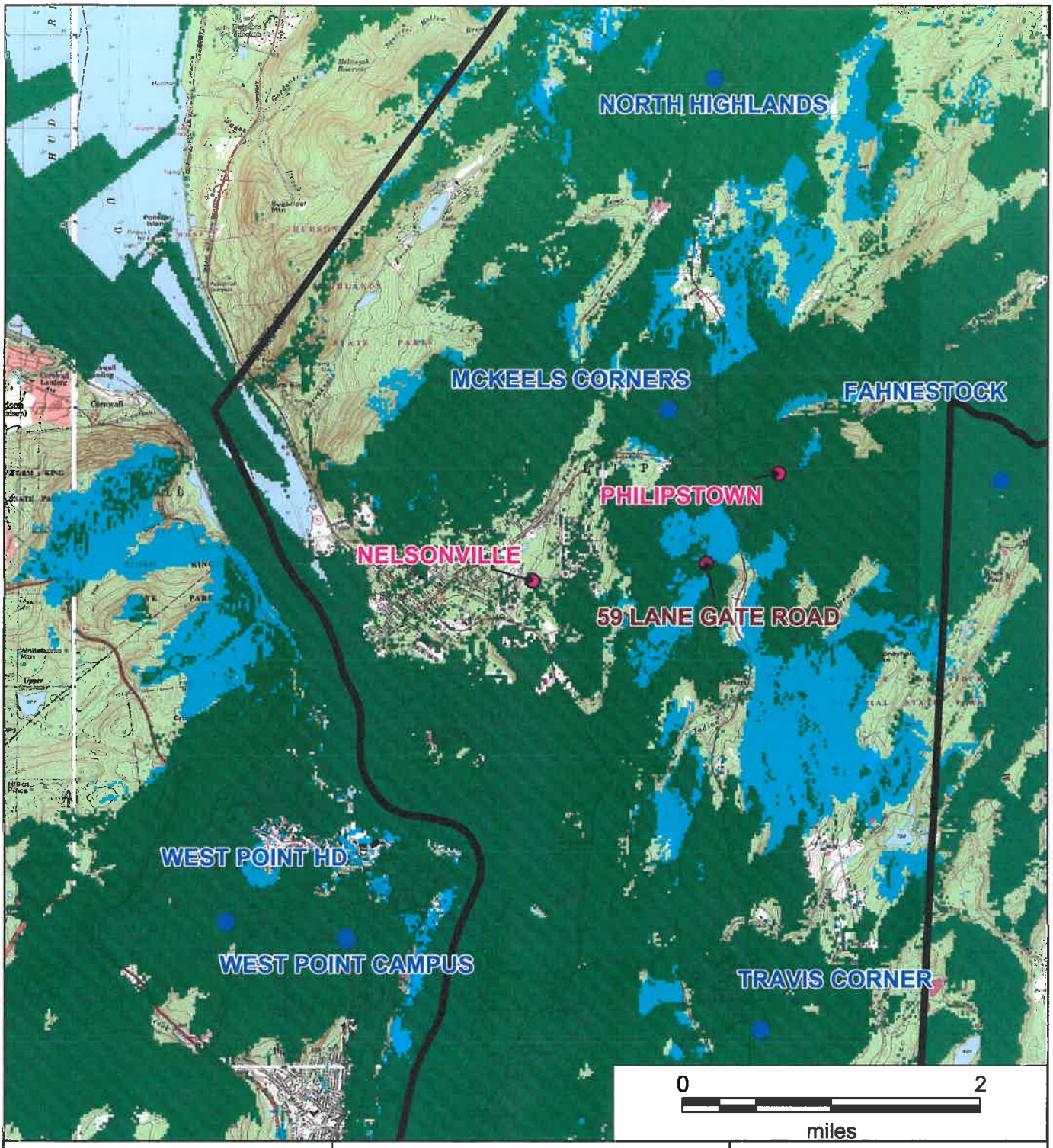
Village of Nelsonville, NY

- Verizon Wireless Existing Facility
- Verizon Wireless Proposed Facility
- Town of Philipstown Boundary
- Reliable In-Building Suburban Coverage (>=-95 dBm RSRP)

verizon

PierCon Solutions LLC
Specialists in Wireless Systems

Prepared by A. Feehan
2/13/2018



Nelsonville

Existing
Verizon Wireless
700 MHz LTE In-Building
Suburban Coverage With
59 Lane Gate Road
@ 210'
Village of Nelsonville, NY

- Verizon Wireless Existing Facility
- Verizon Wireless Proposed Facility
- Town of Phillipstown Boundary
- Reliable In-Building Suburban Coverage (>=-95 dBm RSRP)
- Nelsonville Reliable In-Building Suburban Coverage (>=95 dBm RSRP)

verizon

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Specialists in Wireless Systems

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2/13/2018