C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
Phone: (603) 644 2800
support@csquaredsystems.com

December 4, 2024

VIA EMAIL
Cape Cod Commission
c/o Jeffrey Ribeiro, AICP
Regulatory Planner
3225 Main Street
Barnstable, MA 02630

SUBJECT: TOWERNORTH / 1185 LONG POND ROAD TELECOMMUNICATIONS FACILITY
ISOTROPE'S 12/2/2024 EMAIL AND REQUEST FOR ADDITIONAL RF INFORMATION

Dear Mr. Ribeiro:

This letter and the RF coverage maps attached hereto have been prepared by C Squared Systems on behalf of Verizon in response to Isotrope's 12/2/2024 email requesting information and responses to three items. Each item from the Isotrope email is numbered and *italicized* below, with our responses to each immediately following. The additional RF maps included here have titles that are alphabetically sequenced/labeled as an extension to plots previously submitted on behalf of Verizon.

1. *Attachment A revised to include all Verizon coverage (include coverage from Small Cells as well as from Macrocells)*

   The coverage presented in Attachment A (and other plots submitted) does not include modeled coverage from existing small cells. Small cell antennas are often obstructed by the localized clutter due to their low mounting heights, and modeling the coverage is subject to nuanced obstructions too granular than typically accounted for in a modeling tool intended for analysis across large geographic regions. Furthermore, deployment of small cells is intended to complement the macro-site network, not replace or substitute the coverage provided by macro-sites. This topic and response are consistent with recent discussions related to similar applications in the Town of Falmouth. For this application in Brewster, the nearest small cell is located 2.4 mi to the northwest of the proposed site, near the Breakwater Beach parking lot and has no bearing on the coverage gap or areas to be served by the proposed site. That notwithstanding, we have attached a map to show the surrounding coverage with modeled coverage of the area small cells as Attachment W. Please note that of the 700 MHz and 2100 MHz coverage presented, the small cells visible in the map operate at 2100 MHz and do not include 700 MHz radios.

2. *A specific response to the second section of the DRI review standard section:*

   b. *Measure and provide data on height of surrounding tree, vegetation, and/or building cover. Supply photographs to corroborate. In complex environments, a plan view is recommended.*

   c. *Provide a propagation plot with top of antenna placed ten feet above average surrounding cover line.*

   Based on visual observations from field personnel on site during the balloon test, the surrounding tree height is estimated to be 50' AGL (above ground level). Attached is a map showing the existing coverage with the proposed site at a 55' antenna centerline as Attachment X. This is based on a 60' tower with centerline 5' below, consistent with the relative offset of the proposed 125' tower and 120' centerline. The plot demonstrates the drastic reduction in coverage compared to the proposed tower height.

C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
Phone: (603) 644 2800
support@csquaredsystems.com

3. *The delta plots continue to be misleading and overstating the area of "delta"/difference. The lower signal level for the analysis should align with the stated threshold for acceptable coverage, it is not relevant if coverage predicted to be below the standard is diminished further below the standard.*

   Included in the previously submitted height analysis summary are plots quantifying the signal strength differences with each "delta" plot comparing two antenna heights at the proposed location. While these "delta" plots present a more complex analysis that may require a more detailed accompanying explanation to understand the nuances, we respectfully disagree that the plots are "misleading" and that any coverage differences in areas predicted below the -95 dBm threshold are irrelevant.

   The -95 dBm threshold for RSRP is the minimum threshold at which Verizon considers to be adequate for reliable LTE coverage in suburban areas such as Brewster. This threshold is not and should not be interpreted as a boundary between service and no-service areas. There is no guarantee of 100% call success or service in areas with RSRP greater than -95 dBm. Likewise, there is no guarantee of 100% call failures or no service in areas with RSRP less than -95 dBm. We agree that these delta plots depict coverage at the margins. Of course, users may still be able to make calls and use other wireless services in some of the weaker, below-threshold coverage areas, but the reliability and user experience would be diminished while inefficiently consuming network resources. Verizon's goal is to build and maintain a robust and efficient network to provide their customers with the services they expect and demand.

   While Verizon's minimum targeted threshold for reliable coverage is -95 dBm, we assert that coverage differences in areas below the threshold are relevant. In fact, it is in these marginal, below-threshold areas where even slight differences in coverage strength can mean the difference between maintaining network connectivity to use basic wireless services. Similarly, coverage improvements in areas greater than the -95 dBm threshold result in improved quality and service for the same reasons, it's just that in areas of stronger coverage the differences experienced by the end user have more to do with higher data speeds rather than maintaining basic network connectivity.

   It is for these reasons that a technical review of the overall coverage impact of various tower heights should not be limited only to areas that meet the threshold for reliable service. Doing so would unnecessarily minimize and limit the real-world, practical impacts to the network and its users. Coverage improvements due to tower height or location are of benefit to all users, both above and below the -95 dBm threshold.

   We would be happy to discuss these nuances further at your convenience but clearly there are significant coverage gaps in Verizon's network in this area of Brewster, and we assert that the proposed tower height is at the minimum to meet the specific needs of Verizon with its antennas located at 120' AGL.

Sincerely,

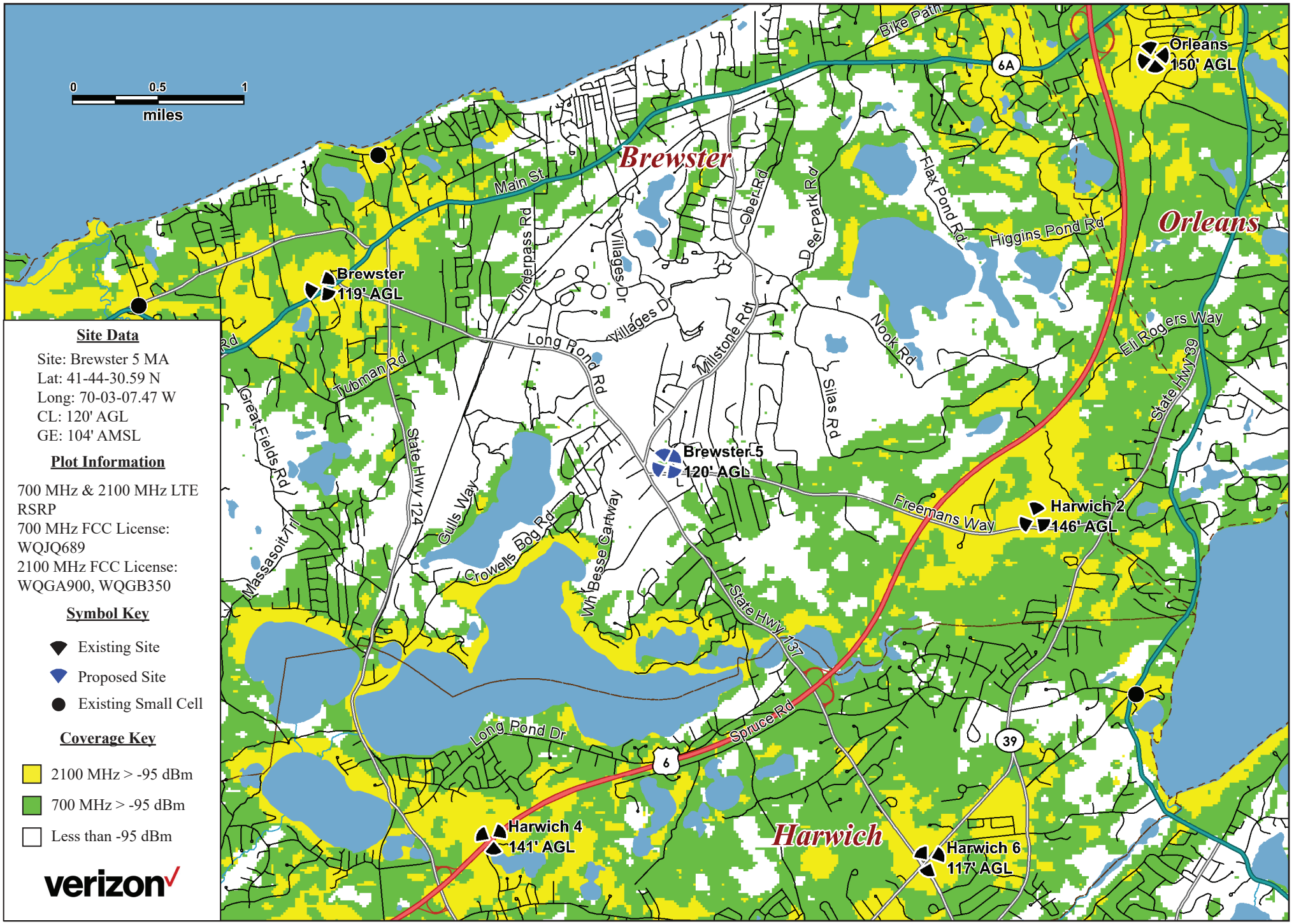
Keith Vellante

Keith Vellante
RF Engineer
C Squared Systems, LLC
Contractor to Verizon Wireless

Cc: Michael Lawton, Isotrope

Enclosures (2)

Attachment W:
Brewster 5 MA - Existing 700 & 2100 MHz LTE Coverage (Macro Sites with Small Cells)



Attachment X:
Brewster 5 MA - 700 & 2100 MHz LTE Coverage with Proposed Site @ 55' (Macro-Sites)

