

Daniel D. Klasnick

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July 28, 2021

Town of Essex
Zoning Board of Appeals
Essex Town Hall
30 Martin Street
Essex, Massachusetts 01929

**Re: Application for Variance – TowerNorth Development LLC
Proposed Free Standing Monopole Tower to be located at
73 Eastern Avenue and 65 Eastern Avenue**

Dear Board Members:

To further assist in its review of the application, I am providing supplemental materials to the application submitted by TowerNorth Development LLC (“TowerNorth”) and with support from Cellco Partnership d/b/a Verizon Wireless (“Verizon Wireless”) to the Zoning Board of Appeals for the installation, maintenance and operation of a telecommunications tower facility at 73 Eastern Avenue in the Town of Essex.

The provided materials pertain to questions and comment contained in the June 8, 2021 report provided by Isotrope Wireless and the matters discussed at the June 16, 2021 Zoning Board of Appeals meeting.

- Exhibit 1 - Balloon Test Affidavit
- Exhibit 2 – Photograph Analysis
- Exhibit 3 – Photo Simulations
- Exhibit 4 – Supplemental RF Materials
- Exhibit 5 – Supplemental Alternative Site Assessment

Should you require any additional information, please don’t hesitate to contact me. Thank you very much for your cooperation.

Very truly yours,

DUVAL & KLASNICK LLC



By: Daniel D. Klasnick
Attorney at Law

EXHIBIT 1
BALLOON TEST AFFIDAVIT



500 N. Broadway
East Providence, RI 02914
Ph: 401-354-2403
Fax: 401-633-6354

June 16, 2021

Ms. Meg Nelson
Chair, Zoning Board of Appeals
Town of Essex
30 Martin Street
Essex, MA 01929

RE: Balloon Demonstration
Proposed telecommunications installation at
65 & 73 Eastern Ave
Client Reference: MA-044

Dear Ms. Nelson:

The following information has been provided on behalf of Tower North Development, LLC. for the proposed wireless communications facility at the above referenced location.

1. My name is Scott N. Adams. I am a licensed professional civil engineer in the Commonwealth of Massachusetts with registration number 46006.
2. I am an independent consultant under contract by Tower North Development, LLC at 95 Ryan Dr, Suite 1, Raynham, MA 02767. My job responsibilities include providing professional engineering services for the design and construction of wireless facilities.
3. On August 28, 2020, (2) two representatives from Advanced Engineering Group, PC (AEG) performed a balloon test demonstration at the above reference location. Weather conditions were partly sunny with mild wind conditions and an average temperature of 75 degrees. Visibility was clear. AEG was instructed by client to fly (1) balloon at 150 ft AGL from 10:00am to 2:00pm. The balloon took flight at approximately 9:53am and ended at 2:10pm.
 - Tower center and lease area corners were staked in the field by AEG survey crew prior to balloon test.
 - Balloon diameter was confirmed at 3.5ft.
 - Additional pink ribbons were placed at elevations of 140ft, 130ft, 120ft, 110ft and 100ft. This allows for additional scale reference points and wind direction.
 - Balloon elevation was confirmed prior to flight by measuring string length in parking area, and marking length at 150ft.
 - Balloon elevation was confirmed during flight by use of laser electronic measuring devices (Leica Disto & Trupulse 200).
4. One representative from AEG stayed at balloon location while the other AEG representative performed the viewshed analysis photos. During the viewshed process, the representatives stayed in communication with each other to determine the optimum time to obtain the photo evidence (when the balloon was at its approximate peak and steady). This process allowed for the most accurate representations possible with a balloon test.

Should you have any questions please contact me at 508-989-7979.

Very truly yours,

Scott N. Adams, P.E.
Advanced Engineering Group, P.C.



EXHIBIT 2
PHOTOGRAPH ANALYSIS

July 19, 2021

Ms. Meg Nelson
Chair, Zoning Board of Appeals
Town of Essex
30 Martin Street
Essex, MA 01929



RE: Photo Simulations - Appropriate Focal Length

Dear Ms. Nelson:

My name is Meagan Sharum, I have been a Professional Photographer for 15 years. I attended the Rhode Island school of design and I have advanced experience and knowledge with cameras and lenses, along with digital editing. I can confidently state that regardless of what many people think, 50mm is not the Subject to Eye distance that the human eye can see. What many people don't take into consideration is some people have different eye sight - one good eye or one bad eye, etc. A normal Focal length is about 50mm for just one eye with 20/20 vision. However, humans have two eyes which work together and are combined in our brain. As a result, objects look wider.

A focal length of about 22-24mm is closest to how most people see with perfect vision in "real world" viewing conditions as it provides for better context and field of view to the landscape. Nevertheless, the scale of the balloon within the photographs remains relatively the same within the field of view regardless of a 22-24mm or 50mm focal length.

Eyes vs. cameras are not comparable. Human eyes have an aspect ratio of roughly 5:3. Most photos taken with cameras have an aspect ratio of 4:3 or 16:9. I edited these images and fixed the ratio to be approximately 5:3. Once again, our vision is combining two perspectives, our left and right eye, and a camera only has one. Not to mention photos are flat and our eyes are curved. I also decided to fix the curvature through Adobe Photoshop using the Lens Correction Tool in order to replicate the best human focal length possible. It is my opinion that the attached modified images, as noted above, accurately reflect what a human eye would see from these vantage points.

Best,

Meagan Sharum Owner/Photographer at Sharum Photography

A handwritten signature in cursive script that reads "Meagan Sharum".

ORIGINAL



MODIFIED



ORIGINAL



MODIFIED



ORIGINAL



MODIFIED



ORIGINAL



MODIFIED



ORIGINAL



MODIFIED



ORIGINAL



MODIFIED



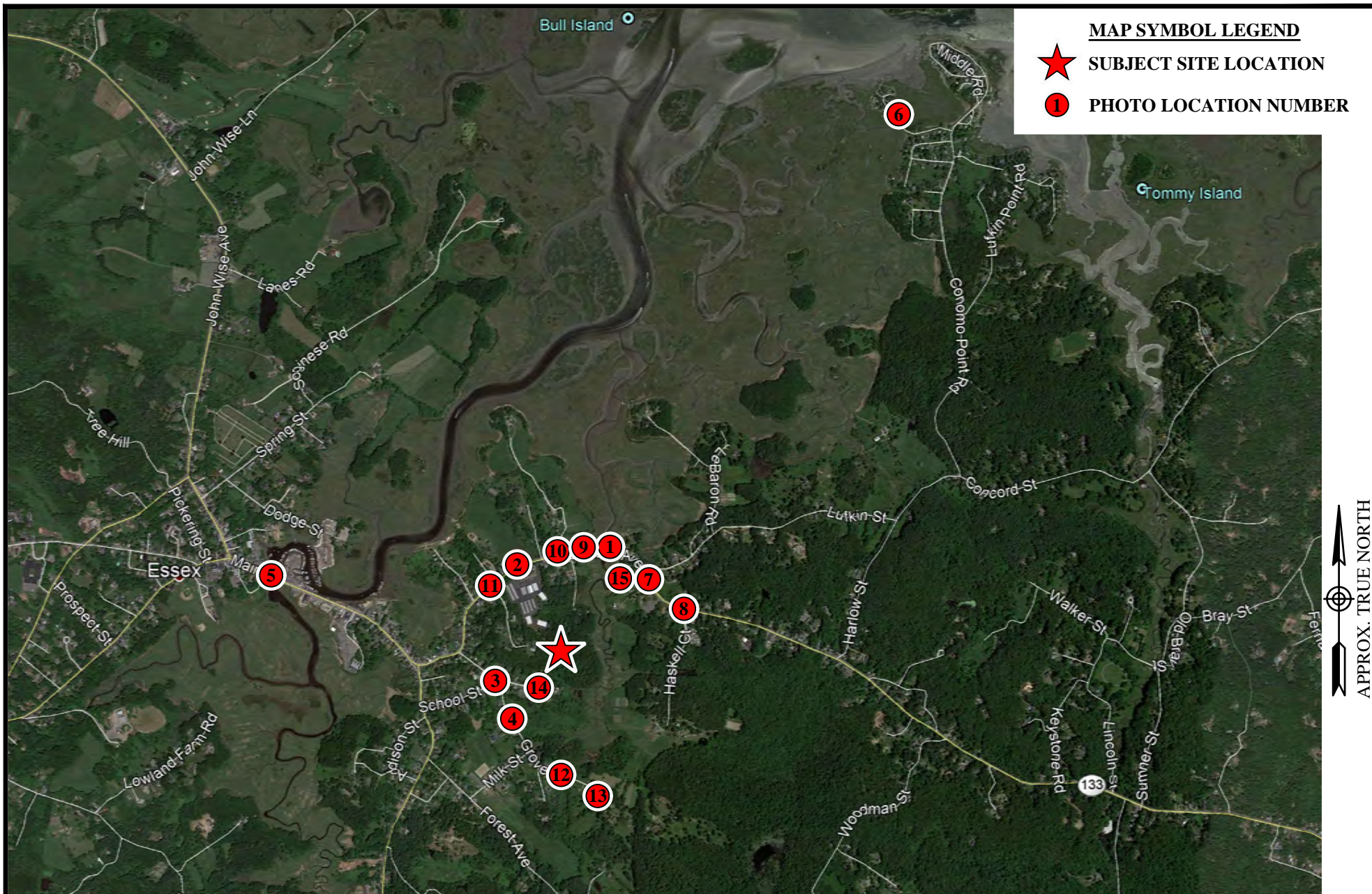
ORIGINAL



MODIFIED



EXHIBIT 3
PHOTO SIMULATIONS



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95 RYAN DRIVE, SUITE 1
RAYNHAM, MA 02767

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Surveying - Telecommunications
500 NORTH BROADWAY
EAST PROVIDENCE, 02914
PH: (401) 354-2403
FAX: (401) 633-6354

SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE
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KEY MAP OF PHOTOS

PAGE: MAP-1

DATE: 7/22/2021

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VIEW #1
EXISTING VIEW FROM THE
NORTHEAST, ON EASTERN AVENUE

PAGE: V-1E

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VIEW #1
PROPOSED VIEW FROM THE
NORTHEAST, ON EASTERN AVENUE

PAGE: V-1P

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MODIFIED VIEW #1
EXISTING VIEW FROM THE
NORTHEAST, ON EASTERN AVENUE

PAGE: V-1EM

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PAGE: V-1PM

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VIEW #2
EXISTING VIEW FROM THE
NORTHWEST, ON EASTERN AVENUE

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NORTHWEST, ON EASTERN AVENUE

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VIEW #3

EXISTING VIEW FROM THE WEST, NEAR
THE INTERSECTION OF GROVE STREET
AND COGSWELL COURT

PAGE: V-3E

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PROPOSED 150'-
MONOPOLE

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THE INTERSECTION OF GROVE STREET
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PAGE: V-3P

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VIEW #4
EXISTING VIEW FROM THE SOUTHWEST,
ON GROVE STREET

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VIEW #4

PROPOSED VIEW FROM THE SOUTHWEST,
ON GROVE STREET

PAGE: V-4P

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BALLOON @ 150'
A.G.L.

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EXISTING VIEW FROM THE SOUTHWEST,
ON GROVE STREET

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VIEW #5
EXISTING VIEW FROM THE WEST,
ON MAIN STREET

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ON MAIN STREET

PAGE: V-5P

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MODIFIED VIEW #5
 EXISTING VIEW FROM THE WEST,
 ON MAIN STREET

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PROPOSED 150'
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PROPOSED VIEW FROM THE WEST,
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VIEW #6

EXISTING VIEW FROM THE NORTHEAST,
ON ROBBINS ISLAND ROAD

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VIEW #6

PROPOSED VIEW FROM THE NORTHEAST,
ON ROBBINS ISLAND ROAD

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BALLOON @ 150'
A.G.L.

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MODIFIED VIEW #6
EXISTING VIEW FROM THE NORTHEAST,
ON ROBBINS ISLAND ROAD

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A.G.L.

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VIEW #7

EXISTING VIEW FROM THE NORTHEAST,
ON EASTERN AVENUE

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VIEW #7

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ON EASTERN AVENUE

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BALLOON @ 150'
A.G.L.

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PAGE: V-7PM

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BALLOON WAS NOT VISIBLE FROM THIS LOCATION

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SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE
 ESSEX, MA 01929

VIEW #8

EXISTING VIEW FROM THE NORTHEAST,
 ON EASTERN AVENUE AT THE
 INTERSECTION OF HASKELL COURT

PAGE: V-8E

DATE: 7/22/2021

DRAWN BY: MR

REVISION: 1



BALLOON WAS NOT VISIBLE FROM THIS LOCATION

PREPARED FOR:



CENTERLINE COMMUNICATIONS
95 RYAN DRIVE, SUITE 1
RAYNHAM, MA 02767

PREPARED BY:



ADVANCED
ENGINEERING GROUP, P.C.
Civil Engineering - Site Development
Surveying - Telecommunications
500 NORTH BROADWAY
EAST PROVIDENCE, 02914
PH: (401) 354-2403
FAX: (401) 633-6354

SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE
ESSEX, MA 01929

VIEW #9
EXISTING VIEW FROM THE NORTH,
ON EASTERN AVENUE

PAGE: V-9E

DATE: 7/22/2021

DRAWN BY: MR

REVISION: 1



BALLOON WAS NOT VISIBLE FROM THIS LOCATION

PREPARED FOR:


CENTERLINE COMMUNICATIONS
 95 RYAN DRIVE, SUITE 1
 RAYNHAM, MA 02767

PREPARED BY:


ADVANCED
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SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE
 ESSEX, MA 01929

VIEW #10
 EXISTING VIEW FROM THE NORTH,
 ON EASTERN AVENUE

PAGE: V-10E

DATE: 7/22/2021

DRAWN BY: MR

REVISION: 1



BALLOON WAS NOT VISIBLE FROM THIS LOCATION

PREPARED FOR:



CENTERLINE COMMUNICATIONS
95 RYAN DRIVE, SUITE 1
RAYNHAM, MA 02767

PREPARED BY:



ADVANCED
ENGINEERING GROUP, P.C.
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EAST PROVIDENCE, 02914
PH: (401) 354-2403
FAX: (401) 633-6354

SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE
ESSEX, MA 01929

VIEW #11

EXISTING VIEW FROM THE NORTHWEST,
ON EASTERN AVENUE AT THE PRIVATE
DRIVEWAY ENTRANCE TO "ESSEX REACH"

PAGE: V-11E

DATE: 7/22/2021

DRAWN BY: MR

REVISION: 1



BALLOON WAS NOT VISIBLE FROM THIS LOCATION

PREPARED FOR:



CENTERLINE COMMUNICATIONS
95 RYAN DRIVE, SUITE 1
RAYNHAM, MA 02767

PREPARED BY:



ENGINEERING GROUP, P.C.
Civil Engineering - Site Development
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500 NORTH BROADWAY
EAST PROVIDENCE, 02914
PH: (401) 354-2403
FAX: (401) 633-6354

SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE
ESSEX, MA 01929

VIEW #12
EXISTING VIEW FROM THE SOUTH,
ON GROVE STREET AT THE
EBBEN CREEK CROSSING

PAGE: V-12E

DATE: 7/22/2021

DRAWN BY: MR

REVISION: 1



BALLOON WAS NOT VISIBLE FROM THIS LOCATION

PREPARED FOR:



CENTERLINE COMMUNICATIONS
95 RYAN DRIVE, SUITE 1
RAYNHAM, MA 02767

PREPARED BY:



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PH: (401) 354-2403
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SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE
ESSEX, MA 01929

VIEW #13
EXISTING VIEW FROM THE SOUTHEAST,
ON GROVE STREET AT THE END OF
PUBLIC RIGHT OF WAY

PAGE: V-13E

DATE: 7/22/2021

DRAWN BY: MR

REVISION: 1



BALLOON WAS NOT VISIBLE FROM THIS LOCATION

PREPARED FOR:


CENTERLINE COMMUNICATIONS
 95 RYAN DRIVE, SUITE 1
 RAYNHAM, MA 02767

PREPARED BY:


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 Civil Engineering - Site Development
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SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE
 ESSEX, MA 01929

VIEW #14
 EXISTING VIEW FROM THE SOUTHWEST,
 ON COGSWELL COURT

PAGE: V-14E

DATE: 7/22/2021

DRAWN BY: MR

REVISION: 1



BALLOON WAS NOT VISIBLE FROM THIS LOCATION

PREPARED FOR:

CENTERLINE
COMMUNICATIONS
CENTERLINE COMMUNICATIONS
95 RYAN DRIVE, SUITE 1
RAYNHAM, MA 02767

PREPARED BY:

EGADVANCED
ENGINEERING GROUP, P.C.
Civil Engineering - Site Development
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500 NORTH BROADWAY
EAST PROVIDENCE, 02914
PH: (401) 354-2403
FAX: (401) 633-6354

SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE
ESSEX, MA 01929

VIEW #14
EXISTING VIEW FROM THE NORTHEAST,
AT THE END OF GOODWIN COURT

PAGE: V-15E

DATE: 7/22/2021

DRAWN BY: MR

REVISION: 1

EXHIBIT 4
SUPPLEMENTAL RF MATERIALS



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

July 28, 2021

Town of Essex, MA
Zoning Board of Appeals
30 Martin Street
Essex, MA 01929

**SUBJECT: 73 EASTERN AVENUE TELECOMMUNICATIONS TOWER
WRITTEN RESPONSE TO QUESTIONS FROM THE BOARD ADDRESSED DURING THE ZBA
HEARING ON 6/16/2021**

Members of the Zoning Board of Appeals:

During the June 16, 2021 public meeting, much of the discussion was centered around questions prepared beforehand by the members of the Board, to which the Applicant's representatives responded to. These prepared questions were provided in writing to the Applicant after the hearing to allow for an opportunity to provide written responses. This letter and attachments were prepared in consultation with Verizon.

1. "Describe relationship between Verizon engineers and C-Squared engineers. Who generates the data about performance issues, how is it shared?"

As discussed during the hearing and in regard to the subject application, C Squared assists Verizon with the preparation and presentation of technical materials required as part of the local, regional, or state permitting processes for the development of wireless communications facilities. C Squared performed the propagation modeling to prepare the maps and analysis discussed in its RF Report (dated November 6, 2020). In order to perform the modeling, Verizon provides site configuration details that C Squared incorporates into its modeling tool. Verizon does not share specific network performance data for use in C Squared reports prepared on its behalf because this information is proprietary and business confidential.

2. "Timothy Parks signed letter of intent, is he a Verizon engineer? What has been his involvement with the project?"

Timothy Parks is the Network Real Estate New Build Program Manager at Verizon.

3. "Discuss the difference between coverage and capacity"

"Coverage" typically refers to the RF signal level in terms of strength/power and will vary across an area due to attenuation of signals due primarily to the surrounding topography, ground clutter/land use, and distance from the transmitter.

"Capacity" typically refers to the volume of voice and data traffic a particular site or sector of a site can process.

4. "TowerNorth believes that there is a "significant gap" in service in the area. Is the gap in coverage or capacity? Distinguish the two. How is this defined? What evidence supports this?"

As discussed during the hearing, gaps in service in more developed suburban areas such as Essex are often related to both deficient coverage and capacity limitations. Both are related in the sense that weaker coverage areas increase capacity strain and the two should not be considered separate from each other.

The evidence presented is contained within the RF Report. Attachment A from the RF Report reflects the coverage provided to the area from the existing Verizon facilities.

Attachment C from the RF Report reflects the geographical area primarily served by the two sectors of the surrounding sites that are currently responsible for handling any service provided around the proposed facility.

5. **“Isotope believe that any gap that exists in one of capacity rather than coverage. Isotope further believes that the applicant has not provided the board with sufficient underlying evidence (metrics) that a gap exists and instead relied on the coverage map.”**

As stated in response to #4, coverage and capacity are interrelated and evaluated holistically.

6. **“Isotope report indicates that the biggest gain from the proposed tower will be in increased capacity (not filling a hole in service), why is this important? And, is this legally mandated by TCC?”**

The proposed site will provide both improved coverage and additional capacity to the surrounding areas. Because wireless service is provided by a network of sites that interact with each other, the proposed site will not only satisfy a need in the immediate surrounding area, but also positively impact the surrounding network of sites throughout the larger geographic area.

Also as mentioned during the hearing, the quality of service and data connection speeds delivered to the users are not necessarily uniform throughout a coverage area. Users located in stronger coverage areas will generally experience better service than those users located near the edges of coverage. This improved coverage will increase network capacity, which further speaks to why coverage and capacity are related to each other.

Responses regarding any legal mandates can be addressed by the Applicant's and/or Verizon's legal counsel.

7. **“What data supports contention that additional coverage and capacity is needed? Provide the data to the Board.”**

Data related to coverage needs is provided in the RF Report, primarily by Attachment A, which shows the areas of deficient LTE coverage at both the 700 MHz and 2100 MHz channels.

8. **“Provide Verizon metrics that there is a capacity problem. I.e. how was the red area on attachment C generated?”**

The red area on Attachment C of the RF Report is based on the propagation modeling mentioned in the response to Question 1. The red area represents what is commonly referred to as the Best Server footprint from the southeast facing sector of the “Essex 2” site on Tree Hill Road. Verizon customers located in this red area would have the strongest connection to this sector and have the highest likelihood of receiving service from that site. Likewise, the orange area represents the area primarily served by the north facing sector of the “Manchester” site. As noted in the RF Report, the gray areas are simply any other sector to help focus on the area of interest without visually cluttering the map.

9. **“How is capacity demand evaluated? What metrics are used?”**

Verizon has internal engineering teams dedicated to monitoring the performance of both the broader network, as well as the individual channels used on each sector of a site. The network performance data is analyzed to track voice and data usage, connection successes/failures, and to identify daily and seasonal traffic patterns over time to proactively plan for growth and keep up with the demand on its network. The specific methodology and metrics used by Verizon to assess its network performance and capacity needs are considered proprietary and confidential.

10. **“Explain 2100 MHz vs. 700 MHz radio bands”**

As discussed during the hearing, Verizon holds FCC licenses in multiple frequency bands and has certain rights and obligations to use those spectral resources to deploy its wireless services. Due to the physics of RF propagation, lower frequency bands will have less attenuation (or signal loss) than higher frequency bands, all else being equal. Verizon deploys its 4G LTE service over both its 700 MHz FCC license (WQJQ689) and its 2100 MHz FCC licenses (WQGB350 and WQGA900). Both 700 MHz and 2100 MHz coverage layers are presented in Attachments A & B of the RF Report to show a best-case (700 MHz) and worst-case (2100 MHz) coverage situation. Deploying LTE service across multiple frequency bands increases the network's capacity to process data to and from its subscribers. The band or bands in which a particular subscriber is using at a given time is transparent to the user and dynamically changes based on the varying RF conditions and demand from other subscribers in the area.

11. **“Why is it important to improve service at 2100 MHz?”**

As noted above, 2100 MHz is used to provide the same LTE service as provided at 700 MHz. By deploying LTE across multiple frequency bands, the capacity to serve more users and provide faster connections increases. Improving service at the higher frequency bands also reduces loading on the lower frequencies, allowing them to increase their geographical reach.

12. “How did Verizon/TowerNorth decide where the tower needs to be located? Application describes “sophisticated models” to identify the search area. Explain these models.”

The location of a new site is driven primarily by the coverage and capacity needs of the network. As with the maps and analysis in the RF Report, propagation modeling software is used to simulate various network metrics and parameters such as RSRP levels and best server footprints by sector, as well as more advanced metrics and parameters. The modeling uses terrain and clutter databases along with a database reflecting the technical parameters and configurations of the sites in the network. The models engineered to simulate the network can be fine-tuned based on real-world drive test data to further improve the accuracy of the calculations.

13. “Not everyone experiences poor call service in the area. Many users report 4 bars of service along Rte. 133 from West Gloucester in to Essex. Why then is there a need for additional service? Provide evidence of the poor service. Provide results of drive tests used.”

Bars of service on a user device are not standardized nor a technical engineering measure of network performance. As discussed in the RF Report, during the hearing, and in responses above, the need for the proposed site is to provide improved coverage and additional capacity to the surrounding area.

The maps in the RF Report are evidence speaking towards the need for the proposed site. Additionally, attached here as requested, are maps of drive test data of the existing Verizon network to reinforce the validity of Attachments A & C of the RF Report.

14. “How does Verizon relate dBm to bars of service?”

As noted above, bars of service are not a standardized technical measure of network performance, including power measurements.

15. “Isotope report indicates that the proposed tower would provide coverage that eclipses the SE sector of Essex 2 tower. Provide data re SE sector of Essex 2 tower i.e. # of subscribers accessing this site, how many subscribers are too many, actual capacity load of Essex tower”

As mentioned during the meeting, Verizon considers network performance or subscriber data confidential and proprietary.

16. “Does Verizon have a “capacity crunch” (other cell sites stressed)? Where? Provide data.”

Verizon is striving to densify its network to provide a high-quality experience to its subscribers while keeping up with the ever-growing reliance and usage demand on its network. As noted previously, specific network performance data is considered proprietary and confidential.

17. “Which sectors of existing Verizon cell sites have call failure events? Provide data.”

Verizon considers specific network performance data proprietary and confidential.

18. “In attachment A, it appears that it is mostly West Gloucester that has deficient service (white area). Attachment A and B seem to indicate that the tower would improve service more in Gloucester than Essex. Wouldn't tower in W. Gloucester better address coverage issues?”

As discussed in the hearing, shifting the tower over into west Gloucester would serve a deeper coverage gap in that area, but at the expense of providing improved coverage and capacity to busier areas along Route 133 in Essex that would be served by the proposed site. Furthermore, Attachments A & B demonstrate that the proposed tower would improve service more in Essex rather than Gloucester.

19. “Did the applicant examine sites further to the east, to avoid coverage redundancy with tower 2?”

As demonstrated at the hearing and through the material submitted, the proposed site is needed to meet capacity and coverage objectives that are not satisfied by other sites in the Verizon network, including “tower 2” (Essex 2 on Tree Hill Road). Please also refer to the Alternate Sites Analysis prepared by TowerNorth and supplemental written responses by TowerNorth to suggested alternatives.

20. “Tower at the proposed site would eclipse coverage provided by the SE sector of Tower 2, why not move the tower to the west, avoid the overlap and expand coverage rather than having a redundancy in the SE sector of tower 2? (See page 16 of Isotope report)”

Moving the proposed tower to the west would increase the degree to which it would provide redundant coverage with Essex 2. It is assumed this question intended to ask about moving the proposed site to the east rather than west, as stated.

In order to continue serving the growing demand, Verizon must densify its network of sites which inherently leads to an increase in coverage overlap between sites. This overlap is an opportunity to optimize the network through antenna downtilts or azimuth changes since there are now more options in how to serve a given area. To be clear, once a site is initially constructed, its design does not remain fixed or stagnant. Verizon's optimization engineers continually monitor the performance and implement changes to the site configurations to improve overall network performance. Both sites are needed to meet Verizon's coverage and capacity targets.

21. "Why did TowerNorth choose this site if moving the tower would avoid this overlap and provide greater coverage?"

This site will optimize coverage and capacity needs identified by Verizon. Once the need is identified in the area, TowerNorth selects the best site (based on a variety of factors, such as topography, availability to lease, and zoning) to meet that need. Please refer to the Alternate Sites Analysis prepared by TowerNorth.

22. "Does Verizon, independent of TowerNorth, have alternatives to provide better coverage such as other sites, other technology?"

Verizon does not have any available alternative sites or technologies to satisfy its network coverage and capacity needs in the area. Verizon identified a need and TowerNorth had a candidate that met that need.

23. "Provide comparative coverage plots for 150, 130, 110 and 90 feet"

Please see attached map. The heights listed in the coverage key on this map is in reference to the antenna centerline and consistent with the height reference of the RF Report maps.

24. "What coverage is gained by 100' tower moved 4' to the N?"

Please see attached plot for 96' antenna centerline (100' tower). A 4' lateral shift of the tower to the north is inconsequential in terms of modeling the RF coverage.

25. "Move tower 140" E and it is out of 500' residential setback. Why not?"

Please refer to the Alternate Sites Analysis prepared by TowerNorth and supplemental written responses by TowerNorth to suggested alternatives.

26. "Address each alternative site discussed in Isotope report pp20-21"

Please refer to the Alternate Sites Analysis prepared by TowerNorth and supplemental written responses by TowerNorth to suggested alternatives.

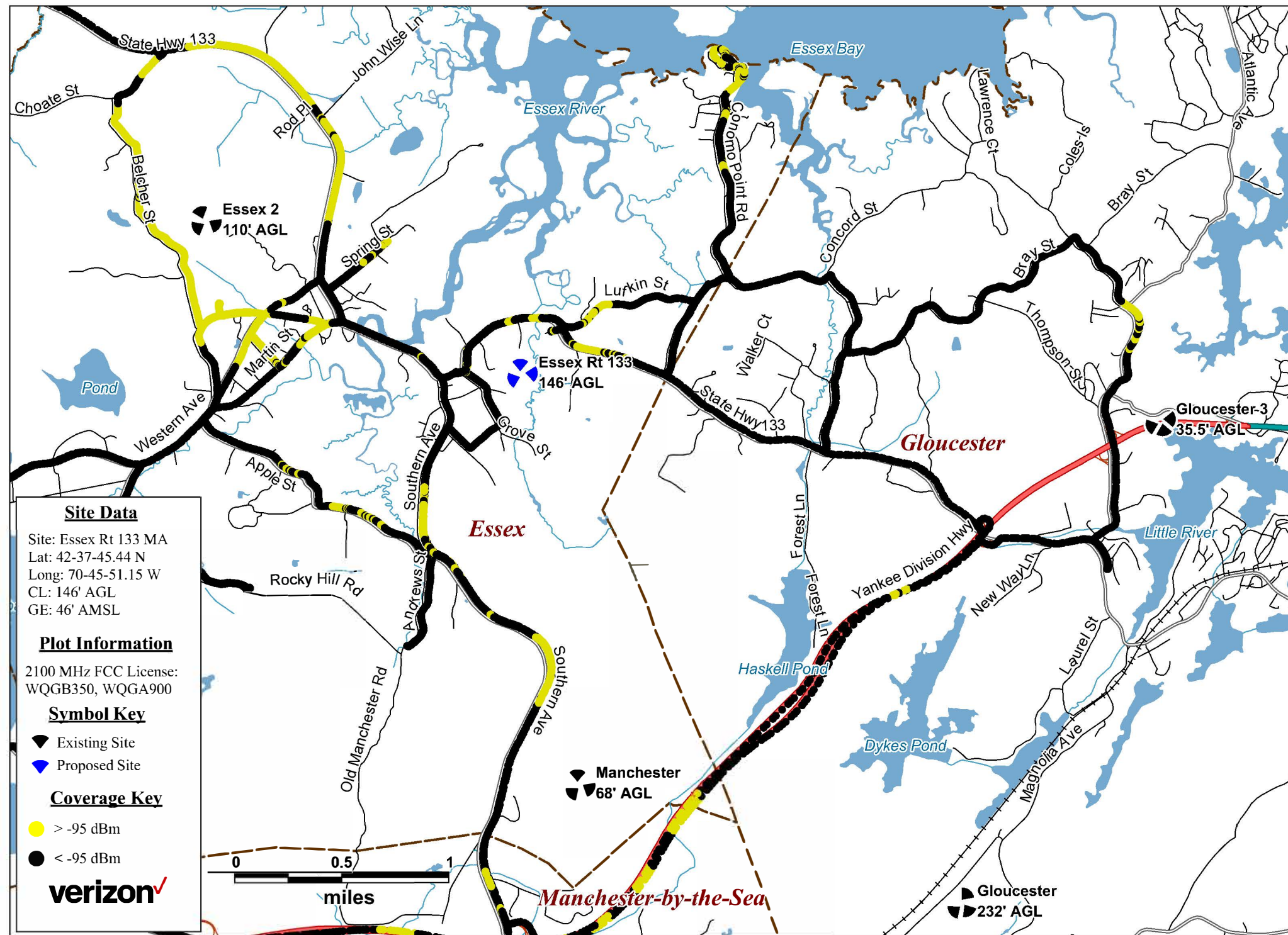
27. Small Cells - "No discussion in application, why not?"

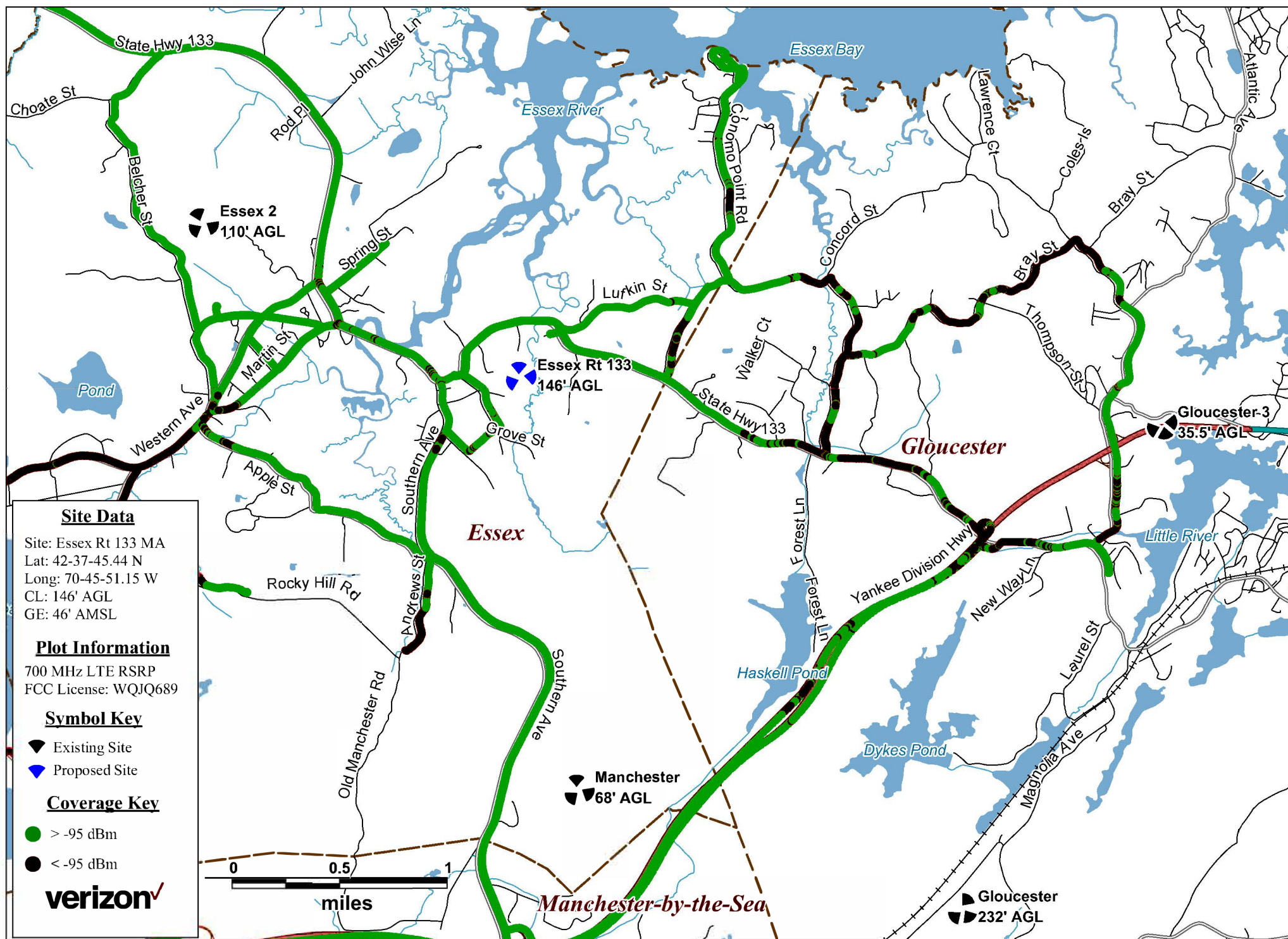
As discussed during the hearing, Verizon actively deploys small cell technology as a complementary solution to augment their base network provided by the traditional macro-sites (towers, monopoles, etc). Small cells are traditionally deployed on utility poles or the like and are intended to provide relief to isolated areas of increased demand. They are not a competing or replacement solution for macro-site facilities such as the proposed site, which is intended to server a broader geographic area.

While smaller form factor of small cells may be appealing, there are limitations on the technology compared to macro-site installations such as; no backup power for emergency outage situations, limited range due to the low antenna height, ineffective in areas dominated by tree cover, and limited ability to deploy multiple technologies and frequencies from a single small cell location.



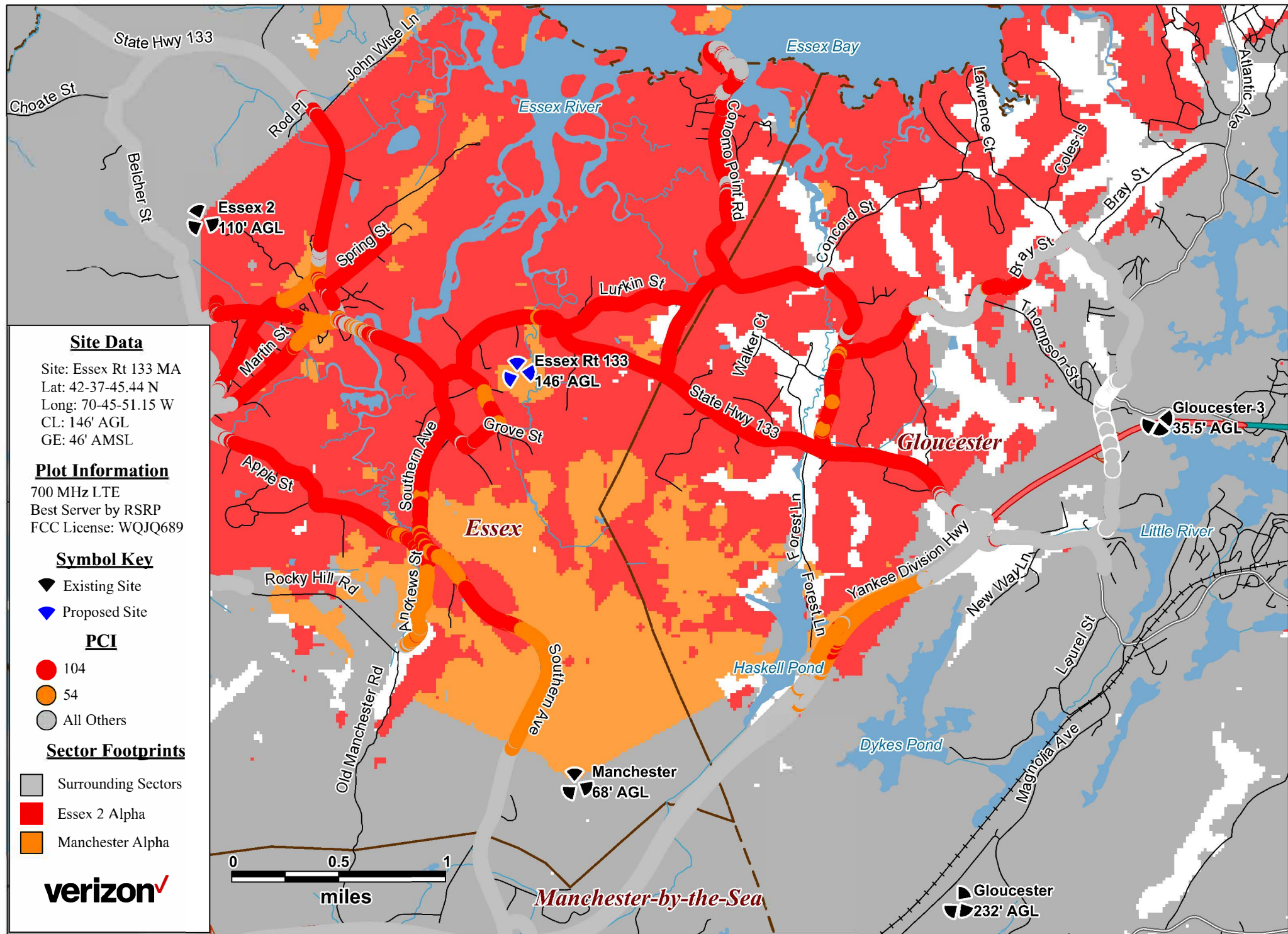
Keith Vellante
RF Engineer
C Squared Systems, LLC

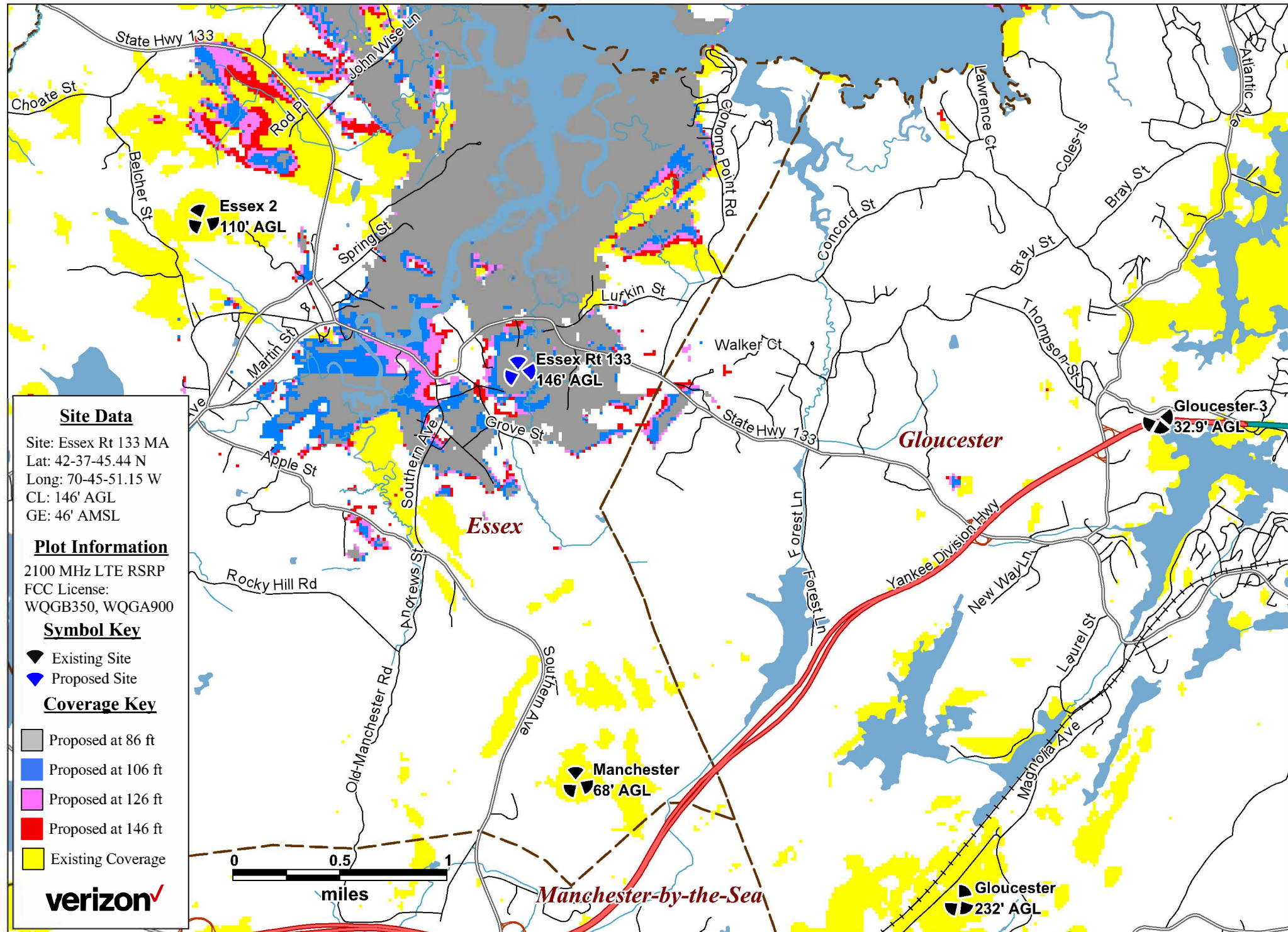




Attachment Q13c:

Essex Rt 133 - Existing 700 MHz LTE Sector Footprints & Drive Data Overlay (PCI) Drive Date: 11/02/2020



Attachment Q23:**Essex Rt 133 - 2100 MHz Height Analysis with Existing AWS Coverage (-95 dBm)**

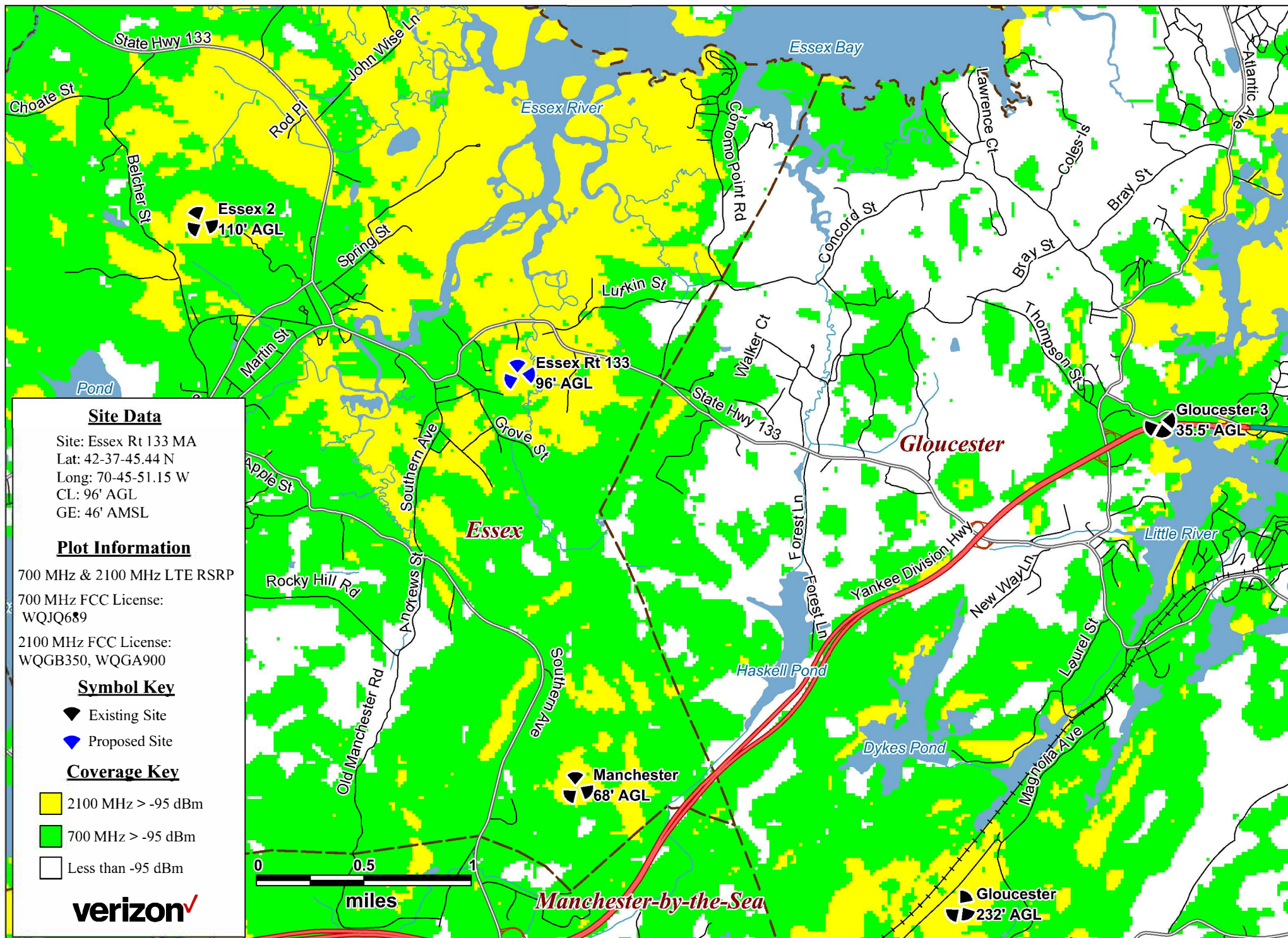
Attachment Q24:**Essex Rt 133 - 700 & 2100 MHz LTE Coverage with Proposed Site @ 96 ft.**

EXHIBIT 5
SUPPLEMENTAL
ALTERNATIVE SITE ASSESSMENT

Elisabeth Rutkowski
Site Development Manager
direct dial: 401.533.1679
LRutkowski@clinellc.com



July 28, 2021

Town of Essex
Zoning Board of Appeals
Essex Town Hall
30 Martin Street
Essex, MA 01929

RE: Application of TowerNorth Development, LLC ("TowerNorth") for Variances for a Proposed Free Standing Monopole Tower to be located at 73 Eastern Avenue and 65 Eastern Avenue for access and utility route (the "Site") – Written response to suggested alternatives.

Dear Members of the Zoning Board of Appeals:

On behalf of TowerNorth with respect to the above-referenced application (the "Application"), below is TowerNorth's response to the memo from Isotrope Wireless ("Isotrope") dated June 8, 2021 (the "Memo") submitted to the Essex Zoning Board of Appeals (the "Board") with respect to alternative locations suggested; and the consideration of two Town owned parcel at Conomo Point at the written request of the Board following the June 16, 2021 public meeting. This response includes coverage information from C Squared Radio Frequency Engineer Keith Vellante and engineering assessment from Scott Adams P.E. with Advanced Engineering Group.

First, as in our normal practice and industry standard, we review potential locations in and around the target area to assess the viability ("Viability Analysis") of the location from a number of different perspectives. In conducting the Viability Analysis, we first look at identifying potential parcels of land in the given search area from the following perspectives: (a) determining if there are any existing buildings and/or structures that are at a height and/or structural capacity to meet the service coverage objectives; (b) the size, shape and dimensions of the parcels in the area; (c) compliance with local zoning requirements, especially any specific wireless communications services regulations; (d) compliance with any applicable State regulations, such as Wetlands and/or Waterways Protection, Historic, etc.; (e) compliance with any applicable Federal regulations, such as NEPA and those promulgated by the FAA, FCC, etc.; (f) proximity to major roadways, residential districts, commercial buildings, schools, downtown centers and other densely populated or travel areas where existing or potential wireless end users are; and (g) a variety of site specific observations that may affect the proper siting of a wireless communications facility in a specific target area.

TowerNorth has been aware of the lack of service in the general area of Route 133 between Essex and Gloucester and has been assessing the area since 2014. I or other Site Acquisition Specialists with whom I work (and have personal knowledge of the work they may have completed), reviewed many locations. The ones determined to be viable under our Viability Analysis, were stated in the Application. However, even though a location is determined to be viable, it must also be available.

We respond to each of the suggested alternative sites provided in the Memo and by the Board.

SHIFT EASTERLY – 73 EASTERN AVENUE | Exhibit 1a, 1b, 2

As discussed by Scott Adams P.E at the June 16, 2021 public meeting, a more easterly location was considered. Specifically, a 129' shift easterly as depicted in the attached Exhibit 1a, Site Plan (Concept) . This shift would meet the 500' Residential Setback but push closer to the wetlands and closer to the riverfront area, which in our opinion would make it more visible. At this location, there would be at least double the amount of area disturbance 16,500 square feet vs current design of 8,810 square feet and the actual disturbance would likely be greater once fully designed. There would be roughly 9' of fill to create the compound area. It is recommended by Mr. Adams that the retaining wall be removed, and the area be graded out manually. The elevation would drop by 8' at the base of the tower and a 150' AGL tower would be required (see Exhibit 1b). Even though variance relief for the 500' Residential setback may not be needed, it is TowerNorth's assessment that the concerns of the residents would only be exacerbated by the proposed relocation. Visibility and proximity to wetlands as voiced at the June 16, 2021 meeting and stated in letters submitted by the residents of Essex to the Federal Communications Commission ("FCC") with respect to TowerNorth's application for Antenna Structure Registration ("ASR"). Our ASR was ultimately granted 14 months later pursuant to the FCC findings (see Exhibit 2).

While a shift easterly is feasible, TowerNorth following a thorough assessment and careful consideration made the decision to shift the location west to the proposed Site which in our professional opinion is a more desirable location.

HASKELL PARCEL (Lot 137-24) | Exhibit 3

We agree with the Memo that at this location only a variance from the 2-mile tower radius would be needed and the other setbacks could theoretically be satisfied. However, this parcel abuts our alternative candidate B (32 Haskell Ct) as provided in the Application and is also owned by Elizabeth Mills (via Daniel Quinn Mills Trust) who was not interested in leasing property to us and therefore not available. We do not consider this a feasible alternative.

OFF GROVE STREET (Lot 139-6) | Exhibit 4a, 4b

We also agree with Isotrope's comments that there is adequate space to meet the property line and 500' residence setback. However, we noted significant wetlands and flood zone issues obstructing access to the buildable portion of the parcel. In addition, we determined from the letter submitted to the FCC dated May 2, 2020 by the owner, Deirdre Nadai and residing at 68 Grove Street (the abutting parcel), there is no interest in leasing the property and therefore it is not available.

Based on our review, TowerNorth does not consider this to be a feasible alternative to the proposed Site.

CONOMO POINT TOWN LOTS

Both lots are approximately 1.5 miles east of the coverage objective and both would meet the 2-mile tower setback. As previously reported, shifting the tower toward west Gloucester would serve another coverage gap in that area, but at the expense of providing improved coverage to targeted area of Route 133 in Essex (Main/Eastern/Essex Ave) and Downtown that would be served by the proposed Site that is currently in front of the Board. Verizon Wireless designs and deploys its network as exclusively regulated by the FCC. Verizon Wireless identified a need and TowerNorth provided the Site meeting those needs. While we agree there is also a coverage gap in Gloucester, that is not the targeted area of coverage. The Board's jurisdiction with respect to the Application is a traditional land use review as modified by law.

TOWN LOT 123-008 | Exhibit 5: There is a NHESP Certified Vernal Pool identified on the west of the parcel close to property line. The telecommunications tower installation would need to stay to the southwest side of the parcel to meet the 500' residence setback and therefore the property line setback could not be met (187.5' for 150' tower). Variance(s) would be needed also at this location for property line setback and possibly the 500' residence setback (depending on location). Furthermore, to our knowledge the property is not available. The Town of Essex has not issued a request for proposal to lease the land for development and operation of a wireless communication facility.

TOWN LOT 123-002 | Exhibit 6: Wetlands are noted in approximate center of parcel along an NHESP Certified Vernal Pool identified in the northwest. The northwest property line also abuts Beach/Dune marked wetlands. Due to the unique shape of parcel and wetlands located in the center of the parcel we broke this down and assessed from a north and south location perspective: 1) A tower placed on the south side of the parcel (below wetlands in middle of parcel) would meet the 500' residential setback but fail the property line setback; 2) Looking at the north side of the parcel, from a high-level analysis, there is only one area on this 17 acre lot that would potentially satisfy all setbacks applicable (150' wetland buffer, 500' residential and property line).

Regarding both lots 123-008 and 123-002, to our knowledge neither of these properties are available. The Town of Essex has not issued a request for proposal ("RFP") to lease for development and operation of wireless communication facility. Furthermore, the lots are also in close proximity to a dense residential area, Conomo Point and visibility will clearly be an issue. TowerNorth anticipates significant opposition from a different group of abutters and neighbors.

Based on diminished coverage at the targeted area and the unavailability by lack of RFP, we do not consider Town Lot 123-008 to be a feasible alternative.

Likewise, for Town Lot 123-002, based on diminished coverage at the targeted area and the unavailability by lack of RFP, we do not consider this location to be a feasible alternative either to the proposed Site.

LOCATIONS IN WEST GLOUCESTER | EXHIBIT 7

As stated above, TowerNorth has been aware of the lack of wireless service in the general vicinity of Route 133 between Essex and Gloucester. Our search for suitable locations did include the portion of Route 133 that crossed into west Gloucester. This area being highly residential, we were not able to identify any parcels that were available, of sufficient size, and not in close proximity to residents that would allow a location to constitute a feasible alternative to the proposed location. Included as Exhibit 7 is a map of this area of west Gloucester to help illustrate those challenges.

CONCLUSION

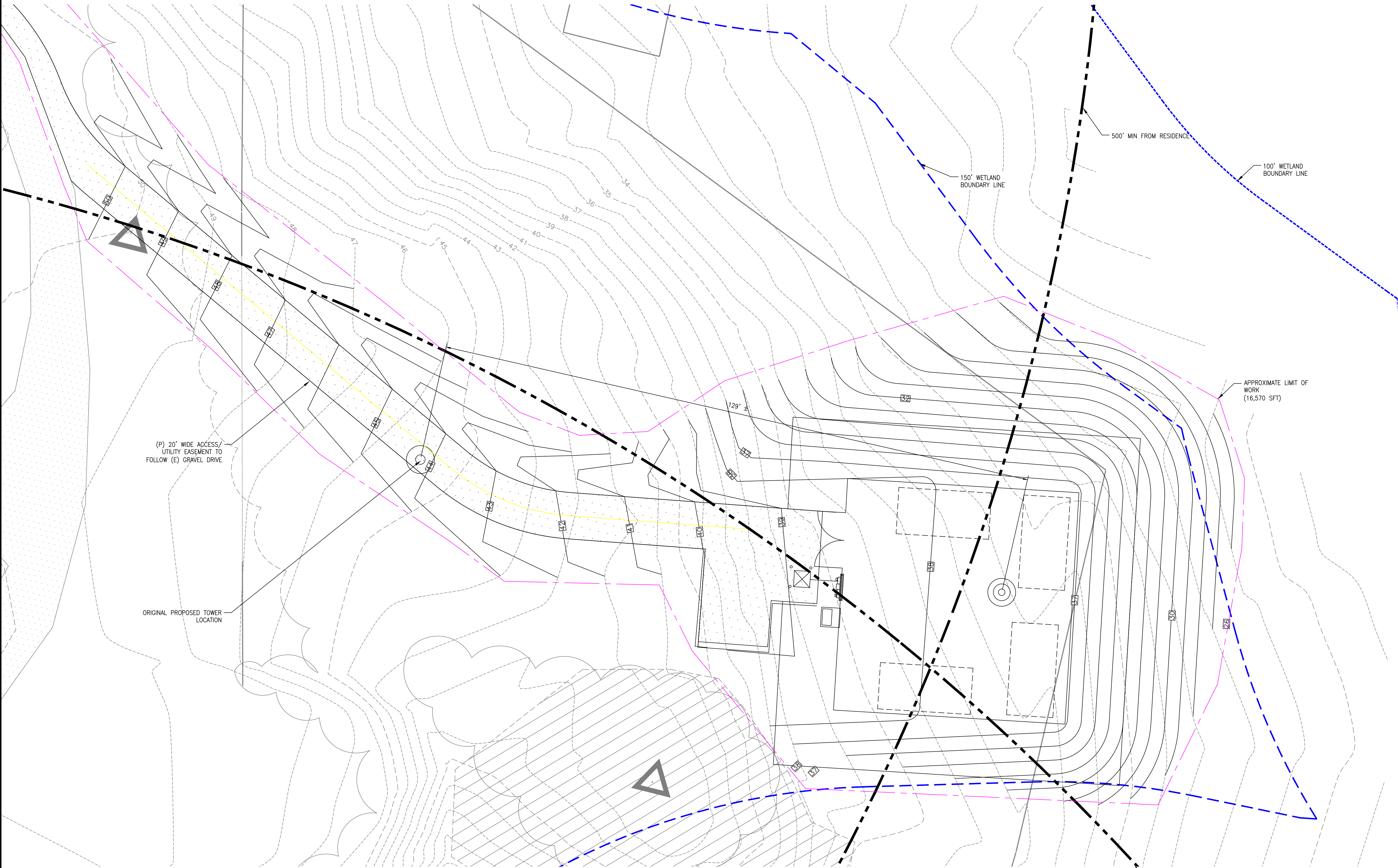
As I have illustrated to Board, there is an abundance of time, effort, due diligence and coordination before we move forward at a specific location and not just a random selection or for monetary gain as was suggested by public comments. Furthermore, after review of the alternative sites suggested, public comments and based on best siting practices, we believe a 150' monopole style tower at the proposed Site is the best solution to address gaps in coverage and capacity in this area of Essex. We look forward to presenting and discussing this information at the upcoming public meeting on August 4, 2021. Of course, we remain willing to work with the Board to address any remaining suggestions, concerns or questions. Thank you.

Very truly yours,

TowerNorth Development, LLC



Elisabeth Rutkowski



1

COMPOUND PLAN

Z-1 (Alt)

SCALE: 1"=10'

0

10'

20'

- NOTES:
1. ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY VERIZON STRUCTURAL & RF ENGINEERS. LOCATIONS OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITY COMPANIES.
 2. PROPOSED COMPOUND/ LEASE AREA TO BE LOCATED OUTSIDE 100' WETLAND BUFFER AND 200' RIVERFRONT BUFFER ZONES AS REQUIRED. FINAL LOCATION PENDING WETLAND MAPPING

ADVANCED
ENGINEERING GROUP, P.C.

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990 North Broadway
East Providence, RI 02914
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CENTERLINE
COMMUNICATIONS

CENTERLINE COMMUNICATIONS
95 RYAN DRIVE, SUITE 1
RAYNHAM, MA 02767

AEG PROJECT #: 2019-0027

DRAWN BY: AAB

CHECKED BY: SNA

SUBMITTALS		
REV#	DATE	DESCRIPTION
0	02/19/20	ISSUED FOR REVIEW
1	03/13/20	ISSUED FOR CONSTRUCTION
2	09/11/20	REVISED
3	02/10/21	REVISED
4	02/22/21	REVISED
5	02/23/21	REVISED
6	02/26/21	REVISED
7	03/22/21	REVISED
8	07/21/21	REVISED FOR ALT CONCEPT

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MA-044 ESSEX

65 & 73 EASTERN AVENUE
ESSEX, MA 01929
ESSEX COUNTY

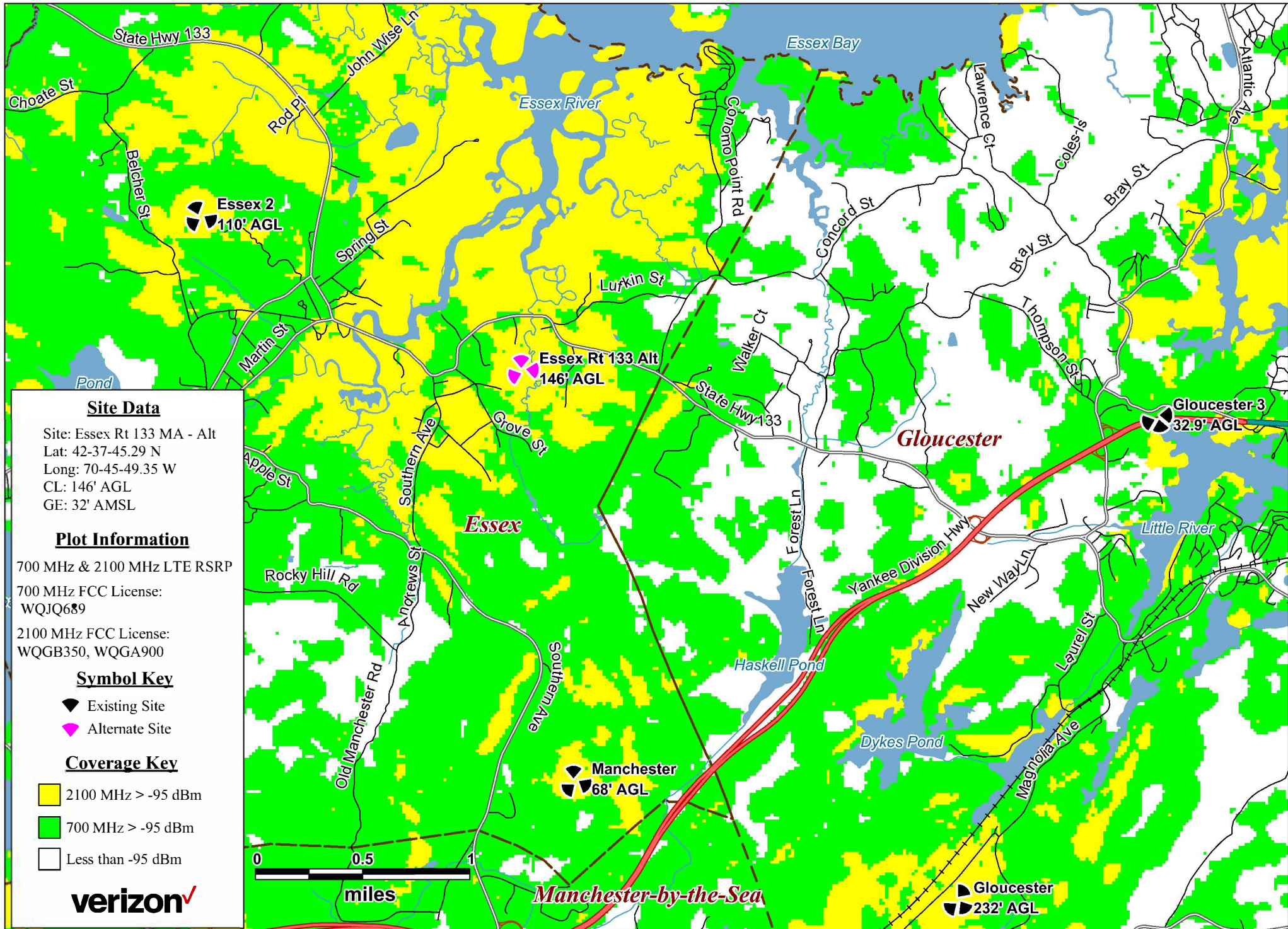
SHEET TITLE

SITE PLAN
(CONCEPT)

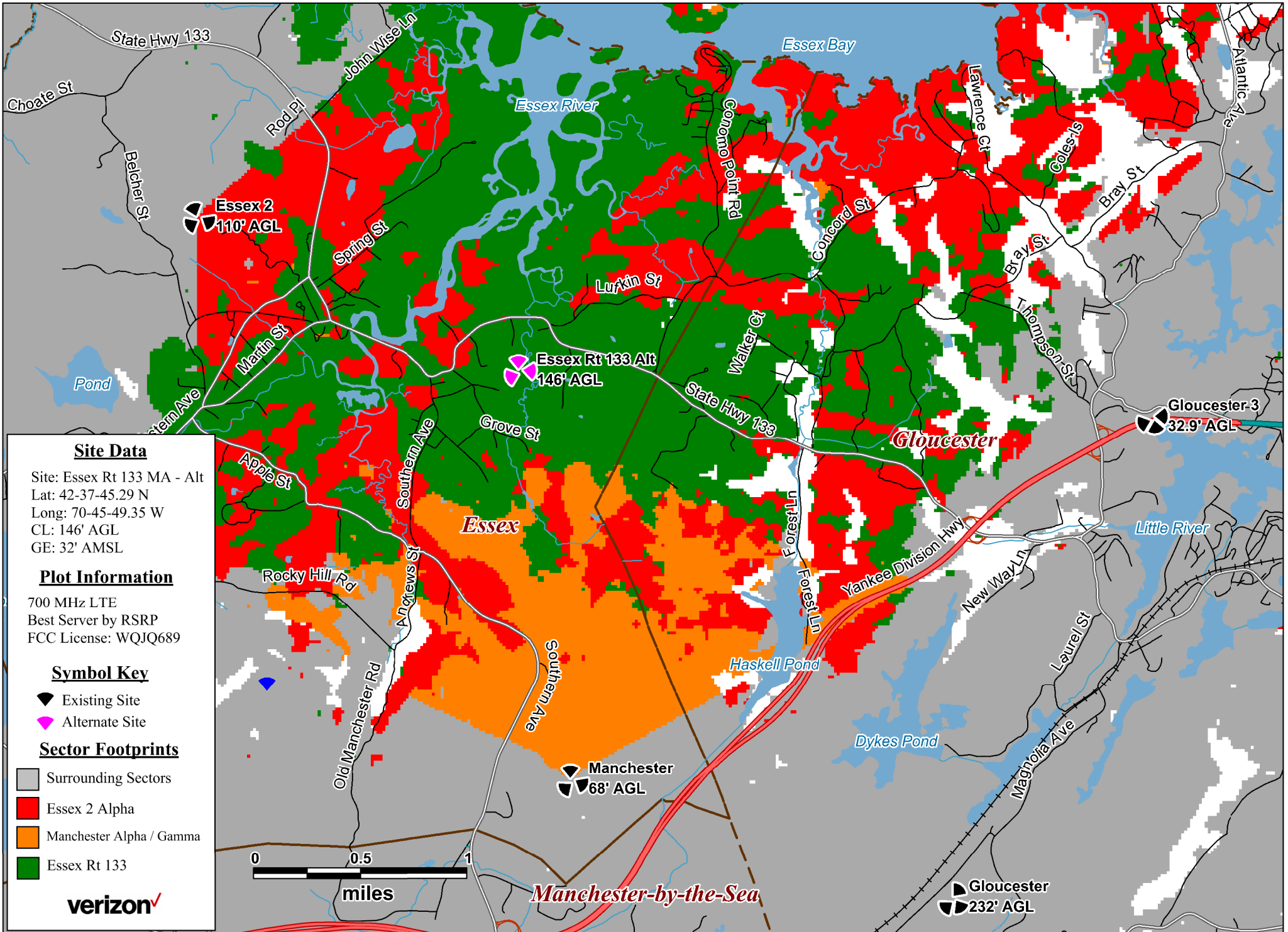
SHEET NUMBER

Z-1 (Alt)

ASA Exhibit 1b: Shift Easterly
Essex Rt 133 - 700 & 2100 MHz LTE Coverage with Alternate Site



Attachment X:
Essex Rt 133 - 700 MHz LTE Sector Footprints with Alternate Site





**UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
ANTENNA STRUCTURE REGISTRATION**



OWNER: TowerNorth Development, LLC

FCC Registration Number (FRN): 0023077357

ATTN: Bert Stern TowerNorth Development, LLC 95 Ryan Drive Suite 1 Raynham, MA 02767	Antenna Structure Registration Number <p style="text-align: center;">1319653</p>
	Issue Date <p style="text-align: center;">06/14/2021</p>
Location of Antenna Structure 3 Eastern Avenue Essex, MA 01929 County: ESSEX	Ground Elevation (AMSL) <p style="text-align: right;">14.0 meters</p>
	Overall Height Above Ground (AGL) <p style="text-align: right;">46.9 meters</p>
Latitude 42- 37- 45.4 N	Longitude 070- 45- 51.2 W
Center of Array Coordinates <p style="text-align: center;">N/A</p>	Overall Height Above Mean Sea Level (AMSL) <p style="text-align: right;">60.9 meters</p>
	Type of Structure <p style="text-align: center;">MTOWER Monopole</p>
Painting and Lighting Requirements: FAA Chapters NONE Conditions:	

This registration is effective upon completion of the described antenna structure and notification to the Commission. **YOU MUST NOTIFY THE COMMISSION WITHIN 24 HOURS OF COMPLETION OF CONSTRUCTION OR CANCELLATION OF YOUR PROJECT, please file FCC Form 854.** To file electronically, connect to the antenna structure registration system by pointing your web browser to <http://wireless.fcc.gov/antenna>. Electronic filing is recommended. You may also file manually by submitting a paper copy of FCC Form 854. Use purpose code "NT" for notification of completion of construction; use purpose code "CA" to cancel your registration.

The Antenna Structure Registration is not an authorization to construct radio facilities or transmit radio signals. It is necessary that all radio equipment on this structure be covered by a valid FCC license or construction permit.

You must immediately provide a copy of this Registration to all tenant licensees and permittees sited on the structure described on this Registration (although not required, you may want to use Certified Mail to obtain proof of receipt), and display your Registration Number at the site. See reverse for important information about the Commission's Antenna Structure Registration rules.

You must comply with all applicable FCC obstruction marking and lighting requirements, as set forth in Part 17 of the Commission's Rules (47 C.F.R. Part 17). These rules include, but are not limited to:

Posting the Registration Number: The Antenna Structure Registration Number must be displayed in a conspicuous place so that it is readily visible near the base of the antenna structure. Materials used to display the Registration Number must be weather-resistant and of sufficient size to be easily seen at the base of the antenna structure. Exceptions exist for certain historic structures. See 47 C.F.R. 17.4(g)-(h).

Inspecting lights and equipment: The obstruction lighting must be observed at least every 24 hours in order to detect any outages or malfunctions. Lighting equipment, indicators, and associated devices must be inspected at least once every three months.

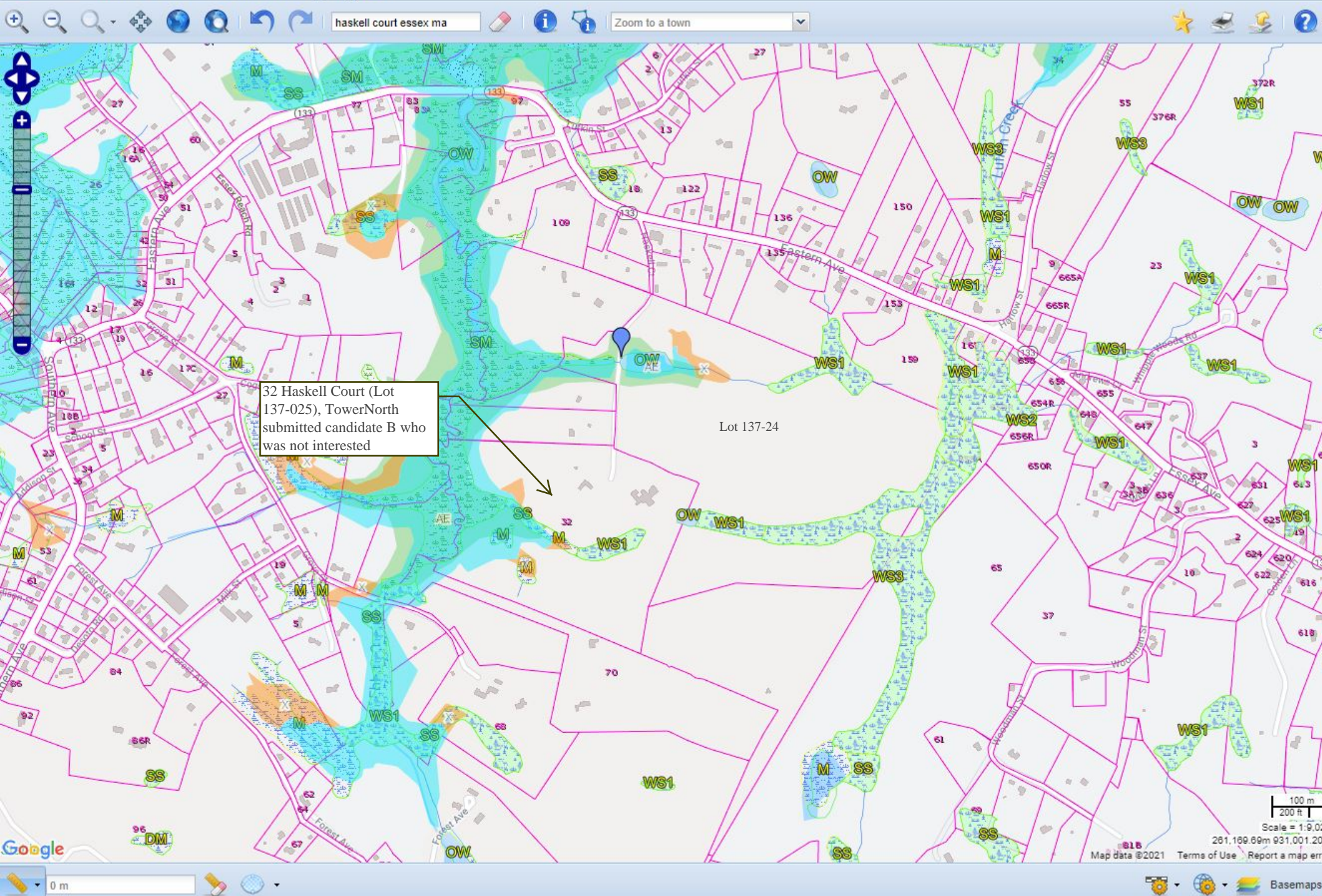
Reporting outages and malfunctions: When any top steady-burning light or a flashing light (in any position) burns out or malfunctions, the outage must be reported to the nearest FAA Flight Service Station, unless corrected within 30 minutes. The FAA must again be notified when the light is restored. The owner must also maintain a log of these outages and malfunctions.

Maintaining assigned painting: The antenna structure must be repainted as often as necessary to maintain good visibility.

Complying with environmental rules: If you certified that grant of this registration would not have a significant environmental impact, you must nevertheless maintain all pertinent records and be ready to provide documentation supporting this certification and compliance with the rules, in the event that such information is requested by the Commission pursuant to 47 C.F.R. 1.1307(d).

Updating information: The owner must notify the FCC of proposed modifications to this structure; of any change in ownership; or, within 30 days of dismantlement of the structure.

You can find additional information at [\[insert link\]](#) or by calling (877) 480-3201 (TTY 717-338-2824).



Available Data Layers

FEMA National Flood Hazard Layer

Active Data Layers

Check all Uncheck all

Legend

FEMA National Flood Hazard Layer

- A: 1% Annual Chance of Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory Floodway
- AH: 1% Annual Chance of 1-3ft Ponding, with BFE
- AO: 1% Annual Chance of 1-3ft Sheet Flow Flooding, with Depth
- VE: High Risk Coastal Area
- D: Possible But Undetermined Hazard
- X: 0.2% Annual Chance of Flooding
- X: 1% Drainage Area < 1 Sq. Mi.
- X: Reduced Flood Risk due to Levee
- Area Not Included
- Area with no DFIRM - Paper FIRMs in Effect

DEP Wetlands Original Linear Features

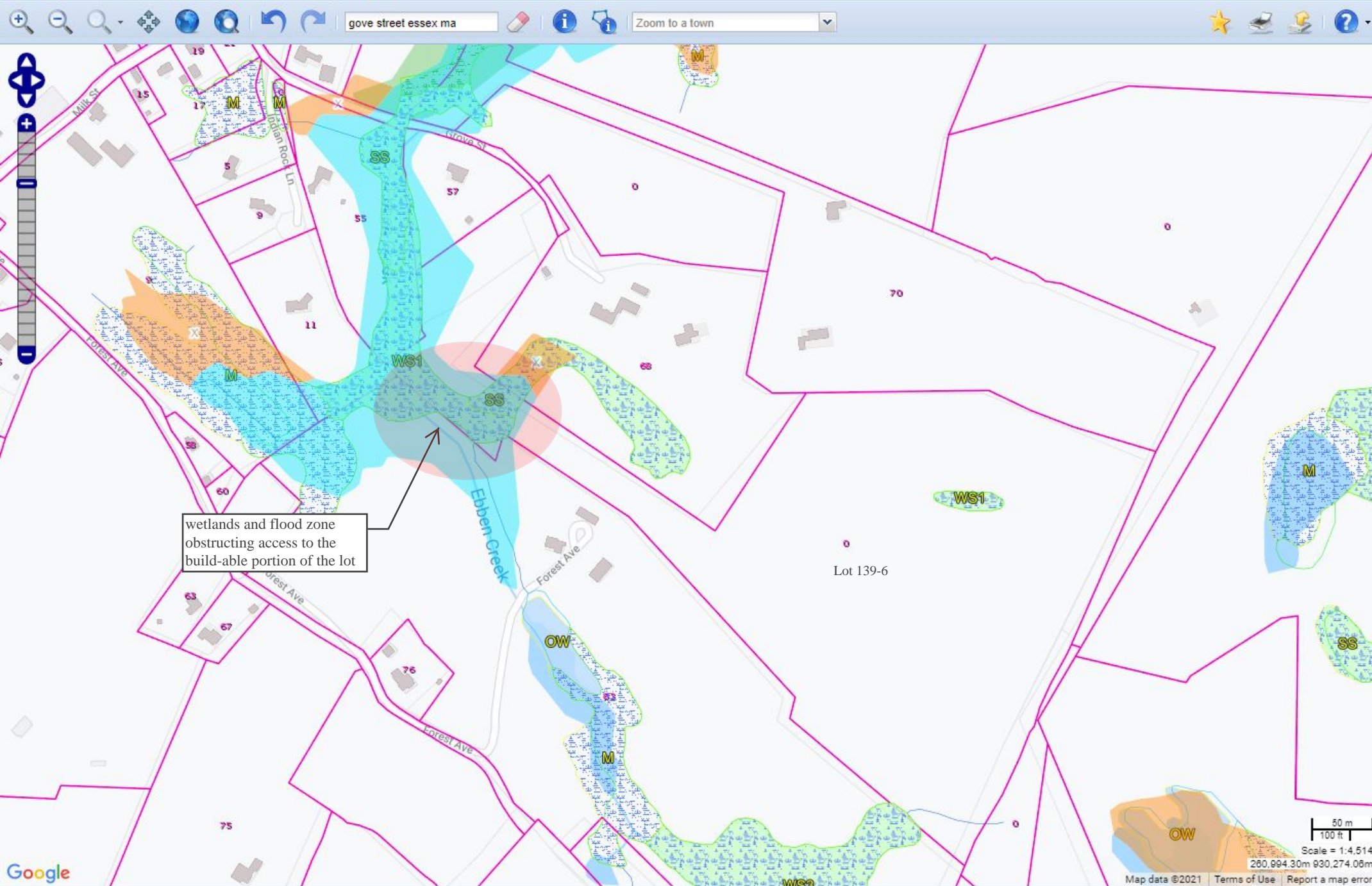
- SHORELINE
- HYDROLOGIC CONNECTION
- MEAN WATER LINE
- APPARENT WETLAND LIMIT
- CLOSURE LINE
- EDGE OF INTERPRETED AREA

DEP Wetlands Labels

DEP Wetlands Outlines Only

DEP Wetlands General Categories

- MARSH/BOG
- WOODED MARSH
- CRANBERRY BOG
- SALT MARSH
- OPEN WATER
- RESERVOIR (WITH PWSID)
- TIDAL FLATS
- BEACH/DUNE



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Exhibit 4b

Letter to the FCC regarding A1161960: Proposed cell tower in Essex, MA

May 2, 2020

I am a fourth-generation owner of property on Grove Street, off Eastern Ave, where the proposed cell tower will be located. My family, which includes my husband, a 93-year-old mother, and three children live here. For 80 years, we have kept our land free from development as a sanctuary for wildlife. It is bordered by Ebben Creek and the Essex River. We carefully restored our house, a salt box, which was built in 1690 and is one of the oldest houses in Essex. This large tower will be in plain sight, a half mile from our house, and will severely lower our property values. We also have concerns about our neighborhood and putting a cell tower near so many people. Our family will have to consider relocating if this tower is built due to concerns for our health and wellbeing.

I refer you to an article in Science Daily (12/3/2019) which notes that putting a cell tower in close proximity to people is a bad idea. This tower would do just that:

<https://www.sciencedaily.com/releases/2019/12/191203162553.htm> That article references one from Science Research Volume 181, February 2020, 108845 titled:

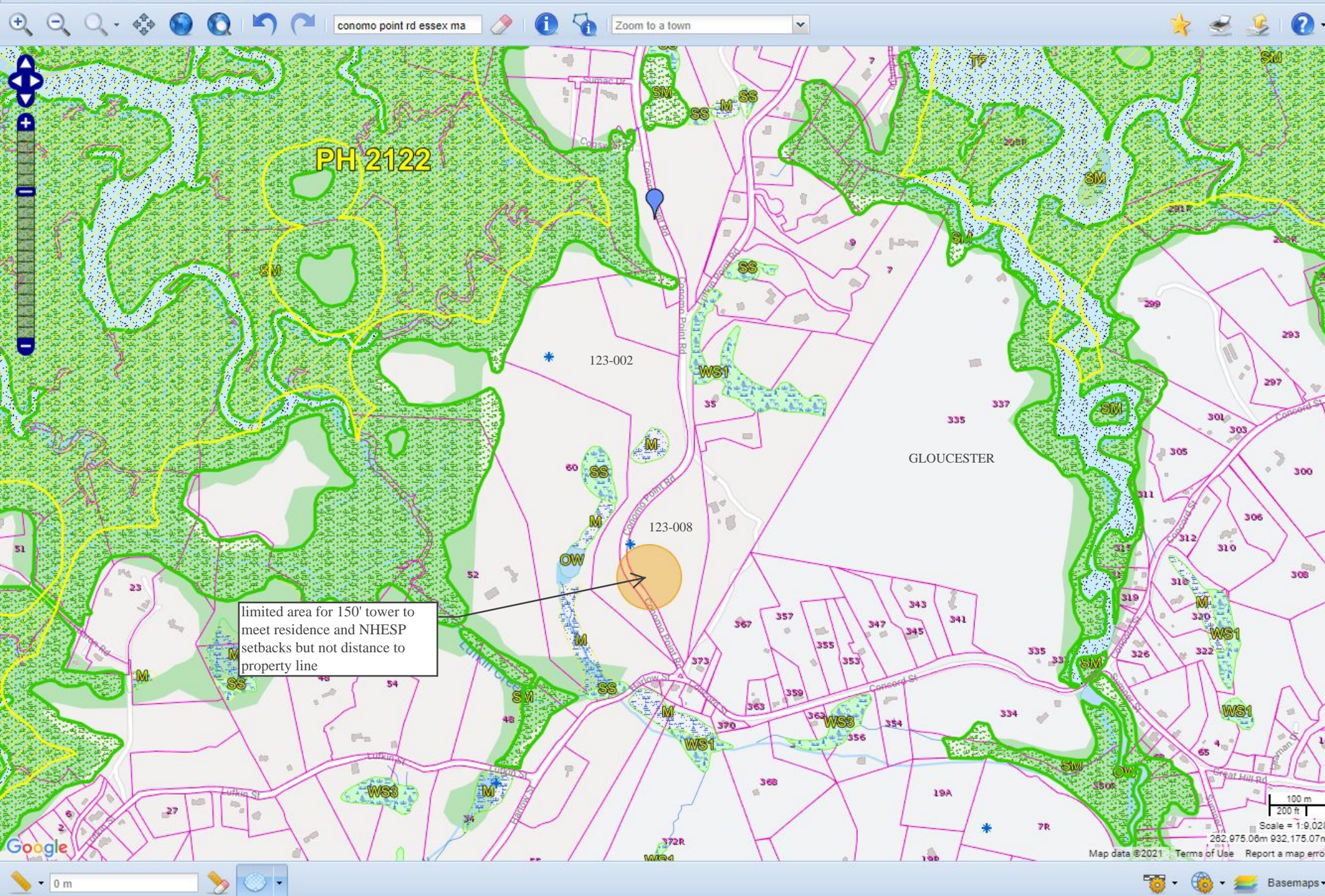
Limiting liability with positioning to minimize negative health effects of cellular phone towers. The abstract of the article states:

“Abstract: The use of cellular phones is now ubiquitous through most of the adult global population and is increasingly common among even young children in many countries (e.g. Finland, where the market for smart phones is nearly saturated). The basic operation of cellular phone networks demands widespread human exposure to radio-frequency radiation (RFR) with cellular phone base stations providing cellular coverage in most areas. As the data needs of the population increase from the major shift in the source of Internet use from personal computers to smart phones, this coverage is widely predicted to increase. Thus, both the density of base stations and their power output is expected to increase the global human RFR exposure. Although direct causation of negative human health effects from RFR from cellular phone base stations has not been finalized, there is already enough medical and scientific evidence to warrant long-term liability concerns for companies deploying cellular phone towers. In order to protect cell phone tower firms from the ramifications of the failed paths of other industries that have caused unintended human harm (e.g. tobacco) this Current Issue summarizes the peer-reviewed literature on the effects of RFR from cellular phone base stations. Specifically, the impacts of siting base stations are closely examined, and recommendations are made for companies that deploy them to minimize their potential future liability.”

As a society, how can we condone the crowding of huge cell towers amongst our populace? As is evident in the above article there are yet unknown unintended effects on humans. This enormous transmitter of radio-frequency radiation (RFR) does not belong within any neighborhood!

Sincerely,

Deirdre Nadai
68 Grove Street
Essex, MA



Available Data Layers

NHESP Certified Vernal Pools

Active Data Layers

Check all Uncheck all

Legend

NHESP Priority Habitats of Rare Species

NHESP Natural Communities

NHESP Estimated Habitats of Rare Wildlife

NHESP Certified Vernal Pools

DEP Wetlands Original Linear Features

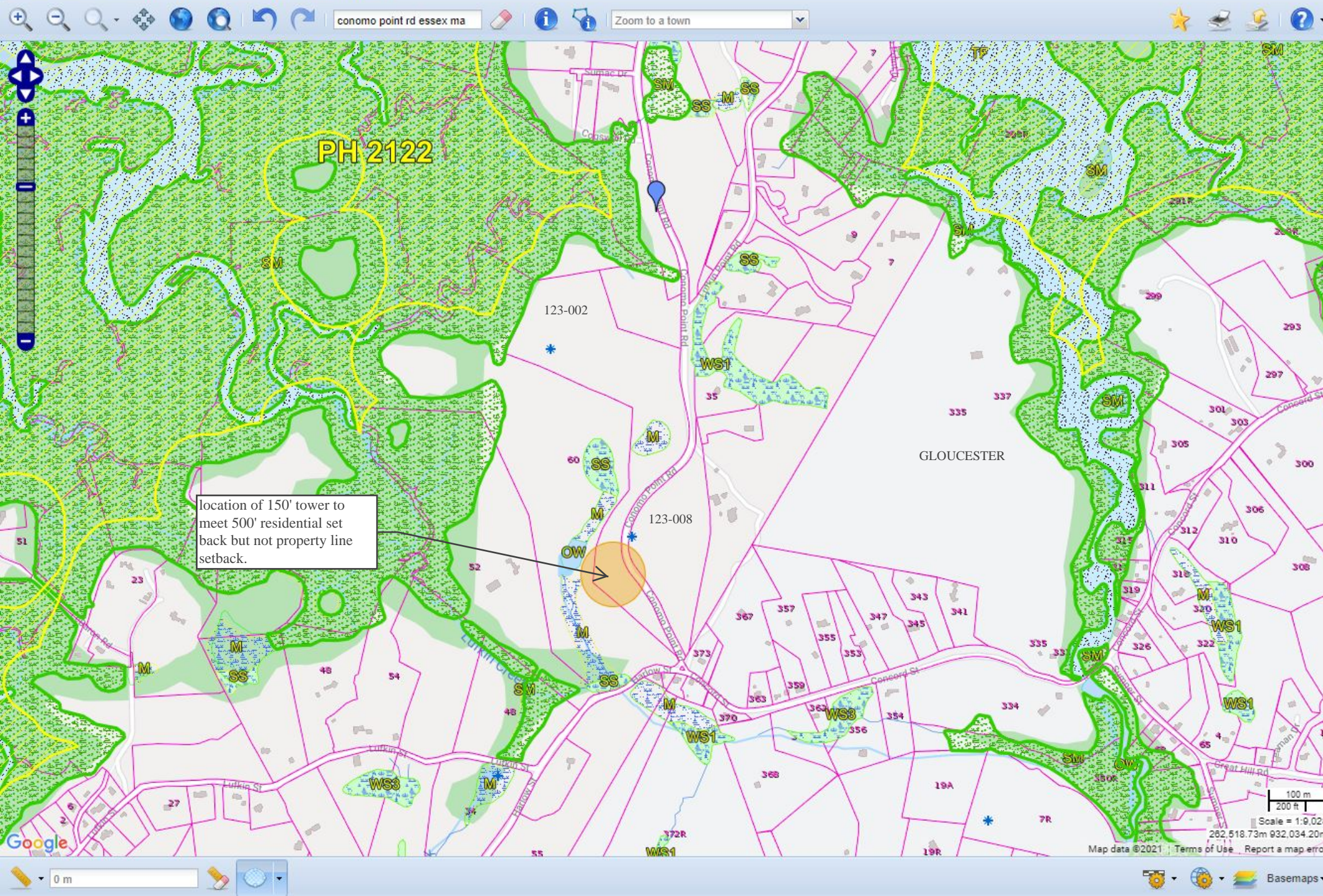
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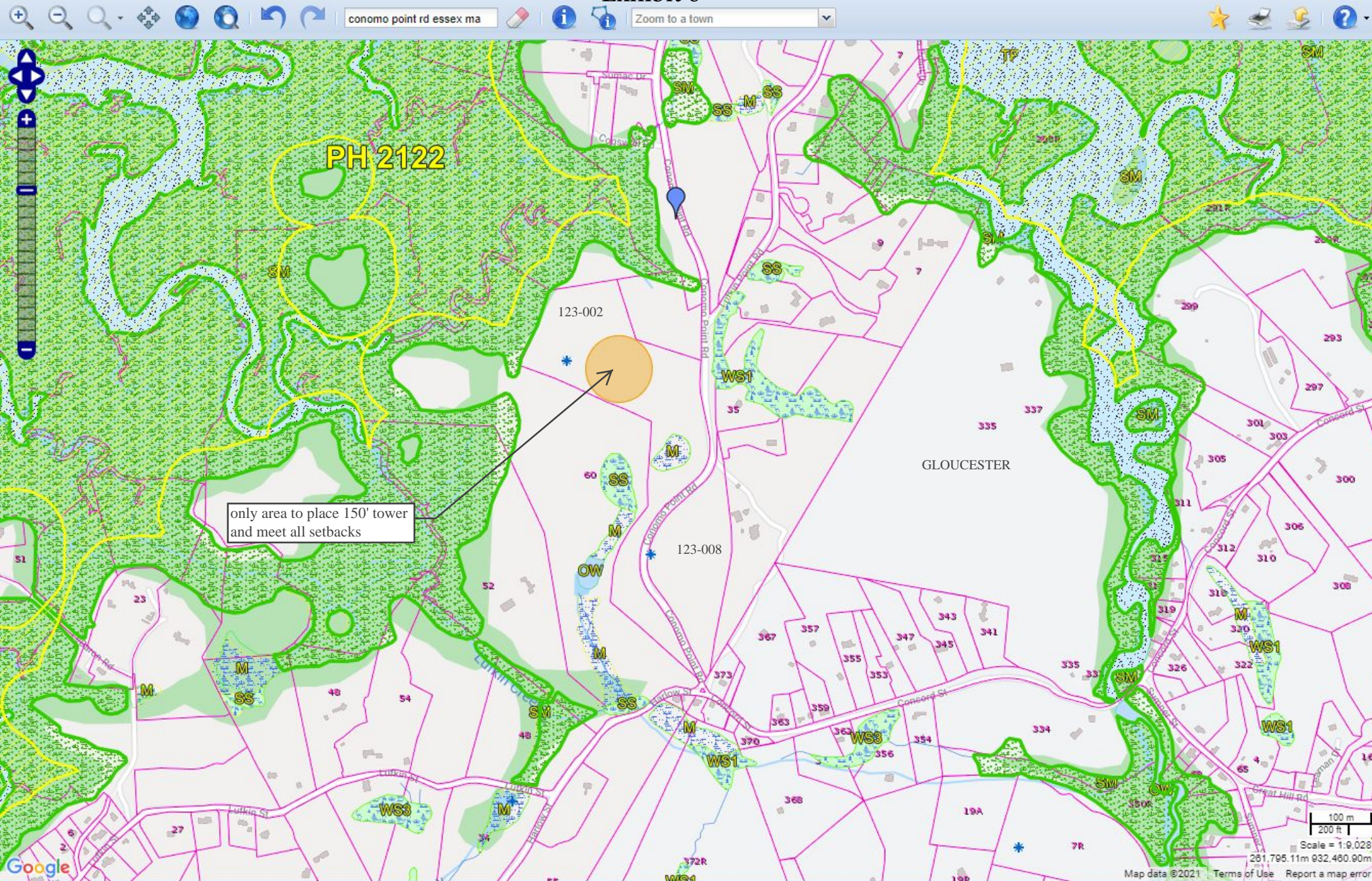
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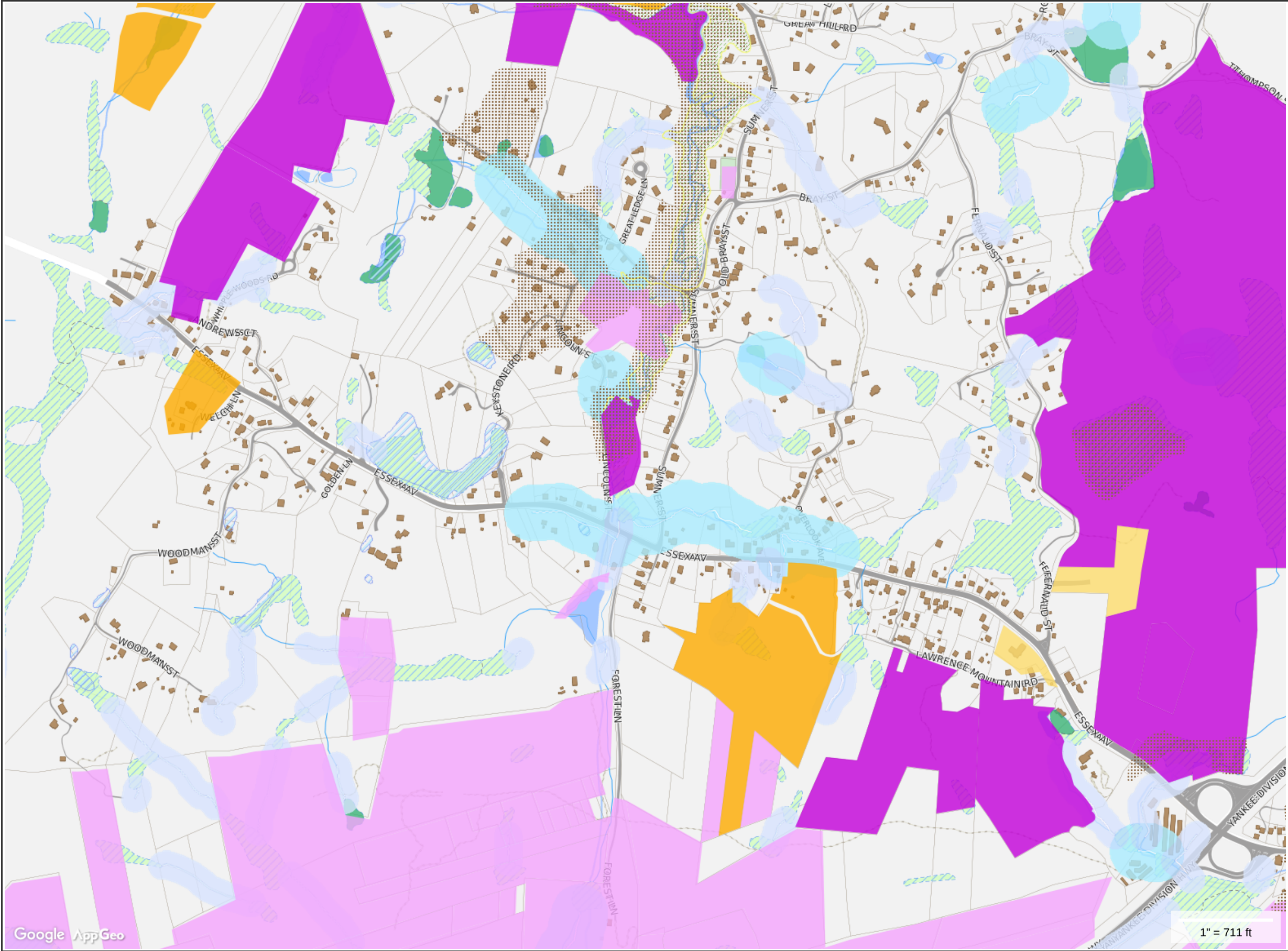
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Gloucester



MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

City of Gloucester, MA makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Geometry updated 6/7/2021
Data updated 6/7/2021

Print map scale is approximate. Critical layout or measurement activities should not be done using this resource.

Map Theme Legends

DEP Wetlands and City Protection Buffers

- Shoreline
- Hydrologic Connection
- Mean Low Water Line
- Wetland Limit
- Closure Line
- Reservoir (with PWSID)
- Marsh/Bog
- Wooded Marsh
- Cranberry Bog
- Salt Marsh
- Tidal Flats
- Beach/Dune
- DEP Coastal Wetlands Resource Area
- USGS Streams**
- Intermittent Streams
- Perennial Streams
- 100FT Wetland Buffer
- 100FT Intermittent Stream Buffer
- 200FT Perennial Streams Buffer
- Additional Surveyed Wetlands

MassDEP Wetlands, City of Gloucester - Planning Department

Land Conservation

- Prime Farmland Soils
- Open Space
- Federal
- State
- County
- Municipal
- Public Non-Profit
- Land Trust
- Conservation Organization
- Non-Profit
- Private
- Other
- Unknown

EOEEA: MassGIS, USDA: NRCS, MA Dept of Agricultural Resources