varsity wireless

APPLICATION FOR SPECIAL PERMIT,
VARIANCE AND SITE PLAN APPROVAL
FOR
WIRELESS SERVICES FACILITY

Applicant:	Varsity Wireless Investors, LLC
Site Id:	VW-MA-0130
Property Address	275 Old Lancaster Road, Sudbury, MA Tax Assessors Parcel HO8-0049
Property Owner:	Town of Sudbury
Date:	September 9, 2015

1. Zoning Board of Appeals Application for Special Permit
2. Zoning Board of Appeals Application for Variance
3. Planning Board Application for Site Plan Approval
4. Letter of Authorization
5. Abutters List
6. Project Narrative
7. Aerial Photos
8. Site Plans

Prepared by:
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ZONING BOARD OF APPEALS
SUDBURY, MASSACHUSETTS

APPLICATION FOR SPECIAL PERMIT

PART I APPLICANT INFORMATION

Name(s): Varsity Wireless Investors, LLC

Address: 290 Congress Street, 7th Floor, Boston, MA 02210

Telephone #: 401 447-8500 Email: fparisi@varsitywireless.com

PART II OWNER INFORMATION

Name(s): Town of Sudbury

Address: Planning and Community Development, 278 Old Sudbury Road, Sudbury, MA 01776

Telephone #: 978 639-3387 Email: pcd@sudbury.ma.us

PART III PROPERTY INFORMATION

Address for which special permit is requested: 275 Old Lancaster Drive

Town Assessor Map #: H08-0049

Area: 16.5 acres Frontage: 363 ft +/- Zoning District: SRA Single Residence A

Is the deed for this property recorded? YES ☒ NO ☐

If YES, Date: 5/19/1949 Book #: 7431 Page#: 153

PART IV DESCRIPTION OF REQUEST

a) Under what provision of the Bylaw is a special permit requested?
Article: 4300 Section #: 4320

b) If this is a Special Permit application under Section 2460B (Construction After Demolition), what is the total floor area of the existing structure: _____, and what is the total floor area of the proposed structure: _____

c) Why is a Special Permit Needed?

Applicant desires to construct a Wireless Service Facility within the Wireless Service Overlay District consisting of a 140' tall "stealth" free-standing monopole tower with all antennas, tower based electronics and cabling to be located within the tower structure, with necessary ground based equipment to be located within a fenced in compound at the base of the tower

ZONING BOARD OF APPEALS
SUDBURY, MASSACHUSETTS

APPLICATION FOR SPECIAL PERMIT

PART IV DESCRIPTION OF REQUEST (continued)

d) Why does the applicant believe that the proposed use or building would be in harmony with the general purpose and intent of the Bylaw?

See Project Narrative which accompanies this Application.

e) Why does the applicant believe that the proposed use would be located in an appropriate location, would not be detrimental to the neighborhood, and would not significantly alter the character of the zoning district?

See Project Narrative which accompanies this Application.

f) Why does the applicant believe that adequate and appropriate facilities will be provided for the proper operation of the proposed use?

See Project Narrative which accompanies this Application.

g) Why does the applicant believe that the proposed use would not be detrimental or offensive to the adjoining zoning districts and neighboring properties due to the effects of lighting, odors, smoke, noise, sewage, refuse materials, or visual nuisances?

See Project Narrative which accompanies this Application.

ZONING BOARD OF APPEALS
SUDBURY, MASSACHUSETTS

APPLICATION FOR SPECIAL PERMIT

PART IV DESCRIPTION OF REQUEST (continued)

h) Why does the applicant believe that the proposed use would not cause undue traffic congestion in the immediate area?

See Project Narrative which accompanies this Application.

i) Has a Special Permit previously been requested? YES ☐ NO ☒

If YES, Case Number(s) Applicant Approved ☐ Denied ☐

j) If this is an application for renewal, indicate any changes that you are requesting from the wording and/or conditions of the previously granted permit:

PART V REQUIRED ATTACHMENTS

- a plot plan showing the location, size, and position of the property, building(s) and parking area(s), including all dimensions and setback distances from property lines, public ways and structures on adjoining property.
- $100.00 Filing fee (initial application) $50.00 for renewals (payable to the Town of Sudbury)
- $25.00 Advertising fee (payable to the Town of Sudbury)

PART VI SIGNATURE

I certify that all of the above are true to the best of my knowledge.

Varsity Wireless Investors, LLC _____ Date: September 9, 2015

By Francis D. Parisi, Esq., Attorney _____ Date: _____

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ZONING BOARD OF APPEALS
SUDBURY, MASSACHUSETTS

APPLICATION FOR VARIANCE

PART I APPLICANT INFORMATION

Name(s): Varsity Wireless Investors, LLC

Address: 290 Congress Street, 7th Floor, Boston, MA 02210

Telephone #: 401 447-8500 email fparisi@varsitywireless.com

PART II OWNER INFORMATION

Name(s): Town of Sudbury

Address: Planning and Community Development, 278 Old Sudbury Road, Sudbury, MA 01776

Telephone #: 978 639-3387

PART III PROPERTY INFORMATION

Address or lot # of property for which variance is requested 275 Old Lancaster Road, Sudbury, MA 01776

Area: 16.5 acres Frontage: 363 feet +/- Zoning District SRA Single Residence A

Is the deed for this property recorded? YES ☒ NO ☐

If YES, Date: 5/19/1949 Book #: 7431 Page #: 153

Present use of property: Town of Sudbury Department of Public Works building and yard

PART IV DESCRIPTION OF REQUEST

a) Under what provision of the Bylaw is a variance requested?

Article: 4300 Section #: 4352

b) Why is a variance needed?

Applicant desires to construct a 140' tall Wireless Service Facility within the Wireless Service Facility Overlay District, and requires a Variance from the 100' height limitation for Wireless Service Facilities under Section 4352

ZONING BOARD OF APPEALS
SUDBURY, MASSACHUSETTS

APPLICATION FOR VARIANCE

PART IV DESCRIPTION OF REQUEST (continued)

c) What are the special conditions relating to the soil condition, shape or topography of the land or structures for which the variance is requested, which especially affect the land or structures but do not affect generally the zoning district in which it is located?

See Project Narrative which accompanies this Application.

d) Why does the applicant believe that the variance requested may be granted without substantial detriment to the public good and without nullifying or substantially derogating from the intent or purpose of the Zoning Bylaw?

See Project Narrative which accompanies this Application.

e) What is the substantial hardship, financial or otherwise, to you, which would result from a literal enforcement of the provisions of the Zoning Bylaw?

See Project Narrative which accompanies this Application.

ZONING BOARD OF APPEALS
SUDBURY, MASSACHUSETTS

APPLICATION FOR VARIANCE

PART IV DESCRIPTION OF REQUEST (continued)

f) Why does the applicant believe that there will be no substantial detriment to the public good if the variance is granted?

See Project Narrative which accompanies this Application.

g) Have any Variances and/or Special Permits previously been requested? YES ☐ NO ☒

If YES, Case Number(s) Applicant Approved ☐ Denied ☐

PART V REQUIRED ATTACHMENTS

- $100.00 filing fee payable to the Town of Sudbury
- $25.00 advertising fee payable to the Town of Sudbury
- a plot plan showing the location, size, and position of the property, building(s) and parking area(s), including all dimensions and setback distances from property lines, public ways and structures on adjoining property.

PART VI SIGNATURE

I certify that all of the above answers are true to the best of my knowledge.

Varsity Wireless Investors, LLC _____ Date September 9. 2015

By: Francis D. Parisi, Esq. Attorney _____ Date _____

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Form SP-1

Site Plan Applic. No._____
(to be assigned)

APPLICATION FOR SITE PLAN APPROVAL

Date: September 9, 2015

To: The Planning Board, Town of Sudbury, Massachusetts 01776

In accordance with Town of Sudbury Bylaws Article IX, Section 6300, and the Planning Board's Rules and Regulations, application for Site Plan approval is made as follows:

1. **Name of Plan/Business:** Varsity Wireless Investors, LLC

2. **Site location/address:** 275 Old Lancaster Road, Sudbury, MA 01776

   Zoning District: SRA Single Residence A Assessors Map/Parcel # H08-0049

   Registry of Deeds Book: 7431 Page#: 153 Area of Property: 16.4 acres/~~square feet~~

3. **Proposed Use:** Wireless Service Facility

4. **Applicant's Name:** Varsity Wireless Investors, LLC

   Phone#: 401 447-8500 Email: fparisi@varsitywireless.com

   Address: 290 Congress Street, 7th Floor, Boston, MA 02210

5. **Owner' Name:** Town of Sudbury

   Phone#: 988 639-3387 Email: pcd@sudbury.ma.us

   Address: Planning and Community Development
   278 Old Sudbury Road, Sudbury, MA 01776

6. **Engineer**: Hudson Design Group, LLC

   Phone#: 978 557-5553 Email: andrey.tsikanovsky@hudsondesigngroupllc.com

   Address: 1800 Osgood Street Bld 20 N. Suite 3090, N. Andover, MA 01845

7. **Architect:**

   Phone#: Email:

   Address:

8. **Plans** (list each sheet of plan by title, date, and sheet number):

   VW-MA-0130A Sudbury DPW dated September 8, 2015
   Sheets T-1, C-1, C-2, C-3, C-4, A-1, A-2, A-3 and A-4

9. **Other documents and data (ATTACH):**

   a. Consent of owner, if applicable (yes/no): YES - see attached Letter of Authorization

   b. Traffic impact study (yes/no). If yes, provide title reference: No -- not applicable

   c. Mass. Highway Dept. street entrance permit (yes/no). If yes, provide date or progress: No - not applicable

   d. Other studies or data (list):

10. **Prior Site Plans** (list any prior site plans submitted, indicating date filed and whether approved or denied):

11. **Prior variances or permits granted by Board of Appeals** (list by Case Numbers and attach copies):

12. **Present use of property:** Town of Sudbury Department of Public Works building and yard

13. **ATTACH: Written Statement of proposed use of property** (fully describe all activities to be conducted and by whom).
    Wireless Service Facility -- see Project Narrative which accompanies this Application

14. **ATTACH: Written statement of changes to site.**
    See Project Narrative and Site Plans which accompany this Application

15. **ATTACH: Building coverage and open space - description and calculation.**
    See Project Narrative and Site Plans which accompany this Application

16. **ATTACH: Estimated traffic impact on adjacent public ways due to changes to site.**
    NONE -- See Project Narrative which accompanies this Application

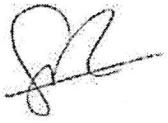
17. **ATTACH: Drainage calculations.**
    There will be no increase in impervious service and no impact on drainage.

18. **ATTACH: Calculations of the volume of earth to be removed.**
    To be determined based on geotechnical investigation and foundation design

19. **ATTACH: Parking space calculations.**
    None required.

20. Applicant understands that application to any of the following may be required for a proposed use or change (this list is not all inclusive):

Board of Appeals (zoning permit or variance)
Conservation Commission (alterations affecting wetlands)
Board of Health (septic/sewerage, food permits)
Building Inspector (building/wiring/gas permits, occupancy permit, approval of signs)
Earth Removal Board [Bylaws, Article V(A)]
Planning Board (Water Resource Protection Special Permit/Stormwater Management Permit)
Historic Districts Commission (Certificate of Appropriateness)
Board of Selectmen (licenses for alcoholic beverages, common victualler, and entertainment)
Sudbury Dept. of Public Works (access to public storm drains, street permit for utilities, driveway permit)
Sudbury Water District (water service)
Massachusetts Highway Department (street entrance permit if State road)



Varsity Wireless Investors, LLC

Signature of Applicant

Francis D. Parisi, Esq, Attorney

Name, title

290 Congress Street, 7th Floor, Boston, MA 02210

Address

Form SP-2

Site Plan Applic. No. _____
(to be assigned)

CONSENT OF RECORD OWNER

Date: September 9, 2015

To: The Planning Board, Town of Sudbury, Massachusetts 01776

As owner of the property located at 275 Old Lancaster Road, Sudbury, MA

Sudbury, MA 01776, I hereby grant permission to:

Name: Varsity Wireless Investors, LLC

Address: 290 Congress Street, 7th Floor, Boston, MA 02201

D/B/A: Varsity Wireless

to file an application for Site Plan approval with the Sudbury Planning Board for the following purpose and to implement the approved plan on said property:

Wireless Service Facility

See Attached Letter of Authorization

Maryanne Bilodeau
Signature, Owner(s) of Property

Maryanne Bilodeau, Int. Town Mgr.
Name Town of Sudbury

278 Old Sudbury Rd, Sudbury MA
Address

Form SP-3

Site Plan Applic. No. _____
(to be assigned)

REQUEST FOR WAIVER FROM SITE PLAN RULES AND REGULATIONS

Date: September 9, 2015

To: The Planning Board, Town of Sudbury, Massachusetts 01776

In connection with Site Plan Application for property at 275 Old Lancaster Road, Sudbury, MA

for the purpose of Wireless Service Facility (proposed use),

the undersigned requests the Planning Board grant a waiver from the following provision of its Site Plan Rules and Regulations: 5.1 Contents of Site Plan, Items 10, 11, 12, and 13, and such other provisions as may not be included on the Site Plans

Provide explanation and state reasons:

To the extent potentially required, Applicant respectfully requests a Waiver of the requirements to submit:
(i) a traffic impact statement in that there will be no impact on traffic,
(ii) drainage calculations, in that there will be no increase in impervious surface,
(iii) calculations for earth removal, in that the foundation cannot be designed until further geotechnical analysis is conducted,
(iv) parking space calculations, as no additional parking spaces will be required; and
(v) such other details to the Site Plans as are inapplicable to the proposed facility

Attach plans or descriptive materials as appropriate.

APPLICANT:

Varsity Wireless Investors, LLC
By: Francis D. Parisi, Esq., Attorney
Signature

290 Congress Street, 7th Floor, Boston, MA 02210
Address

401 447-8500
Telephone Number

fparisi@varsitywireless.com
Email

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varsity wireless

APPLICATION FOR SPECIAL PERMIT,
VARIANCE AND SITE PLAN APPROVAL
FOR
WIRELESS SERVICES FACILITY

Applicant:	Varsity Wireless, LLC
Site Id:	VW-MA-0130
Property Address	275 Old Lancaster Road, Sudbury, MA
	Tax Assessors Parcel HO8-0049
Property Owner:	Town of Sudbury
Date:	September 9, 2015

INTRODUCTION

The Applicant Varsity Wireless Investors, LLC, a Delaware limited liability company ("Varsity") builds, owns and operates the infrastructure that supports wireless telecommunications services. We provide our customers, and the communities they serve, with creative, cost efficient solutions to the ever-growing demand for wireless ubiquity and bandwidth.

Varsity's founders, senior management and staff bring more than 50 years of wireless industry experience to the company, including leadership positions with wireless operators, tower companies, telecommunication infrastructure developers and the FCC. Varsity's exceptional human resources are augmented with equity capital from investors who share the long-term view of investing in responsible communications infrastructure.

Varsity is sometimes herein referred to as the "Applicant".

Applicant's proposed wireless communication facility (the "Wireless Service Facility") is shown on plans submitted with this Application (the "Plans"). Applicant proposes to construct a 140' stealth monopole tower that will structurally accommodate up to 2 wireless broadband telecommunications carriers and associated antennas and cabling; and fence in the base of the tower to accommodate ground based telecommunications equipment. As shown on the Plans that accompany this Application, various wireless telecommunications carriers will place panel style antennas at heights of approximately 137'and 127' (centerline) inside of the tower, and will place telecommunications equipment and backup batteries inside equipment shelter(s) and/or weatherproof cabinets to be located immediately adjacent to the base of the tower. Power/telephone cabinets will be installed just outside the fenced in compound. In addition, the tower will be designed to accommodate the needs of the Town of Sudbury's public safety antennas if required. Applicant's Wireless Service Facility is similar to the other telecommunication facilities already located in Sudbury and the surrounding communities and has been designed to comply with the Town's Zoning Bylaw as much as possible.

THE PROJECT

Wireless telecommunications carriers are in the process of independently designing, constructing and upgrading wireless telecommunications networks to serve areas in and around the Town of Sudbury. Such a network requires a grid of radio transmitting and receiving cell sites located at varying distances depending on the location of existing and proposed installations in relation to the surrounding topography. The radio transmitting and receiving facilities require a path from the Wireless Service Facility to the user on the ground. This requires the antennas to be located in a location above the tree line where the signal is not obstructed or degraded by buildings or topographical features.

Once constructed, the Wireless Service Facility will be unmanned and will involve only periodic maintenance visits. The only utilities required to operate the Wireless Service Facility are electrical power as well as telephone service which are currently available at the property. The traffic generated by the Wireless Service Facility will be one or two vehicle trips per month by maintenance and technical personnel to ensure the telecommunications site remains in good working order. These visits will not result in any material increase in traffic or disruption to patterns of access or egress that will cause congestion hazards or cause a substantial change in the established neighborhood character. The Applicant's maintenance personnel will make use of the existing access roads and parking at the Property. The proposed Wireless Service Facility will not obstruct existing rights-of-way or pedestrian access and will not change the daily conditions of access, egress, traffic, congestion hazard, or character of the neighborhood. The installation will not require the addition of any new parking or loading spaces.

The construction of the Applicant's Wireless Service Facility will enhance service coverage in the Town of Sudbury and surrounding communities. The enhancement of service coverage in the Town of Sudbury is desirable to the public convenience for personal use of wireless services and for community safety in times of public crisis and natural disaster. Wireless communications service also provides a convenience to residents and is an attractive feature and service to businesses. In addition, the requested use at this location will not result in a change in the appearance of the surrounding neighborhoods. The use is passive in nature and will not generate any traffic, smoke, dust, heat, glare, discharge of noxious substances, nor will it pollute waterways or groundwater. Once constructed, the Wireless Service Facility will comply with all applicable local, state and federal safety regulations.

Moreover and most importantly:

1. The proposed Wireless Service Facility will promote and conserve the convenience and general welfare of the inhabitants of the Town by enhancing telecommunications services within the Town.

2. The proposed Wireless Service Facility will lessen the danger from fire and natural disasters by providing emergency communications in the event of such fires and natural disasters.

3. The proposed Wireless Service Facility will preserve and increase the amenities of the Town by enhancing telecommunications services.

4. The proposed Wireless Service Facility will facilitate the adequate provision of transportation by improving mobile telecommunications for business, personal and emergency uses.

Wireless service is important to public safety and convenience. As of the end of 2013, there were almost 340 million wireless telephone users in the United States. See FCC's *Seventeenth Report to Congress on the State of Competition in the Commercial Mobile Radio Services Marketplace*, page 10 (December 18, 2014). There are now more wireless subscriptions than landline telephone subscriptions in the United States, and the number of landline telephone subscribers across the nation is declining each year while the number of wireless users increases.

For many Americans, wireless devices have become an indispensable replacement for traditional landline telephones. Even when Americans maintain both types of telephone service, Americans are opting increasingly to use wireless devices over their landline telephones. For Americans living in "wireless-only" homes and for those others while away from their homes, cell phones are often their only lifeline in emergencies. Almost 40 percent of American households are now "wireless only." *Id.* The FCC estimates that approximately 70% of the millions of 911 calls made daily are placed from cell phones, and that percentage is growing. See *http://www.fcc.gov/guides/wireless-911-services*

COMPLIANCE WITH SITING CRITERIA FOR SPECIAL PERMIT

4300. WIRELESS SERVICES OVERLAY DISTRICT.

4310. Purpose. The purpose of this Bylaw is to establish districts within Sudbury in which wireless services may be provided with minimal harm to the public health, safety and general welfare of the inhabitants of Sudbury; and to regulate the installation of such facilities by 1) minimizing visual impact, 2) avoiding potential damage to adjacent properties, 3) by maximizing the use of existing towers and buildings, 4) by concealing new equipment to accommodate the needs of wireless communication in order to reduce the number of towers needed to serve the community and 5) promoting shared use of existing facilities.

The proposed Wireless Service Facility has been designed to fulfill the purpose of the Bylaw in all respects. The Wireless Service Facility has been designed (i) with a height and structural integrity to facilitate co-location, (ii) to minimize any adverse impacts and (iii) to minimize the need for additional communications towers in the area, without any impact on surrounding properties.

4320. Overlay District. Wireless services (including antennas, transceivers, towers, equipment buildings and accessory structures, if any) may be erected in a Wireless Services Overlay District subject to Site Plan approval pursuant to Section 6300 of the Zoning Bylaw, as may be amended, and upon the issuance of a special permit by the Board of Appeals pursuant to Section 6200 of the Zoning Bylaw. The Wireless Services District shall be constructed as an overlay district with regard to said locations. All requirements of the underlying zoning district shall remain in full force and effect, except as may be specifically superseded herein.

The proposed Wireless Service Facility will be located within the Wireless Services Overlay District. The Applicant has applied for a Special Permit and variances from the Board of Appeals, and also seeks Site Plan Approval from the Planning Board.

4330. Location.

The Wireless Services Overlay District shall consist of the following parcels of land:

4331. Sudbury Landfill property, Assessor's Map No. K12, Parcel 002

4332. Former Melone property, Assessor's Map No. C12, parcel 100

4333. Sudbury Water District Borrow Pit, North Road, Assessor's Map No. C12, Parcel 004

4334. Raymond Road well field area, including Feeley Park and surrounding Town and Water District land, Assessor's Map Nos. L08, Parcels 001, 002, 008, 009, 010, 012 and M08, Parcel 021

4335. Highway Department property, Old Lancaster Road, Assessor's Map No. H08, Parcel 049

4336. All property and buildings owned by the Town of Sudbury, exclusive of school buildings, school properties and cemeteries.

Also included in the overlay district are all properties within Business, Limited Business, Village Business, Industrial, Limited Industrial, Industrial Park and Research districts.

The proposed Wireless Service Facility will be located within the Wireless Services Overlay District on the parcel identified as 4335, Highway Department property, Old Lancaster Road, Assessor's Map No. H08, Parcel 049.

4340. Uses Available As of Right. The following are allowed as-of-right in the overlay district, or elsewhere as specified, subject to section 4360 and Site Plan Review under section 6300 of the Zoning Bylaw.

4341. All interior mounted wireless communications equipment is allowed in any zoning district in the Town. In residential districts, interior-mounted wireless communication equipment shall be permitted only in steeples, bell towers, cupolas and spires of non-residential buildings or structures, or in agricultural buildings.

NOT APPLICABLE

4342. Roof-mounted wireless communications equipment is allowed in the overlay district if it meets the following conditions:

HEIGHT OF BUILDING	MAX. HEIGHT OF EQUIPMENT ABOVE THE HIGHEST POINT OF THE ROOF	REQUIRED SETBACK FROM EDGE OF ROOF OR BUILDING
More than 36 feet	12 feet above roof	1/ 2 foot for every foot of equipment height, including antenna
10-36 feet	10 feet above roof	1 foot for every foot of equipment height, including antenna

If there is a parapet on any building or structure which does not exceed 36 feet in height and if the roof-mounted wireless communication equipment will be transmitting or receiving in the direction of that parapet, the required setback from the edge or edges of the roof of the building at or beyond the parapet shall be reduced by the height of such parapet. The height of a parapet shall

not be used to calculate the permissible maximum height of roof-mounted wireless communication equipment. For the purposes of this section, a parapet is that part of any wall entirely above the roof line.

NOT APPLICABLE

4343. Facade-mounted equipment within the overlay district which a) does not extend above the face of any wall or exterior surface in the case of structures that do not have walls, b) does not extend by more than 18 inches out from the face of the building or structure to which it is attached, and c) does not obscure any window or other architectural feature.

NOT APPLICABLE

4344. Small transceiver sites which utilize technology that does not require the construction of an equipment building, shelter, cabinet or tower (micro-cells), and have a total power input to the antenna of twenty (20) watts or less, in any zoning district.

NOTAPPLICABLE

4345. Changes in the capacity or operation of a wireless service facility which has previously received a special permit under this Bylaw, limited to an increase or decrease in the number of antennae, cells, panels, equipment buildings or cabinets or the number of service providers (co-locators), shall be permitted, subject to Site Plan review under section 6300 of the Zoning Bylaw and authorization from the lessor of the property.

NOT APPLICABLE

4350. Uses Available by Special Permit. Free-standing monopoles meeting the following criteria may be authorized by Special Permit. Any special permit granted under this section shall expire in five (5) years from the date of issuance. Continued operation of such facility shall be subject to application for and renewal of the special permit by the Zoning Board of Appeals.

The proposed Wireless Service Facility will be a free-standing monopole for which the Applicant has applied to the Zoning Board of Appeals for a Special Permit.

4351. Free-standing monopoles shall be allowed only on those parcels in the overlay district which are listed in sections 4331-4336 herein.

The proposed Wireless Service Facility will be a free-standing monopole on parcel 4335 of the Wireless Services Overlay District.

4352. Free-standing monopoles shall be no higher than 100 feet.

Given technical limitations with respect to:

(i) the location of the tower relative to Route 27, the surrounding residential neighborhoods and other existing telecommunication sites in and around the Town of Sudbury;

(ii) the topography of the surrounding area;

(iii) the lack of viable alternatives in the area;

(iv) the Town's desire to accommodate multiple wireless communications companies;

(v) the demand for robust and reliable telecommunications coverage;

(vi) the need to accommodate rapidly evolving technologies; and

(vii) the restrictions of the Town's Zoning Bylaw with respect to the location of wireless service facilities,

the proposed Wireless Services Facility must be minimum of 140 feet tall. Accordingly, the Applicant has respectfully requested that the Zoning Board of Appeals grant a VARIANCE from the requirements of this section.

4353. The setback for a free-standing monopole shall be at least 125 feet from the property line.

The proposed Wireless Services Facility will be setback substantially more than 125' from the nearest property line.

4354. Co-location of wireless communication equipment on existing towers and buildings is encouraged. The applicant for a monopole shall demonstrate that the communication equipment planned for the proposed structure cannot be accommodated on an existing or approved tower or structure or building within a one-half mile search radius of a proposed monopole for one or more structural, technical, economic or other reasons as documented by a qualified engineer or other qualified professional including, but not limited to the following.

a. no such tower or building exists.

b. the structural capacity of the existing tower or structure is inadequate and cannot be modified at a reasonable cost or the proposed equipment will interfere with the usability of existing equipment.

c. the owner of an appropriate building or structure has effectively denied permission to co-locate by unreasonable delay or commercially unreasonable terms or conditions.

d. the height of existing tower or structure in not adequate to permit the proposed equipment to function.

There are no towers or structures or building of sufficient height and structural capacity within a one-half mile radius of the proposed Wireless Service Facility that would achieve the coverage objective of the Facility. Moreover, the location of the proposed Wireless Services Facility was chosen by the Town of Sudbury as part of its Wireless Services Overlay District.

4355. Every new monopole or tower shall be automatically subject to the condition that the permit holder must allow co-location upon the structure by other wireless communication providers upon commercially reasonable terms and conditions and without unreasonable delay, if such co-location is technically feasible. It is expressly provided that any requirement imposed by a permit holder which requires the payment of rent in excess of industry standards or which allows the co-location only if the requesting party provides comparable space on one of its structures to the permit holder shall be deemed commercially unreasonable.

The proposed Wireless Services Facility will be designed to facilitate co-location and will structurally accommodate multiple wireless broadband carriers and at heights reasonably calculated to achieve the coverage objective of the Facility. The Applicant agrees to provide space on the tower to all commercial wireless service providers upon commercially reasonable terms and conditions.

4360. Facility and Site Design Criteria.

4361. All wireless communication equipment shall be sited, screened and/ or painted or otherwise colored or finished to blend in with the building or structure on which it is mounted or in a manner which aesthetically minimizes the visibility of the devices in the surrounding landscape or on the building or structure to which they are attached. In certain circumstances, additional architectural features or changes to the façade may be necessary to maintain the balance and integrity of the design of the building or structure with building-mounted wireless communication equipment.

The proposed Wireless Services Facility has been designed as a "stealth" free-standing monopole, and all antennas, electronics and cabling will be located inside the tower structure, similar to other Wireless Service Facilities already located in the Town of Sudbury.

4362. Equipment boxes or shelters for wireless communication equipment must either be interior to the building on which it is located, completely camouflaged, and/ or completely screened from view from the public way.

The proposed Wireless Service Facility will be located behind the existing DPW building and therefore, all base station equipment and shelters will be completely screened from view from any public way.

4364. Existing on-site vegetation shall be preserved to the maximum extent practicable. Major topographical changes shall be avoided.

No existing on-site vegetation will be affected by the construction of the proposed Wireless Service Facility and construction of the Wireless Service Facility will not require any major topographical changes.

4365. Traffic associated with the facilities and structures shall not adversely affect abutting ways. No part of any building-mounted wireless communication equipment shall be located over a public way. There shall be a minimum of one parking space for each facility, to be used in connection with the maintenance of the facility and the site, and not to be used for the permanent storage of vehicles.

Once constructed, the traffic generated by the Wireless Service Facility will be one or two vehicle trips per month by maintenance and technical personnel to ensure the telecommunications site remains in good working order. These visits will not result in any material increase in traffic or disruption to patterns of access or egress that will cause congestion hazards or cause a substantial change in the established neighborhood character. There are ample existing parking spaces available on the Property for construction and maintenance vehicles.

4366. There shall be no signs, except for announcement signs, no trespassing signs and a required sign giving a phone number where the owner can be reached on a twenty-four (24) hour basis.

There will be no signs, writing, symbols or graphic representations on the tower other than small signs at the base of the tower that may be required for safety purposes.

4367. Night lighting of the facilities shall be prohibited unless required by the Federal Aviation Administration. Lighting shall be limited to that needed for emergencies and/ or as required by the FAA.

The Applicant has determined that the Wireless Service Facility as proposed will not require any lighting under current FAA regulations, and there will be no lighting on the tower other than that that may be required by the FAA in the future

4368. Applicants proposing to erect wireless communications facilities and structures on municipal properties shall provide evidence of contractual authorization from the Town of Sudbury or the Sudbury Water District to conduct wireless communications services on said property.

Included with this Application is a Letter of Authorization from the Town of Sudbury.

4369. All unused facilities or parts thereof or accessory facilities and structures which have not been used for two (2) years shall be dismantled and removed at the owner's expense. A bond in an amount which shall not be less than the estimated cost to dismantle and remove the wireless communication facility plus twenty-five percent (25%), shall be required to be furnished to the Town prior to construction of the facility.

The Applicant agrees to provide such estimate and removal bond to the Town concurrent with the application for a building permit for the proposed Wireless Service Facility.

4370. Submittal Requirements. As part of any application for a special permit under this Section, applicants shall submit, at a minimum, the applicable information required for site plan approval, as set forth herein at Section 6300, as may be amended, and the following additional information:

4371. A color rendition of the proposed facility with its antenna and/ or panels at the proposed location is required. One or more renditions shall also be prepared illustrating the visual effects of the facility from prominent areas and adjacent public roadways.

As required by Section 4375, the Applicant has arranged to fly a balloon to the height of the proposed Wireless Services Facility, and will prepare a map and several photo simulations showing the visibility of the Facility from prominent areas and public roadways, to be presented to the Zoning Board of Appeals at the public hearing on this Application.

4372. The following information prepared by one or more professional engineers:

a. description of the facility and the technical, economic and other reasons for the proposed location, height and design.

b. confirmation that the facility complies with all applicable Federal and State standards.

c. a description of the capacity of the facility including the number and type of panels, antenna and/ or transmitter receivers that it can accommodate and the basis for these calculations.

Accompanying this application are detailed Site Plans and Tower Drawings prepared by professional engineers licensed in the Commonwealth of Massachusetts, detailing the location,, design, height, capacity and other technical information with respect to the proposed Wireless Services Facility, which has been designed to comply with all applicable Federal, State and local regulatory standards.

4373. If applicable, a written statement that the proposed facility complies with, or is exempt from applicable regulations administered by the Federal Aviation Administration (FAA), Federal Communications Commission (FCC), Massachusetts Aeronautics Commission and the Massachusetts Department of Public Health.

The proposed Wireless Services Facility has been designed to comply, and when constructed will comply, with all applicable regulations of the Federal Aviation Administration (FAA), Federal Communications Commission (FCC), Massachusetts Aeronautics Commission and the Massachusetts Department of Public Health.

4374. A general description of the build-out plan of other wireless communications facilities that the provider plans to install in Sudbury within the next five (5) years, including locations, approximate tower height, the capacity of the facility and the proposed compensation to the Town or Water District.

The Applicant has no plans to construct any other wireless communications facilities in the Town of Sudbury, but would be happy to meet with the Town of Sudbury to discuss its communications needs.

4375. Balloon Test: Within 35 days of submitting an application, the applicant shall arrange to fly, or raise upon a temporary mast, a three foot diameter brightly colored balloon at the maximum height of the proposed facility. The dates (including a second date, in case of poor visibility on the initial date), times, and location of this balloon test shall be advertised, by the applicant, at least 7 days in advance of the first test date in a newspaper with a general circulation in the Town of Sudbury. The applicant shall inform the Board of Appeals, in writing, of the times of the test at least 14 days in advance. The balloon shall be flown for at least four (4) consecutive hours between the hours of 8:00 a.m. and 6:00 p.m. on the dates chosen, which shall be on a weekend.

The Applicant will conduct a Visual Demonstration by flying a balloon to illustrate the height of the proposed facility. Said Visual Demonstration will be held SATURDAY, SEPTEMBER 19, 2015 from 8:00 a.m. to 12:00 Noon.

In the case of inclement weather on Saturday, September 19, 2015, the Visual Demonstration will be rescheduled to Sunday, September 20, 2015, from 8:00 a.m. to 12 Noon. In case of inclement weather on both Saturday September 19 AND Sunday September 20, 2015, the rescheduled date of the Visual Demonstration will be posted on http://www.cadsims.com/sudbury

The Visual Demonstration will be advertised in the Sudbury Town Crier on Thursday, September 10, 2015, and written notice of the Visual Demonstration was provided to the Zoning Board of Appeals via email (pursuant to the instruction of the Town of Sudbury Director of Planning and Community Development)) on Thursday, September 3, 2015.

4380. Exemptions. The following types of uses are exempt from this Section:

4381. Towers, satellite dishes or antennas for non-commercial use are regulated under Section 2632 of the Zoning Bylaw.

NOT APPLICABLE

4382. Amateur radio towers used in accordance with the terms of any amateur radio service license issued by the Federal Communications Commission, provided that the tower operator is not licensed to conduct commercial business on a daily basis from that facility.

NOTAPPLICABLE

4390. Selectmen Authority to Lease Town-owned sites. The Board of Selectmen may lease Town-owned property to facilitate the purposes of this bylaw.

The Applicant is in the process of negotiating a lease of the Property with the Town of Sudbury

COMPLIANCE WITH CRITERIA FOR VARIANCE

The proposed Wireless Service Facility has been designed to minimize the visual impact of the tower and also facilitate co-location by multiple telecommunication companies. Moreover, the Wireless Service Facility has been designed to be adaptable to rapidly evolving telecommunications technologies.

There are no other structures of sufficient height in the area surrounding the location of the proposed Wireless Service Facility to achieve the coverage objective to be satisfied by the Wireless Service Facility. In order to accommodate co-location multiple telecommunications carriers and minimize the need for other telecommunications facilities in other areas of the Town, and given the topography of the surrounding area, the location of other telecommunications facilities in the Town of Sudbury, the need for ubiquitous telecommunications coverage, the lack of reliable and robust telecommunications services in the area and the need to provide coverage to the surrounding residents, the proposed Wireless Service Facility represents the best oppurtunity to satisfy the technicial requirments of wireless carriers and also satisfy the town's objectives. At the public hearing on this Application, the Applicant will provide substantial evidence showing the need for telecommunications coverage in the area, as well as the need for a Faciity of the proposed height to achieve the coverage objective.

The tower has been designed as a "stealth" free standing monopole, with all antennas, tower based electronics and cabling to be located inside the tower structure to reduce visual obtrusiveness, and the ground based equipment and shelters will be behind and blend in with the existing public and commercial use of the property. The Applicant has determined that the Wireless Service Facility as proposed will not require any lighting under current FAA regulations, and there will be no lighting on the tower other than that that may be required by the FAA in the future. There will be no signs, writing symbols or graphic representations on the tower other than small signs at the base of the tower that may be required for safety purposes. The proposed Wireless Service Facility has been designed to comply and once constructed will comply with all applicable FCC and other federal, state and local regulatory requirements. The Tower will be located behind a chain link fence and will be constructed so as to prevent unauthorized climbing. Given the pre-existing public and commercial use of the property on which the Wireless Service Facility will be located, the Applicant does not propose any additional landscaping.

Given technical limitations with respect to:

(viii) the location of the tower relative to Route 27, the surrounding residential neighborhoods and other existing telecommunication sites in and around the Town of Sudbury;

(ix) the topography of the surrounding area;

(x) the lack of viable alternatives in the area;

(xi) the Town's desire to accommodate multiple wireless communications companies;

(xii) the demand for robust and reliable telecommunications coverage;

(xiii) the need to accommodate rapidly evolving technologies; and

(xiv) the restrictions of the Town's Zoning Bylaw with respect to the location of wireless service facilities,

the tower must be minimum of 140 feet tall. Therefore, a literal enforcement of the By-Law would involve a substantial hardship, the hardship is owing to the circumstances relating to the soil conditions, shape, or topography of such land or structures, and especially affecting such land or structures but not affecting generally the zoning district in which it is located; and desirable relief may be granted without either substantial detriment to the public good or nullifying or substantially derogating from the intent of the By-Law.

The Applicant has investigated the sites identified by the Town as part of its Wireless Services Overlay District as well as other sites in and around the defined geographic area within which engineers determined that a Wireless Service Facility must be located to fill the gap in service coverage and to function effectively within the network of existing and planned facilities. No existing structure or property in an allowed zoning district in or near the vicinity of the proposed Wireless Service Facility is feasible to accommodate the coverage network requirements. The wireless communications systems being developed by the various telecommunications carriers have has been designed employing the most sophisticated radio frequency engineering methods available. Radio frequency engineers determine the placement of network points-of-presence using computer engineering models that simultaneously evaluate are topography and population patterns to identify specific geographic areas to be serviced by each antenna Wireless Service Facility in the network. As a result of this modeling, combined with actual coverage data provided by existing "on air" facilities, the carriers' radio frequency engineers have identified a limited geographic area as a necessary location for a communications Wireless Service Facility to remedy an existing gap in reliable service coverage in the general vicinity of the Property. Without the requested relief, there would remain a substantial "gap" in reliable service coverage in the carriers' respective networks. Radio frequency coverage maps confirm that a wireless communications Wireless Service Facility located at the Property is required to remedy the existing gap in the wireless network coverage in the area. The requested height has been determined by engineers to be the minimum height necessary to connect coverage from the proposed Wireless Service Facility with coverage from adjacent cell sites in the carriers' respective networks (i.e. to remedy the existing "gap" in service and to effect reliable handoffs between adjacent cell sites as a subscriber travels through the area).

Accordingly, the Applicant respectfully requests that the Zoning Board grant a Variance to permit the construction of a 140' tall Wireless Service Facility.

THE TELECOMMUNICATIONS ACT OF 1996

In 1996, the U.S. Congress enacted the Telecommunications Act of 1996, Pub. L. No. 104-104, § 704; 110 Stat. 56 (1996) (the "TCA" or the "Telecommunications Act'). The intent of the TCA as enacted by Congress was to institute a framework to promote competition and innovation within the telecommunications industry. Although this law specifically preserves local zoning authority with respect to the siting of wireless service facilities, it clarifies when the exercise of local zoning authority may be preempted by federal law. Section 704 of the TCA provides, in pertinent part, that

(7) PRESERVATION OF LOCAL ZONING AUTHORITY-

> (A) GENERAL AUTHORITY- Except as provided in this paragraph, nothing in this Act shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities.
>
> (B) LIMITATIONS-
>
> > (i) The regulation of the placement, construction, and modification of personal wireless service facilities by any State or local government or instrumentality thereof--
> >
> > > (I) shall not unreasonably discriminate among providers of functionally equivalent services; and
> > >
> > > (II) shall not prohibit or have the effect of prohibiting the provision of personal wireless services.

The intent of the TCA enacted by the U.S. Congress was to institute a framework promote competition and innovation within this telecommunications industry. Under its license from the FCC, wireless telecommunications carriers are obligated to provide a reliable "product" [i.e. Telecommunications service] to the population in the greater Boston region, which includes the Town of Sudbury. Likewise, consumer expectations for increasingly robust and reliable service requires competing service providers to identify and remedy existing gaps in reliable network coverage, or gaps that result from increasing subscriber voice and data traffic beyond the limits of existing network infrastructure. A carrier's failure to remedy network gaps in a timely fashion can result in a significant loss of subscribers to competing telecommunications carriers. As demonstrated in the Application and supplemental materials provided by the Applicant, the

proposed Wireless Service Facility and corresponding relief requested are necessary to remedy a gap in reliable service coverage within the existing network infrastructure.

In a growing number of cases, the federal courts have found that permit denials violate the TCA, even if such denials would be valid under state law. For example, in Omnipoint Services v. Town of Lincoln, 107 F. Supp. 2d 108 (D. Mass. 2000), the court found that denial of a variance for a location outside of the town's wireless overlay district violated the TCA and ordered the variance to issue despite a Bylaw provision prohibiting use variances. The court in Nextel Services v. Town of Wayland, 231 F. Supp. 2d 396 (D. Mass 2002) reached the same result. In that case, the court stated: "Although the Board's statement [regarding its lack of authority to issue a use variance] may be correct statement in Massachusetts regarding variances, it is not controlling in the special case of Telecommunications facilities…Under the Telecommunications Act, the Board cannot deny the variance if in so doing it would have the effect of prohibiting wireless services." Wayland at 406-407. Most notably, in Omnipoint Holdings. Inc. v. Town of Cranston, No. 08-2491 (1st Cir. Nov. 3, 2009), the United States Court of Appeals for the First Circuit affirmed a judgment of the United States District Court for the District of Rhode Island, which found that the Cranston Zoning Board of Review violated the TCA by effectively prohibiting the provision of wireless services in Cranston when it denied an application for a special use permit and variance to construct a wireless Wireless Service Facility in a residential area. The Court noted that "[t]he effective prohibition clause does not stand alone; it is also part of the TCA's larger goal of encouraging competition to provide consumers with cheaper, higher-quality wireless technology…. As cell phone use increases, carriers need to build more facilities, especially in populated areas, to continue providing reliable coverage, and local regulations can present serious obstacles." *Cranston*, p. 25.

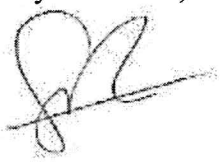
The Applicant has investigated alternative sites in and around the defined geographic area within which its engineers determined that a Wireless Service Facility must be located to fill the gap in service coverage and to function effectively within the wireless network of existing and planned facilities. No existing structure or property in or near the vicinity of the proposed Wireless Service Facility is feasible to accommodate the wireless network requirements. The proposed Wireless Service Facility is on land which already is publicly and commercially used.

Accordingly, denial of a permit to construct a Wireless Service Facility would prevent the Applicant from eliminating an existing gap in reliable service coverage, resulting in a potential loss of subscribers and the inability to effectively compete for subscribers with FCC licensed competitors in the market, contrary to the intent of the Bylaw and the U.S. Congress in enacting the TCA.

SUMMARY

Because the proposed Wireless Service Facility meets all of the requirements for a Special Permit under Section Art4300 Town of Sudbury Zoning Bylaw other than Section 4352 for which the Applicant has requested a Variance, and pursuant to §704(a) of the Federal Telecommunications Act of 1996 which provides, among other things, that wireless facilities may not be prohibited in any particular area and that any denial of zoning relief must be based upon substantial evidence, the Applicant respectfully requests that the Zoning Board of Appeals grant the requested Special Permit and Variances, the Planning Board grant Site Plan Approval as porposed, and nd that Town of Sudbury grant such other relief, amendment to existing special permits, additional special permit or variance relief or waivers deemed necessary by the Town of Sudbury under the current Bylaw and pending Bylaw amendments, if any, so that the Applicant may construct and operate the Wireless Service Facility as proposed.

Respectfully submitted,



Francis D. Parisi, Esq.
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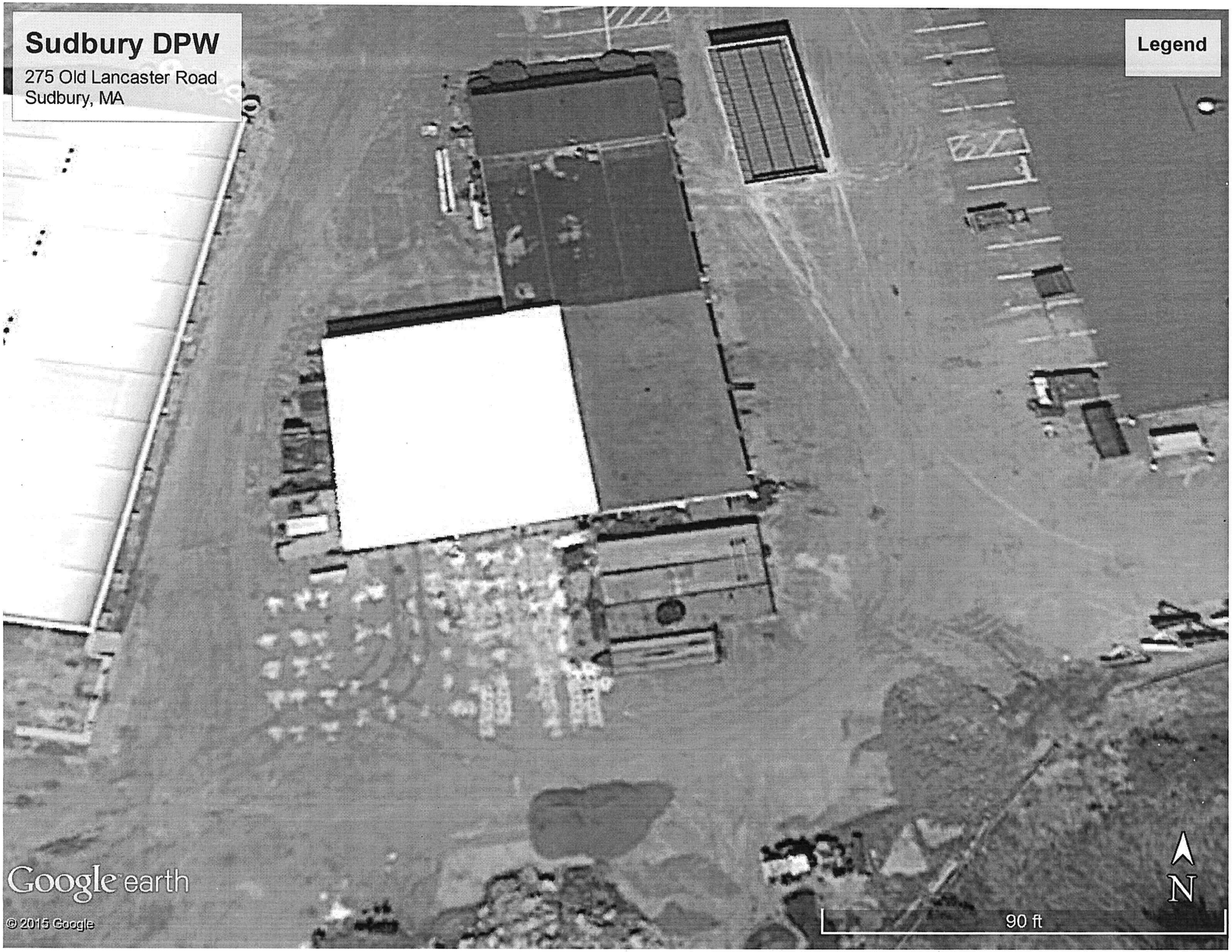
Boston, MA 02210
(401) 447-8500 cell
(401) 447-8500 cell
(401) 941-7800 office
(401) 831-8387 fax
fparisi@varsitywireless.com

7


Sudbury DPW
275 Old Lancaster Road
Sudbury, MA
Legend
Old Lanca
Google earth
© 2015 Google
N
300 ft


Sudbury DPW
275 Old Lancaster Road
Sudbury, MA
Legend
Google earth
© 2015 Google
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90 ft

8

varsity wireless

VW-MA-0130A
SUDBURY DPW

275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SITE TYPE: RAWLAND UNIPOLE

FOR ZONING

SHEET INDEX

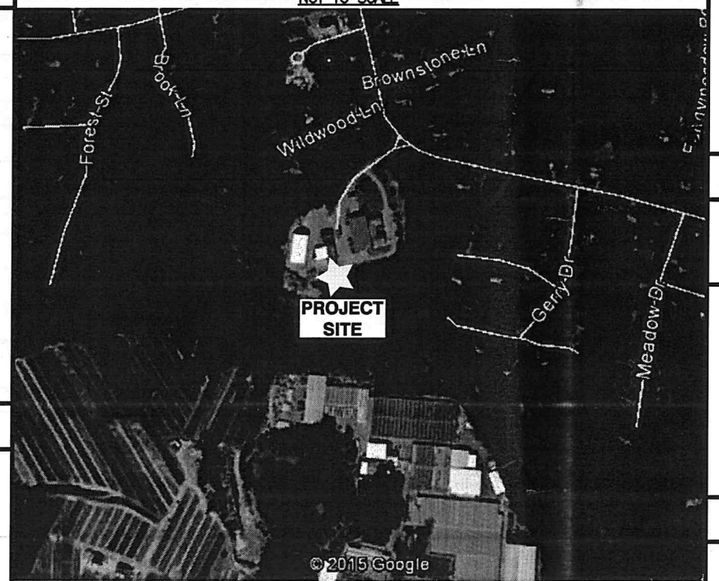
SHEET	DESCRIPTION	REV.
T-1	TITLE SHEET	2
C-1	ABUTTERS PLAN	2
C-2	EXISTING CONDITIONS	2
C-3	EXISTING CONDITIONS	2
C-4	SITE PLAN	2
A-1	COMPOUND PLAN & ELEVATION	2
A-2	DETAILS	2
A-3	DETAILS	2
A-4	EROSION CONTROL DETAILS & NOTES	2

PROJECT INFORMATION:

PROPERTY OWNER:	TOWN OF SUDBURY DPW BUILDING 275 OLD LANCASTER ROAD SUDBURY, MA 01776
APPLICANT:	VARSITY WIRELESS INVESTORS, LLC 290 CONGRESS STREET, 7TH FLOOR BOSTON, MA 02210
SITE ADDRESS:	275 OLD LANCASTER ROAD SUDBURY, MA 01776
COUNTY:	MIDDLESEX
LATITUDE:	N 42° 22' 25.94"
LONGITUDE:	W 71° 25' 31.23"
ZONING CLASSIFICATION:	SRA (SINGLE RESIDENCE A)
ZONING JURISDICTION:	TOWN OF SUDBURY
PARCEL ID:	H08-0049
PARCEL ID:	16.5± ACRES
ARCHITECT / ENGINEER:	HUDSON DESIGN GROUP LLC 1600 OSGOOD STREET BUILDING 20 NORTH, SUITE 3090 N. ANDOVER, MA 01845

VICINITY MAP

NOT TO SCALE



DRIVING DIRECTIONS

DIRECTIONS TO SITE:
START OUT GOING WEST ON COCHITUATE RD/MA-30 TOWARD BURR ST. 0.02 MI. TAKE THE 1ST RIGHT ONTO BURR ST. 0.08 MI. STAY STRAIGHT TO GO ONTO LEGGATT MCCALL CONNECTOR RD. 0.3 MI. TURN LEFT ONTO SPEEN ST. 0.09 MI. TURN RIGHT ONTO OLD CONNECTICUT PATH. 0.5 MI. TURN LEFT ONTO HAMILTON ST. 0.2 MI. TURN LEFT ONTO SCHOOL ST/MA-126. 0.1 MI. KEEP RIGHT AT THE FORK TO GO ON SCHOOL ST. 0.03 MI. TURN RIGHT ONTO CONCORD ST. 0.3 MI. CONCORD ST BECOMES ELM ST. 1.2 MI. ELM ST BECOMES LANDHAM RD. 1.4 MI. TURN LEFT ONTO BOSTON POST RD/US-20 W. 0.7 MI. TURN RIGHT ONTO CONCORD RD. 0.8 MI. TURN LEFT ONTO OLD LANCASTER RD. 0.4 MI. 275 OLD LANCASTER RD IS ON THE LEFT.

PROJECT DESCRIPTION

1. THIS IS AN UNMANNED AND RESTRICTED ACCESS EQUIPMENT SITE AND WILL BE USED FOR THE TRANSMISSION OF RADIO SIGNALS FOR THE PURPOSE OF PROVIDING PUBLIC CELLULAR SERVICE.
2. THIS FACILITY WILL CONSUME NO UNRECOVERABLE ENERGY.
3. NO POTABLE WATER SUPPLY IS TO BE PROVIDED AT THIS LOCATION.
4. NO WASTE WATER WILL BE GENERATED AT THIS LOCATION.
5. NO SOLID WASTE WILL BE GENERATED AT THIS LOCATION.
6. MAINTENANCE CREW (TYPICALLY ONE PERSON) WILL MAKE AN AVERAGE OF ONE TRIP PER MONTH AT ONE HOUR PER VISIT.

DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

3 WORKING DAYS

BEFORE YOU DIG

CALL TOLL FREE 888-DIG-SAFE

UNDERGROUND SERVICE ALERT

varsity wireless
290 CONGRESS ST. 7TH FL
BOSTON, MA 02210

Hudson Design Group LLC
1600 OSGOOD STREET
BLD 20 N, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978)-557-5553
FAX: (978)-336-5586

COMMONWEALTH OF MASSACHUSETTS
DEREK J. CREASER
CIVIL
No. 49195
REGISTERED PROFESSIONAL ENGINEER

LICENSED ENGINEER _____ DATE _____

REVISIONS

REV. #	DATE	DESCRIPTION
2	09/08/15	SUBMITTED FOR PERMITTING
1	08/21/15	SUBMITTED FOR PERMITTING
A	08/12/15	SUBMITTED FOR REVIEW

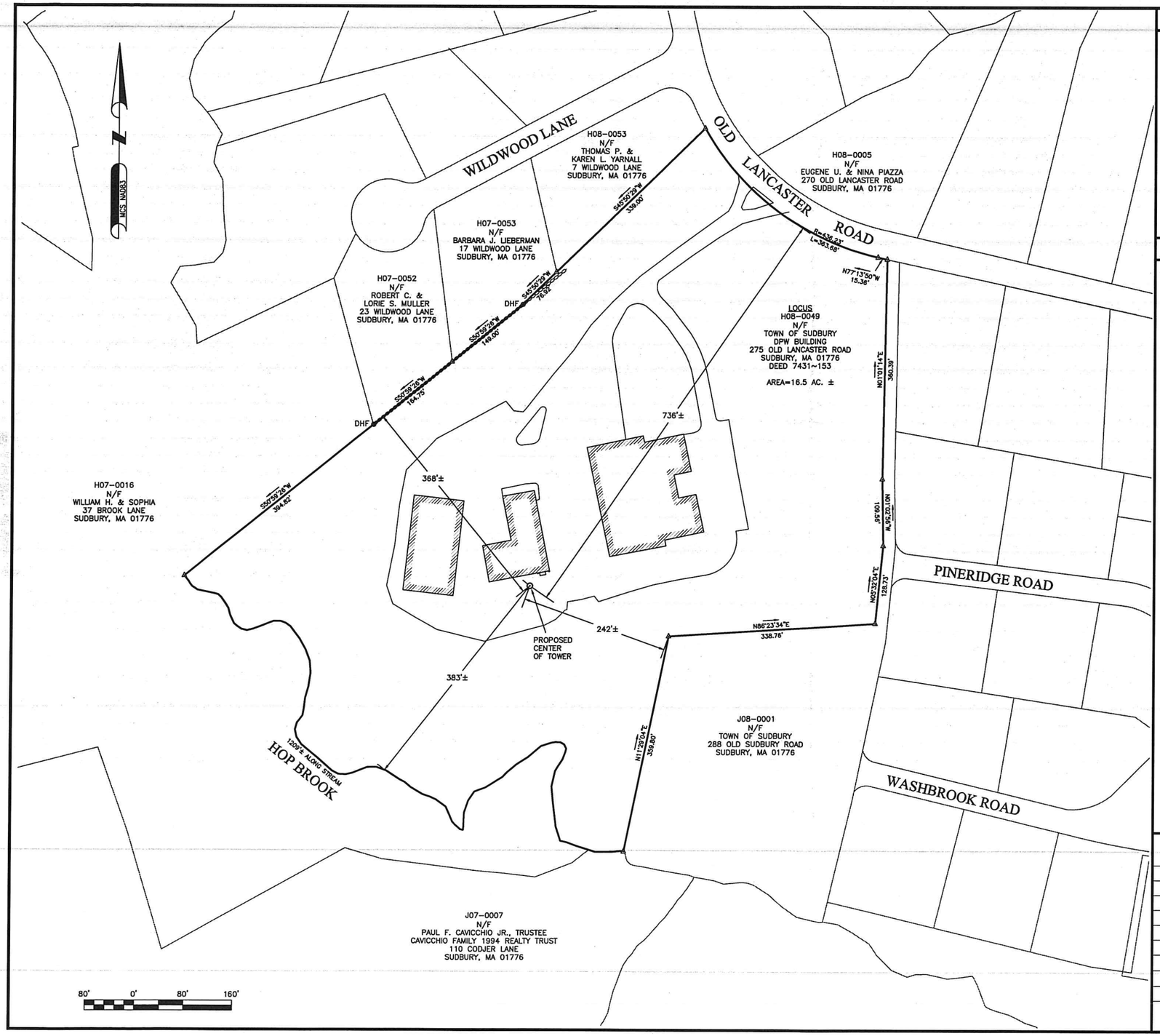
PROJECT NO.	DESIGNED BY: AT	SCALE:
VW-MA-0130A	DRAWN BY: EB	AS SHOWN
	CHECKED BY: DPH	

SITE NAME:
VW-MA-0130A
SUDBURY DPW

SITE ADDRESS:
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SHEET TITLE:
TITLE SHEET

SHEET NO:
T-1



LEGEND

- –LOCUS PROPERTY LINE ±
- –ABUTTERS PROPERTY LINE ±
- –STONE WALL
- –TOWER CONTROL POINT

SITE NOTES

1. FIELD SURVEY DATE:	06–02–2015 & 06–04–2015
2. HORIZONTAL DATUM:	NORTH AMERICAN DATUM OF 1983 (NAD83 2011)
3. VERTICAL DATUM:	NORTH AMERICAN VERTICAL DATUM (NAVD88)
3. ZONING	SINGLE RESIDENCE A (SRA) DISTRICT
4. OWNER:	TOWN OF SUDBURY 275 OLD LANCASTER ROAD SUDBURY, MA 01776
5. SITE NAME:	SUDBURY DPW
6. SITE NUMBER:	MA0130A
7. SITE ADDRESS	275 OLD LANCASTER ROAD SUDBURY, MA 01776
8. APPLICANT:	VARSITY WIRELESS 330 CONGRESS ST. 6TH FLOOR BOSTON, MA 02210
9. AREA:	PARCEL AREA IS 16.5 ACRES ±
10. TAX ID:	H08–0049

11. THE HORIZONTAL DATUM AND VERTICAL DATUM WERE DERIVED FROM A POST–PROCESSED STATIC DUAL FREQUENCY GPS SURVEY.

12. ALL UNDERGROUND UTILITY INFORMATION PRESENTED HEREON WAS DETERMINED FROM SURFACE EVIDENCE AND PLANS OF RECORD. ALL UNDERGROUND UTILITIES SHOULD BE LOCATED IN THE FIELD PRIOR TO COMMENCEMENT OF ALL SITE WORK. CALL DIGSAFE 1–800–322–4844 A MINIMUM OF 72 HOURS PRIOR TO PLANNED ACTIVITY.

15. ACCORDING TO FEDERAL EMERGENCY MANAGEMENT AGENCY MAPS, THE MAJOR IMPROVEMENTS ON THIS PROPERTY ARE LOCATED IN AN AREA DESIGNATED AS ZONE X (NO SHADING), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.
COMMUNITY PANEL NO. 25017C 0506 F
EFFECTIVE DATE: JULY 7, 2014

16. FIELD SURVEY BY EDM TOTAL STATION.

17. THIS IS NOT A BOUNDARY SURVEY.

18. LOCUS PROPERTY LINES ARE BASED UPON TOWN OF SUDBURY GIS DATA AND PLANS OF RECORD ONLY AND SHOULD BE CONSIDERED APPROXIMATE.

19. WETLANDS WERE DELINATED BY NORTHEAST LAND AND WATER, LLC.

ZONING INFORMATION

JURISDICTION:	TOWN OF SUDBURY, MA	
ZONING DISTRICT TYPE:	SRA (SINGLE RESIDENCE A)	
DIMENSION REQUIREMENTS:	REQUIRED	PROPOSED±
MINIMUM LOT AREA:	40,000	–
MINIMUM LOT FRONTAGE:	180'	–
FRONT YARD SETBACK:	40'	738'±
SIDE YARD SETBACK:	20'	242'±
REAR YARD SETBACK:	30'	383'±
MAX. BUILDING HEIGHT:	2.5 STY/35'	N/A

varsity wireless
290 CONGRESS ST. 7TH FL
BOSTON, MA 02210

Hudson Design Group LLC
1600 OSGOOD STREET
BLD 20 N, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978)–557–5553
FAX: (978)–336–5586

NORTHEAST SURVEY CONSULTANTS
116 PLEASANT ST. SUITE 302
P.O. BOX 109
EASTHAMPTON, MA 01027
(413) 203-5144

COMMONWEALTH OF MASSACHUSETTS
DANIEL F. STASZ No.47160
REGISTERED PROFESSIONAL LAND SURVEYOR

DANIEL F. STASZ, LS #47160
LICENSED LAND SURVEYOR

REVISIONS

REV. #	DATE	DESCRIPTION
0	08/12/15	SUBMITTED FOR REVIEW

PROJECT NO.	DESIGNED BY: –	SCALE:
VW-MA-0130A	DRAWN BY: JED	1" = 80'
	CHECK'D BY: DFS	

SITE NAME:
VW-MA-0130A
SUDBURY DPW
LAND OWNER OF RECORD:
ASSESSOR'S ID: H08–0049
DEED BOOK: 7431 – PAGE: 153
TOWN OF SUDBURY – DPW BUILDING
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SITE ADDRESS:
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SHEET TITLE:
ABUTTERS PLAN

SHEET NO:
C-1

LEGEND

- –LOCUS PROPERTY LINE ±
- –ABUTTERS PROPERTY LINE ±
- –CONTOUR LINE
- OHW –OVERHEAD WIRES
- –WETLANDS DELINEATION
- –GUARD RAIL
- –STONE WALL
- –WETLAND FLAG
- –MANHOLE
- –HYDRANT

WILDWOOD LANE

OLD LANCASTER ROAD

H08–0053
N/F
THOMAS P. &
KAREN L. YARNALL
7 WILDWOOD LANE
SUDBURY, MA 01776

H07–0053
N/F
BARBARA J. LIEBERMAN
17 WILDWOOD LANE
SUDBURY, MA 01776

H07–0052
N/F
ROBERT C. &
LORIE S. MULLER
23 WILDWOOD LANE
SUDBURY, MA 01776

H08–0049
LOCUS
N/F
TOWN OF SUDBURY
DPW BUILDING
275 OLD LANCASTER RD
SUDBURY, MA 01776
DEED 7431~153

S45°50'29"W 339.00'

R=436.25'
L=363.69'

S45°50'29"W 76.92'

S50°59'26"W 149.00'

S50°59'26"W 164.75'

S50°59'26"W 394.82'

DHF

BA–1 BA–2 BA–3 BA–4 BA–5 BA–6 BA–7 BA–8 BA–9 BA–10 BA–11 BA–12 BA–13 BA–14 BA–15 BA–16

A–1 A–2 A–3 A–4 END

B–1 START B–2 B–3 B–4 B–5 B–6 B–7 B–8 B–9 B–10

148.13' 148.88' 148.67' 149.55' 150.80' 152.22' 152.80' 151.98' 149.75' 148.32' 148.23' 147.95' 145.45' 144.89' 144.13' 143.84'

UP

OHW

UP W/LIGHT

BIT. DRIVE

UP W/LIGHT & TRANS.

UNNAMED BROOK

BIT.

UP #66 18 3

CONTROL ROD A
IRON ROD SET
N: 2961529.66'
E: 676353.39'

100' BVW BUFFER

200' RIVERFRONT BUFFER

FUEL FILL COVER (TYP.)

TOWN GARAGE

MATCHLINE A

N

NAD 1983 MASS MAINLAND

30' 0' 30' 60'

varsity wireless
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BOSTON, MA 02210

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COMMONWEALTH OF MASSACHUSETTS
DANIEL F. STASZ
No. 47160
REGISTERED PROFESSIONAL LAND SURVEYOR

DANIEL F. STASZ, LS #47160
LICENSED LAND SURVEYOR

REVISIONS		
0	08/12/15	SUBMITTED FOR REVIEW
REV. #	DATE	DESCRIPTION

PROJECT NO.	DESIGNED BY: –	SCALE:
VW–MA–0130A	DRAWN BY: JED	1" = 30'
	CHECK'D BY: DFS	

SITE NAME: VW-MA-0130A
SUDBURY DPW

LAND OWNER OF RECORD:
ASSESSOR'S ID: H08–0049
DEED BOOK: 7431 – PAGE: 153

TOWN OF SUDBURY – DPW BUILDING
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SITE ADDRESS:
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SHEET TITLE:
EXISTING CONDITIONS

SHEET NO:
C-2

LEGEND

- –LOCUS PROPERTY LINE ±
- –ABUTTERS PROPERTY LINE ±
- –CONTOUR LINE
- OHW –OVERHEAD WIRES
- –WETLANDS DELINEATION
- –GUARD RAIL
- –STONE WALL
- –WETLAND FLAG
- –MANHOLE
- –HYDRANT

S50°59'26"W 394.82'

MATCHLINE A

BA-13, B-8, BA-14, B-9, BA-15, B-10, BA-16, BA-17, B-11, BA-18 END, B-12, B-13, B-14, B-15, BB-15 END, BB-13, BB-12, BB-11, BB-10, BB-9, B-16, B-17, BB-8, B-18, BB-7, BB-6, B-19, BB-5, B-20, B-21, B-22, B-23, BB-4, BB-3, BB-2, B-24 END, BB-1, BC-1, BC-2, B-25, BC-3

HOP BROOK

BIT.

144.89'

CONTROL ROD A
IRON ROD SET
N: 2961529.66'
E: 676353.39'

144.13'

200' RIVERFRONT BUFFER

100' BVW BUFFER

143.84'

FUEL FILL COVER (TYP.)

FUEL PUMP

TOWN GARAGE

OVERHANG OVER CONC. PAD

143.42'

FF=144.02'

STORAGE SHED

143.50'

FF=143.98'

TOWN GARAGE

CONC. FOOTINGS

WASTE OIL STORAGE

GENERATOR PAD

CONC. PAD

PROPOSED 40'X22.5 LEASE AREA & FENCE

STORAGE CONTAINERS

TBM
EL=146.33'
CHISSELED SQUARE
TOP CORNER
CONC RET. WALL

STOCKPILES

CONTROL POINT B
MAG NAIL SET
N: 2961208.55'
E: 676325.70'

PROPOSED CENTER OF TOWER
LAT: 42°22'25.94"
LON: 71°25'31.23"
N: 2961277.26
E: 676340.15
GROUND ELEV: 143'±

H08-0049
LOCUS
N/F
TOWN OF SUDBURY
DPW BUILDING
275 OLD LANCASTER RD
SUDBURY, MA 01776
DEED 7431~153

J08-0001
N/F
TOWN OF SUDBURY
288 OLD SUDBURY ROAD
SUDBURY, MA 01776

C-1 START, C-2, C-3, C-4, C-5, C-6, C-7, C-8, BC-4, BC-5, BC-6, BC-7, BC-8, BC-9

GRAPHIC SCALE
30' 0' 30' 60'

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EASTHAMPTON, MA 01027
(413) 203-5144

COMMONWEALTH OF MASSACHUSETTS
DANIEL F. STASZ
No.47160
REGISTERED PROFESSIONAL LAND SURVEYOR

DANIEL F. STASZ, LS #47160
LICENSED LAND SURVEYOR

REVISIONS		
0	08/12/15	SUBMITTED FOR REVIEW
REV. #	DATE	DESCRIPTION

PROJECT NO.	DESIGNED BY: -	SCALE:
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	CHECK'D BY: DFS	

SITE NAME:
VW-MA-0130A
SUDBURY DPW

LAND OWNER OF RECORD:
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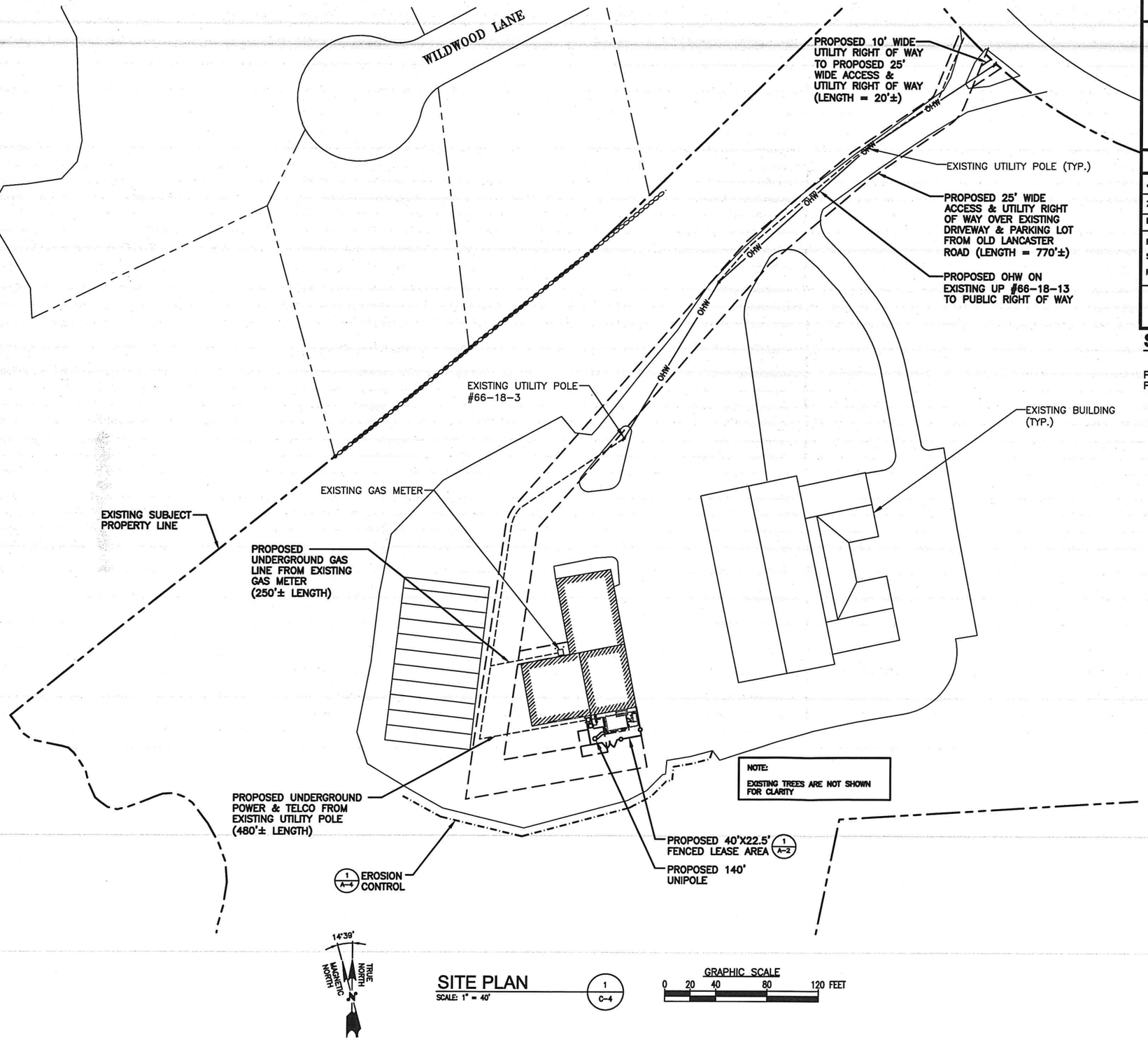
DEED BOOK: 7431 – PAGE: 153

TOWN OF SUDBURY – DPW BUILDING
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SITE ADDRESS:
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SHEET TITLE:
EXISTING CONDITIONS

SHEET NO:
C-3



SITE PLAN

SCALE: 1" = 40'

1 C-4

GRAPHIC SCALE

0 20 40 80 120 FEET

LEGEND

- PROPERTY LINE–SUBJECT PARCEL
- PROPERTY LINE–ABUTTERS
- ZONING DISTRICT BOUNDARY LINE
- EXISTING BUILDING
- XXX–XXX–XXX ASSESSORS MAP–BLOCK–LOT NO.

ZONING INFORMATION

JURISDICTION: TOWN OF SUDBURY

ZONING DISTRICT : SRA (SINGLE RESIDENCE A)

DIMENSION REQUIREMENTS	REQUIRED	PROPOSED
FRONT YARD SETBACK:	40	738
SIDE YARD SETBACK:	20	242
REAR YARD SETBACK:	30	383

(ALL MEASUREMENTS ARE IN FEET ± UNLESS OTHERWISE NOTED)
(SETBACKS TO PROPOSED EQUIPMENT UNLESS OTHERWISE NOTED)

SOURCE:

PLAN TITLED: "EXISTING CONDITIONS" DATED 6/08/15
PREPARED BY: NORTHEAST SURVEY CONSULTANTS.

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COMMONWEALTH OF MASSACHUSETTS
DEREK J. CREASER
CIVIL
No. 49195
REGISTERED PROFESSIONAL ENGINEER

LICENSED ENGINEER DATE

REVISIONS

REV. #	DATE	DESCRIPTION
2	09/08/15	SUBMITTED FOR PERMITTING
1	08/21/15	SUBMITTED FOR PERMITTING
A	08/12/15	SUBMITTED FOR REVIEW

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	CHECKED BY: DPH	

SITE NAME:
VW-MA-0130A
SUDBURY DPW

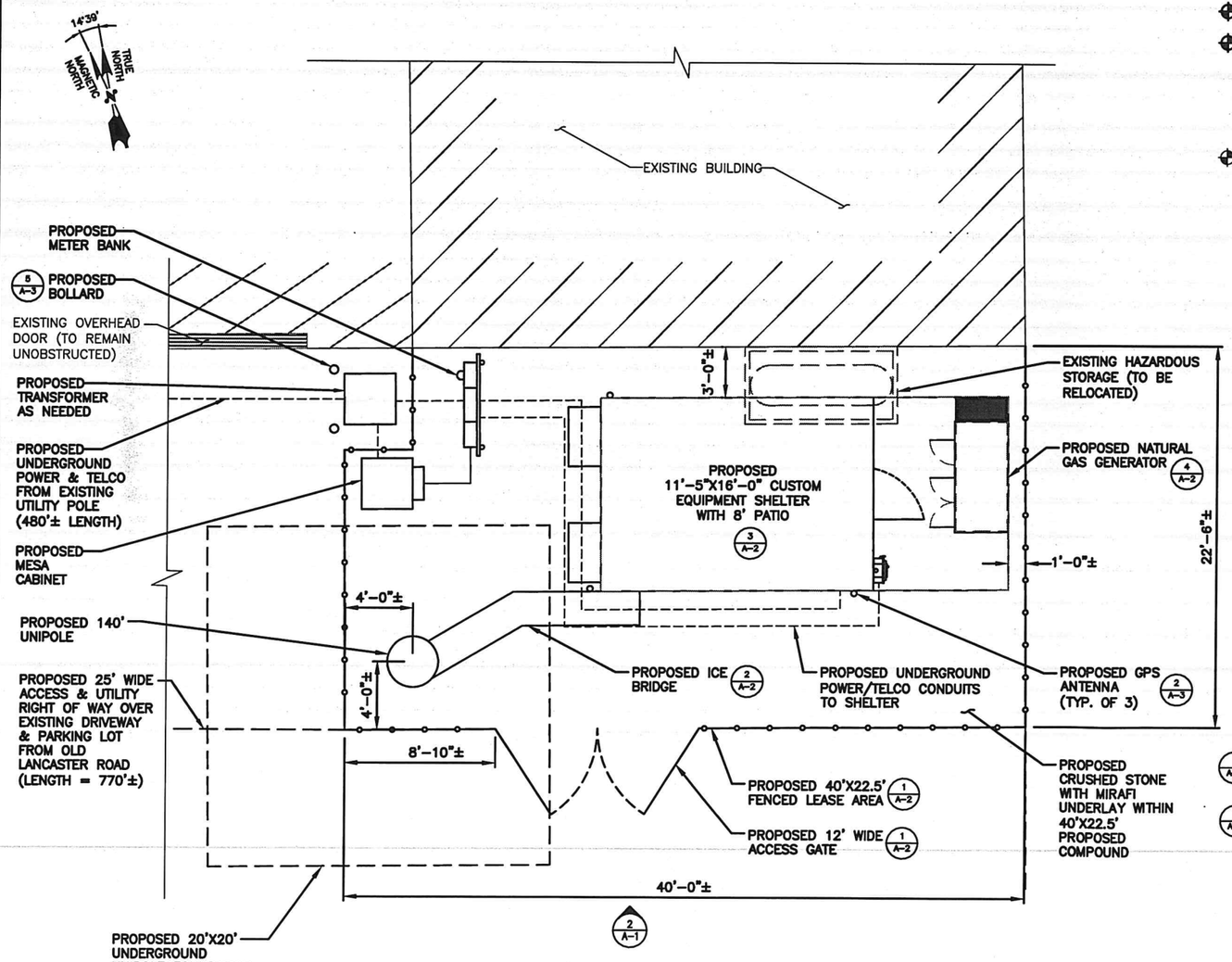
SITE ADDRESS:
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SHEET TITLE:
SITE PLAN

SHEET NO:
C-4

NOTE:

ANTENNA MOUNTS AND COMPONENTS SHALL CONFORM TO NEW STRUCTURAL CALCULATIONS AND MANUFACTURER'S RECOMMENDATIONS. (PERFORMED BY OTHERS PRIOR TO CONSTRUCTION)



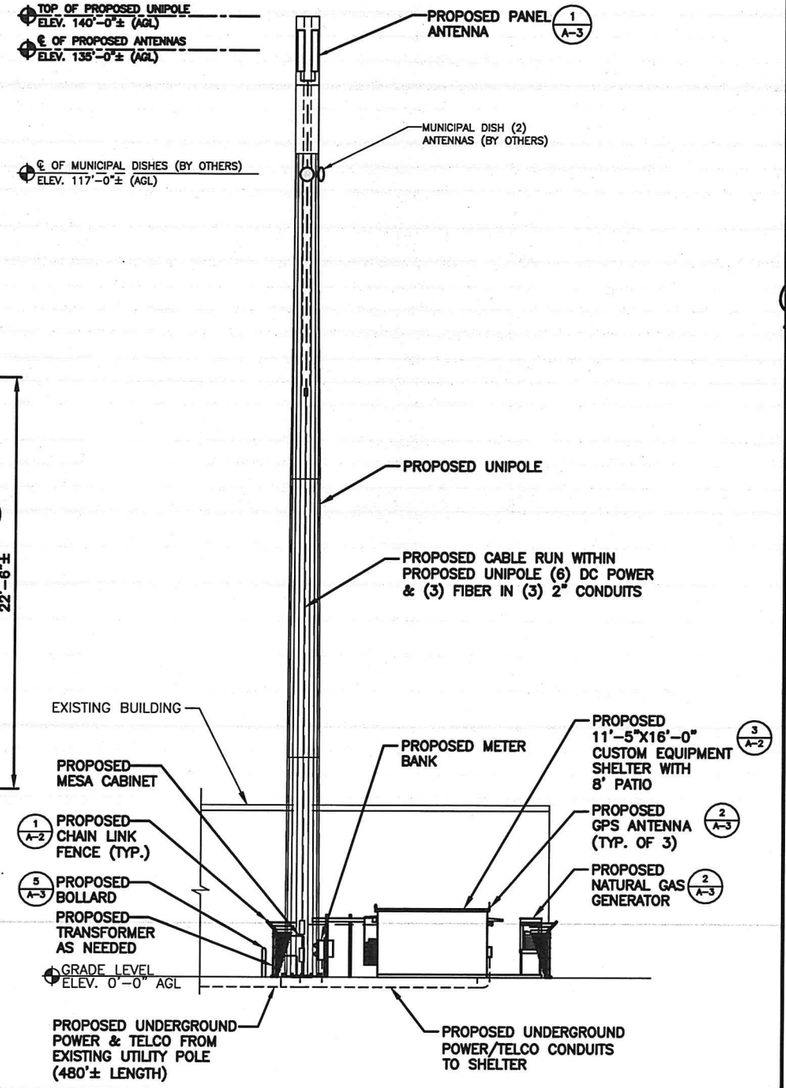
COMPOUND PLAN

1 A-1

SCALE: 1/4" = 1'-0"

GRAPHIC SCALE

0 2 4 8 12 FEET



SOUTHWEST ELEVATION

2 A-1

SCALE: 3/32" = 1'-0"

GRAPHIC SCALE

0 5'-4" 10'-8" 21'-4" 32'-0"

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VW-MA-0130A
SUDBURY DPW

SITE ADDRESS:

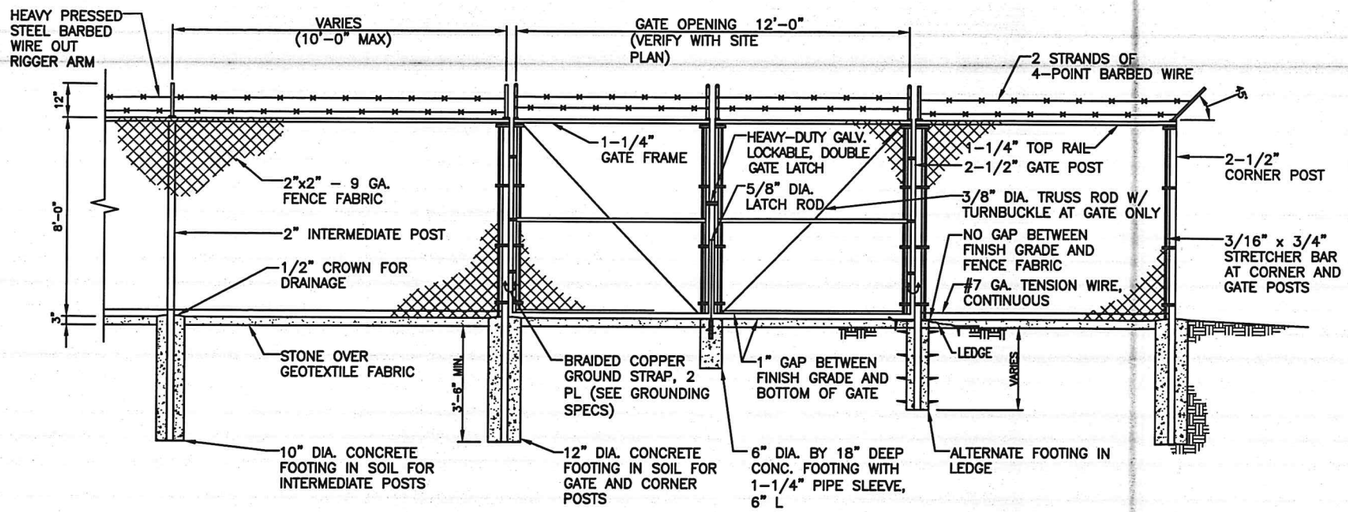
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SHEET TITLE:

COMPOUND PLAN
& ELEVATION

SHEET NO:

A-1

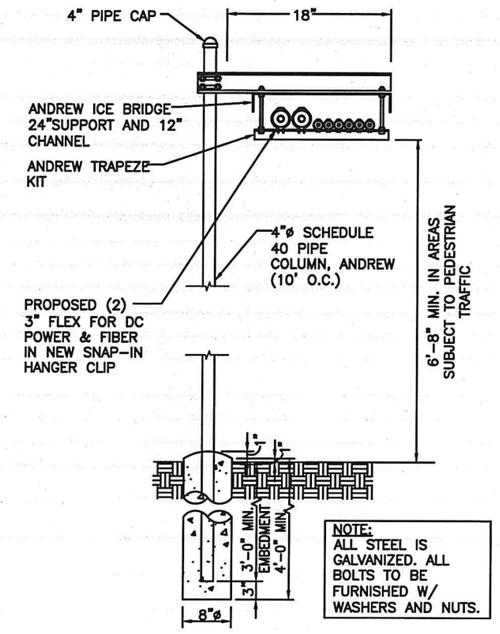


CHAIN LINK FENCE DETAIL (1 / A-3)

SCALE: N.T.S.

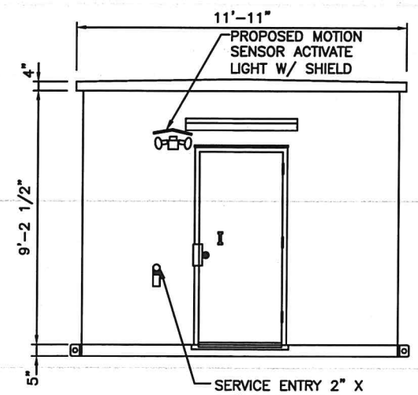
FENCE NOTES

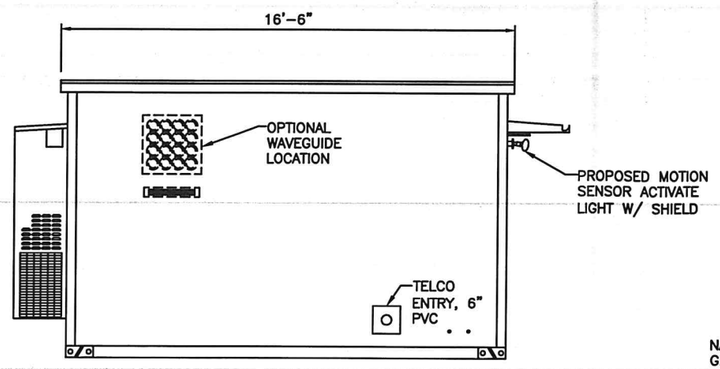
1. FENCE CONSTRUCTION SHALL BE PLUMB, STRAIGHT, AND STRUCTURALLY SOUND.
2. FENCE FABRIC SHALL USE A BOTTOM TENSION WIRE AND BARBED WIRE. FENCING SHALL BE TIGHT AND CONTINUOUS.
3. FENCE, FENCE FABRIC AND BARBED WITE SHALL BE BONDED TO THE FACILITY OR TOWER EXTERNAL GROUND RING (ERG) AT EACH CORNER ON INSIDE OR FENCING COMPOUND.
4. ALL ENTRY GATES SHALL BE BONDED TO THE MAIN FENCE ASSEMBLY BY METAL METAL STRAPS.
5. TWO HOLE COMPRESSION LUGS CAN BE USED IN PLACE OF EXOTHERMIC WELDS DUE TO THINNESS OF METAL.
6. FENCE SHALL CONFORM TO LOCAL ZONING REGULATIONS.
7. ALL STEEL TO BE GALVANIZED.



COAX ICE BRIDGE DETAIL (2 / A-3)

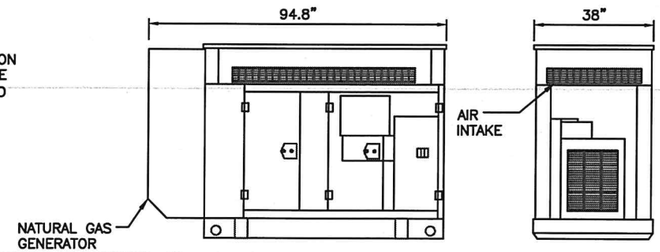
SCALE: N.T.S.





TYPICAL SHELTER DETAILS (3 / A-2)

SCALE: 3/8" = 1'-0"



TYPICAL GENERATOR DETAIL (4 / A-2)

SCALE: N.T.S.

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COMMONWEALTH OF MASSACHUSETTS
DEREK J. CREASER
CIVIL
No. 49195
REGISTERED PROFESSIONAL ENGINEER

LICENSED ENGINEER DATE

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VW-MA-0130A	DRAWN BY: EB	AS SHOWN
	CHECKED BY: DPH	

SITE NAME:
VW-MA-0130A
SUDBURY DPW

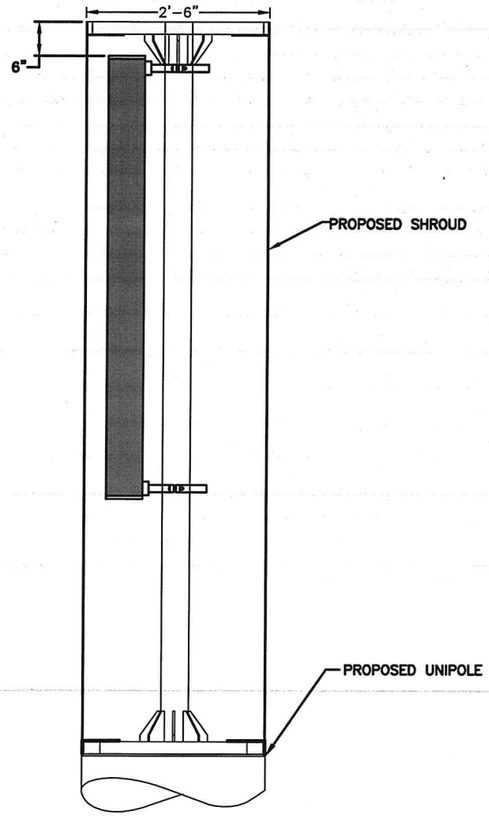
SITE ADDRESS:
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SHEET TITLE:
DETAILS

SHEET NO:
A-2

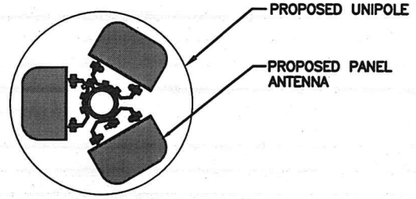
NOTE:

PROPOSED RRHS AND SURGE ARRESTORS SHALL BE MOUNTED DIRECTLY BEHIND PROPOSED ANTENNAS.



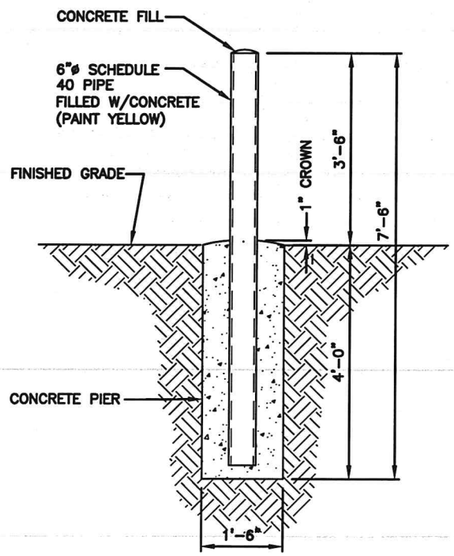
PROPOSED LTE ANTENNA MOUNTING DETAIL (1 / A-3)

SCALE: N.T.S.



ANTENNA PLAN (2 / A-3)

SCALE: N.T.S.



BOLLARD DETAIL (3 / A-3)

SCALE: N.T.S.

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COMMONWEALTH OF MASSACHUSETTS
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SUDBURY DPW

SITE ADDRESS:
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SHEET TITLE:

DETAILS

SHEET NO:

A-3

CONSTRUCTION SPECIFICATIONS – SILT FENCE

1) THE GEOTEXTILE FABRIC SHALL MEET THE DESIGN CRITERIA FOR SILT FENCES.
2) THE FABRIC SHALL BE EMBEDDED A MINIMUM OF 8 INCHES INTO THE GROUND AND THE SOIL COMPACTED OVER THE EMBEDDED FABRIC.
3) WOVEN WIRE FENCE SHALL BE FASTENED SECURELY TO THE FENCE POSTS WITH WIRE TIES OR STAPLES.
4) FILTER CLOTH SHALL BE FASTENED SECURELY TO THE WOVEN WIRE FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP, MID–SECTION AND BOTTOM.
5) WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6 INCHES, FOLDED, AND STAPLED.
6) FENCE POSTS SHALL BE A MINIMUM OF 36 INCHES LONG AND DRIVEN A MINIMUM OF 16 INCHES INTO THE GROUND. WOOD POSTS SHALL BE OF SOUND QUALITY HARDWOOD AND SHALL HAVE A MINIMUM CROSS SECTIONAL AREA OF 3.0 SQUARE INCHES.
7) MAINTENANCE SHALL BE PERFORMED AS NEEDED TO PREVENT BULGES IN THE SILT FENCE DUE TO DEPOSITION OF SEDIMENT.

MAINTENANCE – SILT FENCE

1) SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REPAIRS THAT ARE REQUIRED SHALL BE MADE IMMEDIATELY.
2) IF THE FABRIC ON A SILT FENCE SHOULD DECOMPOSE OR BECOME INEFFECTIVE DURING THE EXPECTED LIFE OF THE FENCE, THE FABRIC SHALL BE REPLACED PROMPTLY.
3) SEDIMENT DEPOSITS SHOULD BE INSPECTED AFTER EVERY STORM EVENT. THE DEPOSITS SHOULD BE REMOVED WHEN THEY REACHED APPROXIMATELY ONE–HALF THE HEIGHT OF THE BARRIER.
4) SEDIMENT DEPOSITS THAT ARE REMOVED OR LEFT IN PLACE AFTER THE FABRIC HAS BEEN REMOVED SHALL BE GRADED TO CONFORM WITH THE EXISTING TOPOGRAPHY AND VEGETATED.
5) REMOVE ALL SEDIMENTATION CONTROLS AFTER SOIL IS STABILIZED.

EROSION CONTROL MEASURES:

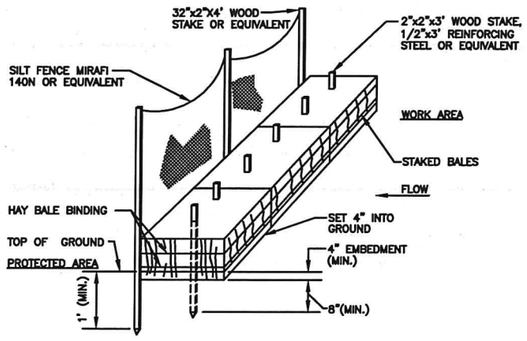
1) DISTURBED AREAS SHALL BE KEPT TO THE MINIMUM AREA NECESSARY TO CONSTRUCT THE ROADWAYS AND ASSOCIATED DRAINAGE FACILITIES.
2) HAY BALE BARRIERS AND SEDIMENT TRAPS SHALL BE INSTALLED AS REQUIRED. BARRIERS AND TRAPS ARE TO BE MAINTAINED AND CLEANED UNTIL ALL SLOPES HAVE A HEALTHY STAND OF GRASS.
3) BALED HAY AND MULCH SHALL BE MOWINGS OF ACCEPTABLE HERBACEOUS GROWTH, FREE FROM NOXIOUS WEEDS OR WOODY STEMS, AND SHALL BE DRY. NO SALT HAY SHALL BE USED.
4) FILL MATERIAL SHALL BE FREE FROM STUMPS, WOOD, ROOTS, ETC.
5) STOCKPILED MATERIALS SHALL BE PLACED ONLY IN AREAS SHOWN ON THE PLANS. STOCKPILES SHALL BE PROTECTED BY SILTATION FENCE AND SEEDED TO PREVENT EROSION. THESE MEASURES SHALL REMAIN UNTIL ALL MATERIAL HAS BEEN PLACED OR DISPOSED OFF SITE.
6) ALL DISTURBED AREAS SHALL BE LOAMED AND SEEDED. A MINIMUM OF 4 INCHES OF LOAM SHALL BE INSTALLED WITH NOT LESS THAN ONE POUND OF SEED PER 50 SQUARE YARDS OF AREA.
7) APPLICATION OF GRASS SEED, FERTILIZERS AND MULCH SHALL BE ACCOMPLISHED BY BROADCAST SEEDING OR HYDROSEEDING AT THE RATES OUTLINED BELOW:

LIMESTONE: 75–100 LBS./1,000 SQUARE FEET.
FERTILIZER: RATE RECOMMENDED BY MANUFACTURER.
MULCH: HAY MULCH APPROXIMATELY 3 TONS/ACRE UNLESS EROSION CONTROL MATTING IS USED.

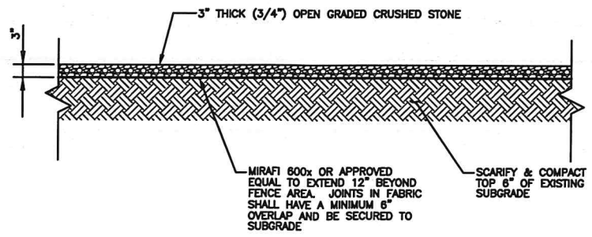
SEED MIX (SLOPES LESS THAN 4:1)	LBS./ACRE
CREEPING RED FESCUE	20
TALL FESCUE	20
REDTOP	2
	42

SLOPE MIX (SLOPES GREATER THAN 4:1)	LBS./ACRE
CREEPING RED FESCUE	20
TALL FESCUE	20
BIRDSFOOT TREEFOIL	8
	48

8) AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED THE TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED.
9) ALL CATCH BASIN INLETS WILL BE PROTECTED WITH LOW POINT SEDIMENTATION BARRIER.
10) ALL STORM DRAINAGE OUTLETS WILL BE STABILIZED AND CLEANED AS REQUIRED, BEFORE THE DISCHARGE POINTS BECOME OPERATIONAL.
11) ALL DEWATERING OPERATIONS MUST DISCHARGE DIRECTLY INTO A SEDIMENT FILTER AREA.
12) NO DISCHARGE SHALL BE DIRECTED TOWARDS ANY PROPOSED DITCHES, SWALES, OR PONDS UNTIL THEY HAVE BEEN PROPERLY STABILIZED.



HAY BALES/ SILT FENCE DETAIL (1 / A–4)
SCALE: N.T.S.



GRAVEL COMPOUND DETAIL (2 / A–4)
SCALE: N.T.S.

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COMMONWEALTH OF MASSACHUSETTS
DEREK J. CREASER
CIVIL
No. 49195
REGISTERED PROFESSIONAL ENGINEER

LICENSED ENGINEER ____ DATE ____

REVISIONS		
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SUDBURY DPW

SITE ADDRESS:
275 OLD LANCASTER ROAD
SUDBURY, MA 01776

SHEET TITLE:
EROSION CONTROL DETAILS & NOTES

SHEET NO:
A-4

DONALD L. HAES, JR., PH.D., CHP

Radiation Safety Specialist

MA Radiation Control Program Health Physics Services Provider Registration #65-0017

PO Box 368, Hudson, NH 03051 603-303-9959 Email: donald_haes_chp@myfairpoint.net

October 1, 2015

RE: Installation of radio base station antennas and associated equipment for the proposed Varsity Wireless personal wireless services facility to be located at 275 Old Lancaster Road, Sudbury, MA.

PURPOSE

I have reviewed the information pertinent to the proposed installation at the above location. To determine regulatory compliance, theoretical calculations of maximal radio-frequency (RF) fields have been prepared. The physical conditions are that Varsity Wireless proposes to install a personal wireless services (PWS) facility including a 140' monopole at 275 Old Lancaster Road, Sudbury, MA (See Figure 1). The monopole is proposed to host Verizon Wireless' directional panel antennas in three different "arrays" aimed 120° apart. The monopole will be designed to accommodate Municipal communication antennas as well.

This report considers the contributions of the **proposed** Verizon Wireless and Municipal transmitters operating at their FCC-licensed capacity. The calculated values of RF fields are presented as a percent of current Maximum Permissible Exposures (%MPE) as adopted by the Federal Communications Commission (FCC),[i,ii] and those established by the Massachusetts Department of Public Health (MDPH).[iii]

SUMMARY

Theoretical RF field calculations data indicate the summation of the proposed Verizon Wireless PWS and Municipal communications RF contributions would be within the established RF exposure guidelines. This includes all publically accessible areas, and the surrounding neighborhood in general. The results support compliance with the pertinent sections of the Sudbury Zoning Bylaws (§ 4300. WIRELESS SERVICES OVERLAY DISTRICT).

Based on the results of the theoretical RF fields I have calculated, it is my expert opinion that this facility would comply with all regulatory guidelines for RF exposure with the proposed Verizon Wireless and Municipal antenna and transmitter installations.

EXPOSURE LIMITS AND GUIDELINES

RF exposure guidelines enforced by the FCC were established by the American National Standards Institute (ANSI)[iv] and the National Council on Radiation Protection and Measurement (NCRP).[v] The RF exposure guidelines are listed for RF workers and members of the public. The applicable FCC RF exposure guidelines for the public are listed in Table 1, and depicted in Figure 1. All listed values are intended to be averaged over any contiguous 30 minute period.

Table 1: Maximum Permissible Exposure (MPE) Values in Public Areas

Frequency Bands	Electric Fields	Magnetic Fields	Equivalent Power Density
0.3 – 1.34 MHz	614 (V/m)	1.63 (A/m)	(100) mW/cm^2
1.34 - 30 MHz	824/*f* (V/m)	2.19/*f* (A/m)	(100) mW/cm^2
30 - 300 MHz	27.5 (V/m)	0.073 (A/m)	0.2 mW/cm^2
300 - 1500 MHz	--	--	*f*/1500 mW/cm^2
1500 - 100,000	--	--	1.0 mW/cm^2

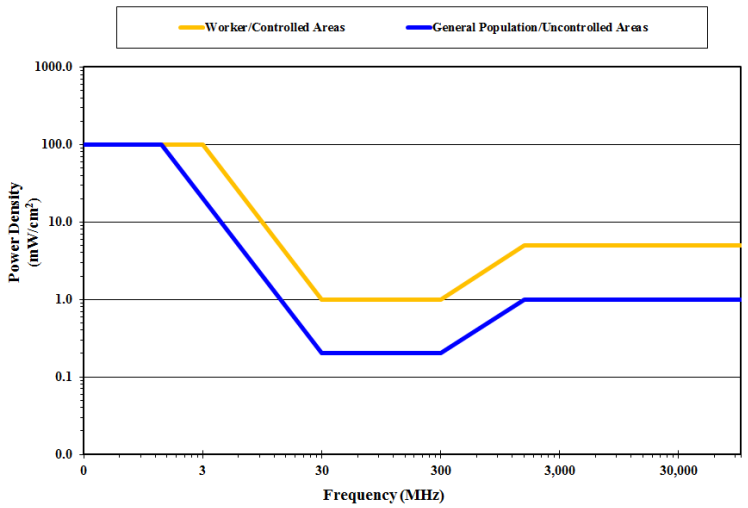


Figure 1: FCC Limits for Maximum Permissible Exposure (MPE)

NOTE: FCC 5% Rule – At multiple transmitter sites, actions necessary to bring the area into compliance with the RF exposure guidelines are the shared responsibility of all licensees whose transmitters produce RF field levels in excess of 5% of the applicable FCC MPEs.

PERTINENT SECTIONS OF THE SUDBURY ZONING BYLAWS

§ 4300. WIRELESS SERVICES OVERLAY DISTRICT

4372. The following information prepared by one or more professional engineers:

a. a description of the facility and the technical, economic and other reasons for the proposed location, height and design.

b. confirmation that the facility complies with all applicable Federal and State standards.

c. a description of the capacity of the facility including the number and type of panels, antenna and/or transmitter receivers that it can accommodate and the basis for these calculations.

4373. If applicable, a written statement that the proposed facility complies with, or is exempt from applicable regulations administered by the Federal Aviation Administration (FAA), Federal Communications Commission (FCC), Massachusetts Aeronautics Commission and the Massachusetts Department of Public Health.

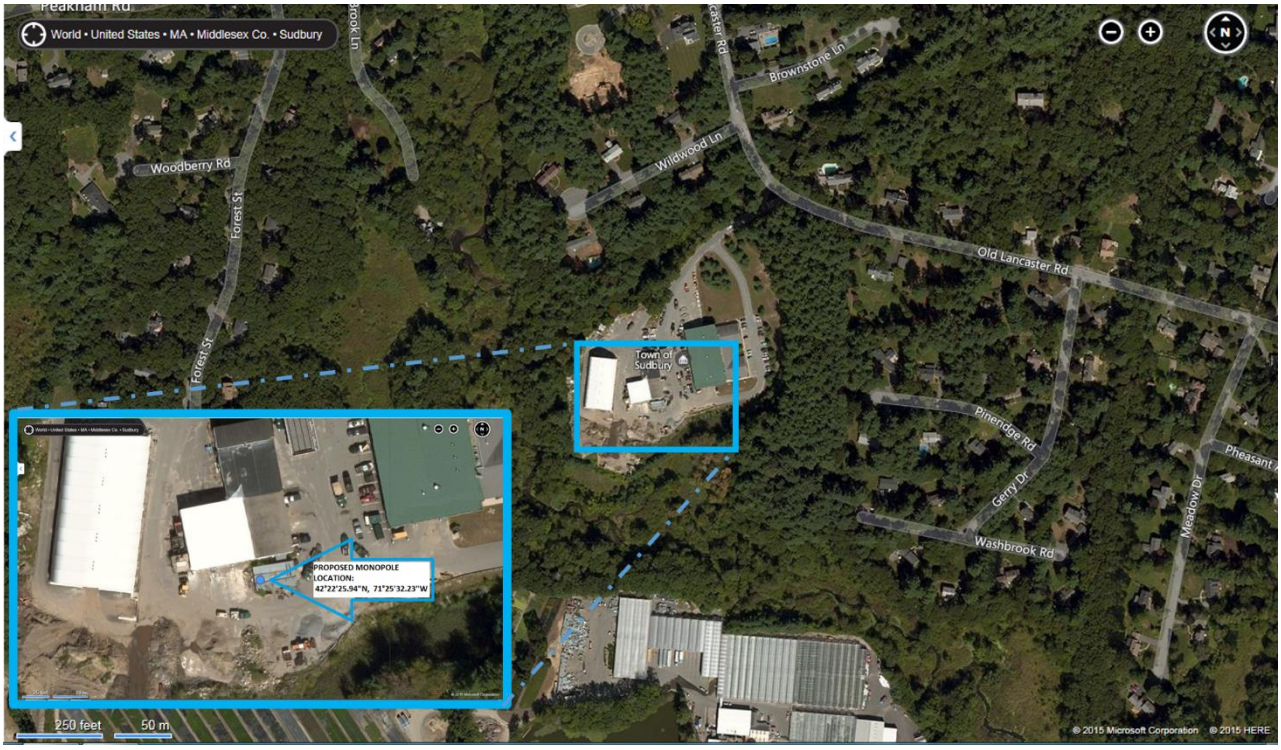


Figure 2: Proposed Location (square) of PWS Compound; 275 Old Lancaster Road, Sudbury, MA
(Picture courtesy Google Earth©2015 and may not represent current conditions)

THEORETICAL RF FIELD CALCULATIONS - GROUND LEVELS

METHODOLOGY

These calculations are based on what are called "worst-case" estimates. That is, the estimates assume 100% use of all transmitters simultaneously. Additionally, the calculations make the assumption that the surrounding area is a flat plane. The resultant values are thus conservative in that they over predict actual resultant power densities.

The calculations are based on the following information (See Table 2 data):

1. Effective Radiated Power (ERP).
2. Antenna height (LOWEST centerline, above ground level (AGL)).
3. Antenna vertical radiation patterns; the source of the negative gain (G) values. "Directional" antennas are designed to focus the RF signal, resulting in "patterns" of signal loss and gain. Antenna radiation patterns display the loss of signal strength relative to the direction of propagation due to elevation angle changes. The gain is expressed as "G^{E}".

   Note: "G" is a unitless factor usually expressed in decibels (dB); where $G = 10^{(dB/10)}$
   For example: for an antenna *gain* of 3 dB, the net factor (G) = $10^{(3/10)} = 2$
   For an antenna *loss* of -3 dB, the net factor (G) = $10^{(-3/10)} = 0.5$

To determine the magnitude of the RF field, the power density (S) from an isotropic RF source is calculated, making use of the power density formula as outlined in FCC's OET Bulletin 65, Edition 97-01: [vi]

$$S = \frac{P \cdot G}{4 \cdot \pi \cdot R^2}$$

Where:
- $P \rightarrow$ Power to antenna (watts)
- $G \rightarrow$ Gain of antenna
- $R \rightarrow$ Distance (range) from antenna source to point of intersection with the ground (feet)
- $R^2 = (\text{Height})^2 + (\text{Horizontal distance})^2$

Since: $P \cdot G = EIRP$ (Effective Isotropic Radiated Power) for broadcast antennas, the equation can be presented in the following form:

$$S = \frac{EIRP}{4 \cdot \pi \cdot R^2}$$

In the situation of off-axis power density calculations, apply the negative elevation gain (G^{E}) value from the vertical radiation patterns with the following formula:

$$S = \frac{EIRP \cdot G^{E}}{4 \cdot \pi \cdot R^2}$$

Ground reflections may add in-phase with the direct wave, and essentially double the electric field intensity. Because power density is proportional to the *square* of the electric field, the power density may quadruple, that is, increase by a factor of four (4). Since ERP is routinely used, it is necessary to convert ERP into EIRP by multiplying by the factor of 1.64 (the gain of a half-wave dipole relative to an isotropic radiator). Therefore, downrange power density estimates can be calculated by using the formula:

$$S = \frac{4 \cdot (ERP \cdot 1.64) \cdot G^E}{4 \cdot \pi \cdot R^2} = \frac{ERP \cdot 1.64 \cdot G^E}{\pi \cdot R^2} = \frac{0.522 \cdot ERP \cdot G^E}{R^2}$$

To calculate the % MPE, use the formula:

$$\%\ MPE = \frac{S}{MPE} \cdot 100$$

The results of the calculations for the potential RF emissions resulting from the proposed Verizon Wireless PWS and Municipal communication antennas are depicted in Figure 3 as plotted against linear distance from the base of the monopole. Note that the values have been calculated for a height of 6' AGL in accordance with regulatory rationale. Also depicted on the graphs are values for a height of 16' AGL (height of a typical 2nd story). A logarithmic scale was used to plot the calculated theoretical %MPE values in order to compare with the MPE of 100%, which is so much larger that it would be off the page in a linear plot. The curves are variable due to the application of the vertical radiation patterns.

OBSERVATIONS IN CONSIDERATION WITH FCC RULES §1.1307(B) & §1.1310

Will it be physically possible to stand next to or touch any omnidirectional antenna and/or stand in front of a directional antenna?

NO; access to the monopole will be restricted, and the site will adhere to RF safety guidelines regarding the transmitting antennas, including appropriate signage.

ANTENNA INVENTORY

Table 2: Proposed and/or Possible Antenna Inventory
Monopole at 275 Old Lancaster Road, Sudbury, MA

Antenna Centerline (AGL)	Typical Antenna Type	Typical Parameters: ERP & Tx Frequencies	Typical Use
Proposed by Verizon Wireless			
135’	Panel Antenna “Arrays” Three Sectors Of Up To Four Panels Each	2625 watts ERP in 700 MHz band (Upper C-Block)	LTE
		2652 watts ERP in 850 MHz band (B Block)	Cellular
		3708 watts ERP in 1900 MHz band (F, C3, and C4 Blocks)	PCS
		3883 watts ERP in 2100 MHz band (A and B Blocks)	AWS
Proposed Municipal Services			
117’	2 X 2 - 6’ Diameter terrestrial radio antenna	4467 watts ERP in 2-18 GHz band	Terrestrial Radio Communication

Table Notes:

PCS: Personal Communication System
LTE: Long Term Evolution (“4G”)
AWS: Advanced Wireless Services

RESULTS OF THEORETICAL RF FIELD CALCULATIONS

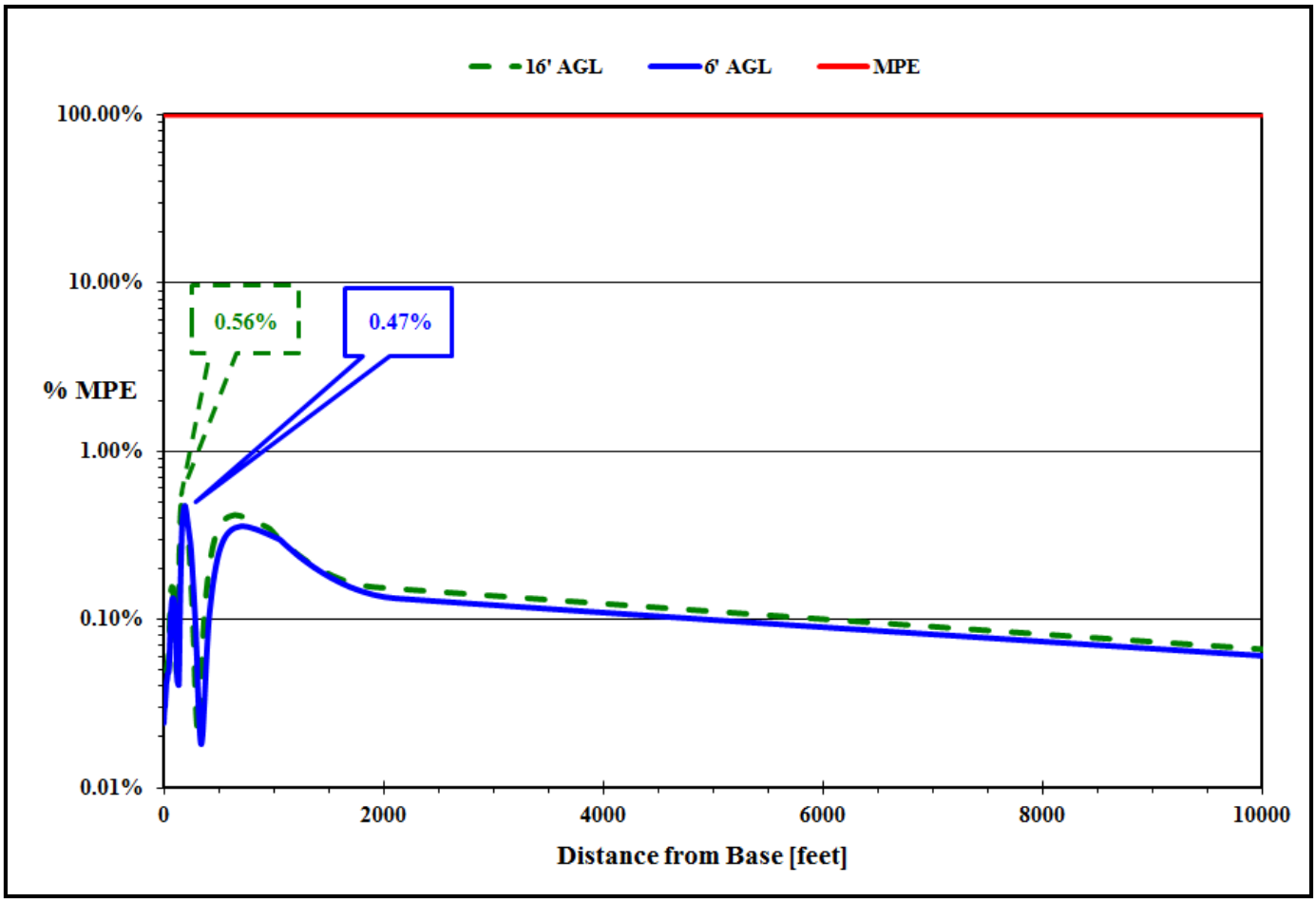


Figure 3: Theoretical Cumulative Maximum Percent MPE - vs. – Distance (Municipal and Verizon Wireless RF Contributions)

CONCLUSION

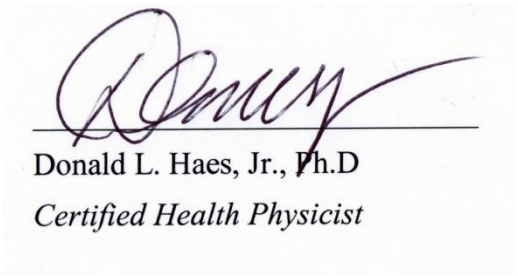
Theoretical RF field calculations data indicate the summation of the proposed Verizon Wireless PWS and Municipal communications RF contributions would be within the established RF exposure guidelines. This includes all publically accessible areas, and the surrounding neighborhood in general. The results support compliance with the pertinent sections of the Sudbury Zoning Bylaws (§ 4300. WIRELESS SERVICES OVERLAY DISTRICT).

The number and duration of calls passing through PWS facilities cannot be accurately predicted. Thus, in order to estimate the highest RF fields possible from operation of these installations, the maximal amount of usage was considered. Even in this so-called "worst-case", the resultant increase in RF field levels are far below established levels considered safe.

Based on the results of the theoretical RF fields I have calculated, it is my expert opinion that this facility would comply with all regulatory guidelines for RF exposure with the proposed Verizon Wireless and Municipal antenna and transmitter installations.

Feel free to contact me if you have any questions.

Sincerely,



Donald L. Haes, Jr., Ph.D
Certified Health Physicist

Note: The analyses, conclusions and professional opinions are based upon the precise parameters and conditions of this particular site**; 275 Old Lancaster Road, Sudbury, MA**. Utilization of these analyses, conclusions and professional opinions for any personal wireless services installation, existing or proposed, other than the aforementioned has not been sanctioned by the author, and therefore should not be accepted as evidence of regulatory compliance.

DONALD L. HAES, JR., PH.D., CHP

Radiation Safety Specialist

MA Radiation Control Program Health Physics Services Provider Registration #65-0017

PO Box 368, Hudson, NH 03051 603-303-9959 Email: donald_haes_chp@myfairpoint.net

STATEMENT OF CERTIFICATION

1. I certify to the best of my knowledge and belief, the statements of fact contained in this report are true and correct.

2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are personal, unbiased professional analyses, opinions and conclusions.

3. I have no present or prospective interest in the property that is the subject of this report and I have no personal interest or bias with respect to the parties involved.

4. My compensation is not contingent upon the reporting of a predetermined energy level or direction in energy level that favors the cause of the client, the amount of energy level estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.

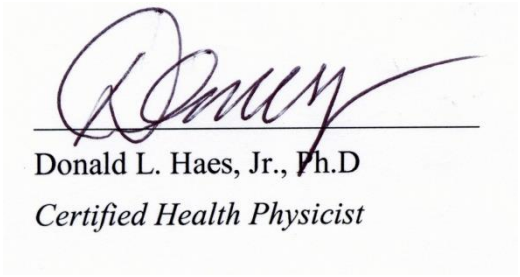
5. This assignment was not based on a requested minimum environmental energy level or specific power density.

6. My compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.

7. The consultant has accepted this assessment assignment having the knowledge and experience necessary to complete the assignment competently.

8. My analyses, opinions, and conclusions were developed and this report has been prepared, in conformity with the *American Board of Health Physics* (ABHP) statements of standards of professional responsibility for Certified Health Physicists.

Date: October 1, 2015



ENDNOTES

[i]. Federal Register, Federal Communications Commission Rules; *Radiofrequency radiation; environmental effects evaluation guidelines* Volume 1, No. 153, 41006-41199, August 7, 1996. (47 CFR Part 1; Federal Communications Commission).

[ii]. Telecommunications Act of 1996, 47 USC; Second Session of the 104th Congress of the United States of America, January 3, 1996.

[iii]. 105 CMR 122.000: Massachusetts Department of Public Health, *Non-Ionizing Radiation Limits for: The General Public from Non-Occupational Exposure to Electromagnetic Fields, Employees from Occupational Exposure to Electromagnetic Fields, and Exposure from Microwave Ovens*.

[iv]. ANSI/IEEE C95.1-1999: American National Standard, *Safety levels with respect to human exposure to radio frequency electromagnetic fields, from 3 KHz to 300 GHz* **(Updated in 2010)**.

[v]. National Council on Radiation Protection and Measurements (NCRP); *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*, NCRP Report 86, 1986.

[vi]. OET Bulletin 65: Federal Communications Commission Office of Engineering and Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*; Edition 97-01, August 1999.

NORTHEAST LAND & WATER, LLC
131 WEST MAIN STREET, SUITE 327, ORANGE, MA 01364 (413)374-887 MACLEODALEC@GMAIL.COM

June 18, 2015

Dan Stasz, RPLS
Northeast Survey Consultants, PC
P.O. Box 109
Easthampton, MA 01027

RE: *Site Investigation and Resource Area Delineation, 275 Old Lancaster Rd., Sudbury, MA*

Dear Mr. Stasz:

On Thursday, May 28, 2015, Northeast Land & Water, LLC visited a potential cell tower site located within the Town offices and DPW complex at 275 Old Lancaster Road in Sudbury, Mass. to determine whether areas subject to protection under the Massachusetts Wetlands Protection Act, the Sudbury Wetlands Administration Bylaw, and other pertinent environmental regulations are present within and around the parcel. We have also reviewed relevant sources of information to support and enhance our findings regarding the regulatory context within which projects might be pursued on this land.

The precise location of the project area is within the DPW portion of the parcel occupied by both the Town offices and the DPW complex (Figure 1: topographic locus map, Figure 2: aerial view). This is a large and intensively utilized area bounded by the perennial Hop Brook to the west, an un-named intermittent tributary to Hop Brook to the north, a thoroughly vegetated stormwater basin to the south and Old Lancaster Road to the east. Hop Brook and its tributary have wetland areas associated with them. The wetland boundaries have been delineated using consecutively numbered blue flagging. The Bank of the tributary and the Mean Annual High Water elevation of Hop Brook were flagged using consecutively numbered red flagging.

Please note that permitting under the Sudbury Wetlands Administration Bylaw of projects within jurisdictional areas involves additional filing fees and may require a peer review fee, the amount of which is based upon the cost of the project. A Notice of Intent for a commercial project begins with a $500.00 application fee. Other fees, including the state application fee, may apply as well.

The online Soil Survey for Middlesex County (soils report included) shows the soils beneath the proposed tower location to be Windsor loamy sand, 0 – 3% slopes (Unit 255A). This is a very deep, excessively drained soil formed in sandy outwash. The adjacent soil associated with Hop Brook is Freetown muck, 0 – 1% slopes (Unit 52A). This is a hydric soil. Field observations showed that the Soil Survey is accurate to at least the usual resolution of soil mapping.

The Natural Heritage Atlas (Online Edition, Figure 3) shows that the potential lease area is not within any areas shown to be mapped priority and/or rare species habitat.

Floodplain does not exist within the actual potential project location, which is higher in elevation than the elevation of the adjacent mapped floodplain associated with Hop Brook (about 139 feet above MSL).

We hope this information is useful to you. Please call if you have any further questions.

Sincerely,

Alec MacLeod, Principal
Northeast Land & Water, LLC

Figure 1. Locus. USGS Topographic Map

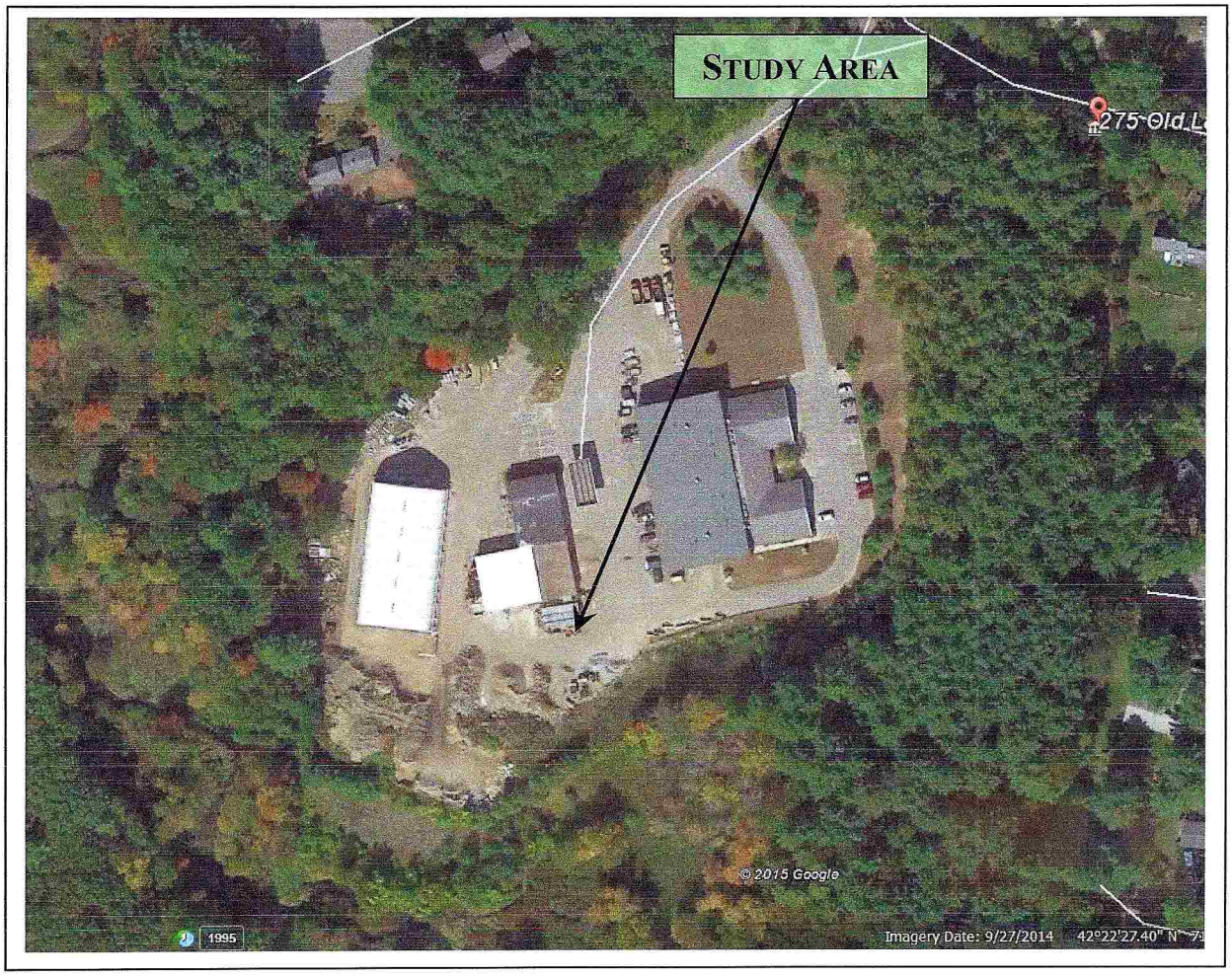
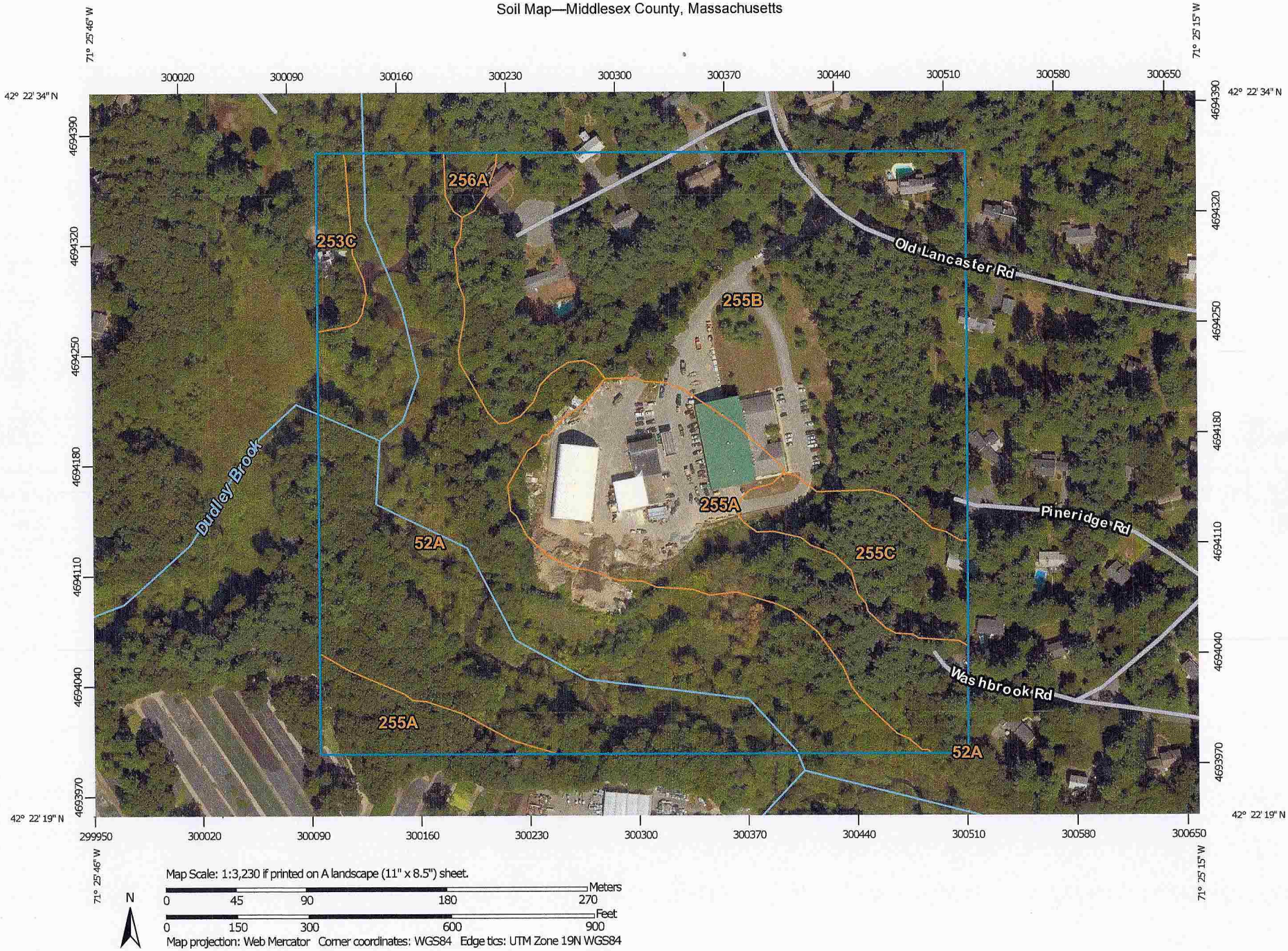


Figure 2. Aerial view of the study area (GoogleEarth)

Figure 3. Natural Heritage Atlas, online edition. Green hatch marks indicate an ACEC.

Data source: MassGIS, Commonwealth of Massachusetts Executive Office of Environmental Affairs, NHESP, Estimated Habitats of Rare Wildlife and Certified Vernal Pools. For use with the Massachusetts Wetlands Protection Act.

Soil Map—Middlesex County, Massachusetts



Map Scale: 1:3,230 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 14, Sep 19, 2014

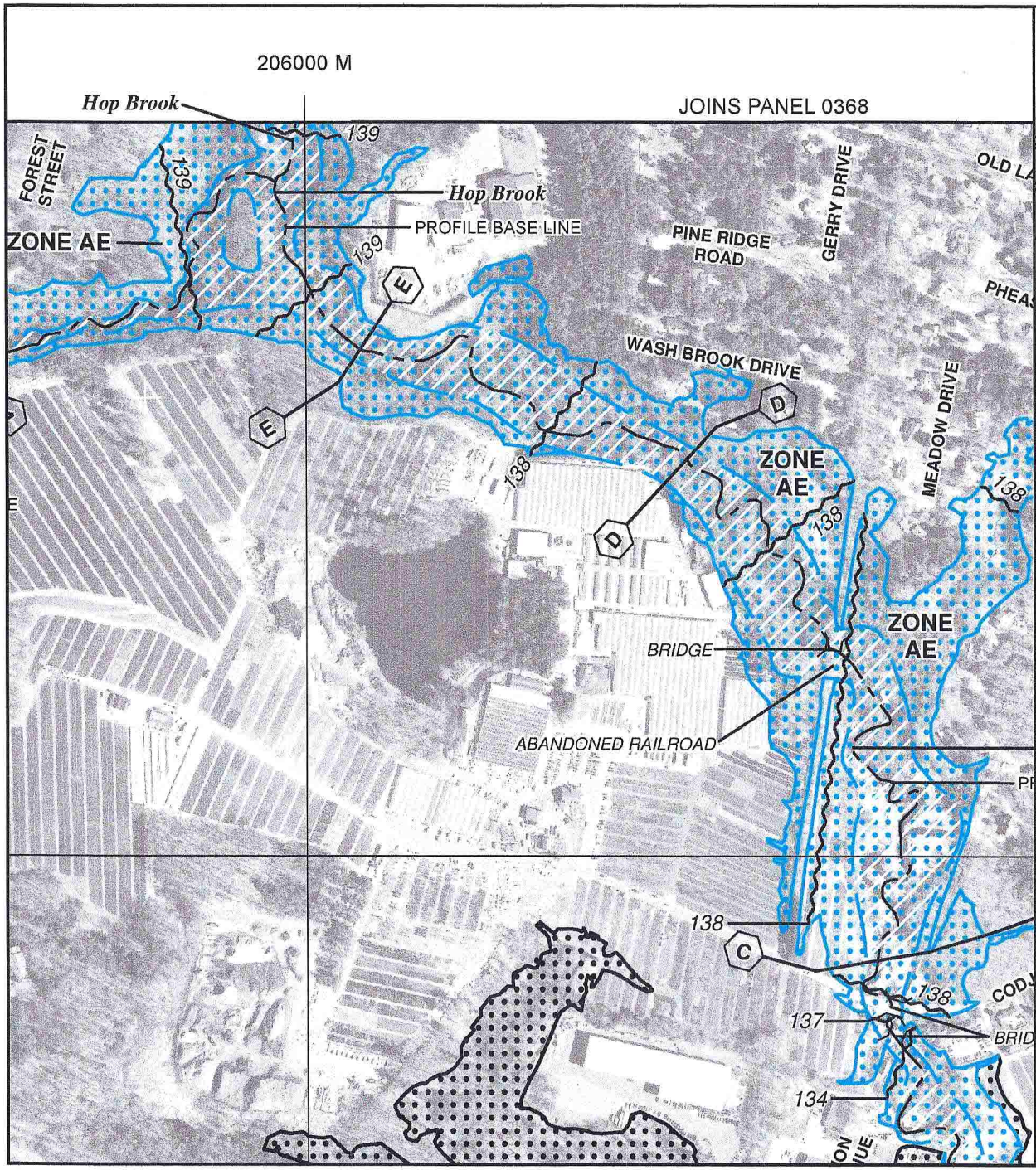
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

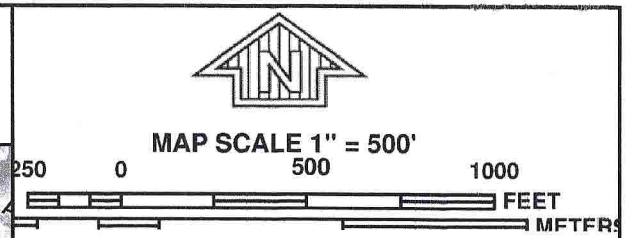
Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Middlesex County, Massachusetts (MA017)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
52A	Freetown muck, 0 to 1 percent slopes	14.8	37.7%
253C	Hinckley loamy sand, 8 to 15 percent slopes	0.6	1.7%
255A	Windsor loamy sand, 0 to 3 percent slopes	7.3	18.6%
255B	Windsor loamy sand, 3 to 8 percent slopes	14.3	36.3%
255C	Windsor loamy sand, 8 to 15 percent slopes	2.0	5.1%
256A	Deerfield loamy sand, 0 to 3 percent slopes	0.3	0.7%
Totals for Area of Interest		**39.3**	**100.0%**





NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0506F

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 506 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

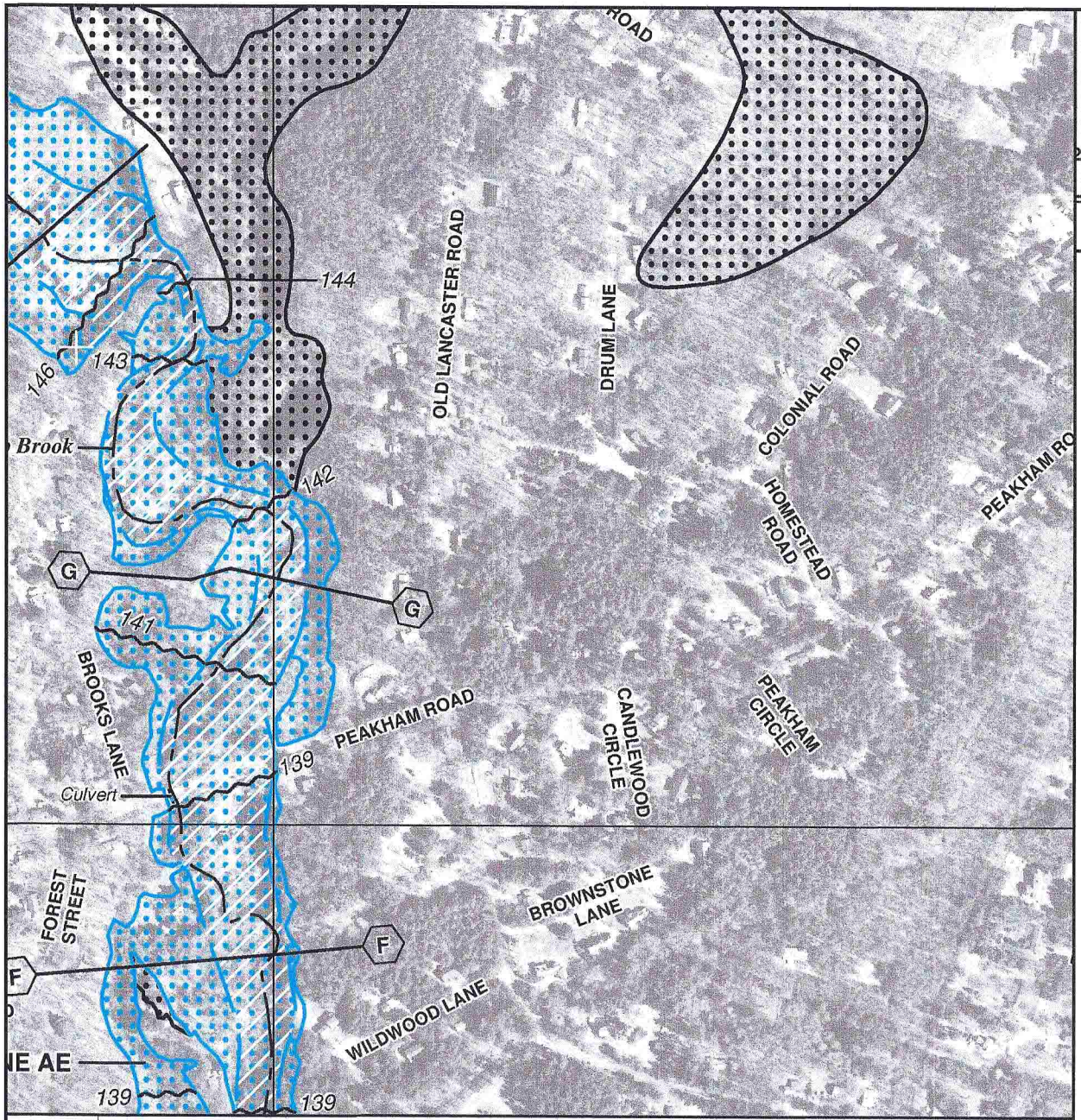
COMMUNITY	NUMBER	PANEL	SUFFIX
FRAMINGHAM, TOWN OF	250193	0506	F
SUDBURY, TOWN OF	250217	0506	F

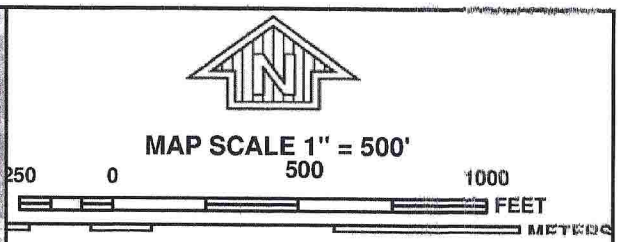
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0506F

MAP REVISED
JULY 7, 2014

Federal Emergency Management Agency





NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0368F

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 368 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SUDBURY, TOWN OF	250217	0368	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0368F

MAP REVISED
JULY 7, 2014

Federal Emergency Management Agency

SUPPLEMENT NO. 1
APPLICATION FOR SPECIAL PERMIT,
VARIANCE AND SITE PLAN APPROVAL
FOR
WIRELESS SERVICES FACILITY

Applicant:	Varsity Wireless Investors, LLC
Site Id:	VW-MA-0130
Property Address	275 Old Lancaster Road, Sudbury, MA Tax Assessors Parcel HO8-0049
Property Owner:	Town of Sudbury
Date:	October 5, 2015

1. Affidavit of RF Expert and Propagation Maps
2. RF Health Safety Report
3. Viewshed Analysis
4. Wetlands Report
5. Presentation for the Town of Sudbury (ZBA 10/5/15)
6. Site Plans (revised 9/30/15)

Prepared by:
Francis D. Parisi, Esq.
Varsity Wireless Investors, LLC.
290 Congress Street, 7th Floor
Boston, MA 02210
(401) 447-8500 cell
(401) 831-8387 fax
fparisi@varsitywireless.com

1

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

RF Report

Proposed Wireless Facility
275 Old Lancaster Road
Sudbury, MA 01776

September 29, 2015

TABLE OF CONTENTS

LIST OF TABLES

ATTACHMENTS

1. Overview

This RF Report has been prepared on behalf of Verizon Wireless in support of the Varsity Wireless application before the Town of Sudbury for the installation and operation of a wireless facility located at 275 Old Lancaster Road in Sudbury, MA. The proposed facility consists of a ground based equipment shelter and a proposed 140' "unipole" tower.

This report concludes that the proposed site is needed to fill in coverage gaps and provide capacity relief to central sections of Sudbury in order to improve deficient service areas along Peakham Road, Hudson Road, and the surrounding roads, neighborhoods, businesses, and community areas.

Included in this report is: a brief summary of the site's objectives, maps showing Verizon Wireless' current network plan, and predicted Radio Frequency coverage of the subject site and the surrounding sites in Verizon Wireless' network.

2. Introduction

Verizon Wireless provides digital voice and data communications services using 3rd Generation (3G) CDMA/EVDO technology in the Cellular (800 MHz) and PCS (1900 MHz) frequency bands, and is in the midst of deploying advanced 4th Generation (4G) voice and data services over LTE technology in the 700 MHz, PCS, and AWS (2100 MHz) frequency bands as allocated by the FCC. These networks are used by mobile devices for fast web browsing, media streaming, and other applications that require broadband connections. The mobile devices that benefit from these advanced networks are not limited to basic handheld phones, but also include devices such as smartphones, PDA's, tablets, and laptop air-cards. With the evolving rollout of 4G LTE services and devices, Verizon Wireless customers will have even faster connections to people, information, and entertainment.

As explained within this report, Verizon Wireless has identified the need to add a new facility to its existing network of sites in the Sudbury area to improve coverage and capacity to a gap in service that now exists in central Sudbury, in order to support reliable communications and meet the growing demand in the area.

To maintain a reliable and robust communications system for the individuals, businesses, public safety workers and others who use its network, Verizon Wireless deploys a network of cell sites (also called wireless communications facilities) throughout the areas in which it is licensed to provide service. These cell sites consist of antennas mounted on structures, such as buildings and towers, supported by radio and power equipment. The receivers and transmitters at each of these sites process signals within a limited geographic area known as a "cell."

Mobile subscriber handsets and wireless devices operate by transmitting and receiving low power radio frequency signals to and from these cell sites. Handset signals that reach the cell site are transferred through land lines (or other means of backhaul transport) and routed to their destinations by sophisticated electronic equipment. In order for Verizon Wireless' network to function effectively, there must be adequate overlapping coverage between the "serving cell" and adjoining cells. This not only allows a user to access the network initially, but also allows for the transfer or "hand-off" of calls and data transmissions from one cell to another, and prevents unintended disconnections or "dropped calls."

Verizon Wireless' antennas also must be located high enough above ground level to allow transmission (a.k.a. propagation) of the radio frequency signals above trees, buildings and other natural or man-made structures that may obstruct or diminish the signals. Areas without adequate radio frequency coverage have substandard service, characterized by dropped and blocked calls, slow data connections, or no wireless service at all, and are commonly referred to as coverage gaps.

The size of the area potentially served by each cell site depends on several factors including the number of antennas used, the height at which the antennas are deployed, the topography of the surrounding land, vegetative cover, and natural or man-made obstructions in the area. The actual service area at any given time also depends on the number of customers who are on the network in range of that cell site. As customers move throughout the service area, the transmission from the phone or other device is automatically transferred to the Verizon Wireless facility with the best reception, without interruption in service, provided that there is overlapping coverage between the cells.

Each cell site must be primarily designed to strike a balance between the overall geographic coverage area it will serve, and the site's capacity to support the usage within the coverage footprint. In rural areas, cell sites are generally designed to have broader coverage footprints because the potential traffic is sparser and distributed over a larger area. In more densely populated suburban and urban environments, the capacity to handle calls and data transmissions is of increasing concern, and cell sites must limit their coverage footprint to an area where the offered network traffic can be supported by the radio equipment and resources. Due to the aggressive historical and projected growth of mobile usage, particularly for mobile data (51% in 2014-2015, 47% CAGR 2014-2019 in North America)[1], instances arise where the usage demand can no longer be supported by the site(s) serving an area, and new facilities must be integrated to provide capacity relief to the overloaded sites.

We have concluded that by installing the proposed wireless communication facility at 275 Old Lancaster Road at an antenna centerline height of 137' above ground level (AGL), Verizon Wireless will be able to fill the substantial coverage gap that it now experiences, and provide improved coverage and capacity to residents, businesses, and traffic corridors within central sections of Sudbury that are currently located within deficient service areas of Verizon Wireless' network.

[1] "Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2014-2019", February 3, 2015, Cisco Systems, Inc. http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.pdf

3. The Proposed Facility

As shown on the plans submitted with the application, Verizon Wireless' proposal consists principally of the following elements:

1) An 11'-5" x 16'-0" telecommunications equipment shelter, to be located within Varsity Wireless' proposed 40' x 22.5' fenced compound;

2) Three (3) panel antennas (one per sector) mounted within the proposed 140' unipole tower, at a centerline elevation of 137' ± above ground level;

3) Remote Radio Heads (RRHs) with accessory junction boxes and surge suppressors mounted below the antennas within the unipole;

4) An ice bridge from the proposed equipment shelter to the proposed unipole tower to protect cabling between Verizon Wireless' equipment and the tower.

4. Coverage and Capacity Objectives

As mentioned above, Verizon Wireless is in the process of rolling out its 4G LTE high-speed wireless broadband system in the 700 MHz, PCS, and AWS frequency bands, in accordance with its licenses from the FCC. In order to expand and enhance their wireless services throughout New England, Verizon Wireless must fill in existing coverage gaps and address capacity, interference, and high-speed broadband issues. As part of this effort, Verizon Wireless has determined that insufficient network capacity and significant coverage gaps exist in and around central sections of Sudbury, MA, as described further below.

Verizon Wireless currently operates wireless facilities, similar to the proposed facility, within Sudbury and the surrounding towns in the vicinity. Due in large part to the distances between the existing sites, the intervening topography, and volume of user traffic in the area, these existing facilities do not provide sufficient capacity and coverage to portions of Sudbury. Specifically, Verizon Wireless determined that much of central Sudbury is without reliable service in the following areas and town roads, including but not limited to:

- Peakham Road, west of Route 27;
- Hudson Road, between Dutton Road and the Wayland town line;
- Concord Road, south of Route 27;
- Old Lancaster Road, between Concord Road and Hudson Road;
- Ephraim Curtis Middle School, Sudbury D.P.W.;
- The surrounding roads, residential neighborhoods, businesses, and community areas in the proximity of the proposed facility.

The proposed site located at 275 Old Lancaster Road ("Sudbury 5") is needed to fill in these targeted coverage and capacity gaps, in order to improve network quality and reliability for Verizon Wireless subscribers traveling along these roads, as well as to the numerous residences, businesses, and visitors in this area.

5. Site Search and Candidate Selection Process

To find a site that provides acceptable service, fills the gaps in coverage, and provides sufficient capacity relief, computer modeling software is used to define a search area. The search ring identifies the area within which a site could be located (assuming that sufficient height is used) that would have a high probability of addressing the significant coverage gap and meeting the capacity objectives established by the Verizon Wireless RF (Radio Frequency) engineers.

Once a search ring is determined, Verizon Wireless' real estate specialists search within the proximity of the defined area for existing buildings, towers and other structures of sufficient height that would meet the defined objectives. If none are found, then the focus shifts to "raw land" sites. A suitable site must satisfy the technical requirements identified by the RF engineers, must be available for lease, and must have access to a road and be otherwise suitable for constructing a cell site of the required size and height. Every effort is made to use existing structures before pursuing a "raw land" build to minimize the number of towers throughout the towns being served.

After a search of the area had been completed, Verizon Wireless determined that there are no existing structures suitable for collocation with respect to its network requirements, and that collocating on the proposed Varsity Wireless communications facility at 275 Old Lancaster Road is the best solution to address the targeted coverage and capacity objectives.

6. Pertinent Site Data

Table 1 below details the site-specific information for the existing and proposed Verizon Wireless sites used to perform the coverage analysis and generate the coverage plots provided herein.

Site Name	Address	City	Location		Structure Type	Antenna Height (ft AGL)	Status
			Latitude	Longitude			
Acton South	36 Knox Trail	Acton	42.4462	-71.4271	Monopole	148	On-Air
Framingham N	2 Central Street	Framingham	42.3241	-71.4003	Smokestack	130	On-Air
Framingham Repl.	410 Brimstone Lane	Framingham	42.3467	-71.4489	Guyed Tower	90	On-Air
Hudson 2	1 Mildred Circle	Hudson	42.3872	-71.5694	Stealthpole	74	On-Air
Hudson	188 Central Street	Hudson	42.3965	-71.5854	Watertank	116	On-Air
Lincoln S	30 Lewis Street	Lincoln	42.4116	-71.3244	Unipole	105	On-Air
Marlborough DT	175 Maple Street	Marlborough	42.3411	-71.5433	Rooftop WT	106	On-Air
Marlborough E	860 Boston Post Road	Marlborough	42.3548	-71.4949	Monopole	117	On-Air
Marlborough	Arnold Road	Marlborough	42.3458	-71.5671	Watertank	108.5	On-Air
Maynard	2 Clock Tower Place	Maynard	42.4304	-71.4541	Smokestack	166	On-Air
Stow	23 Hillcrest Avenue	Stow	42.4404	-71.5155	Unipole	75	On-Air
Sudbury 2	199 Raymond Road	Sudbury	42.3583	-71.4211	Unipole	83	On-Air
Sudbury	Maynard Road (Willis Hill)	Sudbury	42.4026	-71.4337	Watertank	62	On-Air
Sudbury N	100 North Road	Sudbury	42.4189	-71.3846	Monopole	142	On-Air
Sudbury W	104 Wayside Inn Road	Sudbury	42.3585	-71.4718	Steeple	46.5	On-Air
Wayland	Boston Post Road	Sudbury	42.3639	-71.3839	Unipole	136	On-Air
Wayland S	139 Old Connecticut Path	Wayland	42.3484	-71.3514	Monopole	130	On-Air
Weston 2	235 Wellesley Street	Weston	42.3512	-71.3091	Rooftop	93	On-Air
Weston 4	1 Sudbury Rd	Weston	42.3815	-71.3219	Unipole	54	On-Air
Weston	668 South Street	Weston	42.3341	-71.3200	Lattice	147/155/147	On-Air
Weston NE	180 Boston Post Road Bypass	Weston	42.3636	-71.3066	Monopole	88	On-Air
Hudson East	71 Parmenter Road	Hudson	42.3841	-71.4931	Guyed Tower	170	On-Air
Sudbury 5	275 Old Lancaster Road	Sudbury	42.3739	-71.4253	Unipole	137	Proposed

Table 1: Verizon Wireless Site Information Used in Coverage Analysis[2]

[2] Some sites listed in this table are outside the plot view but are included for completeness of information.

7. Coverage Analysis and Propagation Plots

The signal propagation plots provided in this report show coverage for the 700 MHz frequency range and were produced using deciBel Planner™, a Windows-based RF propagation computer modeling program and network planning tool. The software takes into account the geographical features of an area, land cover, antenna models, antenna heights, RF transmitting power and receiver thresholds to predict coverage and other related RF parameters used in site design and network expansion.

The plots included as attachments show coverage based on RSRP signal strengths of -90 dBm and -95 dBm. All other areas (depicted in white) fall within coverage areas characterized by poor service quality, low data throughput, and the substantial likelihood of unreliable service.

Attachments A - E are discussed below:

- Attachment A titled "Sudbury 5 MA - Existing 700 MHz LTE Coverage" shows the existing coverage provided to central areas of Sudbury from the "On-Air" sites listed in Table 1. The green areas represent the minimum desired level of coverage for this area, whereas the orange areas represent a slightly lower signal strength. The deficient areas of coverage are defined by the unshaded or "white" areas. As shown in this plot and described in the Coverage and Capacity Objectives section of this report, much of central Sudbury is in an area of deficient coverage. These coverage gaps include Peakham Road, Hudson Road, Old Lancaster Road, and the surrounding roads, neighborhoods, businesses, and community areas in the proximity of the proposed site.
- Attachment B titled "Sudbury 5 MA - 700 MHz LTE Coverage with Proposed Site" shows the composite coverage with the proposed "Sudbury 5" facility. As shown by the additional areas of coverage, the proposed facility will provide coverage to:
  - ~ 1.4 mi along Peakham Road, west of Route 27;
  - ~ 0.7 mi along Hudson Road, west of Route 27;
  - ~1.1 mi along Old Lancaster Road, south of Hudson Road;
  - ~ 0.5 mi along Concord Road;
  - ~ 1,650 additional Sudbury residents[3] within the proximity of the proposed facility;
  - The surrounding roads, residential neighborhoods, businesses, and community areas within the proximity of the proposed site.

[3] Population counts are based upon 2010 U.S. Census residential data. Please note that this does not include any employee or visitor counts in the area.

- Attachment C titled "Sudbury 5 MA - Existing 700 MHz LTE Sector Footprints" depicts the areas primarily served by the sectors (a.k.a. signal "footprints") of the existing Verizon Wireless sites in the area, which are shown by a unique color for the particular sectors of interest. For clarity, all other sectors of less interest with respect to the proposed site are shown in gray. As demand for wireless voice and data services continues to grow, Verizon Wireless manages the footprint of each sector so that it can support the demand within the area it is primarily serving. In addition to improving coverage to the area, the proposed site is also needed to serve existing and anticipated demand in the vicinity and thereby offload some of the burden experienced by the surrounding sites. In that way, those sites will be able to more adequately serve the demand for service in the areas nearer to those surrounding sites. Please note that the outer parts of each sector footprint include areas that presently have signal strength below the targeted value required for reliable service to Verizon Wireless' customers. The fact that low-level signal is capable of reaching these areas does not mean that these areas experience adequate coverage. These unreliable areas of low signal level, however, impose a significant capacity burden on the sites primarily serving the area.
- Attachment D titled "Sudbury 5 MA - 700 MHz LTE Sector Footprints with Proposed Site" shows the composite coverage with the overall footprint of the proposed facility in blue. As shown in this map, the proposed "Sudbury 5" facility is an effective solution to provide capacity relief to the area, particularly to the overloaded "Sudbury 2" alpha sector (red), "Sudbury" beta sector (orange), and "Framingham Repl." alpha sector (yellow). The proposed facility is located within the area of deficient coverage, allowing it to distribute the traffic load within the gap across multiple sectors, and provide a dominant server to this pocket of heavy usage in central Sudbury. Table 2 below details the capacity relief in terms of population and geographic area based on the sector footprints shown in Attachments C and D.

Sector	*Current*		*With Proposed*		*Offload Summary*	
	Pops	Area (mi^2)	Pops	Area (mi^2)	Pops Offloaded	Area Offloaded (mi^2/%)
Sudbury 2 Alpha	1240	1.53	166	0.45	*1074 (86.61%)*	*1.08 (70.59%)*
Sudbury Beta	2327	3.01	1733	2.39	*594 (25.53%)*	*0.62 (20.6%)*
Framingham Repl. Alpha	3231	3.4	2064	2.35	*1167 (36.12%)*	*1.05 (30.88%)*

Table 2: Capacity Offload Summary[4]

- Attachment E titled "Sudbury 5 – Area Terrain Map" details the terrain features around the proposed "Sudbury 5" site. These terrain features play a key role dictating both the unique coverage area served from a given location, and the coverage gaps within the network. This map is included to provide a visual representation of the terrain variations that must be considered when determining the appropriate location and design of a proposed wireless facility. The dark and light blue shades correspond to lower elevations, whereas the yellow, red, and white shades indicate higher elevations.

[4] Population counts are based upon 2010 U.S. Census residential data. Please note that this does not include any employee or visitor counts in the area.

8. Certification of Non-Interference

Verizon Wireless certifies that the proposed facility will not cause interference to any lawfully operating emergency communication system, television, telephone or radio, in the surrounding area. The FCC has licensed Verizon Wireless to transmit and receive in the Upper C-Block of the 700 MHz band, B Block of the Cellular (850 MHz) band, the F, C3, and C4 Blocks of the PCS (1900 MHz) band, and the A and B Blocks of the AWS (2100 MHz) band of the RF spectrum. As a condition of the FCC licenses, Verizon Wireless is prohibited from interfering with other licensed devices that are being operated in a lawful manner. Furthermore, no emergency communication system, television, telephone, or radio is licensed to operate on these frequencies, and therefore interference is highly unlikely.

9. Summary

In undertaking its build-out of 4G LTE service in Middlesex County, Verizon Wireless has determined that an additional facility is needed to provide reliable service and capacity to central areas of Sudbury, MA. Verizon Wireless determined that constructing a wireless communications facility at 275 Old Lancaster Road in Sudbury at an antenna centerline of 137 feet (AGL) will provide additional coverage and capacity needed in the targeted areas including key roadways such as Peakham Road, Hudson Road, and the surrounding roads, neighborhoods, businesses, and community areas. Without the installation of the proposed site, Verizon Wireless will be unable to improve and expand their existing 4G LTE wireless communication services in this area of Sudbury; therefore, Verizon Wireless respectfully requests that the Town of Sudbury act favorably upon the proposed facility.

10. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate.

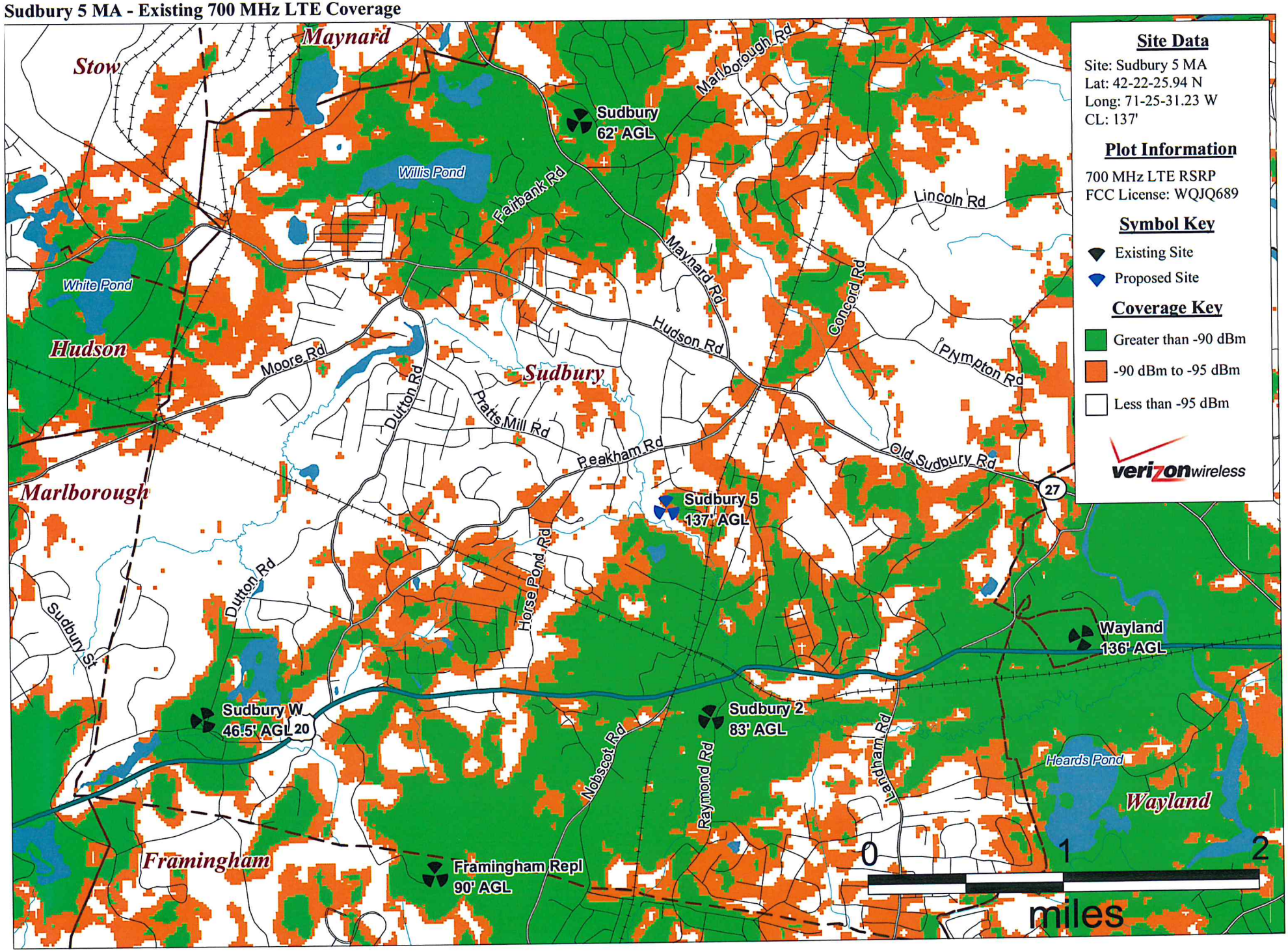
Keith Vellante

Keith Vellante
RF Engineer
C Squared Systems, LLC

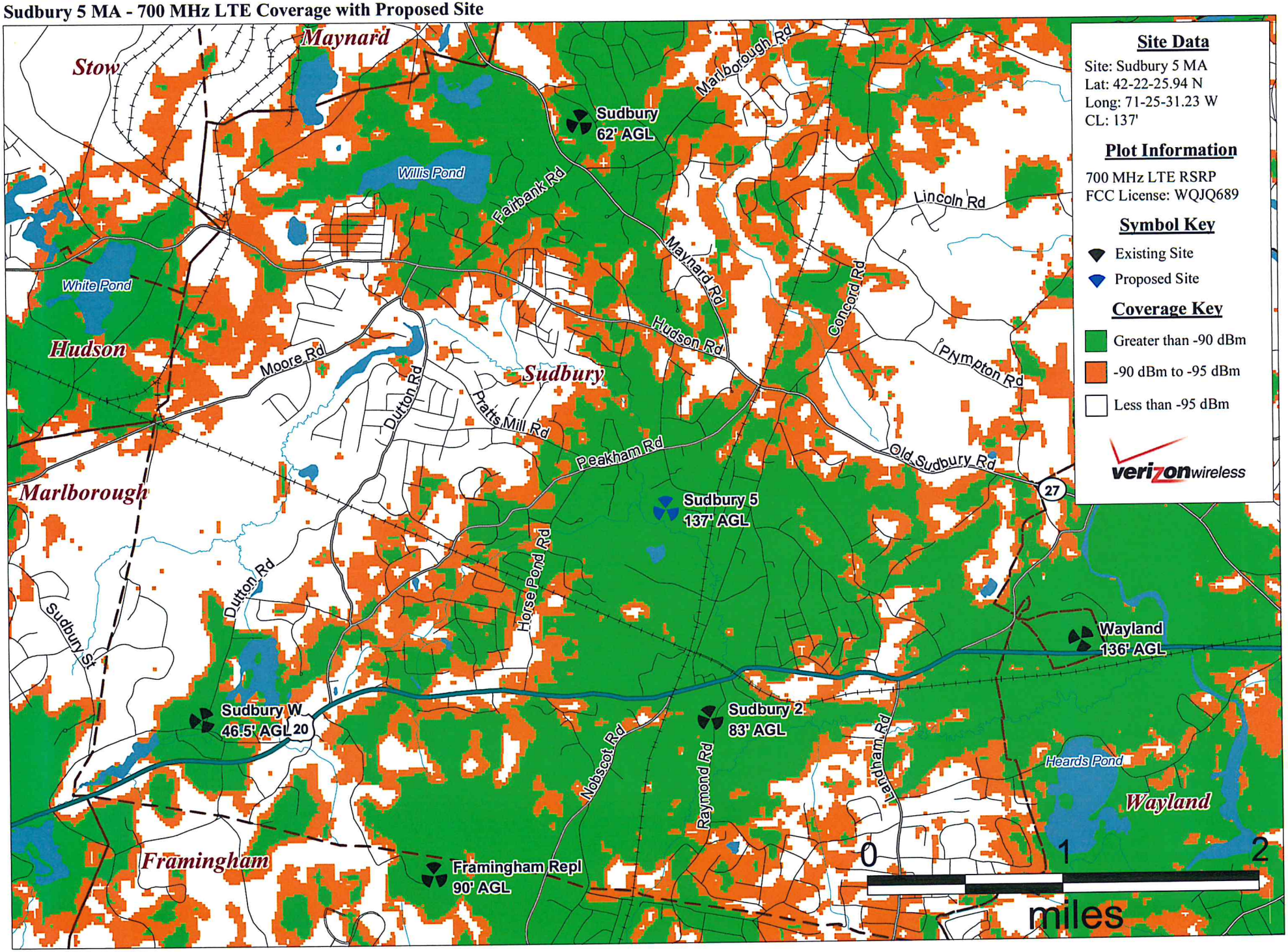
September 29, 2015
Date

11. Attachments

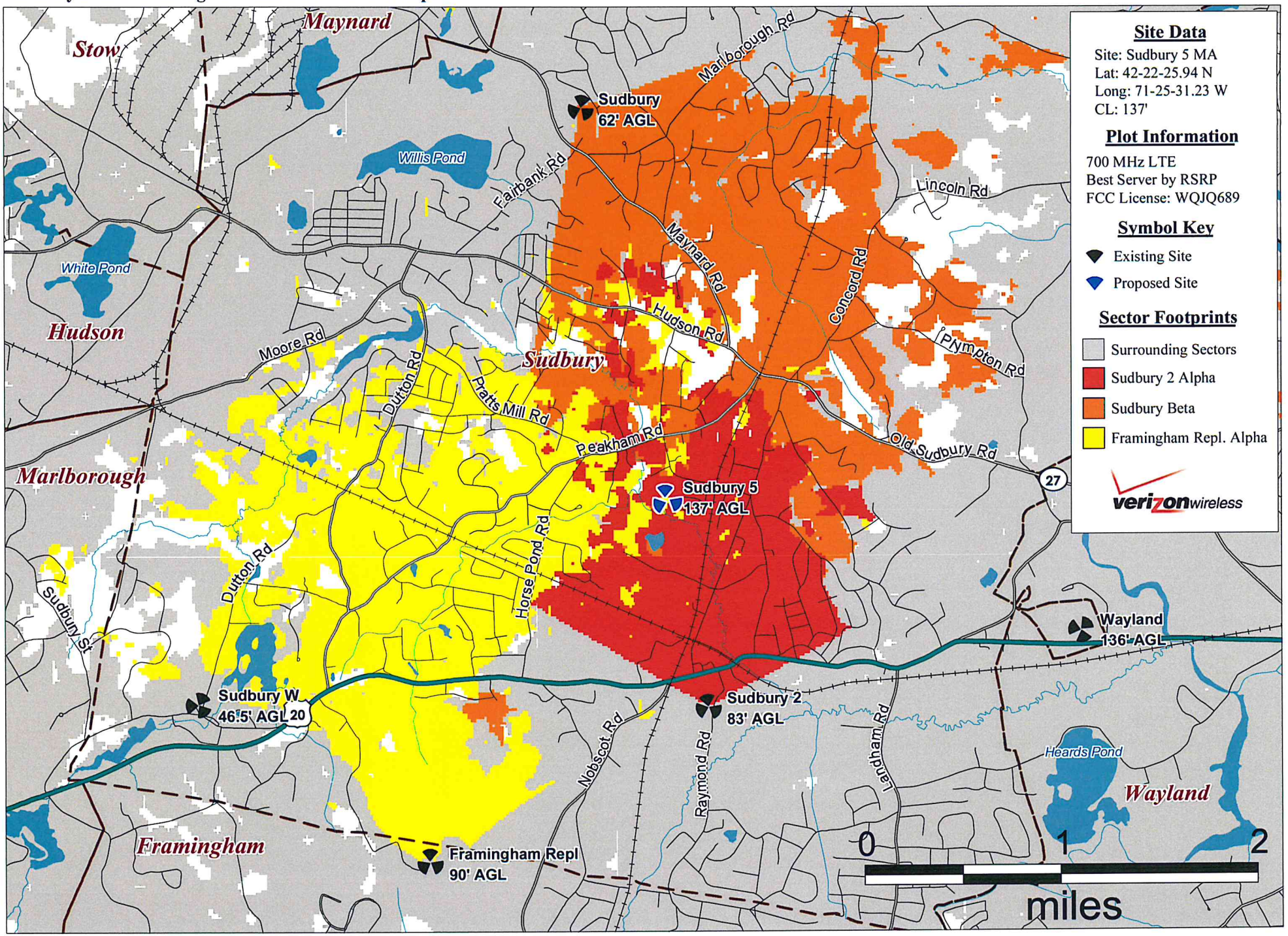
Attachment A:
Sudbury 5 MA - Existing 700 MHz LTE Coverage



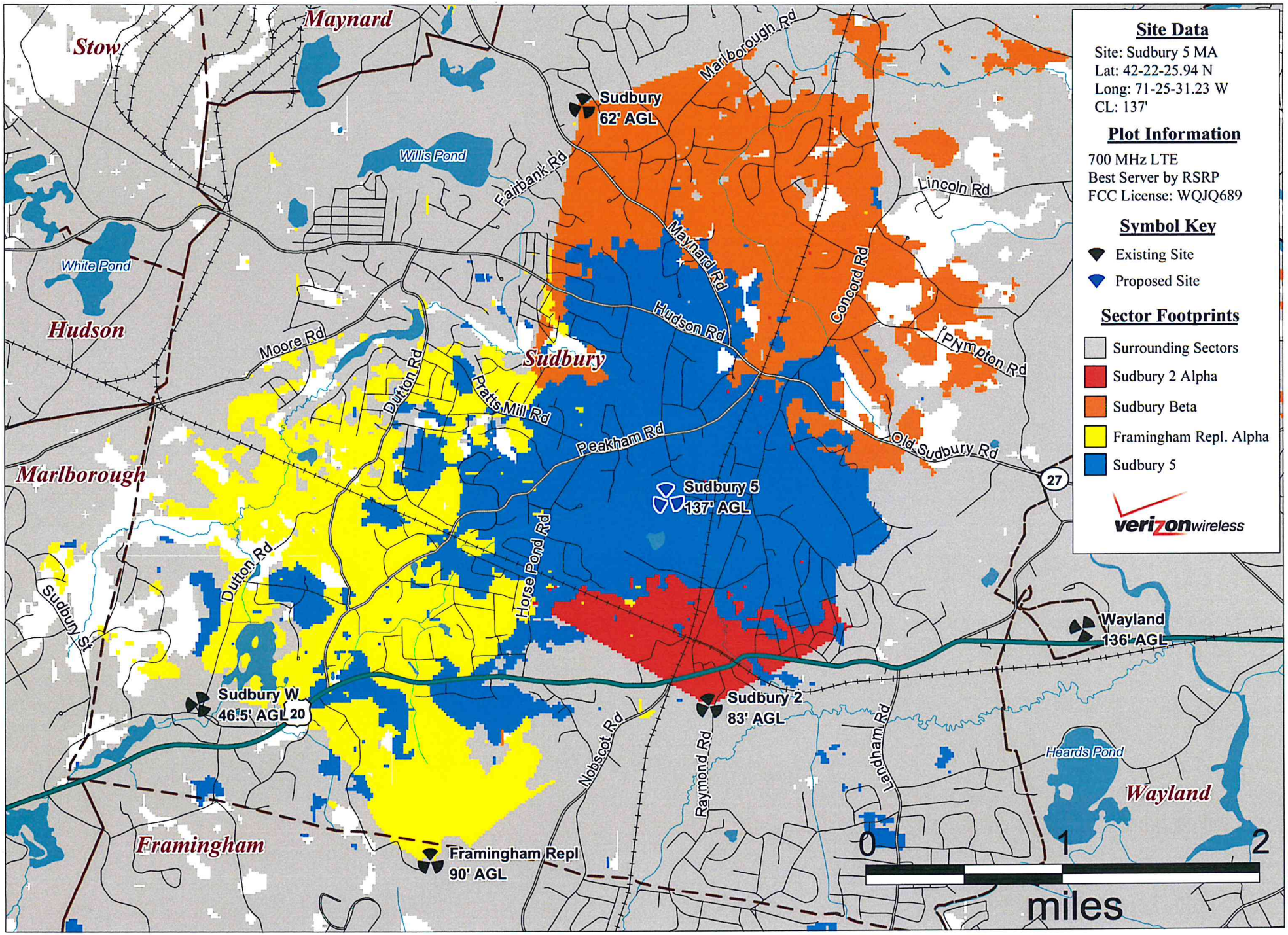
Attachment B:
Sudbury 5 MA - 700 MHz LTE Coverage with Proposed Site



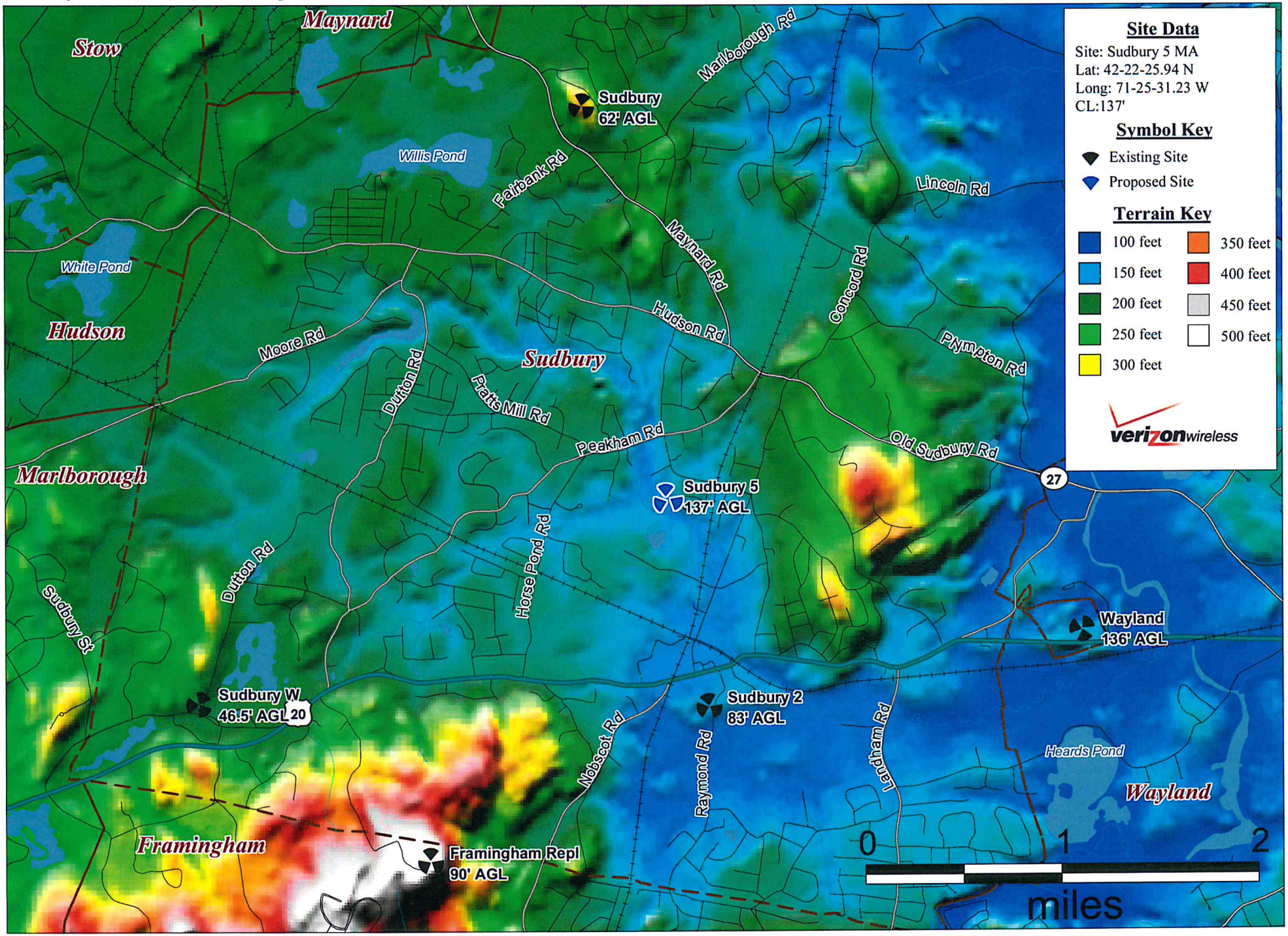
Attachment C:
Sudbury 5 MA - Existing 700 MHz LTE Sector Footprints



Attachment D:
Sudbury 5 MA - 700 MHz LTE Sector Footprints with Proposed Site



Attachment E:
Sudbury 5 MA - Area Terrain Map



2

DONALD L. HAES, JR., PH.D., CHP

Radiation Safety Specialist

MA Radiation Control Program Health Physics Services Provider Registration #65-0017

PO Box 368, Hudson, NH 03051 603-303-9959 Email: donald_haes_chp@myfairpoint.net

October 1, 2015

RE: Installation of radio base station antennas and associated equipment for the proposed Varsity Wireless personal wireless services facility to be located at 275 Old Lancaster Road, Sudbury, MA.

PURPOSE

I have reviewed the information pertinent to the proposed installation at the above location. To determine regulatory compliance, theoretical calculations of maximal radio-frequency (RF) fields have been prepared. The physical conditions are that Varsity Wireless proposes to install a personal wireless services (PWS) facility including a 140' monopole at 275 Old Lancaster Road, Sudbury, MA (See Figure 1). The monopole is proposed to host Verizon Wireless' directional panel antennas in three different "arrays" aimed 120° apart. The monopole will be designed to accommodate Municipal communication antennas as well.

This report considers the contributions of the **proposed** Verizon Wireless and Municipal transmitters operating at their FCC-licensed capacity. The calculated values of RF fields are presented as a percent of current Maximum Permissible Exposures (%MPE) as adopted by the Federal Communications Commission (FCC),[i,ii] and those established by the Massachusetts Department of Public Health (MDPH).[iii]

SUMMARY

Theoretical RF field calculations data indicate the summation of the proposed Verizon Wireless PWS and Municipal communications RF contributions would be within the established RF exposure guidelines. This includes all publically accessible areas, and the surrounding neighborhood in general. The results support compliance with the pertinent sections of the Sudbury Zoning Bylaws (§ 4300. WIRELESS SERVICES OVERLAY DISTRICT).

Based on the results of the theoretical RF fields I have calculated, it is my expert opinion that this facility would comply with all regulatory guidelines for RF exposure with the proposed Verizon Wireless and Municipal antenna and transmitter installations.

Note: The analyses, conclusions and professional opinions are based upon the precise parameters and conditions of this particular site; **275 Old Lancaster Road, Sudbury, MA**. Utilization of these analyses, conclusions and professional opinions for any personal wireless services installation, existing or proposed, other than the aforementioned has not been sanctioned by the author, and therefore should not be accepted as evidence of regulatory compliance.

EXPOSURE LIMITS AND GUIDELINES

RF exposure guidelines enforced by the FCC were established by the American National Standards Institute (ANSI)[iv] and the National Council on Radiation Protection and Measurement (NCRP).[v] The RF exposure guidelines are listed for RF workers and members of the public. The applicable FCC RF exposure guidelines for the public are listed in Table 1, and depicted in Figure 1. All listed values are intended to be averaged over any contiguous 30 minute period.

Table 1: Maximum Permissible Exposure (MPE) Values in Public Areas

Frequency Bands	Electric Fields	Magnetic Fields	Equivalent Power Density
0.3 – 1.34 MHz	614 (V/m)	1.63 (A/m)	(100) mW/cm^2
1.34 - 30 MHz	824/f (V/m)	2.19/f (A/m)	(100) mW/cm^2
30 - 300 MHz	27.5 (V/m)	0.073 (A/m)	0.2 mW/cm^2
300 - 1500 MHz	--	--	f/1500 mW/cm^2
1500 - 100,000	--	--	1.0 mW/cm^2

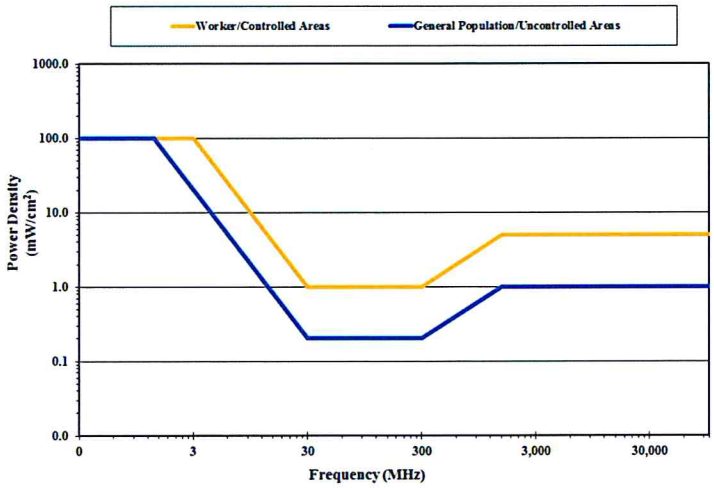


Figure 1: FCC Limits for Maximum Permissible Exposure (MPE)

NOTE: FCC 5% Rule – At multiple transmitter sites, actions necessary to bring the area into compliance with the RF exposure guidelines are the shared responsibility of all licensees whose transmitters produce RF field levels in excess of 5% of the applicable FCC MPEs.

PERTINENT SECTIONS OF THE SUDBURY ZONING BYLAWS

§ 4300. WIRELESS SERVICES OVERLAY DISTRICT

4372. The following information prepared by one or more professional engineers:

a. a description of the facility and the technical, economic and other reasons for the proposed location, height and design.

b. confirmation that the facility complies with all applicable Federal and State standards.

c. a description of the capacity of the facility including the number and type of panels, antenna and/or transmitter receivers that it can accommodate and the basis for these calculations.

4373. If applicable, a written statement that the proposed facility complies with, or is exempt from applicable regulations administered by the Federal Aviation Administration (FAA), Federal Communications Commission (FCC), Massachusetts Aeronautics Commission and the Massachusetts Department of Public Health.

Figure 2: Proposed Location (square) of PWS Compound; 275 Old Lancaster Road, Sudbury, MA
(Picture courtesy Google Earth©2015 and may not represent current conditions)

THEORETICAL RF FIELD CALCULATIONS - GROUND LEVELS

METHODOLOGY

These calculations are based on what are called "worst-case" estimates. That is, the estimates assume 100% use of all transmitters simultaneously. Additionally, the calculations make the assumption that the surrounding area is a flat plane. The resultant values are thus conservative in that they over predict actual resultant power densities.

The calculations are based on the following information (See Table 2 data):

1. Effective Radiated Power (ERP).
2. Antenna height (LOWEST centerline, above ground level (AGL)).
3. Antenna vertical radiation patterns; the source of the negative gain (G) values. "Directional" antennas are designed to focus the RF signal, resulting in "patterns" of signal loss and gain. Antenna radiation patterns display the loss of signal strength relative to the direction of propagation due to elevation angle changes. The gain is expressed as "G^E".

   Note: "G" is a unitless factor usually expressed in decibels (dB); where $G = 10^{(dB/10)}$
   For example: for an antenna *gain* of 3 dB, the net factor $(G) = 10^{(3/10)} = 2$
   For an antenna *loss* of -3 dB, the net factor $(G) = 10^{(-3/10)} = 0.5$

To determine the magnitude of the RF field, the power density (S) from an isotropic RF source is calculated, making use of the power density formula as outlined in FCC's OET Bulletin 65, Edition 97-01: [vi]

$$S = \frac{P \cdot G}{4 \cdot \pi \cdot R^2}$$

Where:
- $P \rightarrow$ Power to antenna (watts)
- $G \rightarrow$ Gain of antenna
- $R \rightarrow$ Distance (range) from antenna source to point of intersection with the ground (feet)
- $R^2 = (\text{Height})^2 + (\text{Horizontal distance})^2$

Since: $P \cdot G = EIRP$ (Effective Isotropic Radiated Power) for broadcast antennas, the equation can be presented in the following form:

$$S = \frac{EIRP}{4 \cdot \pi \cdot R^2}$$

In the situation of off-axis power density calculations, apply the negative elevation gain (G^E) value from the vertical radiation patterns with the following formula:

$$S = \frac{EIRP \cdot G^E}{4 \cdot \pi \cdot R^2}$$

Ground reflections may add in-phase with the direct wave, and essentially double the electric field intensity. Because power density is proportional to the *square* of the electric field, the power density may quadruple, that is, increase by a factor of four (4). Since ERP is routinely used, it is necessary to convert ERP into EIRP by multiplying by the factor of 1.64 (the gain of a half-wave dipole relative to an isotropic radiator). Therefore, downrange power density estimates can be calculated by using the formula:

$$S = \frac{4 \cdot (ERP \cdot 1.64) \cdot G^E}{4 \cdot \pi \cdot R^2} = \frac{ERP \cdot 1.64 \cdot G^E}{\pi \cdot R^2} = \frac{0.522 \cdot ERP \cdot G^E}{R^2}$$

To calculate the % MPE, use the formula:

$$\%\ MPE = \frac{S}{MPE} \cdot 100$$

The results of the calculations for the potential RF emissions resulting from the proposed Verizon Wireless PWS and Municipal communication antennas are depicted in Figure 3 as plotted against linear distance from the base of the monopole. Note that the values have been calculated for a height of 6' AGL in accordance with regulatory rationale. Also depicted on the graphs are values for a height of 16' AGL (height of a typical 2nd story). A logarithmic scale was used to plot the calculated theoretical %MPE values in order to compare with the MPE of 100%, which is so much larger that it would be off the page in a linear plot. The curves are variable due to the application of the vertical radiation patterns.

OBSERVATIONS IN CONSIDERATION WITH FCC RULES §1.1307(B) & §1.1310

Will it be physically possible to stand next to or touch any omnidirectional antenna and/or stand in front of a directional antenna?

NO; access to the monopole will be restricted, and the site will adhere to RF safety guidelines regarding the transmitting antennas, including appropriate signage.

ANTENNA INVENTORY

Table 2: Proposed and/or Possible Antenna Inventory
Monopole at 275 Old Lancaster Road, Sudbury, MA

Antenna Centerline (AGL)	Typical Antenna Type	Typical Parameters: ERP & Tx Frequencies	Typical Use
Proposed by Verizon Wireless			
135'	Panel Antenna "Arrays" Three Sectors Of Up To Four Panels Each	2625 watts ERP in 700 MHz band (Upper C-Block)	LTE
		2652 watts ERP in 850 MHz band (B Block)	Cellular
		3708 watts ERP in 1900 MHz band (F, C3, and C4 Blocks)	PCS
		3883 watts ERP in 2100 MHz band (A and B Blocks)	AWS
Proposed Municipal Services			
117'	2 X 2 - 6' Diameter terrestrial radio antenna	4467 watts ERP in 2-18 GHz band	Terrestrial Radio Communication

Table Notes:

PCS: Personal Communication System
LTE: Long Term Evolution ("4G")
AWS: Advanced Wireless Services

RESULTS OF THEORETICAL RF FIELD CALCULATIONS

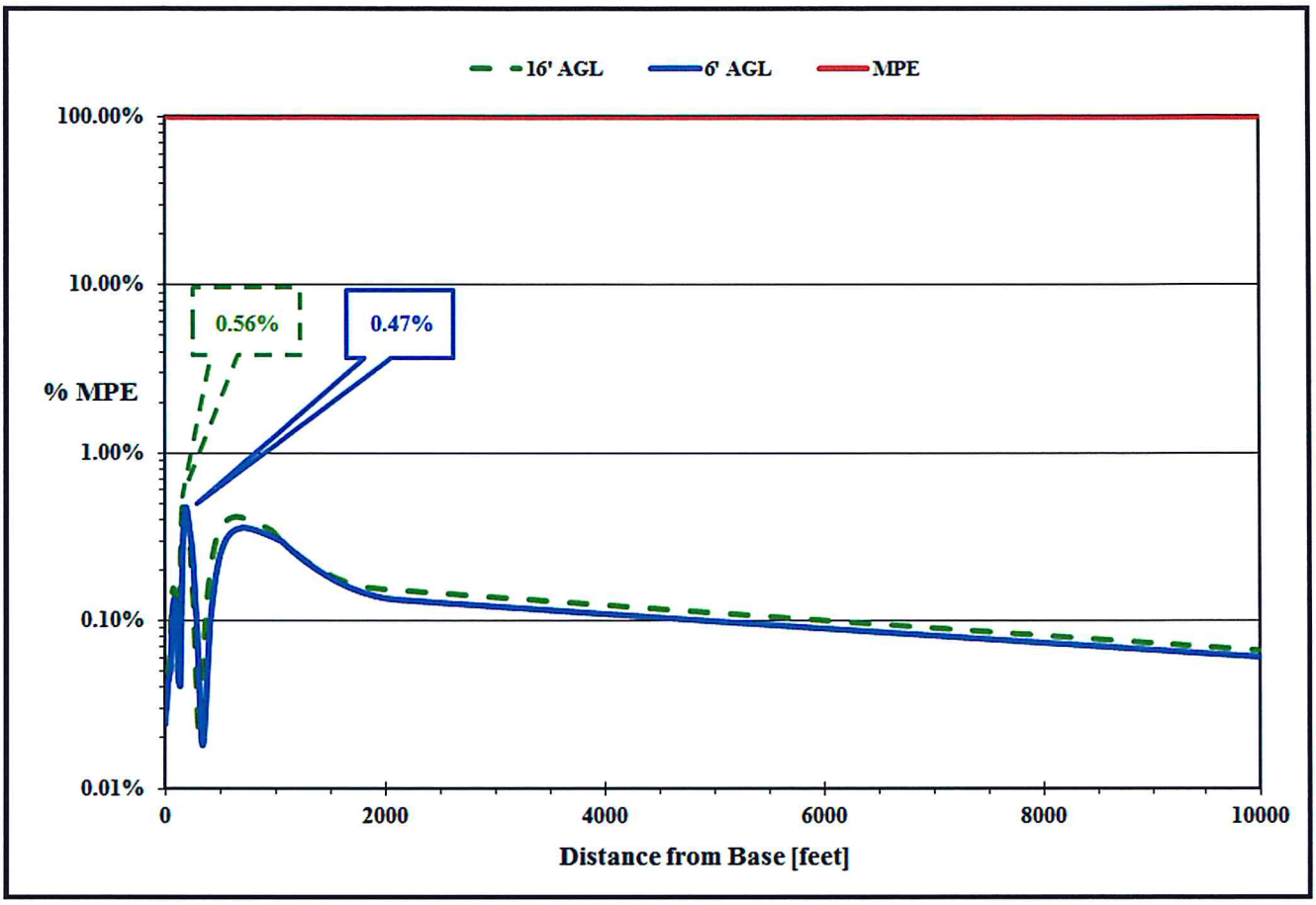


Figure 3: Theoretical Cumulative Maximum Percent MPE - vs. – Distance (Municipal and Verizon Wireless RF Contributions)

CONCLUSION

Theoretical RF field calculations data indicate the summation of the proposed Verizon Wireless PWS and Municipal communications RF contributions would be within the established RF exposure guidelines. This includes all publically accessible areas, and the surrounding neighborhood in general. The results support compliance with the pertinent sections of the Sudbury Zoning Bylaws (§ 4300. WIRELESS SERVICES OVERLAY DISTRICT).

The number and duration of calls passing through PWS facilities cannot be accurately predicted. Thus, in order to estimate the highest RF fields possible from operation of these installations, the maximal amount of usage was considered. Even in this so-called "worst-case", the resultant increase in RF field levels are far below established levels considered safe.

Based on the results of the theoretical RF fields I have calculated, it is my expert opinion that this facility would comply with all regulatory guidelines for RF exposure with the proposed Verizon Wireless and Municipal antenna and transmitter installations.

Feel free to contact me if you have any questions.

Sincerely,

Donald L. Haes, Jr., Ph.D
Certified Health Physicist

Note: The analyses, conclusions and professional opinions are based upon the precise parameters and conditions of this particular site; **275 Old Lancaster Road, Sudbury, MA**. Utilization of these analyses, conclusions and professional opinions for any personal wireless services installation, existing or proposed, other than the aforementioned has not been sanctioned by the author, and therefore should not be accepted as evidence of regulatory compliance.

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MA Radiation Control Program Health Physics Services Provider Registration #65-0017
PO Box 368, Hudson, NH 03051 603-303-9959 Email: donald_haes_chp@myfairpoint.net

STATEMENT OF CERTIFICATION

1. I certify to the best of my knowledge and belief, the statements of fact contained in this report are true and correct.

2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are personal, unbiased professional analyses, opinions and conclusions.

3. I have no present or prospective interest in the property that is the subject of this report and I have no personal interest or bias with respect to the parties involved.

4. My compensation is not contingent upon the reporting of a predetermined energy level or direction in energy level that favors the cause of the client, the amount of energy level estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.

5. This assignment was not based on a requested minimum environmental energy level or specific power density.

6. My compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.

7. The consultant has accepted this assessment assignment having the knowledge and experience necessary to complete the assignment competently.

8. My analyses, opinions, and conclusions were developed and this report has been prepared, in conformity with the *American Board of Health Physics* (ABHP) statements of standards of professional responsibility for Certified Health Physicists.

Date: October 1, 2015

Donald L. Haes, Jr., Ph.D
Certified Health Physicist

ENDNOTES

[i]. Federal Register, Federal Communications Commission Rules; *Radiofrequency radiation; environmental effects evaluation guidelines* Volume 1, No. 153, 41006-41199, August 7, 1996. (47 CFR Part 1; Federal Communications Commission).

[ii]. Telecommunications Act of 1996, 47 USC; Second Session of the 104th Congress of the United States of America, January 3, 1996.

[iii]. 105 CMR 122.000: Massachusetts Department of Public Health, *Non-Ionizing Radiation Limits for: The General Public from Non-Occupational Exposure to Electromagnetic Fields, Employees from Occupational Exposure to Electromagnetic Fields, and Exposure from Microwave Ovens*.

[iv]. ANSI/IEEE C95.1-1999: American National Standard, *Safety levels with respect to human exposure to radio frequency electromagnetic fields, from 3 KHz to 300 GHz* **(Updated in 2010)**.

[v]. National Council on Radiation Protection and Measurements (NCRP); *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*, NCRP Report 86, 1986.

[vi]. OET Bulletin 65: Federal Communications Commission Office of Engineering and Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*; Edition 97-01, August 1999.

3

Prepared For:
Varsity Wireless
Site Name:
VW-MA-0130A
Sudbury DPW
Site Address:
275 Old Lancaster Road
Sudbury, MA 01776

Prepared By:
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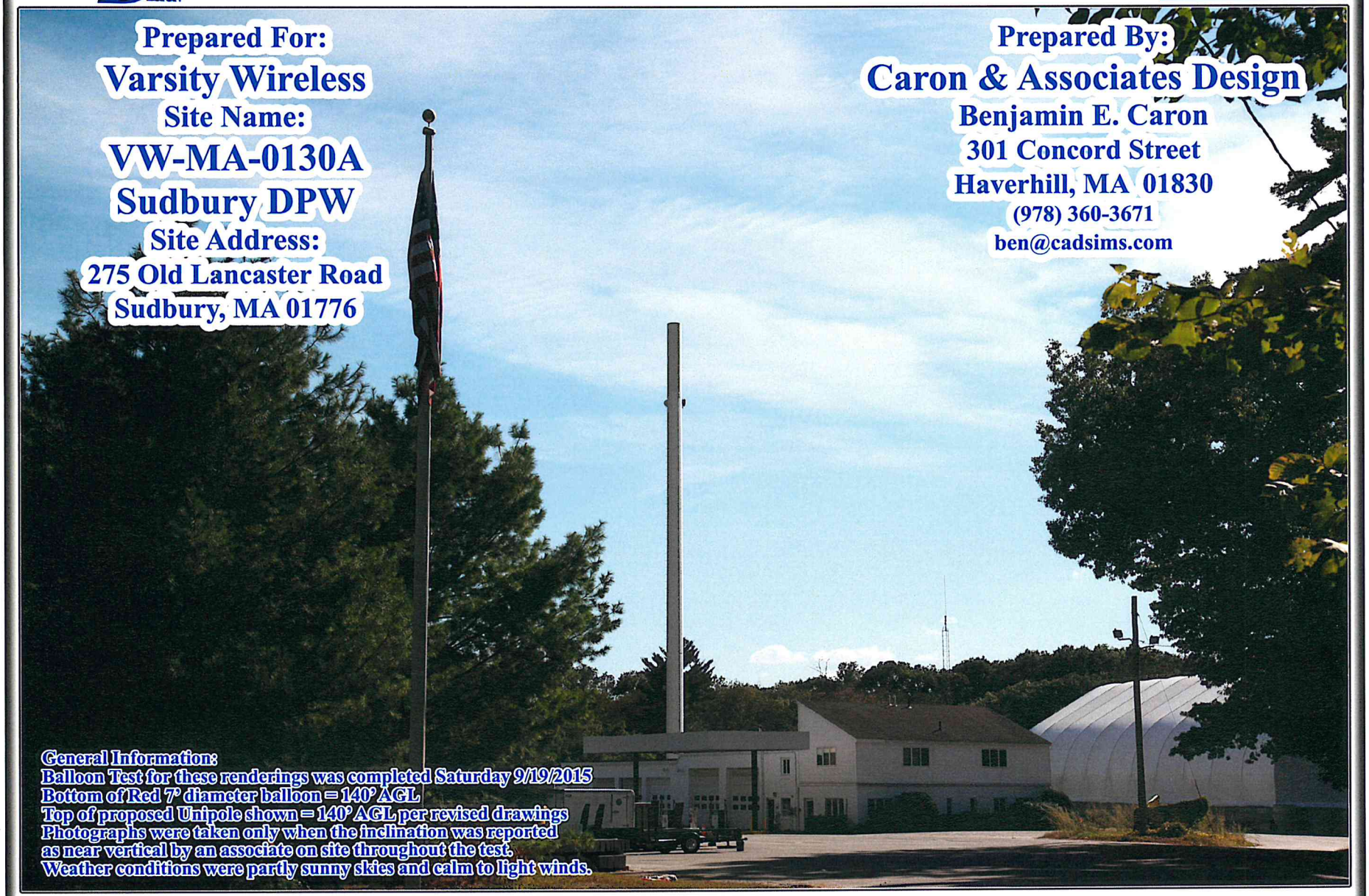


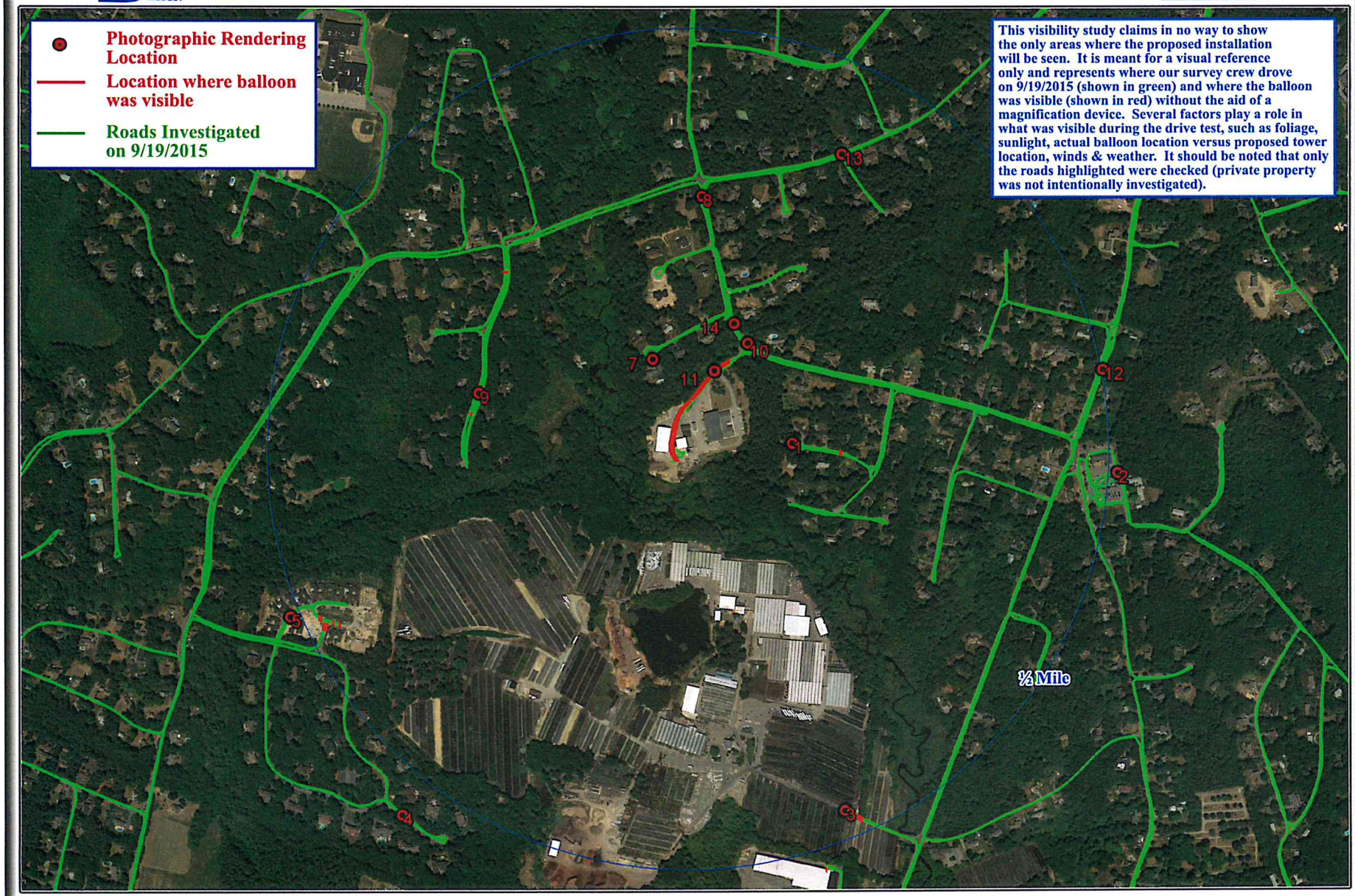
General Information:
Balloon Test for these renderings was completed Saturday 9/19/2015
Bottom of Red 7' diameter balloon = 140' AGL
Top of proposed Unipole shown = 140' AGL per revised drawings
Photographs were taken only when the inclination was reported as near vertical by an associate on site throughout the test.
Weather conditions were partly sunny skies and calm to light winds.

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)
Photographic Renderings

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com



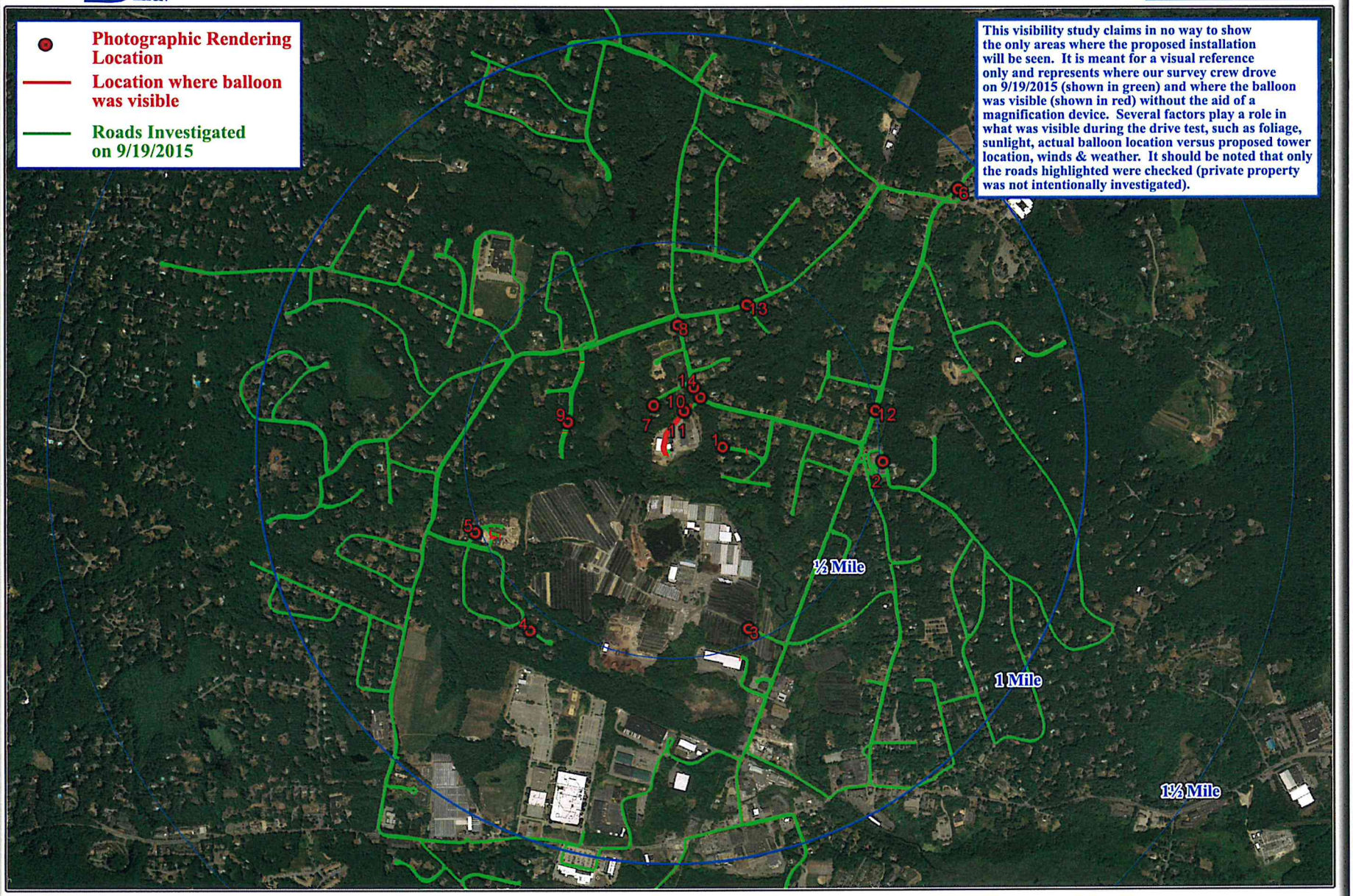
For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Driven/Verified Visibility Map
½ Mile Radius

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com



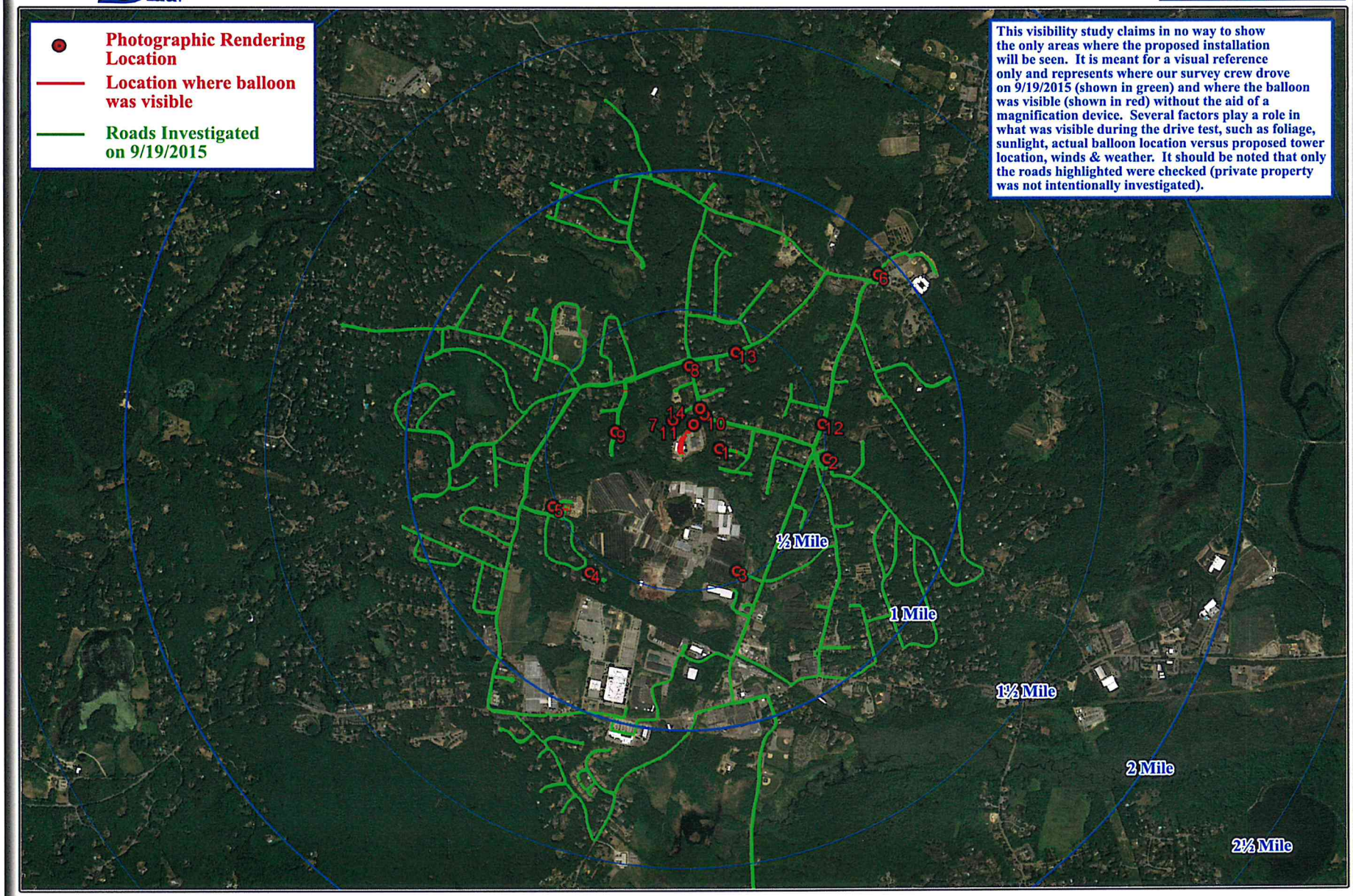
For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Driven/Verified Visibility Map
1 Mile Radius

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com



For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Driven/Verified Visibility Map
1 ½ Mile Radius

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Existing Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 1 ~ 50mm ~ 670'+/- (0.13mi) Away
Near 22 Pineridge Road

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Proposed Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 1 ~ 50mm ~ 670'+/- (0.13mi) Away

Near 22 Pineridge Road

Created By: Ben Caron & Mike Barreiros

Caron & Associates Design

(978) 360-3671 info@cadsims.com

Existing/Proposed Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 2 ~ 65mm ~ 2714'+/- (0.51mi) Away From Our Lady of Fatima Church

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Existing Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 3 ~ 65mm ~ 2462'+/- (0.47mi) Away From Codjer Lane

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Proposed Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 3 ~ 65mm ~ 2462'+/- (0.47mi) Away From Codjer Lane

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Existing Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 4 ~ 65mm ~ 2891'+/- (0.55mi) Away
Near 4 Trailside Drive

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Proposed Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 4 ~ 65mm ~ 2891'+/- (0.55mi) Away
Near 4 Trailside Drive

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Existing Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 5 ~ 65mm ~ 2686'+/- (0.51mi) Away
Near Crossing of Tall Pine Drive & Bridle Path

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Proposed Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 5 ~ 65mm ~ 2686'+/- (0.51mi) Away
Near Crossing of Tall Pine Drive & Bridle Path

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Existing/Proposed Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 6 ~ 85mm ~ 4948'+/- (0.94mi) Away
Near Sudbury Town Hall

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Existing Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 7 ~ 50mm ~ 614'+/- (0.12mi) Away
Near 24 Wildwood Lane

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Proposed Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 7 ~ 50mm ~ 614'+/- (0.12mi) Away
Near 24 Wildwood Lane

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Caron & Associates Design
(978) 360-3671 info@cadsims.com

Existing/Proposed Conditions

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Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 8 ~ 50mm ~ 1599'+/- (0.30mi) Away
Near 317 Old Lancaster Road

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Existing Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 9 ~ 50mm ~ 1351'+/- (0.26mi) Away
Near 38 Forest Street

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Proposed Conditions

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Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

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Existing Conditions

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Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 10 ~ 50mm ~ 781'+/- (0.15mi) Away
Across from Public Works Department

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Proposed Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

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Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 11 ~ 50mm ~ 535'+/- (0.10mi) Away From Public Works Department

Created By: Ben Caron & Mike Barreiros
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(978) 360-3671 info@cadsims.com

Proposed Conditions

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Existing/Proposed Conditions

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Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 12 ~ 65mm ~ 2666'+/- (0.50mi) Away
Across from 199 Concord Road

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

Existing/Proposed Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 13 ~ 65mm ~ 2098'+/- (0.40mi) Away

Near 541 Peakham Road

Created By: Ben Caron & Mike Barreiros

Caron & Associates Design

(978) 360-3671 info@cadsims.com

Existing/Proposed Conditions

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Photo Location 14 ~ 50mm ~ 857'+/- (0.16mi) Away
Near 286 Old Lancaster Road

Created By: Ben Caron & Mike Barreiros
Caron & Associates Design
(978) 360-3671 info@cadsims.com

For visual reference only. Actual visibility is dependent upon weather conditions, season, sunlight, and viewer location.

Based upon Rev. 2 Dwgs by Hudson Design dated: 9/08/2015

Sudbury DPW ~ VW-MA-0130A ~ (9/24/2015)

Balloons Used for Test Completed on Saturday 9-19-2015

Flown from 7:20am to 3:50pm

Created By: Ben Caron & Mike Barreiros

Caron & Associates Design

(978) 360-3671 info@cadsims.com

4

NORTHEAST LAND & WATER, LLC

131 WEST MAIN STREET, SUITE 327, ORANGE, MA 01364 (413) 374-887 MACLEODALEC@GMAIL.COM

June 18, 2015

Dan Stasz, RPLS
Northeast Survey Consultants, PC
P.O. Box 109
Easthampton, MA 01027

RE: *Site Investigation and Resource Area Delineation, 275 Old Lancaster Rd., Sudbury, MA*

Dear Mr. Stasz:

On Thursday, May 28, 2015, Northeast Land & Water, LLC visited a potential cell tower site located within the Town offices and DPW complex at 275 Old Lancaster Road in Sudbury, Mass. to determine whether areas subject to protection under the Massachusetts Wetlands Protection Act, the Sudbury Wetlands Administration Bylaw, and other pertinent environmental regulations are present within and around the parcel. We have also reviewed relevant sources of information to support and enhance our findings regarding the regulatory context within which projects might be pursued on this land.

The precise location of the project area is within the DPW portion of the parcel occupied by both the Town offices and the DPW complex (Figure 1: topographic locus map, Figure 2: aerial view). This is a large and intensively utilized area bounded by the perennial Hop Brook to the west, an un-named intermittent tributary to Hop Brook to the north, a thoroughly vegetated stormwater basin to the south and Old Lancaster Road to the east. Hop Brook and its tributary have wetland areas associated with them. The wetland boundaries have been delineated using consecutively numbered blue flagging. The Bank of the tributary and the Mean Annual High Water elevation of Hop Brook were flagged using consecutively numbered red flagging.

Please note that permitting under the Sudbury Wetlands Administration Bylaw of projects within jurisdictional areas involves additional filing fees and may require a peer review fee, the amount of which is based upon the cost of the project. A Notice of Intent for a commercial project begins with a $500.00 application fee. Other fees, including the state application fee, may apply as well.

The online Soil Survey for Middlesex County (soils report included) shows the soils beneath the proposed tower location to be Windsor loamy sand, 0 – 3% slopes (Unit 255A). This is a very deep, excessively drained soil formed in sandy outwash. The adjacent soil associated with Hop Brook is Freetown muck, 0 – 1% slopes (Unit 52A). This is a hydric soil. Field observations showed that the Soil Survey is accurate to at least the usual resolution of soil mapping.

The Natural Heritage Atlas (Online Edition, Figure 3) shows that the potential lease area is not within any areas shown to be mapped priority and/or rare species habitat.

Floodplain does not exist within the actual potential project location, which is higher in elevation than the elevation of the adjacent mapped floodplain associated with Hop Brook (about 139 feet above MSL).

We hope this information is useful to you. Please call if you have any further questions.

Sincerely,

Alec MacLeod, Principal
Northeast Land & Water, LLC

Figure 1. Locus. USGS Topographic Map

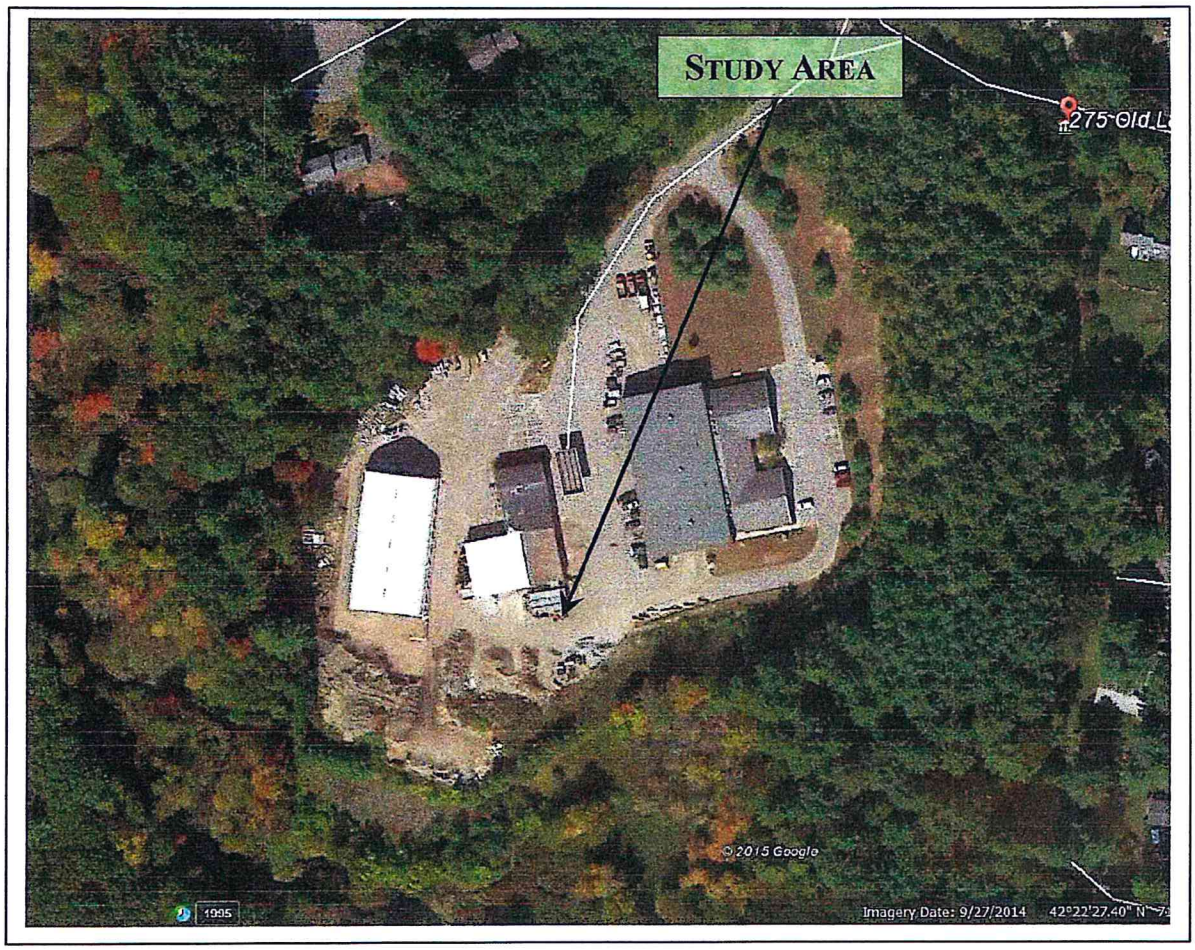
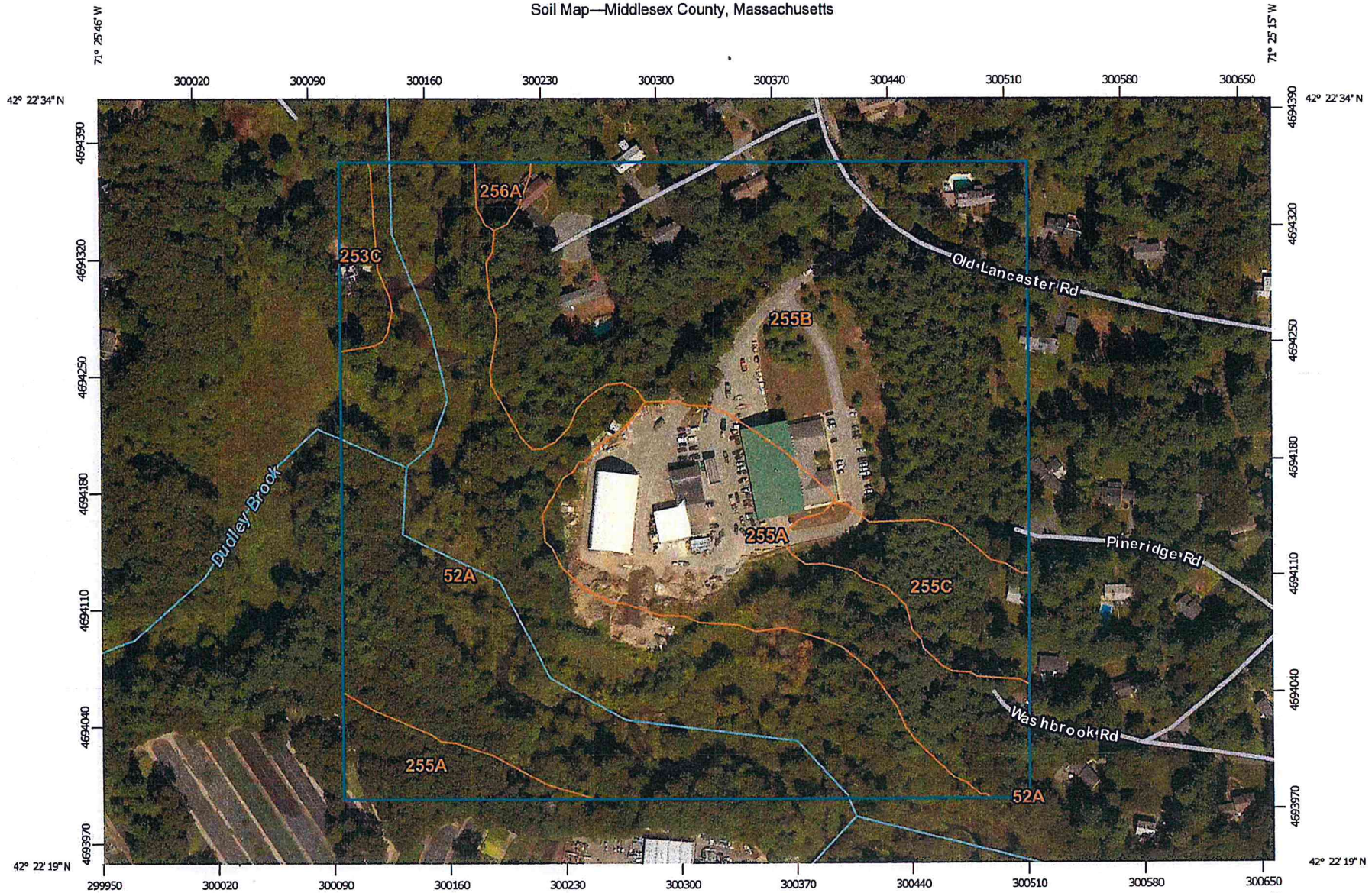


Figure 2. Aerial view of the study area (GoogleEarth)

Figure 3. Natural Heritage Atlas, online edition. Green hatch marks indicate an ACEC.

Data source: MassGIS, Commonwealth of Massachusetts Executive Office of Environmental Affairs, NHESP, Estimated Habitats of Rare Wildlife and Certified Vernal Pools. For use with the Massachusetts Wetlands Protection Act.

Soil Map—Middlesex County, Massachusetts



Map Scale: 1:3,230 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 45 90 180 270

Feet
0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 14, Sep 19, 2014

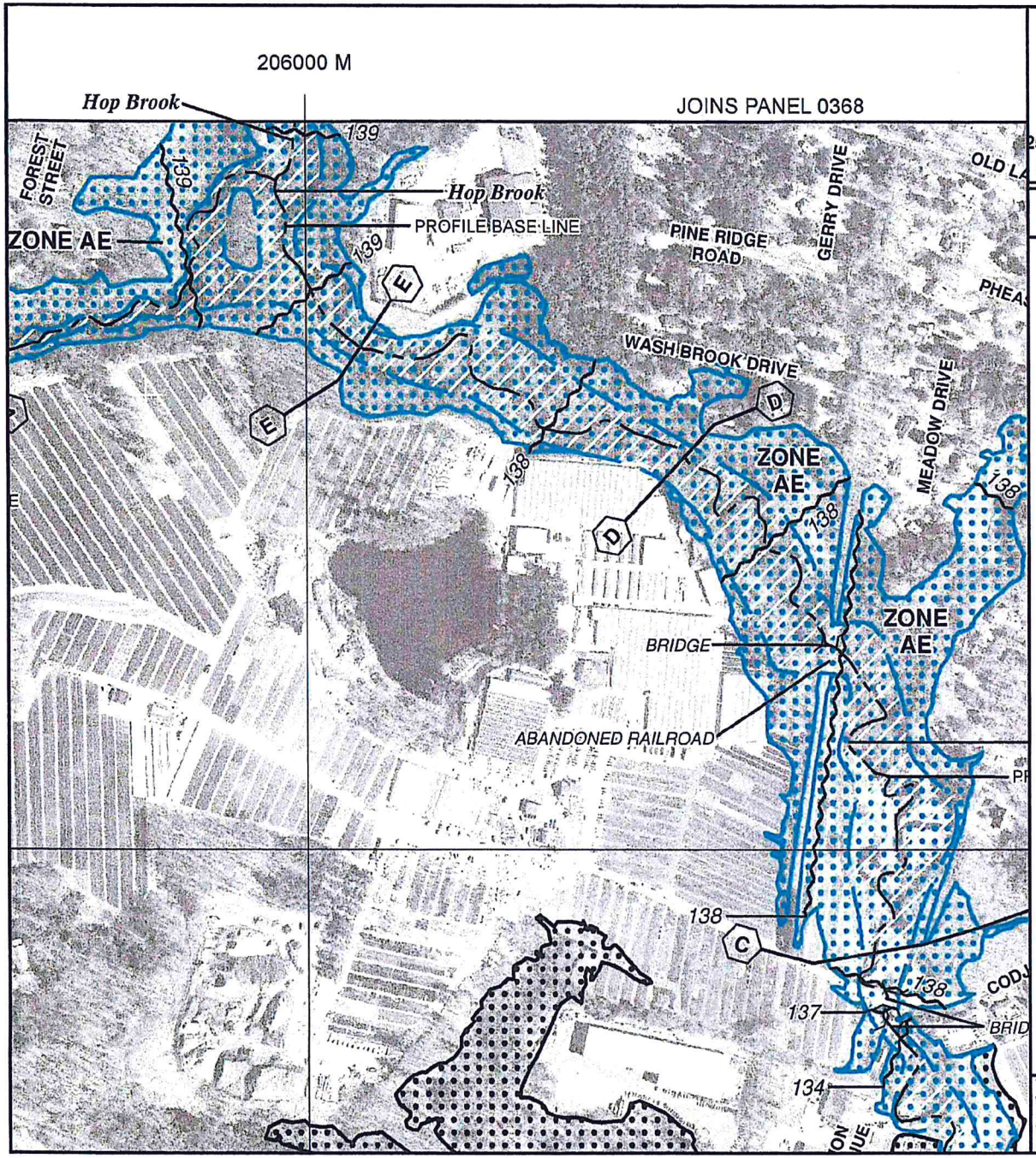
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Middlesex County, Massachusetts (MA017)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
52A	Freetown muck, 0 to 1 percent slopes	14.8	37.7%
253C	Hinckley loamy sand, 8 to 15 percent slopes	0.6	1.7%
255A	Windsor loamy sand, 0 to 3 percent slopes	7.3	18.6%
255B	Windsor loamy sand, 3 to 8 percent slopes	14.3	36.3%
255C	Windsor loamy sand, 8 to 15 percent slopes	2.0	5.1%
256A	Deerfield loamy sand, 0 to 3 percent slopes	0.3	0.7%
Totals for Area of Interest		**39.3**	**100.0%**



MAP SCALE 1" = 500'

250 0 500 1000

FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0506F

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS

(ALL JURISDICTIONS)

PANEL 506 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

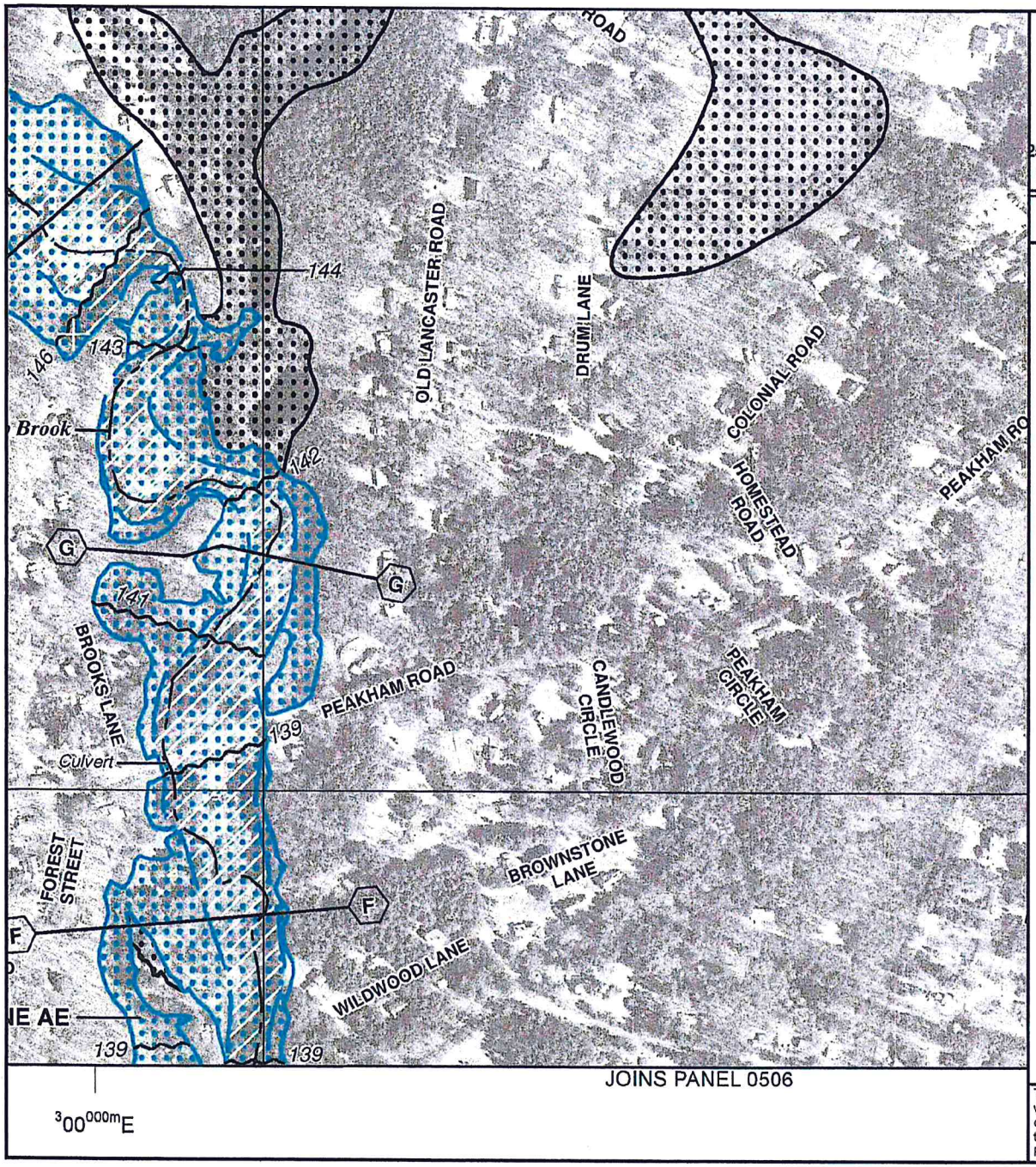
COMMUNITY	NUMBER	PANEL	SUFFIX
FRAMINGHAM, TOWN OF	250103	0506	F
SUDBURY, TOWN OF	250217	0506	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0506F

MAP REVISED
JULY 7, 2014

Federal Emergency Management Agency



MAP SCALE 1" = 500'

250 0 500 1000

FEET

METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0368F

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS

(ALL JURISDICTIONS)

PANEL 368 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SUDBURY, TOWN OF	250217	0368	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0368F

MAP REVISED
JULY 7, 2014

Federal Emergency Management Agency

5

varsity wireless

PRESENTATION FOR THE TOWN OF SUDBURY

OCTOBER 5, 2015

FRANCIS D. PARISI
FPARISI@VARSITYWIRELESS.COM

Meeting Purpose

- Request:
  - **Special Permit (Zoning Board):** To construct a communications facility consisting of a 140' tall stealth monopole tower
  - **Variance (Zoning Board):** To increase the height above the 100' maximum to 140'
  - **Site Plan Review (Planning Board): (10/14/15)**
- Applicant: Varsity Wireless Investors, LLC
- Property:
  - Address: 275 Old Lancaster Road
  - Property Owner: Town of Sudbury
  - Tax Assessor Parcel: H08-0049

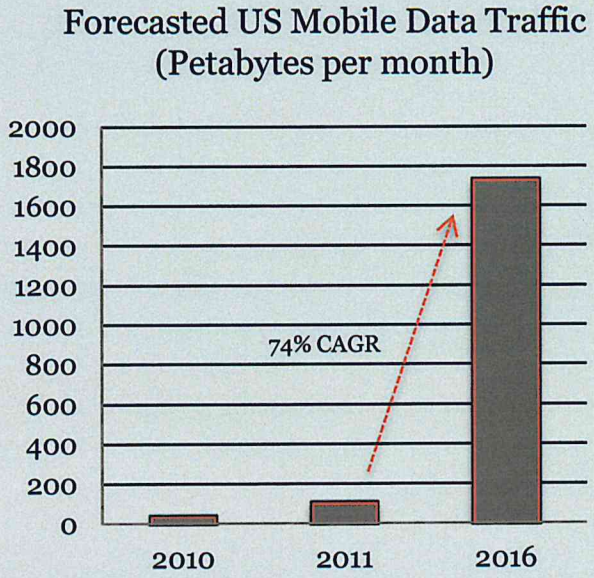
Varsity Wireless, LLC

- Varsity Wireless, Investors, LLC (Delaware) builds, owns and operates communications infrastructure needed to deliver consumer and public safety communications services to the public.
- Varsity's infrastructure provides its customers and the communities they serve with creative, cost efficient solutions for the ever-growing demand for wireless ubiquity and bandwidth.
- All of our facilities are built with "colocation" in mind to minimize the aesthetic impact and negative perception of new cell sites deployed to enhance these important services.
- Varsity's founders, senior management and staff bring more than 75 years of wireless industry experience to the company, including leadership positions with wireless operators, tower companies, telecommunication infrastructure developers and the FCC.

Why another cell site?

Today's smartphones generates 50 times more mobile traffic than traditional cell phones. For tablets, it's 120 times more traffic. Julius Genachowski, past chairman of the FCC, WSJ 3/6/2013

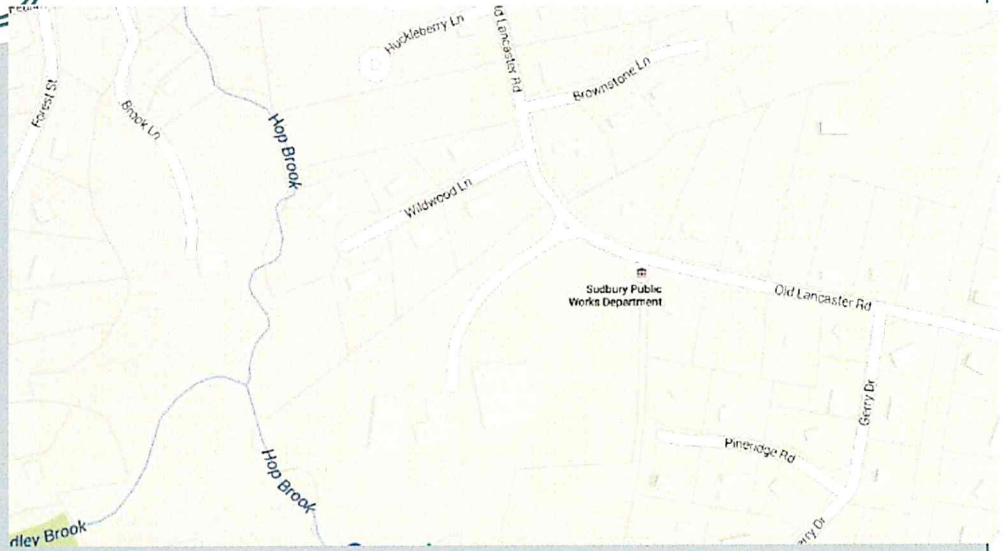
- Wireless data has eclipsed voice:
  - 67% of US mobile subscribers have smartphones. *Nielsen*
  - Voice is still important
    - Nearly 40% of US homes are wireless only. *CDC National Center for Health Statistics*
    - More than 70% of 911 emergency calls are made from wireless phones.
  - 4G|LTE was developed to support high speed wireless data services



- The 4G/LTE technology requires more cell sites.

Why 275 Old Lancaster Road?

- Property is ideally located to address the coverage gap :
  - Old Lancaster Road
  - Surrounding residential areas



- Property best meets the intent of the Sudbury Zoning Bylaw:
  - Specifically delineated as a preferred site
  - Large parcel used for public purposes –meets all required setbacks
  - Dense vegetative buffer mitigates visual impact
- No suitable alternatives:
  - No existing structures of sufficient height to satisfy coverage objective
  - No other suitable lots in area for a new structure

Application Package (Submitted)

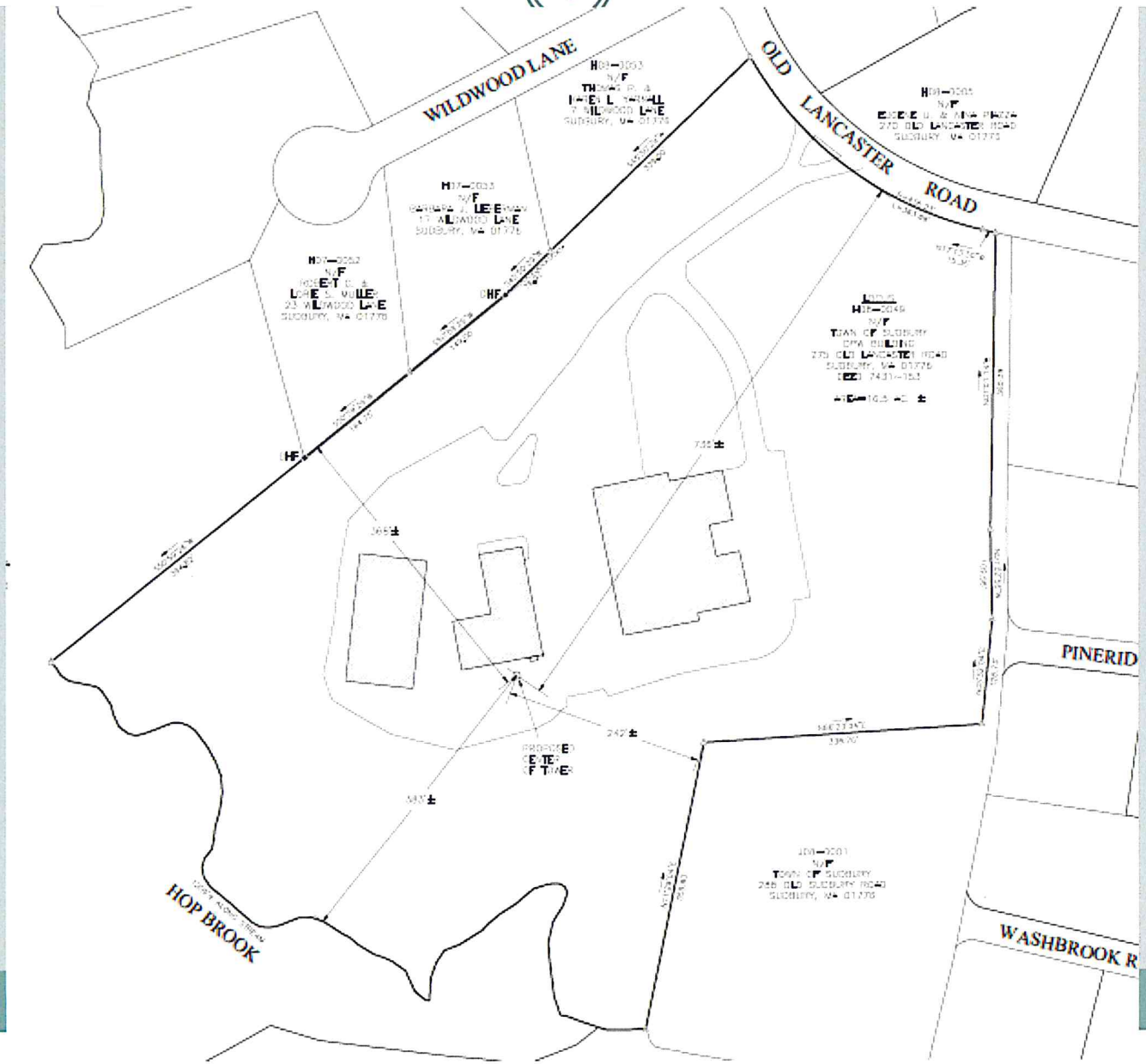
1. Application for Special Permit
2. Application for Variance
3. Planning Board Application for Site Plan Review
4. Letter of Authorization
5. Abutters List
6. Project Narrative
7. Aerial Photos
8. Site Plans

Supplemental Package No. 1

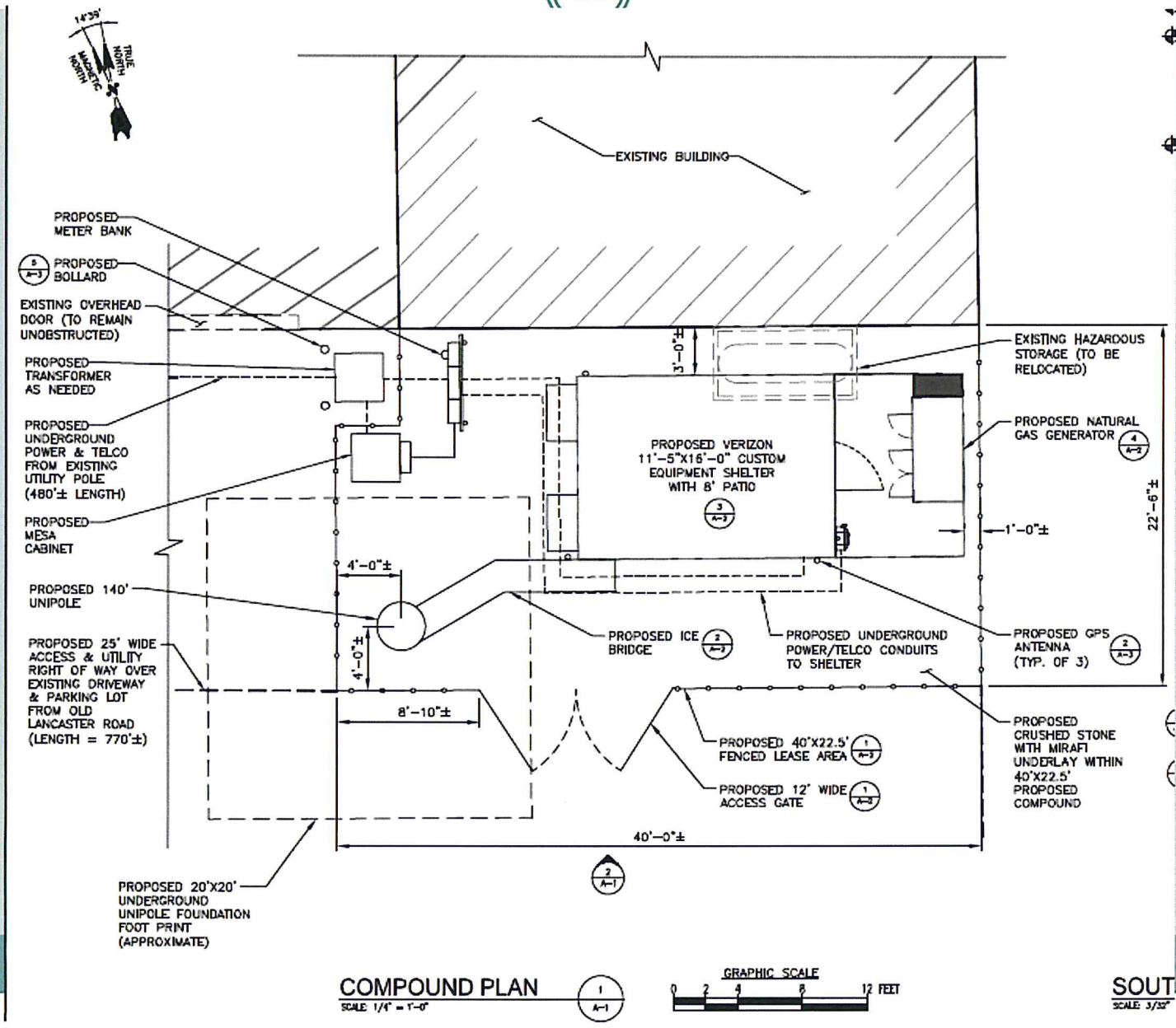
1. Affidavit of RF Expert and Propagation Maps
2. RF Health Safety Report
3. Viewshed Analysis
4. Wetlands Report
5. Presentation slides from 10/5/15 hearing
6. Site Plans (revised 9/30/15)

Aerial Photo

Site Plan


WILDWOOD LANE
OLD LANCASTER ROAD
PINERID
HOP BROOK
WASHBROOK R

Compound Detail



CURRICULUM VITAE

Donald L. Haes, Jr., Ph.D., CHP †, CLSO ‡

Radiation Safety Specialist

PO Box 368, Hudson, NH 03051

Voice: 603-303-9959

Email: donald_haes_chp@myfairpoint.net

† Board Certified by the American Board of Health Physics 1994; renewed 1998, 2002, 2006, 2010, 2014 (exp 12/31/2018).

‡ Board Certified by the Board of Laser Safety 2008; renewed 2011, 2014 (exp 12/31/2017).

Academic Training -

- Ph.D. in Radiation Protection,04/2000; MS in Radiological Sciences and Protection, 05/1988; BS in Health Physics, 06/1987.
- Naval Nuclear Prototype Training Unit, Knolls Atomic Power Laboratory, Windsor, Connecticut, 01-9/1977. Qualification - Nuclear Reactor Plant Mechanical Operator and Engineering Laboratory Technician (MO/ELT).
- Naval Nuclear Power School, 06/1976.

Continuing Education –

- *Profession Enrichment Program [PEP],* American Academy of Health Physics:

07/10-14/15, Indy, IN	07/25-29/06, Providence, RI	06/12-13/01, Cleveland, OH
07/13-17/14, Balt, MD	07/10-13/05, Spokane, WA	06/26-29/00, Denver, CO
07/7-11/13, Mad, WI (chair)	02/12-14/05, N Orleans, LA	06/27-29/99, Phil, PA
06/26-30/11, P Beach, FL	07/11-15/04, Wash, DC	07/12-16/98, Mpls, MN
06/27-1 07//10, SL City, UT	05-07/04, Augusta, GA	06/29-07-02/97, S Ant, TX
07/12-16/09, Mpls, MN	07/20-24/03, San Diego, CA	07/22-27/95, Boston, MA
07/13-17/08, Pittsburgh, PA	01/26-27/03, San Ant, TX	07/23-28/ 94; San Fran, CA
07/08-12/07, Portland, OR	02/15-18/02, Orlando, FL	07/25-30/93; Atlanta, GA

- *Annual DOE LSO Workshops; 2012-present;* Lecturer and attendee.
- *Laser Safety Officer With Hazard Analysis;* LIA Inc.; November 3-7 2008; Boston, MA
- *Laser Safety Officer Training;* Laser-Professionals Inc.*;* November 1-4, 2006; Austin, TX.
- *Prepare for and Pass the ABHP Exam*; TMS, Inc.; March 7-11, 1994; New Orleans, LA.
- *EPRI Power System Magnetic Field Measurement Workshop*; Conducted by G.E. Company at the High Voltage Transmission Research Center, April 13-16, 1992; Lenox, MA
- *Advanced Laser Safety*; Engineering Technology Institute, March 2-6, 1992; Waco, TX.
- *Laser Safety*; Engineering Technology Institute, June 10-1 4, 1991; Woburn, MA.
- *Non-ionizing Radiations: Health Physics & Radiation Protection*; MIT, July 23-27 1990; Cambridge, MA*;* Lecturer and attendee.
- *Assessing Non-Ionizing Radiation Hazards*; 1990 Health Physics Society Summer School, June 17-22, 1990; Fullerton, CA.
- *Certification Review for HPs*; Skrable Enterprises, Inc; March 19-24, 1989; Nashua, NH.
- *Hazardous RF Electromagnetic Radiation: Evaluation, Control, Effects, and Standards*; George Washington University, November 2-4, 1988; Washington, DC.

Employment History -

- Consulting Health Physicist; Ionizing/Nonionizing Radiation, 1988 - present.
  - **See Attached list of clients.**
- Radiation Safety Officer; Ionizing/Nonionizing Radiation - BAE SYSTEMS, Inc., 2005 - present.
- Radiation Safety Officer; Ionizing/Nonionizing Radiation - MIT, 1988 – 2005 (retired).
- Radiopharmaceutical Production Supervisor - DuPont/NEN, 1981 - 1988.
- United States Navy; Nuclear Power Qualifications, 1975 - 1981.

Professional Societies -

- Health Physics Society [HPS].
  - American Academy of Health Physics [AAHP]
    - **Part II Panel of Examiners**, 2001-2006; 2010-2015.
  - National Chapter: HPS Journal peer reviewer, non-ionizing radiation.
  - New England Chapter [NECHPS].
- Institute of Electrical and Electronics Engineers [IEEE];
  - Standards Association [SA] voting member.
  - International Committee on Electromagnetic Safety [ICES] (ANSI C95 series).
    - Technical Committee 95 [TC95].
    - Subcommittee SC-2 **{Secretary}**: Terminology and Units of Measurement.
    - SC-3/4: Safety Levels With Respect to Human Exposure, 0-3 300 GHz.
- Laser Institute of America [LIA].
  - Board of Laser Safety [BLS]; **Board of Commissioners**; 2011-present.
  - American National Standards Institute Accredited Standards Committee (ASC Z136).
    - SSC-1: Safe Use of Lasers.
    - SSC-6: Safe Use of Lasers Outdoors.
    - SSC-8 Safe Use of Lasers in Research, Development & Testing.
    - TSC5 **{Vice Chair}**: Technical Scientific Committee on *Non-Beam Hazards*
- Committee on Man and Radiation [COMAR].
  - Contributing member; 2014-present.

Pertinent Publications -

- **Haes, D.L.**; *Subjugating Technical Imperfections in the Composition of Wireless Cellular Telephone Radio-frequency [RF] Environmental Assessments.* Dissertation for Ph.D.; 2000.
- **Haes, D.L.**, McCunney, R. (ed); *Medical Center Occupational Health & Safety*. Chap 14 Nonionizing Radiation Including Lasers, pp. 219-230. Lippincott Williams & Wilkins, Philadelphia, 1999.
- **Haes, D.L.**, Galanek, M, DiBerardinis, L. (ed); *Handbook of Occupational Safety and Health*. Chap 24 Radiation: Nonionizing & Ionizing Sources, 987-1016. John Wiley & Sons, Inc., 1999.
- **Haes, D.L.**, Fitzgerald, M.F.; VDT VLF Measurements: The Need for Protocols in Assessing VDT User "Dose". *Health Physics*, 68(4), 572-578, 1995.
- Ducatman, A., **Haes, D.L.**.; *Textbook of Clinical Occupational and Environmental Medicine*. Chap 23 Nonionizing Radiation, 646-657. W.B. Saunders Company, 1993.
- **Haes, D.L.**; ELF Magnetic Field Measurements: Units of bedlam. *Health Physics*, 63(5), 591, 1992.
- **Haes, D.L.**; VDT _Radiation_ Protection Products - Protection or Pacification?. *Health Physics Newsletter*, Vol XIX, No 12, 19-21, December 1991.
- **Haes, D.L.**; Are VDTs Safe?. *Information Display*, Vol 7, No 6, 17-27, June 1991.
- Heath Physics Society ***Ask the Expert***: Contributing expert, non-ionizing radiation.

Standards Setting Organizations Involvement: Cited as Author and/or Reviewer -

- **ANSI® Z136.1 – 2014 (Revision of ANSI Z136.1-2007)**: American National Standard for Safe Use of Lasers
- **ANSI® Z136.2–2012**: American National Standard for Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode and LED Sources
- **ANSI® Z136.3–2012**: American National Standard for Safe Use of Lasers in Health Care
- **ANSI® Z136.6 – 2005**: American National Standard for Safe Use of Lasers Outdoors
- **ANSI® Z136.8–2012**: American National Standard for Safe Use of Lasers in Research, Development, or Testing
- **ANSI® Z136.9 – 2013**: American National Standard for Safe Use of Lasers in manufacturing Environments
- **IEEE Std C95.1™-2005 (Revision of IEEE Std C95.1-1991)**: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
- **IEEE PC95.1a™-2010**: Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz—Amendment 1: Specifies Ceiling Limits for Induced and Contact Current, Clarifies Distinctions between Localized Exposure and Spatial Peak Power Density
- **IEEE PC95.1-2345™-2013**: Standard for Military Workplaces - Force Health Protection Regarding Personnel Exposure to Electric, Magnetic and Electromagnetic Fields, 0 Hz to 300 GHz
- **IEEE Std C95.2™-1999 (Revision of IEEE Std C95.2-1982)**: IEEE Standard for Radio-Frequency Energy and Current-Flow Symbols
- **IEEE Std C95.4™-2002**: IEEE Recommended Practice for Determining Safe Distances from Radio Frequency Transmitting Antennas When Using Electric Blasting Caps During Explosive Operations
- **IEEE Std C95.6™-2002**: IEEE Standard for Safety Levels with Respect to Human Exposure to
- Electromagnetic Fields, 0–3 kHz
- **IEEE Std C95.7™-2005**: IEEE Recommended Practice for Radio Frequency Safety Programs, 3 kHz to 300 GHz

Below is a listing of Clients by category:

Academia / Research
Center for Blood Research
Boston College
Boston University
Harvard University
MIT
New England College of Optometry
Tufts University
University of Connecticut
University of Massachusetts
University of Texas
Woods Hole Oceanographic Institute

Bio-Tech
Alpha Gene
BioGen
Cell Signaling Technology
CytoMed
Enzytech
Ergo Sciences
Genetics Institute
Genzyme
NeoGenesis
Osteo Arthritis Sciences
Peptimed
Peptimune
Procept
ProScript
Weyth

Government Organizations & Services
City of Peabody, MA DPH
City of Quincy, MA DPH
City of Watertown, MA DPH
Malden, MA Fire Department
Massachusetts State Police
Massachusetts Radiation Control Program
NASA
Swampscott, MA Police & Fire Departments
USN
Wellesley Municipal Light Plant
Worcester Housing Authority

City/Town Permitting Boards
Candia, NH
Duxbury, MA
Edgartown, MA
Freeport, ME
Foxborough, MA
Lancaster, MA
Lincoln, MA
Maynard, MA
North Andover, MA
Needham, MA
Newington, CT
Reading, MA
Tewksbury, MA

Consulting/Law
Amec Foster Wheeler
Anderson & Kreiger
Arthur D. Little
Atlantic Western
Bailey Associates
D.L. Haes, Sr.
DRM PLC
Duval & Klasnick LLC
Environmental Heath & Engineering
Environmental Training
F.X. Massé Associates
Gehring Associates
Hunter Inc.
J. Lee Consulting
Kilpatrick Townsend & Stockton LLP
Network Building & Consulting, LLC
Network Development Consulting
S.B.A.
SeaCoast LLP
Tectonics
Terracord LLC
Wenstrup Consulting
Wireless Facilities

Health Care
Addison Gilbert Hospital
Dana Farber Cancer Institute
Fallon Clinic
Health Resources
MDPH Lead Lab
Merrimack Valley Hospital
New England Medical Center
Rhode Island Hospital
St. Vincent's Hospital
Tufts Medical Center
Worcester Medical Center

Industry
Agilent Technologies
American Holographic
American Saw
Analog Devices
Anthony's Building Company
ASML
BAE Systems

Becton-Dickenson
Channel Fish Co.
Compugraphics
Draper Laboratory
Display Components
DuPont/NEN Products
Federal-Mogul
Focal
Gillette
GTE Products
Harris
Hewlett Packard
Ingold
Kopin
Kraft General Foods
Landis + Gyr
Lockheed Martin
Loral Microwave
Lucent Technologies
Mettler-Toledo
MIT Lincoln Laboratory
MRM, Inc.
Muro Pharmaceutical
Narda
Northrop
Osram-Sylvania
Phasex
Philips Medical Systems
Polaroid
Portsmouth Naval Shipyard
Questek
Sanofi Pasteur
Senior Flexonics
Skyworks
Spire
SVG Lithography
The Money Store
Varian
Visidine
W.R. Grace
Wearguard
Wyman-Gordon

Wireless/Broadcast/Paging

5-State Tower
American Tower Co.
American Tower Corp.
AT&T Wireless
Bay Communications
Berkshire Wireless
Centerline Communications LLC
Cingular Wireless
Clear Wire, LLC
Cricket Communications
Crown Castle International
Direct Network Services
DRT Enterprises
FiberTower
General Dynamics Network Systems, Inc.
Independent Wireless One
Industrial Communications
Infinigy Engineering
Light Squared
Lighttower
MetroPCS
Mid-Hudson Communications
Nextel Communications
Northeast Paging/UCOM
Northeast Wireless Services, LLC
Northern Telecom
NY Cellular
OmniPoint Communications
Pyramid Network Services
RCC
SAI Communications
Sprint PCS
Telecorp
Telegent
Tower Resource Management
Ultranet
US Cellular
Varsity Wireless
Verizon Wireless
Vermont Public Radio
Vermont Public Television
Videolink TV
Voice Stream
WCVB-TV
WEBK-FM
WFLY-TV
WGNA-TV
WIZN-FM
WMHT-TV
WPYX-FM
WVPS-FM

Elaboration of Localities Where the Following Services Have Been Provided:
RF Environmental Assessments, RF Field Measurements, and/or Public Testimony

Colorado
Englewood
Littleton
Thornton

Connecticut
Avon
East Hartford
Guilford
Hartford
Middletown
Putum
Stamford
Westerly

Florida
Miami

Maine
Baldwin
Cornish
Fort Kent
Freeport
Orono
Poland
Standish
Tremont
Winthrop

Massachusetts
Abington
Acton
Amesbury
Amherst
Andover
Arlington
Ashland
Athol
Attleboro
Auburn
Avon
Barnstable
Barre
Bedford
Bellingham
Belmont
Billerica
Boston
Bourne
Boxborough
Boylston
Braintree
Bridgewater
Brimfield
Brockton
Brookline
Brookline Village
Burlington
Cambridge
Canton
Carver
Charlestown
Charlton
Chelmsford
Chelsea
Cheshire
Chester
Chestnut Hill
Cohasset
Concord
Cotuit
Cummington
Dalton
Danvers
Dartmouth
Dedham
Deer Island
Dighton
Dorchester
Douglas
Dover
Dracut
Dudley
Dunstable
Duxbury
East Bridgewater
East Fairhaven
Eastham
Easton
Edgartown
Everett
Exeter
Fairhaven
Fall River
Falmouth
Foxborough
Framingham
Franklin
Freetown
Georgetown
Gloucester
Grafton
Great Barrington
Greenfield
Groveland
Hamden
Hamilton
Hanover
Harvard
Haverhill
Hingham
Holbrook
Holden
Holliston
Hopkinton
Hudson
Huntington
Hyannis
Ipswich
Jamaicaway
Kingston
Lakeville
Lancaster
Lanesborough
Lawrence
Leominster
Lexington
Lincoln
Littleton
Lowell
Lunenburg
Lynn
Lynnfield
Malden
Manchester-by-the Sea
Mansfield
Marblehead
Marlborough
Marshfield
Marston Mills
Martha's Vineyard
Mattapan
Maynard

Medfield
Medway
Melrose
Mendon
Methuen
Middleboro
Millis
Milton
Monson
Montague
Montgomery
Nahant
Nantucket
Natick
Needham
New Bedford
Newburyport
Newton Centre
Newton
North Andover
North Easton
North Reading
Northampton
Northborough
Northbridge
Norton
Norwell
Orleans
Oxford
Paxton
Pembroke
Pepperell
Plympton
Princeton
Provincetown
Quincy
Randolph
Reading
Rehoboth
Revere
Rochester
Rockland
Rockport
Roslindale
Rowley
Roxbury
Rutland
Salem
Salisbury
Sandwich
Saugus
Savoy
Seekonk
Scituate
Sharon
Shelburne
Sherborn
Shrewsbury
Somerville
Southborough
South Hadley
Stow
Sturbridge
Sudbury
Sutton
Swampscott
Taunton
Templeton
Tewksbury
Tolland
Topsfield
Townsend
Truro
Turner Falls
Tyngsborough
Upton
Vineyard Haven
Wakefield
Walpole
Waltham
Warren
Watertown
Wayland
Wellesley
Wellfleet
Wenham
West Medford
West Peabody
West Roxbury
West Tisbury
West Boylston
Westborough
Westford
Weston
Westwood
Weymouth
Whitman
Wilbraham
Wilmington
Winchester
Windsor
Woburn
Wolfeboro
Woods Hole
Worcester
Wrentham

New Hampshire

Albany
Amherst
Antrim
Ashland
Belmont
Bedford
Bow
Candia
Canterbury
Chesterfield
Claremont
Concord
Cornish
Danbury
Dartmouth
Deerfield
Deering
Derry
Dublin
Effingham
Epsom
Exeter
Fitzwilliam
Franconia
Goffstown
Greenfield
Hanover
Hooksett
Hopkinton
Hudson
Jackson
Keene
Kingston
Lebanon
Lee
Londonderry
Madison
Merrimack
Milton
Mont Vernon

Moultonborough
Nashua
New Boston
Newbury
New Hampton
Newington
Newmarket
Northfield
North Hampton
Pelham
Pembroke
Portsmouth
Salem
Sandwich
Seabrook
Spofford
Troy
Wakefield
Warner
Weare
Webster
Winchester
Windham
Wolfeboro

New Jersey
Alpine

New York
Antwerp
Barneveld
Buffalo
Clifton Park
Conewango
Darien Center
Deposit
East Syracuse
Glencove
Goshen
Harpursville
Honeoye
Lake Placid
Lindley
Lockport
Macedon
Malone
Marbletown
Middleton
Olean
Oneida
Pavilion
Pearl River
Penfield
Philadelphia
Pittsford
Port Crane
Rochester
Rome
Rye Brook
Sand Lake
Smethport
Sodus
Spencerport
Syracuse
Troy
Tupper Lake
Vestal
Yonkers
Watertown
Webster
West Sand Lake
Wolcott

Pennsylvania
Caroline
Lansdale
Philadelphia

Rhode Island
Barrington
Block Island
Burrillville
Bristol
Charlestown
Chepachet
Coventry
Cranston
East Greenwich
Exeter
Foster
Glocester
Hopkinton
Jamestown
Johnston
Lincoln
Marieville
Middletown
North Providence
Pawtucket
Perryville
Portsmouth
Providence
Richmond
Riverside
Smithfield
Tiverton
Warwick
West Greenwich
West Warwick
Woonsocket

Vermont
Burlington
Charlotte
Killington
Stowe
West Windsor
Windsor

Town of Sudbury

Planning and Community Development Department

Flynn Building
278 Old Sudbury Rd
Sudbury, MA 01776
978-639-3387
Fax: 978-443-0756

Jody A. Kablack, Director

http://www.sudbury.ma.us/services/planning
kablackj@sudbury.ma.us

TO: Zoning Board of Appeals
Planning Board

FROM: Jody Kablack, Planning and Community Development Director

RE: Varsity Wireless Investors LLC, Site Plan and Special Permit/Variance Applications
275 Old Lancaster Road, DPW Facility

DATE: October 1, 2015

This application seeks Site Plan, Special Permit and Variance approval to install a 140 foot monopole wireless communications tower with internal antennas, and approximately 900 sq. ft. of land for equipment needs, on property located at 275 Old Lancaster Road owned by the Town of Sudbury and contained in the Wireless Overlay District. The property is a 16 acre parcel located in an A-Residential Zoning District and Zone III of the Water Resource Protection District, and is presently improved with the Town's DPW facility. The applications request approval for 2 carriers, as well as the installation of Town public safety equipment. A dimensional variance for the height of facility to exceed the 100' height limit is also proposed.

I have reviewed the above applications for conformance with the Zoning Bylaw, and offer the following comments and recommendations:

1. These applications are a result of a Request for Proposals advertised by the Board of Selectmen in June 2014 for the lease of land for a wireless communication facility on this property. The Selectmen awarded the proposal to New Cingular Wireless in August 2014 as the most advantageous proposal, subject to the execution of a lease. New Cingular Wireless and the Town (through Town Counsel) have come to agreement on the terms of a lease, which requires the assignment of the lease to Varsity Wireless for construction of the facility. General provisions of the lease include a 10 year term with 2 five year extensions, annual payment to the Town of $27,000, and a one-time $50,000 payment to be used for public safety communications.

2. A balloon test was conducted in accordance with section 4375 of the Bylaw on September 19, 2015, and the results will be shared with the Board at the hearing on October 5, 2015.

3. The Special Permit application requests approval for 2 carriers, which complies with section 4354 of the Zoning Bylaw. If approved, no further zoning approvals will be necessary for another carrier to co-locate on the tower and erect an equipment shelter at a future date. However, since this is Town land, the Board of Selectmen will need to issue an RFP prior to the use of the tower by any future carriers.

4. The wetland boundaries have not been approved by the Conservation Commission, and the applicant is urged to proceed with that approval immediately as there are multiple wetland resource areas surrounding the property. The Plan indicates that the proposal is outside all required buffer areas, however this must be confirmed prior to construction. A wetland report dated June 2015 has been received and will be circulated to the Conservation Commission office for review.

5. The access drive and the provision of utilities to the equipment area will be along the existing driveway from Old Lancaster Road, which is sufficient for this proposal.

6. A General Stormwater Management Permit application will be required for this proposal. Approximately 900 sq. ft. of disturbance is anticipated.

7. There is no additional impervious surface being added to the site with this proposal. The tower and equipment structure will be located on an already paved surface. Site drainage will consist of a 3" deep crushed stone base over a layer of geotextile filter fabric to be installed beneath the entire compound area to naturally infiltrate stormwater. Hay bales and silt fencing will be installed to the south of the compound area to intercept any runoff or sediment from the construction activities prior to reaching the wetlands.

8. Power back-up will be provided by a natural gas generator located within the equipment compound, which will be fed from an underground line located on the property.

9. All utilities to the new facility must be installed underground. Electricity will originate at an existing utility pole located on the property, however any extensions for this facility must be installed underground.

10. It is recommended that the barbed wire proposed along the top of the fence around the facility be removed. The property is well patrolled by the Sudbury Police Department, as it contains the fueling facility for all town vehicles.

11. Typically a radio frequency analysis is supplied with an application for a new tower in order to fulfill section 4354 of the Bylaw (demonstration that the facility cannot be accommodated on an existing or approved tower within a ½ mile radius of the proposed tower). The applicant has informed me that this information will be submitted at the hearing.

12. The diameter of the tower at its base will be 60" at the base, tapering to 48" at the top. This detail should be added to the Plan.

13. The tower will be a galvanized (non-reflective) gray color and the fiberglass shrouds on top will be gray as well. This detail should be added to the Plan.

14. A post-construction construction control affidavit should be required to be performed to ensure that the tower was constructed properly.

15. Section 4360 of the bylaw requires a bond to dismantle and remove the facility be posted prior to issuance of a building permit for of the facility. This should be included in any decisions granted.

16. The ability to co-locate town equipment on this tower in the future should be included as a condition of any approval.

17. Signature blocks for the Building Inspector, DPW Director and Planning Director must be added to all Plan sheets.

18. The deadline to render a decision on the Site Plan application is January 9, 2016 (120 days from filing the application). The deadline to render a decision on the Special Permit is 90 days from the close of the public hearing. The deadline to render a decision on the Variance application is December 20, 2015 (100 days from filing the application).

cc:

Applicant	Police Chief	Board of Selectmen
DPW Director	Conservation Agent	Town Manager
Building Inspector	Fire Chief	

Fire Department
Sudbury, MA

Police Department
Sudbury, MA

October 2, 2015

Zoning Board of Appeals
Sudbury, Massachusetts 01776

We are writing to voice our need for the proposed cell tower to be located at the Department of Public Works on Old Lancaster Road.

At the present time, Fire Department radio transmissions are transmitted by microwaves from the top of Nobscot Mountain to the present Police Station on Boston Post Road. This change to microwave transmission was implemented approximately two years ago as a way to remove ourselves from the dependence on occasionally unreliable copper transmission lines. Police Department radio traffic continues to utilize Verizon copper lines. With the hard wired system, we are at the mercy of Verizon to maintain emergency radio operation for the Sudbury Police and Fire Departments. Service on this system can be erratic, which puts our ability to provide for the safety of the public in jeopardy.

Since we implemented the microwave system, we have not experienced a single minute of interruption. The new cell tower would provide us the ability to re-locate the microwave dish and re-link to Nobscot Mountain, and continue to provide continuity for our emergency radio operations while allowing the Police Department to transition to the same technology.

We believe this is an important step in ensuring necessary communications capability for both public safety entities and respectfully request your support of the cell tower implementation.

Respectfully,

William L. Miles
Fire Chief

Scott Nix
Chief of Police

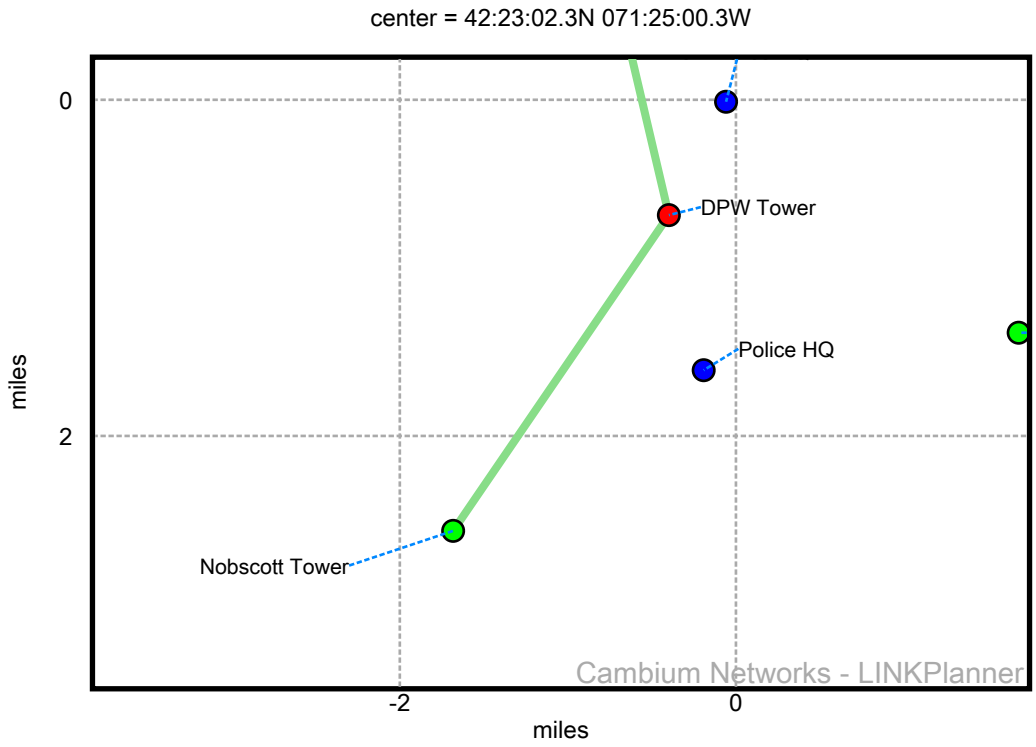
Cambium Networks™

Project Sudbury Police 4-28-2015_ 23GHz
DPW Tower to Nobscott Tower
LINKPlanner PTP Proposal Report

27 August 2015

Jeffrey Boles
Organization: Cyber Communications
Phone: 978-317-4570
Email: jboles@cybercomminc.com

Cambium Networks™

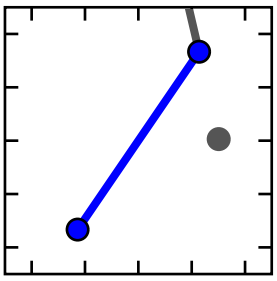


Project Summary

Project: Sudbury Police 4-28-2015_ 23GHz

General Information	
Customer Name	Town of Sudbury
Company Name	Police Department
Address	Chief Scott Nix 415 Boston Post Rd Sudbury, MA 01776
Phone	(978) 443-1042
Cell Phone	
Email	

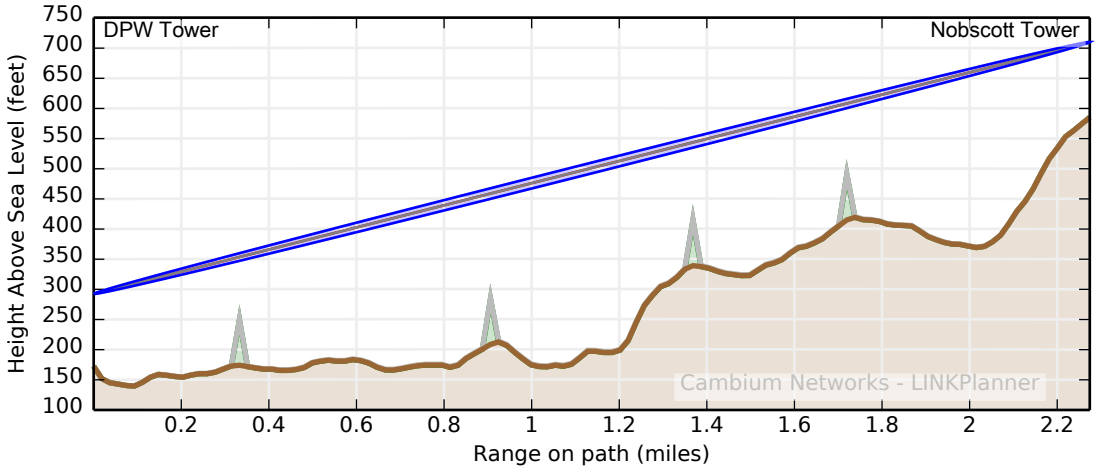
DPW Tower to Nobscott Tower



Equipment: Cambium Networks PTP23800 with ODU-B - 1+0

Cambium Networks 2ft HP Antenna 85010089043 - Direct @ 120 ft

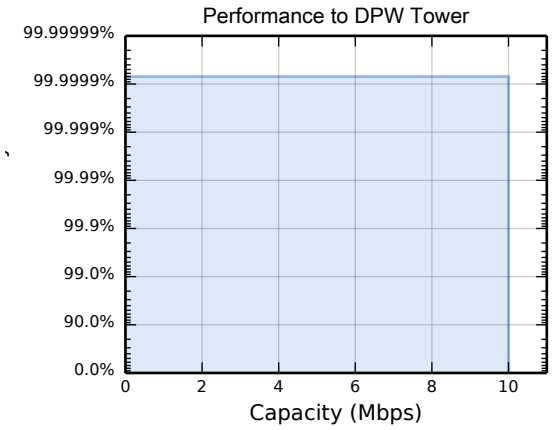
Cambium Networks 2ft HP Antenna 85010089043 - Direct @ 125 ft

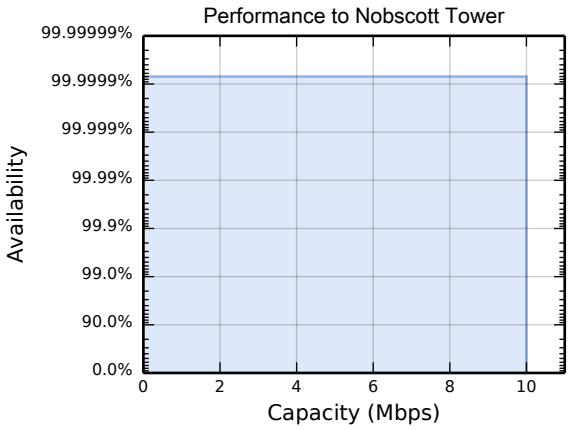


	Performance to DPW Tower	Performance to Nobscott Tower
Mean IP	10.0 Mbps	10.0 Mbps
IP Availability	99.9999 % for 10.0 Mbps	99.9999 % for 10.0 Mbps

Link Summary			
Link Length	2.274 mi.	System Gain	185.64 dB
Band	23 GHz	System Gain Margin	54.11 dB
Regulation	FCC	Mean Aggregate Data Rate	20.0 Mbps
Modulation	QPSK 0.86 (13.84Mbps)	Annual Link Availability	99.9999 %
Bandwidth	10 MHz	Annual Link Unavailability	22 secs/year
Total Path Loss	131.53 dB	Prediction Model	ITU-R

Performance Charts





Climatic Factors, Losses and Standards

dN/dH not exceeded for 1% of time	-347.62 N units/km	Excess Path Loss	0.00 dB
Area roughness 110x110km	99.02 metre	Annual 2-way Availability	100.0000 %
Geoclimatic factor	2.02e-04	Annual 2-way Unavailability	0 secs/year
Fade Occurrence Factor (P0)	1.75e-05	Rain Availability	99.9999 %
Path inclination	34.78 mr	Rain Unavailability	22 secs/year
Value of K Exceeded for 99.99% (ke)	0.40	Atmospheric Gasses	ITU-R P.676-7, ITU-R P.835-4
Excess Path Loss at ke	0.00 dB	Diffraction Loss	ITU-R P.526-10
0.01% Rain rate	40.71 mm/hr	Propagation	ITU-R P.530-12
Free Space Path Loss	130.72 dB	Rain Rate	ITU-R P.837-5
Gaseous Absorption Loss	0.81 dB	Refractivity Index	ITU-R P.453-9
Link Type	Line-of-Sight		

Part Number	Qty	Description
(no part number)	2	Unspecified 23 GHz ODU (invalid TX frequency selection). Please select a TX frequency
01010419001	2	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
07009304001	3	Hoisting Grip for CNT-400 cable
30010195001	1	50 Ohm Braided Coaxial Cable - 500 meter
85010089043	2	2' HP Antenna, 21.20 ~ 23.60 GHz, Single Pol, Mot Interface
WB3480	2	PTP800 Modem 1000/100BaseT with Capacity CAP 10 Mbps
WB3616	2	Coaxial Cable Installation Assembly Kit (W/O LPU End Kit)
WB3618	2	Mains Lead- US 3pin to C5 (PTP800 AC-DC PSU)
WB3622	2	AC-DC Power Supply Convertor (no lead cable included). Converts 110/230V to 48V.

(continued)

Part Number	Qty	Description
WB3657	2	LPU END KIT PTP800 (1 kit required per Coaxial cable)

TOWN OF SUDBURY
Building & Inspections Department
978-440-5461

To: Jody Kablack, Planning Director

From: Mark Herweck, Building Inspector

Re: Site Plan Application for 275 Old Lancaster Road Cell Tower

Date: October 2, 2015

I have reviewed the application on the site plan for the proposed cell tower at 275 Old Lancaster Road and have the following comments:

- Will the chain-link fence within 3' of the unipole guard it from possible impact from heavy equipment? (2" poles spaced up to 10' apart)
- The plan shows the unipole at grade level. I would suggest that the pole be protected from salt because of the high salt content in the area.
- Recommend a structural engineer inspect and give wet stamped report on the unipole every 10years to insure safety.

cc: Zoning Board of Appeals

Kablack, Jody

From: Dineen, Deborah
Sent: Tuesday, September 29, 2015 4:15 PM
To: Kablack, Jody
Cc: Kupfer, James
Subject: Site Plan Varsity Wireless Investors LLC

Jody,

I have reviewed the above site plan for proposed work at 275 Old Lancaster Road and submit the following comments.

The materials submitted with the application do not indicate if the wetland line shown on the plan is new wetland delineation recently done in the field, or if the wetlands were taken from the Sudbury GIS MapsOnline. The plan does not indicate the mean annual high water (beginning of the 200' riverfront area) of Hop Brook. Either way, the wetlands shown were not confirmed by the Conservation Commission. Using MapsOnline, the new alterations appear to be approximately 230' +- from the Hop Brook main channel at the closest point. The mean annual high water of Hop Brook must be determined in order to establish the 200' riverfront area. If mean annual high water begins beyond the man brook channel, there is a potential for work to occur within the riverfront area.

The applicant should submit a Request for Determination of Applicability or ANRAD with supporting current documentation to the Commission to confirm the extent of wetland jurisdiction on this site.

Debbie

Deborah Dineen
Sudbury Conservation Coordinator
275 Old LancasterRoad
Sudbury MA 01776
978-440-5470
978-440-5404 (fax)

From: Lisa von Lichtenberg <planetnianow@gmail.com>
Sent: Thursday, September 10, 2015 9:48 AM
To: Appeals, Board of
Subject: NO to the Cell Tower Project at DPW Sudbury Residents

The Residents of the Washbrook Road, Gerry Drive and PineRidge will not tolerate the installation of a Cell Tower at the Sudbury DPW

This is completely dangerous and unacceptable. There is a direct correlation between a threefold increase of various cancers and EMR (electro magnetic radiation) to anyone working or living within 500 meters of cell towers.

It was recently brought to my attention that the town is planning to let a private company erect a cell tower in our area at the DPW. They have sent proposal letters to abutters within a 300 meter radius of the site. Unfortunately, that excludes the rest of the residents in the area who will be impacted as well. Currently, most of the research I found shows a negative health impact of abutters residing 500 meters from cell towers. It is interesting to note that most of these studies which show a direct correlation between a threefold increase of various cancers and EMR (electro magnetic radiation) were done outside the U.S.

Lisa von Lichtenberg
10 Washbrook Rd
Sudbury, MA

From: Elizabeth <Elizabeth@habitatclothes.com>
Sent: Thursday, September 10, 2015 10:03 AM
To: Appeals, Board of
Subject: no cell tower at the DPW

Good morning!

I am a Sudbury resident who lives on Old Lancaster Rd. I am sending an letter of appeal regarding a possible cell tower being constructed on the DPW property. Please advise if I need to draft a more formal letter of appeal in order to be taken into consideration.

Thanks,
Elizabeth McCormick

226 Old Lancaster Rd.

From: Jane Roddy <jhroddy@verizon.net>
Sent: Tuesday, September 15, 2015 9:13 PM
To: Appeals, Board of
Subject: Concern about the cell tower in our already tightly packed neighborhood

Dear Mr. O'Brien and Board of Appeals - I believe the impact that a very tall cell tower will have on the nearby neighborhoods of smaller lots, and many families has not been considered. I hope to see you at the demonstration this Saturday. I'm sure a better location for this tall metal tower can be found that will not impact so many families in residential neighborhoods.
Regards,
Jane Roddy
22 Gerry Drive

Vert, Lillian

From: Lisa Vitale <lvb@simplydirect.com>
Sent: Friday, October 23, 2015 5:07 PM
To: Appeals, Board of
Subject: Cell Tower @ Sudbury DPW

Planning Board,
I am writing you in reference to the proposed cell tower to be located at the Sudbury DPW on Old Lancaster Road. I would like to express my concern and frustration that once again the neighborhoods surrounding the DPW are being asked to endure another expansion that threatens to decrease our property values by installing a large and unsightly tower that can be seen for quite some distance.

The DPW is in a residential neighborhood when it never should've never been placed here to begin with. It should've been moved to an industrially zoned location. We already had to take a hit on our property values when the new DPW was built. We lost that battle. I would ask you to place this tower in another location which is more appropriate instead of asking the same area, yet again, to endure the further erosion of our property values.

Sincerely,
Lisa

Lisa Vitale Barth
286 Old Lancaster Road
Sudbury, MA 01776
lvb@simplydirect.com

Vert, Lillian

From: Samantha Karustis <karustis@gmail.com>
Sent: Sunday, October 25, 2015 9:24 PM
To: Appeals, Board of
Subject: Opposition to Cell Tower

Hello,

My husband and I live near where the proposed cell tower will be located. We ADAMANTLY oppose it! Do not construct that in our neighborhood!

Samantha and Charlie Karustis

5 Candlewood Cir.

I am coming before the Board with a legitimate concern regarding the long term effects of exposure to low level electromagnetic radiation as a result of the placement of a cell tower in a Residential Zone A-1 at the address of ~~125~~ 275 Old Lancaster Road.

The current limitations proposed by the FCC on non-ionizing radiation are based on the amount of EMR that produces a thermal burn. "The current U.S. standard for radiation from cell phone towers is 580-1,000 microwatts per square centimeter (mW/cm2) among the least protective in the world" -Cathy Bergman-Veniza (Vermont Law School Environmental Law Center Conference, 1996.) Dr. Gerard Hyland, twice nominate for the Nobel Prize in Medicine states "existing safety guidelines for cell phone towers are completely inadequate, since they focus only on the thermal effects of exposure".

Radiofrequency Radiation Sickness was first identified in the 1950s by Soviet medical researchers. Also known as "Electromagnetic Hypersensitivity Syndrome" European Parliment has recognized it as a true medical condition. Symptoms include fatigue, sleep disturbances, headaches, difficulty concentrating, depression, memory loss, visual and hearing disruptions, irritability, skin problems, and dizziness. "The syndrome is reversible in the early stages but is considered lethal over time" (Tolgskaya et al. 1973)

Research has since indicated that EMR also produces alterations w/in our bodies due to continuous prolonged exposure. These alterations can contribute to the development of childhood leukemia, other childhood cancers, brain tumors and acoustic neuromas, other adult cancers, decreased cognitive changes in the nervous system and brain function such as Alzheimer's disease, DNA breakdown, stress protein and immune system deficiencies. This research can be viewed on the BioInitiate Report: A Rationale for Biologically-Based Exposure Standards for Low Intensity Electromagnetic Radiation. (2012)

Egar et al. (2004) evaluated data on 1000 people living in close proximity to cell antenna between 1994 and 2004. The cancer rates were higher for those residents who had lived 5 to 10 years at a distance of up to 400 meters from a cell tower compared to those individuals living further away.

Wolf and Wolf (2004) initiated a study in a small area of Israel of people living within a 350 meter half circle of the antenna. Eight cases of varying cancer were diagnosed in a period of one year compared to two reports of cancer in the general population. They also examined the medical history of the exposed individuals five years prior to the erection of the cell tower "and found only two cases in comparison to the eight cases that resulted 1 year after the tower went into service".

The World Health Organization has since categorized EMR in Group 2B thus recognizing its potential as a carcinogen to humans

Dr. Gerd Oberfeld, Public Health Officer for Environmental Medicine of Salzburg, Austria states in the article "Putting Cell Phone Antennas Near Schools is Too Risky" (2004) that "because children's bodies are developping and research is not complete on the health effects of microwave radiation, greater caution should be taken in siting cell towers near places where children spend considerable amounts of time", such as in a neighborhood where infants and small children reside.

Due to data, I request that an alternate site, be regarded for the placement of a cell tower. The Broadcast Signal Lab Coverage Analysis recognized that the DPW site would require an additional facility to substantiate its coverage to the West pressure point. Why potentially cause harm to the residents of the area for [redacted] such ~~little~~ limited benefit?

Thank you for your time,

Linda Huet-Clayton

October 29, 2015

Dear Zoning Board of Appeals,

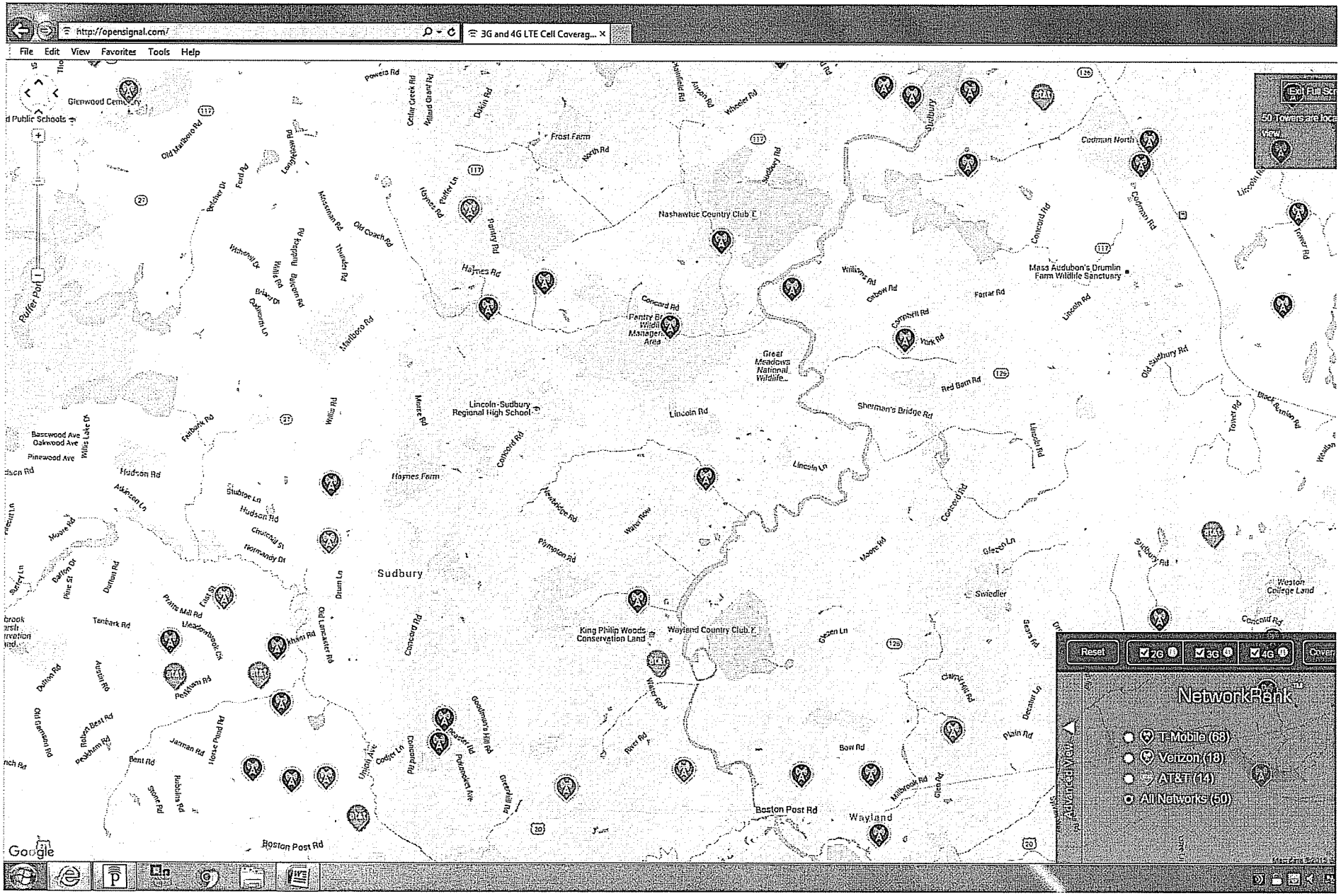
As a neighborhood opposed to the construction of a 140 foot cell tower in our midst, we set out to determine the validity of Mr. Parisi's argument regarding lack of cellular coverage to the area surrounding 275 Old Lancaster Road.

We determined that the map Varsity Wireless displayed at the Appeals Hearing misrepresented available coverage. While driving around the neighborhood, our cell coverage neither waned nor cut out. [Please refer to contents on thumb drive.] In fact, the cul-de-sac at the end of Pine Ridge Road had coverage second to that of the Martha Mary Chapel which houses a carrier in its steeple.

In addition, further investigation revealed there is already a high concentration of carriers surrounding this area. [Please see enclosed map]

Thank you for your time and consideration,

Linda Huet-Clayton


http://opensignal.com/
3G and 4G LTE Cell Coverag...
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Sudbury
Wayland
Boston Post Rd
Lincoln-Sudbury Regional High School
Nashawtuc Country Club
Wayland Country Club
King Philip Woods Conservation Land
Great Meadows National Wildlife...
Mass Audubon's Drumlin Farm Wildlife Sanctuary
Glenwood Cemetery
Frost Farm
Haynes Farm
Swiedler
Reset
2G
3G
4G
NetworkRank
T-Mobile (68)
Verizon (18)
AT&T (14)
All Networks (50)
Google

From: John Gannon <jgannon@ymail.com>
Sent: Friday, October 30, 2015 8:25 AM
To: Appeals, Board of
Subject: Re: Proposed DPW cellular monopole

Note: This letter corrects an error in the version sent yesterday which cited the proposed antenna height as being 147 feet. The correct proposed height is 140 feet.

Dear Board of Appeals members:

I am writing to urge the Board to reject the application by Varsity Wireless for a variance to allow construction of a 140 foot mono-pole antenna tower at the DPW site on Old Lancaster Rd. The potential effects of the proposed antenna are significant, particularly for those of us who live nearby. Along with many of my neighbors, I feel that there has been insufficient discussion of certain details as well as alternative solutions that should be considered in relation to the proposed antenna and the variance application. The key points of my objections are as follows:

- Inadequate visual impact assessment
  - The balloon test that was conducted in early September to simulate the presence of the antenna was done under best-case conditions, when foliage coverage was at its peak. The vast majority of the surrounding trees that blocked sight of the balloon on nearby roads and in local neighborhoods are deciduous and without any leaves nearly 6 months out of the year. The antenna will certainly be much more visible without tree foliage to block the view. The tower's visibility will be an eyesore for many local residents and will negatively affect the marketability and value of homes having any view of the antenna. The presence of a 140 foot structure with line of sight visibility would be an unfair burden on those homeowners. At the very least, these homeowners and other town residents should have a right to see the worst case visual impact of the proposed antenna before anything is approved.

- Failure by Varsity Wireless to demonstrate the extent and nature of alleged coverage gaps
  - Data presented by Varsity Wireless appears to indicate little or no coverage in several areas close to the DPW site, but this is not accurate and was strongly questioned at the last Board of Appeals meeting. Many local neighbors have testified or commented that they do not experience any significant cell signal quality issues in these areas. Furthermore, there has been no independent assessment of coverage and signal strength for areas that are allegedly lacking. An independent RF engineer is needed for an unbiased test and assessment of signal strength and coverage questions.

- No indication of local customer demand for improved coverage/service
  - As indicated above, the vast majority of local residents are satisfied with the current level of wireless service and are not seeking any sort of upgrade. Varsity and Verizon claim the 140 foot antenna is needed to address local market demand, but neither organization has demonstrated that this market demand exists. A legitimate question is: "Is there real customer demand for higher service levels, or is Varsity/Verizon in fact looking to increase coverage and performance in order to be able to push higher data volume (and more profitable) applications and services to homeowners?"

- No discussion of pros/cons for a conforming (100 ft) mono-pole vs. a non-conforming 140 foot antenna.

    - Certainly there are cost and performance trades that whould have been considered as part of the system design review prior to the variance application. There have been some verbal comments made, but no presentation of any such comparison. Signal coverage factors along with details of the commerical viability impact for both options should be presented for discussion.

- No discussion of alternatives to address Emergency Services needs
    - A claim is being made that the new police station and other emergency services need a tower at the DPW site. However, to my knowledge there has been no data presented on any possible alternative solutions, including alternative sites (e.g., the existing mono-pole on the Ti Sales property) or other antenna systems that would address only Emergency Services needs. For the latter, the town would likely be fully responsible for antenna construction and maintenance costs. If that is the case, then the people of Sudbury should have an opportunity to approve or reject this option. The voters of Sudbury will be reasonable in weighing public safety needs against cost to the town and any aesthetic factors, and they should be given an opportunity to weigh in.

Thank you for your consideration.

Sincerely,
John Gannon
38 Forest St

From: Mindy Davies <mdavies.pilates@gmail.com>
Sent: Monday, November 02, 2015 12:56 AM
To: Appeals, Board of
Cc: lmhuet@hotmail.com
Subject: Varsity Wireless Cell Tower at DPW..

Dear Mr. O'Brien and Members of the Sudbury Board of Appeals,

I am writing to voice my concern regarding the Varsity Wireless application for cell tower placement and variance to that application.

While I am not a direct abutter to the proposed cell tower site, I feel the need to join the voices standing out against this project.

The bylaws of our town are written in part to protect the citizens, and the protection of the citizens of Sudbury should always come first before any financial or commercial use of town property. At the least, the ZBA has an obligation to uphold the bylaws of the town and turn down the request for a height variance from 100' to 140'.

I am not sure it is within the power of your committee to reject the plan entirely, but it is highly suspect when a project of this size seems to be fast tracked through the process without careful consideration of the long term consequences of placing a cell tower among a densely populated neighborhood area.

It would be a crime for the ZBA to pass something that ends up pushing the scale of tolerable cell tower emissions to where we end up seeing an increased rate of cancer in the areas closest to this tower years from now. Current studies are coming up with results indicating that cell tower use has a much greater impact long term than earlier studies show. Please do more homework, and make use of your Board of Health members. They are already working hard to do the research you need.

If the original intent is to boost the reach of public safety communications for the new police station, then the town should fund the project and keep it to the 100' limit or find another, more suitable location. The impact of a safety system is far less of an emissions bombardment than the proposed commercially focused tower.

There is no short term financial gain great enough to put the larger public at higher risk of radiation. Our cell coverage is just fine, take a look at the coverage map. Furthermore, most homes these days have an internet connection they may tap into for their coverage at home and we are not supposed to be using our phones in our cars.

So why the need to go with a commercial carrier unless the town is purely after monetary gains? Sounds like a conflict of interest to me.

Thank you for considering my point of view. I will see you Monday evening, November 2nd.

Respectfully Yours,
Mindy J Davies
14 Gerry Drive
mdavies.pilates@gmail.com

October 5, 2015

Sudbury Zoning Board of Appeals
Flynn Building
278 Old Sudbury Road
Sudbury, MA 01776

Dear Members of the Zoning Board of Appeals:

Please find attached a petition signed by residents of Sudbury requesting that the Zoning Board of Appeals deny the following applications regarding the proposed wireless communications tower at the site of the Department of Public Works (DPW), 275 Old Lancaster Road, Residential Zone A-1:

- Public Hearing, Case 15-33 for a Special Permit under the provisions of Section 4320 of the Zoning Bylaws
- Public Hearing, Case 15-34 for a Special Permit under the provisions of Section 4352 of the Zoning Bylaws

We oppose the construction and operation of the 140' tower and submit this petition to express our concerns, as follows:

- **Limited assessment of visual impact, due to foliage and wind**: The two balloon tests conducted heretofore occurred during months of full foliage (May and September). Residents have not had the opportunity to assess the visibility of the proposed tower during a month with minimal foliage. Furthermore, the visual impact of the balloon test was subject to significant variation due to wind. We request that a crane test be conducted for a more accurate representation of the tower's height and visual impact. Finally, the anchor of the test balloon was placed at a distance of 8' from where the actual tower would be constructed. It is unclear what the difference in visibility would be at the exact location. Minimization of visual impact is a purpose and a requirement of the Zoning Bylaws.

- **Excessive tower height for meeting public safety wireless communication needs**: First, the proposed Special Permit to permit a 140' tower does not further the stated objective of the construction, which is to meet "the public safety communication needs of the Police and Fire Departments."[1] The additional 40' are in excess of what is required for public safety communication needs. The height of the trees in the area is approximately 80'. The tower need only be 10' higher that the trees in the area to transmit signals. The sole purpose of the additional 40' would be to generate revenue from numerous wireless communication providers. Second, it is unclear what "other options are being phased out"[2] that require construction of a tower. Third, alternative designs for a facility without commercial carriers (presumably something specific for the emergency services system) were "not previously pursued because the Town would have to incur all the costs."[3] It is unclear what the costs would be and whether that option was ever considered in earnest.

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[1] Ms. Jody Kablack's statement at the August 19, 2014 Board of Selectmen meeting.

[2] Ms. Jody Kablack's statement at the August 19, 2014 Board of Selectmen meeting.

[3] Ms. Jody Kablack's statement at the August 19, 2014 Board of Selectmen meeting.

Received 10/5/15

- **Adverse effect on property values**: Property values in the residential neighborhoods surrounding the DPW site would be adversely affected by the looming presence of a 140' tower.

- **Absence of consideration by the Board of Health**: The Board of Health has not formally reviewed the proposal for the tower, nor has it been consulted regarding the requested Special Permits and Variance under the Town's Zoning Bylaws. The stated purpose of the wireless services Zoning Bylaw is "to establish districts within Sudbury in which wireless services may be provided with minimal harm to the public health, safety and general welfare of the inhabitants of Sudbury."[4] The Board of Health has not assessed the potential levels of harm to the public health or safety of residents.

- **Residents' health concerns**: Despite the prevalence of cell phones, residents are concerned about the as yet unknown long-term effects of electromagnetic fields (EMFs), particularly from continuous exposure to radiofrequency (RF) microwave radiation from antennas on a tower with multiple wireless carriers' antennas and equipment in close proximity to residences (including those with small children). In 2011, the International Agency for Research on Cancer (IARC) acknowledged potential risks of RF EMFs by classifying them as "possibly carcinogenic to humans (Group 2B), a category used when a causal association is considered credible, but when chance, bias or confounding cannot be ruled out with reasonable confidence."[5] The World Health Organization (WHO) has acknowledged that further research into the possible adverse health effects of EMFs is warranted, and its International Electromagnetic Fields (EMF) Project assesses the scientific evidence of such effects. Areas of study on the WHO's EMF Research Agenda include childhood cancer and exposure assessment for base stations; effects of RF exposure on cognition, electroencephalogram (EEGs), and sleep in children; effects of prolonged exposure of immature animals to RF fields on the development and maturation of the central nervous system; effects of prenatal exposure to RF fields on the development and maturation of the blood-brain barrier; and RF effects on carcinogenic processes and cell differentiation.[6] The WHO has stated it will "conduct a formal risk assessment of all studied health outcomes from radiofrequency fields exposure by 2016."[7] It would be prudent to see what new data are included in the forthcoming assessment before granting Special Permits in a residential district for the tower at the DPW.

- **Insufficient evidence of meeting the "West pressure point" demand for wireless coverage:** The wireless coverage analysis provided to Sudbury by Broadcast Signal Lab, LLP in 2010 concluded that a tower sited at the DPW could potentially fill in coverage gaps in the "West pressure point" of town ("the vicinity of Hudson Road west of Goodnow Road to the Stow boundary, which is

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[4] Wireless Services Overlay District Zoning Bylaw, 4310 Purpose. Zoning Bylaw Article IX. 2015.

[5] "Electromagnetic fields and public health: mobile phones." World Health Organization (WHO) Fact Sheet N°193, Reviewed October 2014. http://www.who.int/mediacentre/factsheets/fs193/en/.

[6] Children's EMF Research Agenda. World Health Organization (WHO). http://www.who.int/peh-emf/research/children/en/index4.html.

[7] "Electromagnetic fields and public health: mobile phones." World Health Organization (WHO) Fact Sheet N°193, Reviewed October 2014. http://www.who.int/mediacentre/factsheets/fs193/en/.

roughly bounded by Maynard Road, Peakham Road and the western town boundary").[8] However, the analysis also concluded that "because [the DPW site] is on the eastern margin of the West pressure point, the DPW site would require an additional facility to more fully serve the West pressure point."[9] Rather than permit a tower with limited efficacy at the DPW site only to require an additional tower at a second site, the town should permit a single tower in a more effective location or boost the potential of existing facilities as outlined in the analysis' composite of potential opportunities. The summary of analysis provided by Broadcast Signal Lab ultimately recommended that, for the West pressure point, the Water District parcel "has beneficial characteristics (large parcel, municipally owned, nearly central to a significant coverage objective) that are more enticing than utilizing the DPW site."[10]

- **Insufficient setback requirement**: Sudbury's setback requirement of 125' is not comparable to the setback standards set by surrounding towns (e.g., 900' in Wayland, 1000' in Concord). It is unclear how the 125' setback was determined. In any event, a 125' setback, as is also true of a 140' height variance, in a residential zone does nothing to minimize either public health or visual impact concerns.

- **Environmental impacts**: The perimeter of the DPW site abuts Hop Brook. EMFs have been shown to negatively impact wetland habitats; in one study, for example, exposure to EMF radiation from wireless towers within 459' caused an increase in mortality in common tadpoles.[11]

- **Absence of evaluation by an independent radiofrequency (RF) engineer**: The town has not hired an RF engineer, independent of the wireless carrier's RF engineer, at the expense of the applicant, to 1) evaluate current gaps in wireless communications coverage; and 2) quantify the RF field strength near the tower (where a person could be exposed) to ensure that it is within the acceptable range for public health and safety standards.

- **Variance required**: The notice of the Zoning Board of Appeals hearing refers to two Special Permit applications. The notice of the balloon test refers to a Special Permit application and a dimensional Variance application. A dimensional Variance is needed to exceed the 100' free standing monopole tower height limit.

- **Selectmen authority to lease the DPW site**: The Wireless Services Overlay District provisions of the Town's Zoning Bylaw provides that the Board of Selectmen may lease town-owned property to facilitate the purposes of said bylaw.[12] It is unclear when, if ever, site-specific authorization to

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[8] *Coverage Analysis and Options Outline in Support of Tasks 1 and 2 of the Sudbury Wireless Planning Project.* Broadcast Signal Lab, LLP. February 10, 2010.

[9] *Coverage Analysis and Options Outline in Support of Tasks 1 and 2 of the Sudbury Wireless Planning Project.* Broadcast Signal Lab, LLP. February 10, 2010.

[10] *Coverage Analysis and Options Outline in Support of Tasks 1 and 2 of the Sudbury Wireless Planning Project.* Broadcast Signal Lab, LLP. February 10, 2010.

[11] Balmori A. Mobile Phone Mast Effects on Common Frog (Rana temporaria) Tadpoles: The City Turned into a Laboratory. Electromagn Biol Med. 2010 Jun;29(1-2):31-5.

[12] Wireless Services Overlay District Zoning Bylaw, 4390 Selectmen Authority to Lease Town-owned sites. Zoning Bylaw Article IX. 2015.

lease the DPW property was put to a vote and passed by a two-thirds majority at a Town Meeting. It is our understanding that disposition of surplus Town-owned land is not a subject that may be authorized through zoning.

A 140' wireless communications tower in a residential zone at the DPW site is not in the best interests of Sudbury residents. Please protect our community by denying the Special Permit and Variance applications.

Respectfully submitted,

PETITION OPPOSING THE PROPOSED WIRELESS COMMUNICATIONS TOWER AT THE SUDBURY DEPARTMENT OF PUBLIC WORKS SITE, 275 OLD LANCASTER ROAD, RESIDENTIAL ZONE A-1

Signature	Name (printed)	Address
	SUSAN Arayas	16 Pineridge rd SUDBURY
	Jane Roddy	22 Gerry Drive
	Alex von Lichtenberg	10 Washbrook Rd Sudbury
	Lisa von Lichtenberg	10 Washbrook Rd
	Mindy Davies	14 Gerry Dr. Sudbury MA 01776
Richard C Beaven	RICHARD C. BEAVEN	9 Gerry Drive
	Linda Hurst-Clayton	8 Pine Ridge Rd
	MELISSA GOUGH	16 WILDWOOD LANE.
	Carl Roddy	22 Gerry Drive
	Gang Yao	20 Washbrook Rd
	Xiaohua Qiao	20 Washbrook Rd
	MICHAEL ROE	19 WASHBROOK
	Hillary Roe	19 Washbrook
	Heather Currier	15 Washbrook Rd
	Brian Currier	15 Washbrook Rd.
	Lawrence Wind	4 Washbrook Rd.
	Christine Tucker	4 Washbrook Rd
	Jean Cunningham	3 Washbrook Rd.
	Joan S. Burke	7 Pine Ridge Rd.
	DAN GOLDFARB	9 Brownstone La

PETITION OPPOSING THE PROPOSED WIRELESS COMMUNICATIONS TOWER AT THE SUDBURY DEPARTMENT OF PUBLIC WORKS SITE, 275 OLD LANCASTER ROAD, RESIDENTIAL ZONE A-1

Signature	Name (printed)	Address
	John Gannon	38 Forest St
	Florence Young	38 Forest St.
	G F Fetterer	32 Forest St
	Harriet Quirk	67 Forest St.
	WM. KENDA	68 FOREST ST
	Jenny Joo	15 Woodberry Road
	Fred Blatz	35 Forest St.
	Jana Blanchette	12 Woodberry Rd
	JAMES BLANCHETTE	12 WOODBERRY RD
	DOROTHY HEINDEL	5 WOODBERRY
	LouAnn Fetterer	32 Forest St.
	Beverly F. Blatz	35 Forest St.
	Michele Maguire	56 Forest St.
	MARGARET KENDA	68 Forest St
	Ellen Cook	2 Woodberry Rd
	Andrew Cook	2 Woodberry Rd.
	Martha Reid	7 Forest St
	Ben Benton	7 Forest St.
	John Lindgren	474 Peakham Rd

PETITION OPPOSING THE PROPOSED WIRELESS COMMUNICATIONS TOWER AT THE SUDBURY DEPARTMENT OF PUBLIC WORKS SITE, 275 OLD LANCASTER ROAD, RESIDENTIAL ZONE A-1

Signature	Name (printed)	Address
	KEVIN CHIN	4 Huckleberry Ln
	DOUGLAS BARTY	286 OLD LANCASTER RD.
Margaret A. Pemberton	Margaret A. Pemberton Healy Harty	25 Meadow Drive
	NICHOLAS CLAYTON	8 PINE RIDGE ROAD
	Jen Segal	247 Old Lancaster rd
	Cristian Contreas	247 " "
Nina Piazza	Nina Piazza 270 Old Lancaster →	
Thomas Yarnall	THOMAS YARNALL	7 Wildwood Ln
	Ashley Yarnall	7 Wildwood Ln
Eugene Piazza	Eugene Piazza, MD	270 old Lancaster Rd
	ELIZABETH MCCORMICK	226 OLD LANCASTER
	DAVID MCCORMICK	226 OLD LANCASTER
	MARILYN BEAVEN	9 FERRY Drive
Sally Gimber	Sally Gimber	377 Concord Rd
	Peter P Gimber	377 CONCORD Rd.
	Michael Cunningham	3 Washbrook Rd.

PETITION OPPOSING THE PROPOSED WIRELESS COMMUNICATIONS TOWER AT THE SUDBURY DEPARTMENT OF PUBLIC WORKS SITE, 275 OLD LANCASTER ROAD, RESIDENTIAL ZONE A-1

Signature	Name (printed)	Address
Anne V Fischer	Anne V Fischer	24 Wildwood Ln
[illegible]	Zachary Blake	546 Peakham Rd
[illegible]	Catharine V. Blake	546 Peakham Rd
Steven C Fischer	Steven C Fischer	24 Wildwood Lane
[illegible]	Patricia Forin	15 Pineridge Rd
[illegible]	Robert Muller	23 Wildwood Ln.

PETITION OPPOSING THE PROPOSED WIRELESS COMMUNICATIONS TOWER AT THE SUDBURY DEPARTMENT OF PUBLIC WORKS SITE, 275 OLD LANCASTER ROAD, RESIDENTIAL ZONE A-1

Signature	Name (printed)	Address
Nancy Mushnick	Nancy Mushnick	9 Wash Brook Rd Sudbury, MA
Samuel Mushnick	Samuel Mushnick	9 Wash Brook Rd Sudbury MA
John Forino	JOHN FORINO	15 PINE RIDGE ROAD SUDBURY, MA
Patty Forino	Patty FORINO	15 PINERIDGE ROAD SUDBURY, MA

PETITION OPPOSING THE PROPOSED WIRELESS COMMUNICATIONS TOWER AT THE SUDBURY DEPARTMENT OF PUBLIC WORKS SITE, 275 OLD LANCASTER ROAD, RESIDENTIAL ZONE A-1

Signature	Name (printed)	Address
Hilde Kneissl	Hilde Kneissl	23 Gides Mill Rd.
Sharon Colombo	Sharon Colombo	39 Country Village Dr.
~~Richard Beaven~~	~~RICHARD BEAVEN~~	~~9 Gerry Drive~~

PETITION OPPOSING THE PROPOSED WIRELESS COMMUNICATIONS TOWER AT THE SUDBURY DEPARTMENT OF PUBLIC WORKS SITE, 275 OLD LANCASTER ROAD, RESIDENTIAL ZONE A-1

Signature	Name (printed)	Address
Judith Loughry	Judith Loughry	24 WashBrook Rd Sudbury
Kevin Loughry	KEVIN LOUGHRY	24 WASHBROOK RD. SUDBURY

PETITION OPPOSING THE PROPOSED WIRELESS COMMUNICATIONS TOWER AT THE SUDBURY DEPARTMENT OF PUBLIC WORKS SITE, 275 OLD LANCASTER ROAD, RESIDENTIAL ZONE A-1

Signature	Name (printed)	Address
Paige Goldfarb	PAIGE GOLDFARB	9 BROWNSTONE LANE

This petition has collected
24 signatures
using the online tools at iPetitions.com

Printed on 2015-10-05

Received 10/5/2015

Cell Towers do not belong next to residential homes

About this petition

September 24, 2015

To: Sudbury Zoning Board of Appeals

We, the undersigned residents of Sudbury, hereby petition the Sudbury Zoning Board of Appeals to reject the Special Permit applications (Case 15-33 and Case 15-34) for the proposed wireless communications tower at the site of the Department of Public Works (DPW). We oppose the construction of the 140' tower due to the following concerns:

* Limited assessment of visual impact, due to foliage and wind: Residents have not had the opportunity to assess the visibility of the proposed tower during a month with minimal foliage. We request that a crane test (rather than a balloon test) be conducted for a more accurate representation of the tower's height and visual impact.

* Excessive height for meeting public safety communication needs: Permitting a 140' tower instead of a 100' tower does not further the stated objective of the construction, which is to meet public safety communication needs. A tower with a height of 100' would sufficiently meet any public safety communication needs.

* Adverse effect on property values: Property values in the neighborhoods surrounding the DPW would be adversely affected by the presence of a tower.

* Absence of consideration by the Board of Health: The Board of Health has not formally reviewed the proposal for the tower, nor has it been consulted regarding the requested exceptions to the Zoning Bylaws.

* Residents' health concerns: Some residents are concerned about the long-term effects of electromagnetic fields (EMFs), particularly from continuous exposure to a tower with multiple wireless carriers in close proximity to residences. The Agency for Research on Cancer (IARC) classifies EMFs as "possibly carcinogenic to humans (Group 2B)," and the World Health Organization (WHO) has acknowledged that further research into the possible adverse health effects of EMFs is warranted.

* Insufficient evidence of meeting the "West pressure point" demand for wireless coverage: Gaps in coverage in the "West pressure point" of town would not be adequately filled by a DPW site alone, because it is on the eastern margin of the West pressure point. Rather than permit a tower with limited efficacy at the DPW site only to require an additional tower at a second site, the town should permit a single tower in a more effective location or boost the potential of existing facilities.

* Insufficient setback requirement: Sudbury's setback requirement of 125' is not comparable to the setback standards set by surrounding towns (900' in Wayland;

1000' in Concord). It is unclear how the 125' setback was agreed upon and whether the matter was ever put forth for consideration by residents.

* Absence of evaluation by an independent radiofrequency (RF) engineer: The town has not hired an RF engineer, independent of the wireless carrier, to 1) evaluate current gaps in wireless coverage; and 2) quantify the RF field strength near the tower to ensure that it is within the acceptable range for public health standards.

A 140' wireless communications tower at the DPW site is not in the best interest of Sudbury residents. Please protect our community by rejecting the Special Permit applications.

Signatures

1. Name: Lisa Barth on 2015-10-01 16:58:11
Comments: 286 Old Lancaster Road
Sudbury, MA 01776

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2. Name: Lisa von Lichtenberg on 2015-10-01 17:38:25
Comments: NO to Cell tower in residential area!

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3. Name: Xiaohua Qian on 2015-10-01 18:25:12
Comments:

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4. Name: Michael Cunningham on 2015-10-01 19:17:20
Comments:

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5. Name: Melissa Stolper on 2015-10-01 19:31:05
Comments: Melissa Stolper
30 Meadow Drive
Sudbury, MA 01776

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6. Name: Jim Kodera on 2015-10-01 20:43:00
Comments: No cell phone tower in the residential area, our area or not.

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7. Name: Paige goldfarb on 2015-10-01 21:58:25
Comments: Please don't do this

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8. Name: Emma Wang on 2015-10-01 22:44:33
Comments: We don't need cell towers!

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9. Name: Na Qian on 2015-10-01 23:18:20
Comments: Please no cell towers in any residential areas.

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10. Name: David Zakur on 2015-10-01 23:21:50
Comments:

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11. Name: Jean Cunningham on 2015-10-01 23:51:22
Comments:

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12. Name: Nancy Mushnick on 2015-10-02 00:08:43
Comments:

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13. Name: Robert Stolper on 2015-10-02 00:57:43
Comments: 30 Meadow Drive, Sudbury MA 01776

14. Name: Samuel Mushnick on 2015-10-02 01:01:16
Comments:

15. Name: Amy Zakur on 2015-10-02 01:15:10
Comments:

16. Name: Jane Hightower Roddy on 2015-10-02 01:35:51
Comments:

17. Name: Alexa Greenbaum on 2015-10-02 02:06:13
Comments:

18. Name: Greg George on 2015-10-02 13:08:46
Comments: We should have an emergency tower without the unnecessary cell tower.
Meadow Drive, Sudbury, MA

19. Name: Melissa Gough, 16 Wildwood Lane on 2015-10-02 14:48:05
Comments:

20. Name: Linda Huet on 2015-10-02 20:01:29
Comments:

21. Name: Kristen Rice on 2015-10-02 23:00:42
Comments: 8 Pheasant Avenue, Sudbury, MA 01776

22. Name: Sam Karustis on 2015-10-03 11:27:39
Comments:

23. Name: Joseph F Arayas on 2015-10-05 13:41:37
Comments: 16 Pineridge Road
Sudbury, MA 01776

24. Name: Debra M. Winslow on 2015-10-05 20:23:38
Comments:


Received 10/5/15

10-5-18
Received