

**NORTHERN  
WESTCHESTER COUNTY**

**COOPERATIVE  
WIRELESS  
COMMUNICATIONS  
MASTER  
PLAN**

June 23, 2023

PREPARED BY

**CityScape**

CONSULTANTS, INC.  
[www.CityScapeGov.com](http://www.CityScapeGov.com)



# TABLE OF CONTENTS

INTRODUCTION .....	3
EXECUTIVE SUMMARY .....	5
CHAPTER 1 - WESTCHESTER COUNTY AND WIRELESS INVENTORY .....	7
WESTCHESTER COUNTY .....	8
INFRASTRUCTURE INVENTORY MAPS .....	10
Structure Type .....	10
Antenna Type .....	13
Location .....	17
Design Type .....	20
CHAPTER 2 - WIRELESS OVERVIEW AND COVERAGE MAPPING .....	23
WIRELESS OVERVIEW .....	24
WIRELESS COVERAGE VARIABLES .....	25
WIRELESS COVERAGE .....	28
COVERAGE MAPPING .....	30
MAPPING ANALYSIS .....	35
WIRELESS CAPACITY .....	37
NETWORK CAPACITY GAP ANALYSIS .....	39
LTE WIRELESS SERVICE GAPS .....	41
POTENTIAL SOLUTIONS .....	45
CHAPTER 3 - COMMUNITY SURVEY .....	46
COMMUNITY SURVEY .....	47
CHAPTER 4 - STATE AND FEDERAL REGULATIONS .....	50
FEDERAL REGULATIONS .....	51
STATE REGULATIONS .....	54
CHAPTER 5 - REGULATORY RECOMMENDATIONS AND CONCLUSION .....	55
REGULATORY RECOMMENDATIONS .....	56
CONCLUSION .....	59

**APPENDIX A: WIRELESS DEFINITIONS**

**APPENDIX B: BEDFORD**

**APPENDIX C: LEWISBORO**

**APPENDIX D: MOUNT KISCO**

**APPENDIX E: NEW CASTLE**

**APPENDIX F: NORTH SALEM**

**APPENDIX G: POUND RIDGE**

**APPENDIX H: SOMERS**

**APPENDIX I: YORKTOWN**

# INTRODUCTION

The Cooperative Wireless Communications Master Plan (Plan) has been prepared as a resource to address the need for improved wireless services for specific communities in Northern Westchester County (NWC). The study area is made up of eight individual communities and include the Towns of Bedford, Lewisboro, New Castle, North Salem, Pound Ridge, Somers, Yorktown and the Village/Town of Mount Kisco.

The Plan is a comprehensive wireless telecommunications study intended to facilitate an optimal wireless telecommunications environment and promote efficient network deployment practices. The research and analysis in this Plan details and maps existing wireless facilities, simulates current wireless coverages, identifies areas with gaps in wireless services along with suggested locations for new facilities. The wireless network gap maps help direct strategic planning for future wireless communications infrastructure placement and design throughout NWC.

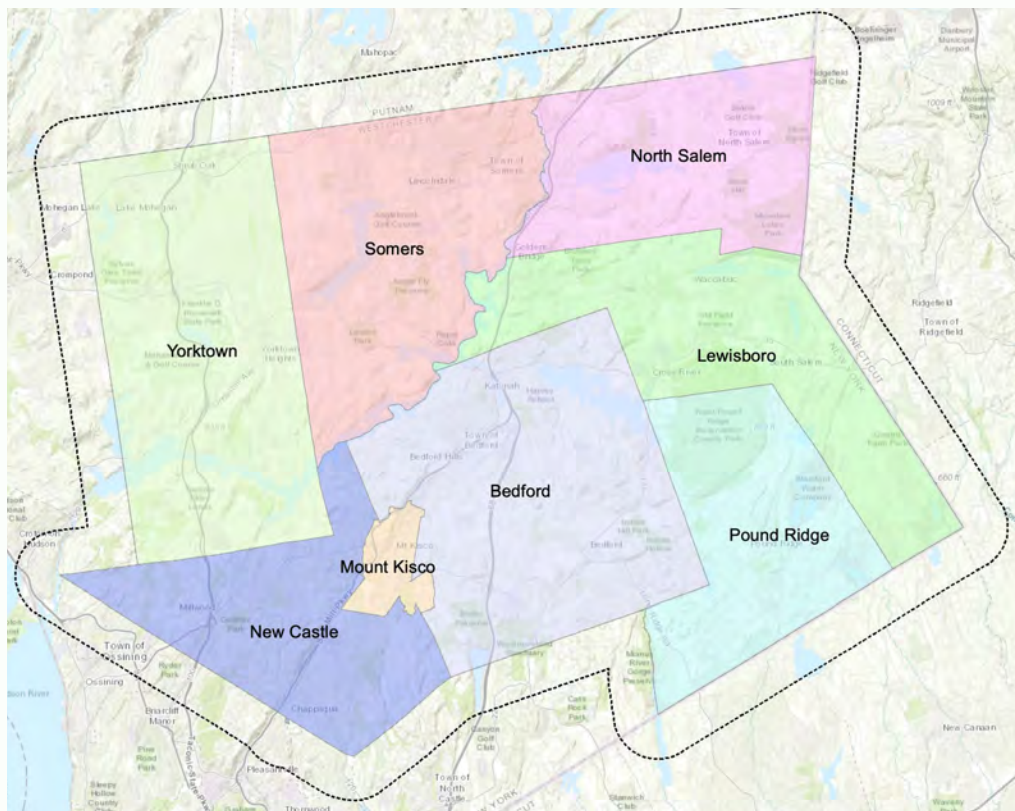
Key objectives identified by NWC community surveys are as follows:

- Improve wireless services throughout the communities allowing for robust wireless connectivity for residents, businesses, visitors and emergency management personnel.
- Protect community aesthetics by planning for well-sited, well-designed, concealed infrastructure consistent with surrounding areas.
- Promote greater transparency from the wireless industry by requiring applicants to demonstrate radio frequency emission compliance with Federal Communications Commission (FCC) standards in connection with any new or existing wireless development.
- Address small wireless facility buildout standards in public rights-of-way.
- Promote continued use of public assets to allow greater community control over placement and design of new wireless infrastructure to protect the community from visual impacts and improve coverage in hard-to-reach areas.

The main document of the Plan consists of the Northern Westchester County overall wireless depiction. Included in the Plan are:

- County characteristics; and
- Wireless inventory maps categorized by structure type, antenna type, location and design type; and
- Simulated propagation mapping outlining existing wireless coverages; and
- Maps indicating gaps in wireless services, recommended solutions, federal and state regulations; and
- Overall community survey results; and
- Regulatory review and recommendations.

Definitions of certain technical terms used within this document can be found in Appendix A. Each communities individual Plan is included as subsequent appendices.



# EXECUTIVE SUMMARY

The Cooperative Wireless Communications Master Plan (Plan) began in response to the award of a request for proposal (RFP) for the Town of Bedford for a Study and Report of Emergency Service and Wireless Telecommunications infrastructure Master Plan. The wireless telecommunication portion of the Bedford Study expanded to a northern County-wide project.

The Plan addresses wireless trends and community concerns related to wireless infrastructure and develops the framework to proactively plan for the responsible deployment of new wireless facilities throughout the Northern Westchester County (NWC) region. The NWC region as defined in this plan consists of eight communities of Bedford, Lewisboro, Mount Kisco, New Castle, North Salem, Pound Ridge, Somers and Yorktown.

The study includes the overall region of the eight combined jurisdictional boundaries plus a one-mile perimeter around the border. Each community is also represented as a stand-alone document in Appendices B through I. All existing wireless facilities were assessed, studied, cataloged and used as the baseline in CityScape's mapping and analysis.

Simulated propagation maps from all identified wireless facilities reveal areas throughout the Towns and Village lacking wireless coverages. United States Census population data along with geographic variables are considered and shown on maps illustrating areas with service gaps.

A wireless infrastructure facility survey was conducted in each community to engage residents, staff and elected officials. Collectively there were 4,002 responses from the community surveys which provides guidance related to aesthetics and types of wireless land use development the residents will support. This information was used to strategize solutions for a more continuous wireless network throughout the region over the next ten years.

The assessment process discovered a total of 106 wireless facilities categorized as follows:

**Structure Type:** 81 Towers, 25 Base Stations

**Antenna Type:** 71 Macro Cell, 3 Small Cell, 12 Public Safety/Macro, 17 Public Safety, 3 Other

**Location:** 54 Private Property, 38 Public Property, 8 Utility Easement, 6 Public ROW

**Design Type:** 76 Non-Concealed, 23 Concealed, 7 Semi-Concealed

The coverage maps simulate wireless coverages utilizing the existing personal wireless facilities and identify wireless coverage gaps throughout NWC.

Coverage does not portray the entire wireless story throughout the region and for that reason network capacity needs to be considered when studying the gaps. Coverage refers to the area where a device can obtain network access. Capacity refers to the amount of traffic a network can handle and its corresponding speeds. The more people in the area using the network the less capacity available; thus, connectivity can be an issue in areas where more people are simultaneously using their wireless devices.

One way to estimate capacity concerns is considering areas with the highest population density. These areas have the potential for the highest usage of wireless devices. Capacity maps are included and consider what may happen to the wireless network when there are higher usage demands. This gives a more realistic picture of gaps in wireless services, estimating the potential capacity strains of a network during peak times.

Each NWC community had three public meetings regarding the project beginning with a project initiation meeting. A second meeting presented results of the infrastructure assessments, the inventory catalog, simulated propagation, census data, land use and capacity heat maps. At the conclusion the public was invited to participate in an on-line Wireless Master Plan Survey. The third meeting summarized survey results and presented gap maps and code review observations.

Potential solutions to fill in identified network gaps include the recommendation of adding 36 macro cell facilities ranging 80' to 130' in height throughout the Study Area. It is recommended that each facility accommodate multiple collocations. A total of 118 small wireless facilities are suggested on existing utility poles as a start to fill in gaps in visually sensitive view sheds.

Wireless communications regulations play an important role in setting clear guidelines for the wireless industry to ensure necessary infrastructure is deployed in a way that meets the preferences of individual communities. Code amendment comments are provided for each community to ensure compliance with current federal guidelines and to incorporate community preferences ascertained from public remarks provided in the community surveys.



# CHAPTER 1

# **WESTCHESTER COUNTY**

AND

# **WIRELESS INVENTORY**

# WESTCHESTER COUNTY

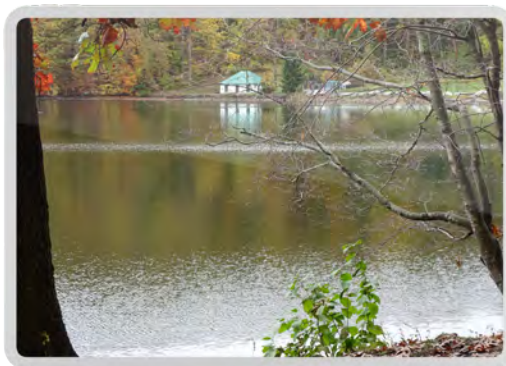
Westchester County, located in the Hudson Valley, is approximately 450 square miles and the seventh most populated county in the state of New York. It was founded in 1683 with the county seat located in the City of White Plains. The Hudson River parallels the western county line and the southeastern county line has miles of shoreline along the Long Island Sound.

The County is a large suburban area because of its proximity to New York City. Southern Westchester County is significantly more densely populated with the cities of Yonkers, Mount Vernon, New Rochelle, White Plains and Rye but the northern part of the County has retained much of its rural character while adopting the urban and suburban lifestyles dictated by its proximity to New York City.

To the north is Putnam and Fairfield Counties and to the East the County line abuts Connecticut. The County is intersected by the Bronx, Saw Mill and Croton rivers and there are steep hills within the County's borders.

Northern Westchester County (NWC) is significantly more rural, predominantly low-density single-family dwelling units with significant acreage set aside for conservation, public parks and open spaces. Quaint shopping districts with a few midsize shopping centers in Bedford, New Castle, Yorktown and Somers characterize the commercial service areas throughout NWC. The Village/Town of Mount Kisco is the most densely populated community with the largest shopping districts. Pound Ridge is the least densely populated Town in NWC.

The following *Table 1* is gathered from the U.S. Census Bureau Quick Facts web site with the most notable differences in population between Yonkers to the south and the communities in NWC.





US CENSUS DATA QUICK FACTS	POPULATION ESTIMATES 2021	PEOPLE PER SQUARE MILE	
		2010	2020
Westchester County	997,895	2,204	2,332
Yonkers	209,530	10,880	11,750
Bedford	17,183	466	461
Lewisboro	12,049	447	442
Mount Kisco	10,777	3,584	3,604
New Castle	18,000	756	793
North Salem	5,195	239	245
Pound Ridge	5,129	225	226
Somers	21,322	689	725
Yorktown	35,953	984	994

Table 1: US Census Data Comparison

The topography varies significantly throughout NWC with tall hills, deep valleys, rock walls and rock outcrops. Most of NWC is heavily wooded with mostly deciduous trees. Rivers, perennial and intermittent streams flow through the region along with several reservoirs and hundreds of lakes and small ponds are located throughout the study area. The highest elevation is 987 feet in Mountain Lakes Park located in North Salem and the lowest elevation is around 20 feet along the water’s edge of the New Croton Reservoir in Yorktown.

Major north/south transportation networks in NWC include I-684, the Taconic State Parkway, Highway 22 (Bedford Road), Saw Mill River Parkway and Highway 9. The rail service parallels the Saw Mill River Parkway and a portion of Highway 9. Train stations for commuters are located in Katonah, Bedford Hills, Mount Kisco and New Castle. Park and Ride lots are also found along I-684. There are no major east/west thoroughfares in NWC. Most of the smaller highways and local roads are typically winding and narrow and paralleled with trees and man-made cobblestone/stream bed/local rock walls.

Maintaining the viewsheds among the hilltops and rural open space regions are top priorities and goals of the NWC communities. The goal of the Plan aims to complement these objectives in conjunction with balancing the need of additional infrastructure to accommodate the existing and growing wireless demands.

# INFRASTRUCTURE INVENTORY MAPS

Existing and proposed wireless infrastructure is the foundation for understanding the wireless industry deployment patterns and when modeled helps predict where new sites are needed to fill in network gaps.

CityScape completed an assessment of each antenna location to verify the following information: 1) exact location; 2) ownership; 3) tenants; 4) type of facility; and 5) notable observations.

As of October 2022, there are a total of 106 wireless facilities verified in the designated “study area” which is identified as NWC including a one-mile perimeter outside of the NWC boundary.

The inventory is categorized and mapped accordingly for analytical purposes:

- Structure Type: Towers and Base Stations
- All Antenna Type: Macro Cell, Small Cell, Broadcast, Public Safety, Other
- Personal Wireless Service Facility (PWSF) Antenna Type: Macro Cell, Small Cell
- Location: Private Property, Public Property, Utility Easements, Rights-of-Way
- Design Type: Concealed, Non-Concealed, Semi-Concealed, Dual Purpose

Infrastructure in each community is identified by a unique prefix followed by a number to distinguish the specific community in which the site is located as follows: B-Bedford, L-Lewisboro, M-Mount Kisco, C-New Castle, N-North Salem, P-Pound Ridge, S-Somers, Y-Yorktown and O-Outside for facilities in the one-mile perimeter.

Detailed site information is within each individual community's Inventory Infrastructure Catalog located in the respective appendices.

## STRUCTURE TYPE

Towers and base stations make up the structure type. Towers are structures that are built for the sole purpose of supporting wireless equipment. Base stations are other structures that wireless equipment can be placed upon such as buildings, water tanks and utility poles.

Wireless infrastructure is not commonly owned by the commercial wireless service providers installing wireless equipment.

Stakeholders who own and lease vertical real estate in NWC are American Tower Corporation (ATC), Crown Castle (CC), Homeland Towers, InSite Towers, and SBA. Public agencies also own tower assets for use of their equipment and in NWC some of those entities include the State of New York, Town of Bedford, Village/Town of Mount Kisco and Westchester County. These facilities are primarily used for public safety equipment but some also host commercial wireless antennas.

Of the 106 wireless facilities in the study area, 81 are towers and 25 are base stations. Three of these structures are approved but not yet built, four are proposed and under review and seven are inquiries. Infrastructure in the one-mile perimeter is included as they may fully or partially provide wireless services to NWC. There are 17 towers and one base station located within the one-mile perimeter outside of the defined NWC borders.

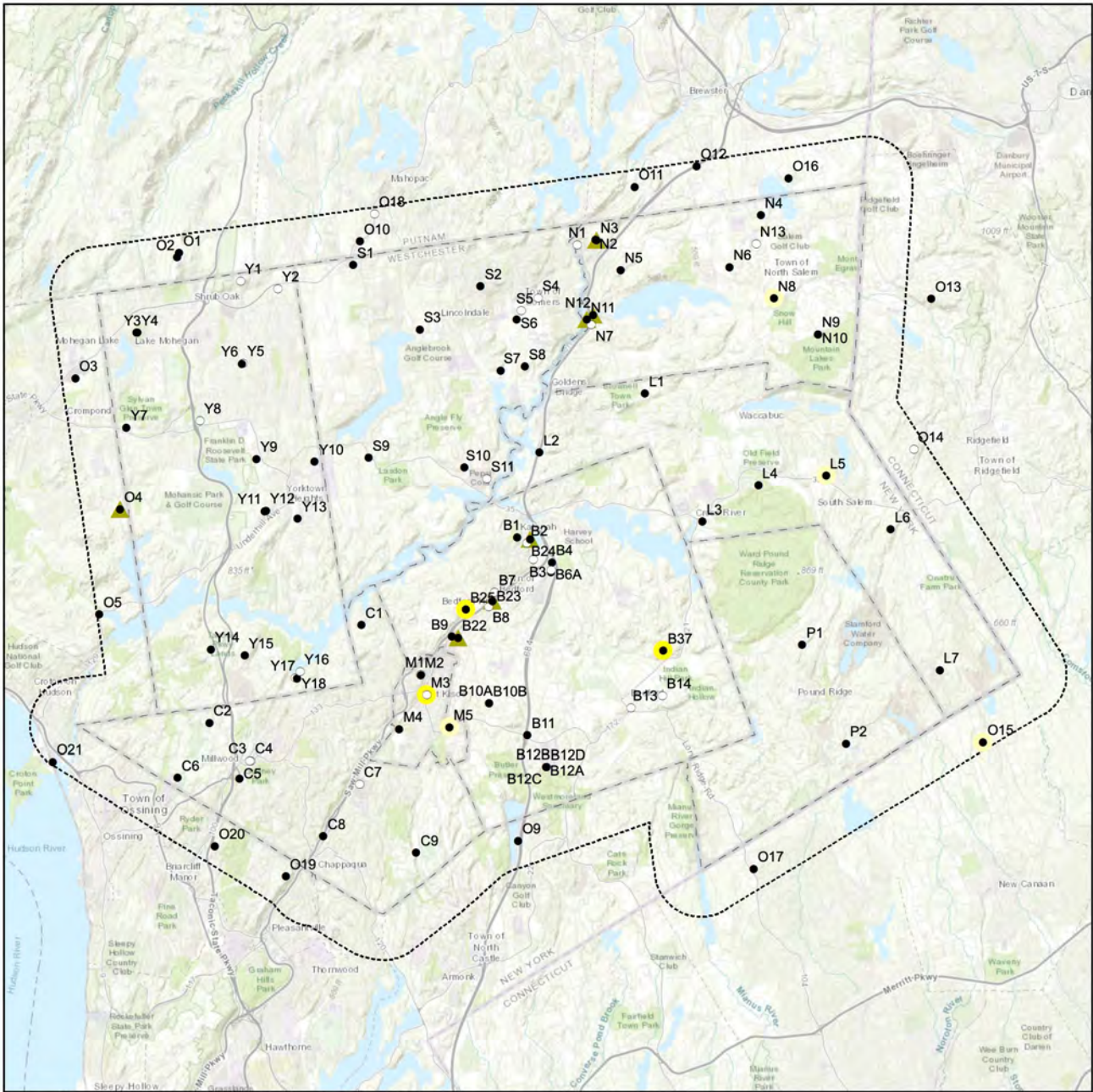
The following *Table 2* summarizes the overall inventory by structure type for each of the communities in the study area.

TOWERS	EXISTING	APPROVED NOT BUILT	PROPOSED UNDER REVIEW	INQUIRY	TOTAL
<b>Westchester County</b>	<b>68</b>	<b>2</b>	<b>4</b>	<b>7</b>	<b>81</b>
Bedford	11	2	0	3	16
Lewisboro	6	0	1	0	7
Mount Kisco	2	0	1	0	3
New Castle	6	0	0	0	6
North Salem	6	0	1	3	10
Pound Ridge	2	0	0	0	2
Somers	8	0	0	0	8
Yorktown	12	0	0	0	12
One Mile Perimeter	15	0	1	1	17
<b>BASE STATIONS</b>					
<b>Westchester County</b>	<b>24</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>25</b>
Bedford	7	0	0	0	7
Lewisboro	0	0	0	0	0
Mount Kisco	1	1	0	0	2
New Castle	3	0	0	0	3
North Salem	1	0	0	0	1
Pound Ridge	2	0	0	0	2
Somers	3	0	0	0	3
Yorktown	6	0	0	0	6
One Mile Perimeter	1	0	0	0	1
<b>TOTAL</b>	<b>92</b>	<b>3</b>	<b>4</b>	<b>7</b>	<b>106</b>

Table 2: Infrastructure Inventory by Structure Type by Community

The sites are further depicted in *Figure 1* and represented by the following colored dots:

- Towers
- Base Stations



Northern Westchester County Inventory by: **County**

- Cataloged Structure Type**
- Tower (80)
  - Base Station (26)
  - Approved but Not Yet Built (3)
  - Proposed and Under Review (4)
  - ▲ Inquiry (7)
  - ▭ City Boundaries
  - ⋯ 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 6/21/2023

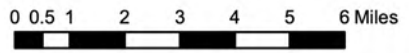


Figure 1: Wireless Facilities by Structure Type

## ANTENNA TYPE

Wireless antenna types are referenced by their characteristics of functionality. The types referenced in this Plan are macro cell (macro), small wireless, public safety, broadcast and other. Personal wireless service facilities (PWSFs) are sites that have at least one commercial wireless provider and the antenna types are referenced as either macro wireless or small wireless antennas. Macro wireless facilities are high powered sites intended to cover sizeable geographic areas (typically within two to three miles of the tower) to service the largest number of network subscribers. Small wireless facilities have smaller antennas, are shorter in height and operate at less power than the traditional macro facilities. Small wireless facilities have a smaller coverage footprint (~500' radius) and are typically placed between macro facility sites to be used to “fill-in” areas. Small facilities can be attached to buildings, rooftops, utility poles, traffic signals or free-standing structures in public rights-of-way. These sites are routinely deployed in areas with large concentrations of network subscribers or in areas not conducive to macro facilities.

AT&T, Dish Wireless, T-Mobile and Verizon are the four personal wireless service providers deploying networks in the study area. Collectively these service providers are on the 71 existing facilities. Of those there are ten existing macro wireless facilities on public safety towers.

There are two approved but not yet built macro sites, four proposed and under review macro facilities, three macro cell inquiries and three small wireless facilities inquiries.

Nineteen existing facilities do not have any personal wireless equipment.

*Table 3* categorizes the sites by all antenna type.

	NWC	ONE-MILE PERIMETER	TOTAL
<b>ALL ANTENNA TYPE</b>	<b>88</b>	<b>18</b>	<b>106</b>
<b>Macro Wireless Facilities</b>			
Existing	50	12	62
Approved Not Built	2	0	2
Proposed Under Review	3	1	4
Inquiry	2	1	3
<b>Subtotal Macro Wireless</b>	<b>57</b>	<b>14</b>	<b>71</b>
<b>Small Wireless Facilities</b>			
Inquiry	3	0	3
<b>Subtotal Small Wireless</b>	<b>3</b>	<b>0</b>	<b>3</b>
<b>Public Safety and Macro Wireless Facilities</b>			
Existing	6	4	10
Approved Not Built	2	0	2
Inquiry	0	0	0
<b>Subtotal Public Safety and Macro</b>	<b>8</b>	<b>4</b>	<b>12</b>
<b>Public Safety Facilities</b>			
Existing	16	0	16
Inquiry	1	0	1
<b>Subtotal Public Safety</b>	<b>17</b>	<b>0</b>	<b>17</b>
<b>Other Type Facilities</b>			
Existing	3	0	3
<b>Subtotal Other</b>	<b>3</b>	<b>0</b>	<b>3</b>

Table 3: Infrastructure Inventory by All Antenna Type

The all antenna type sites are further depicted in *Figure 2* and represented by the following colored dots:

- Macro Wireless      ● Small Wireless      ● Public Safety
- Macro and Public Safety      ● Other

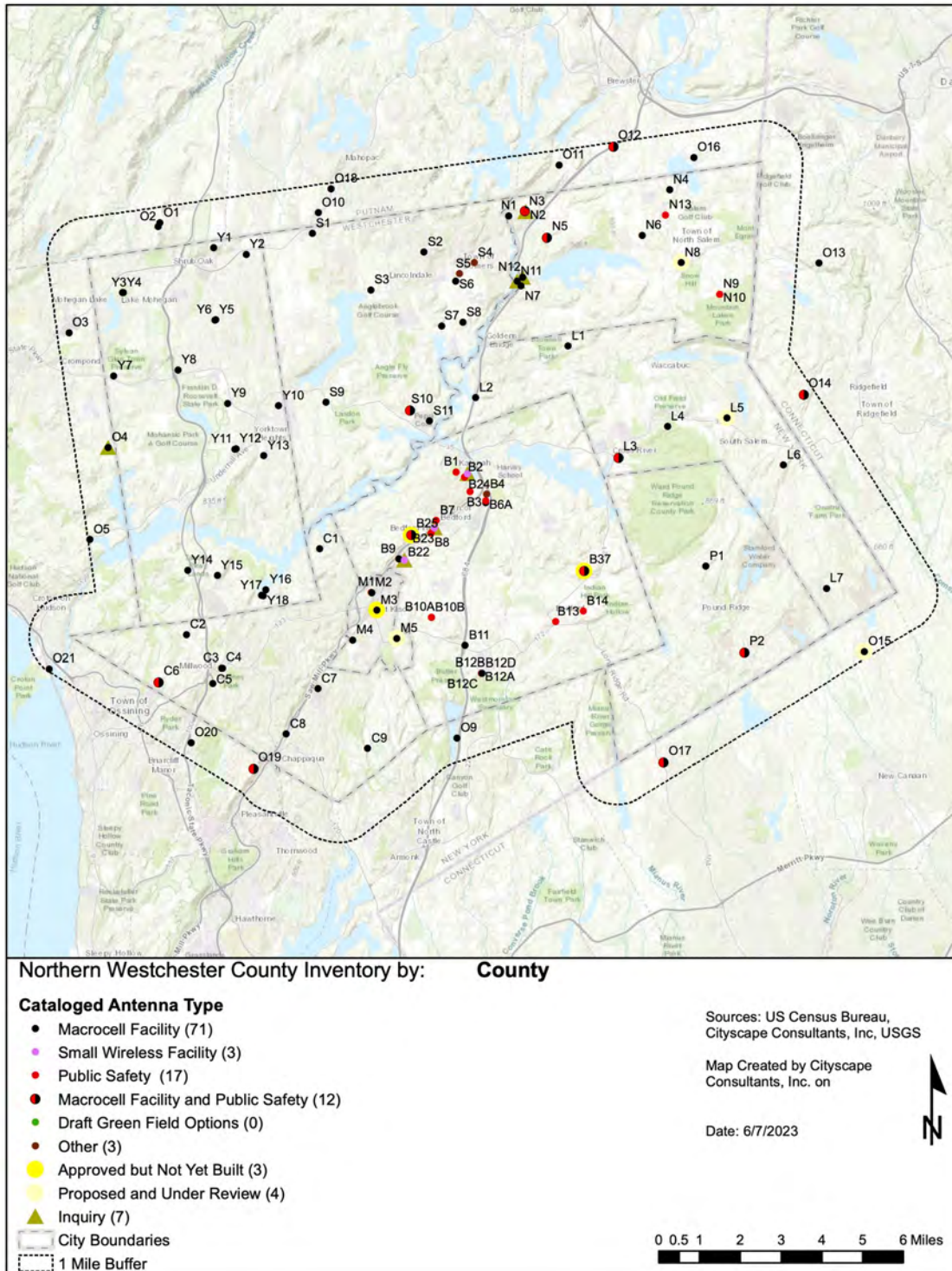


Figure 2: Wireless Facilities by All Antenna Types

The following *Table 4* summarizes the inventory by PWSF sites which are macro and small wireless facilities. *Table 5* itemizes these sites by community.

	NWC	ONE-MILE PERIMETER	TOTAL
<b>PWSF TYPE</b>	<b>68</b>	<b>18</b>	<b>86</b>
<b>Macro Wireless Facilities</b>			
Existing	51	12	63
Approved Not Built	1	0	1
Proposed Under Review	4	1	5
Inquiry	2	1	3
<b>Subtotal Macro Wireless</b>	<b>58</b>	<b>14</b>	<b>72</b>
<b>Public Safety and Macro Wireless Facilities</b>			
Existing	6	4	10
Approved Not Built	1	0	1
<b>Subtotal Public Safety and Macro Wireless</b>	<b>7</b>	<b>4</b>	<b>11</b>
<b>Small Wireless Facilities</b>			
Inquiry	3	0	0
<b>Subtotal Small Wireless</b>	<b>3</b>	<b>0</b>	<b>3</b>

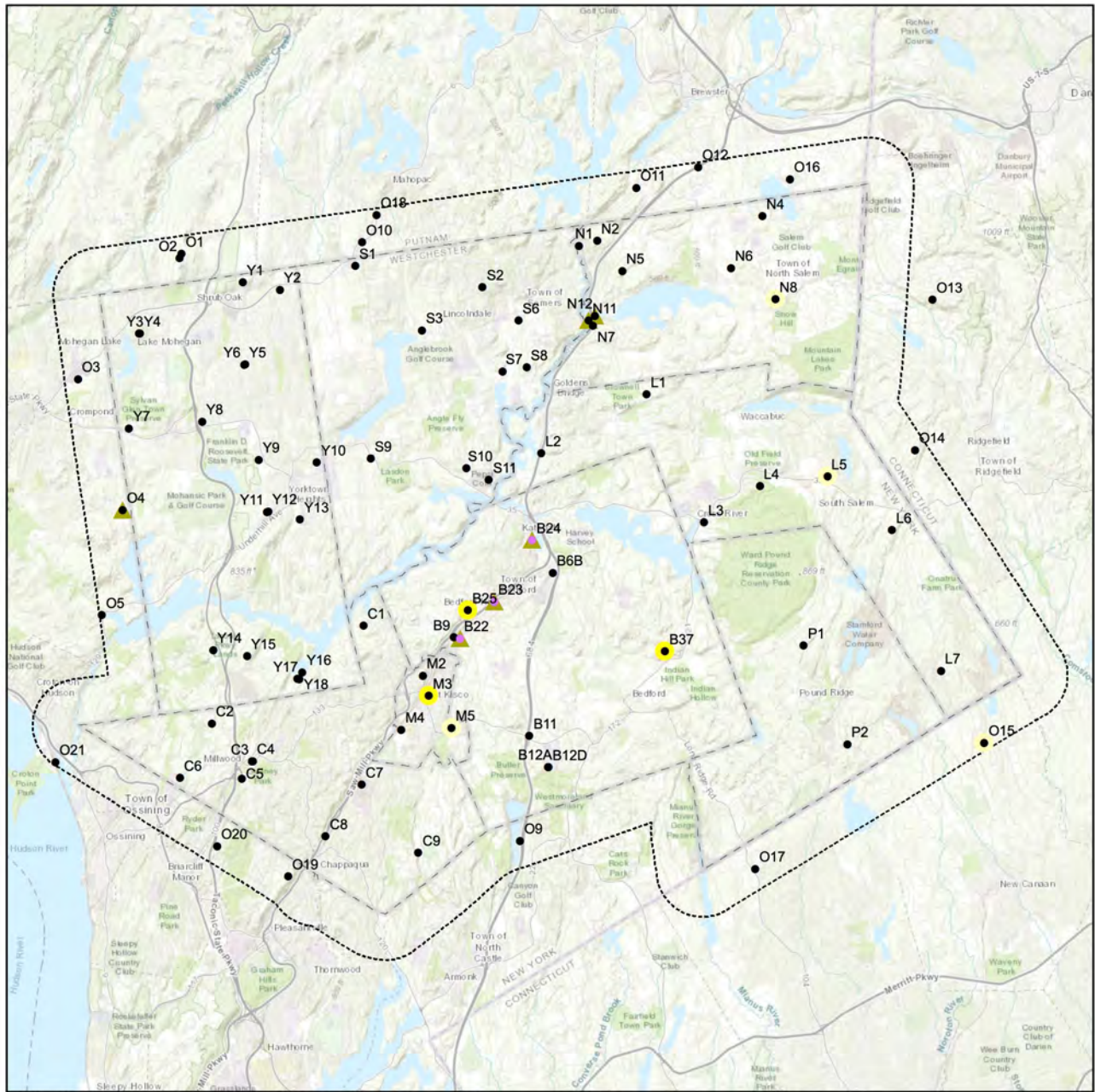
Table 4: Infrastructure Inventory by PWSF Type

PWSF ANTENNA TYPE	EXISTING	APPROVED NOT BUILT	PROPOSED UNDER REVIEW	INQUIRY	TOTAL
<b>Westchester County</b>	<b>73</b>	<b>3</b>	<b>4</b>	<b>6</b>	<b>86</b>
<b>Macro Wireless Facilities</b>					
Bedford	5	2	0	0	7
Lewisboro	6	0	1	0	7
Mount Kisco	2	1	1	0	4
New Castle	9	0	0	0	9
North Salem	6	0	1	2	9
Pound Ridge	2	0	0	0	2
Somers	9	0	0	0	9
Yorktown	18	0	0	0	18
One-Mile Perimeter	16	0	1	1	18
<b>Subtotal Macro</b>	<b>73</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>83</b>
<b>Small Wireless Facilities</b>					
Bedford	0	0	0	3	3
<b>Subtotal Small</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>

Table 5: PWSF Infrastructure by Community

The following *Figure 3* illustrates all PWSF antenna types (macro and small wireless) and represented by the following colored dots:

- Macro
- Small Wireless Facilities



Northern Westchester County Inventory by: **County**

**Cataloged PWSF Antenna Type**

- Macrocell Facility (83)
- Small Wireless Facility (3)
- Approved but Not Yet Built (3)
- Proposed and Under Review (4)
- ▲ Inquiry (6)
- ▭ City Boundaries
- ▭ 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 6/7/2023



0 0.5 1 2 3 4 5 6 Miles

Figure 3: Wireless Facilities by PWSF Type



## LOCATION

The location of a wireless facility is denoted as being located on either private or public property, in public rights-of-way (ROW) or in public utility easements. In the overall study area, 54 sites are on private property, 38 on public property, eight in utility easements and six in the ROW. Public property locations include: Westchester County, educational institutions, parks, public utility and waste facilities. Consolidated Edison (Con Ed) and New York Department of Transportation are examples of utility and rights-of-way locations.

The following *Table 6* summarizes the inventory by location.

	NWC	ONE-MILE PERIMETER	TOTAL
<b>LOCATION</b>	<b>88</b>	<b>18</b>	<b>106</b>
<b>Public Property</b>			
Existing	29	3	32
Approved Not Built	1	0	1
Proposed Under Review	2	0	2
Inquiry	3	0	3
<b>Subtotal Public Property</b>	<b>35</b>	<b>3</b>	<b>38</b>
<b>Private Property</b>			
Existing	35	12	47
Approved Not Built	2	0	2
Proposed Under Review	1	1	2
Inquiry	2	1	3
<b>Subtotal Private Property</b>	<b>40</b>	<b>14</b>	<b>54</b>
<b>Inside Rights-of-Way</b>			
Existing	4	1	5
Inquiry	1	0	1
<b>Subtotal ROW</b>	<b>5</b>	<b>1</b>	<b>6</b>
<b>Utility Easement</b>			
Existing	8	0	8
<b>Subtotal Utility Easement</b>	<b>8</b>	<b>0</b>	<b>8</b>

Table 6: Infrastructure Inventory by Location

The following *Table 7* summarizes the inventory by location and by community.

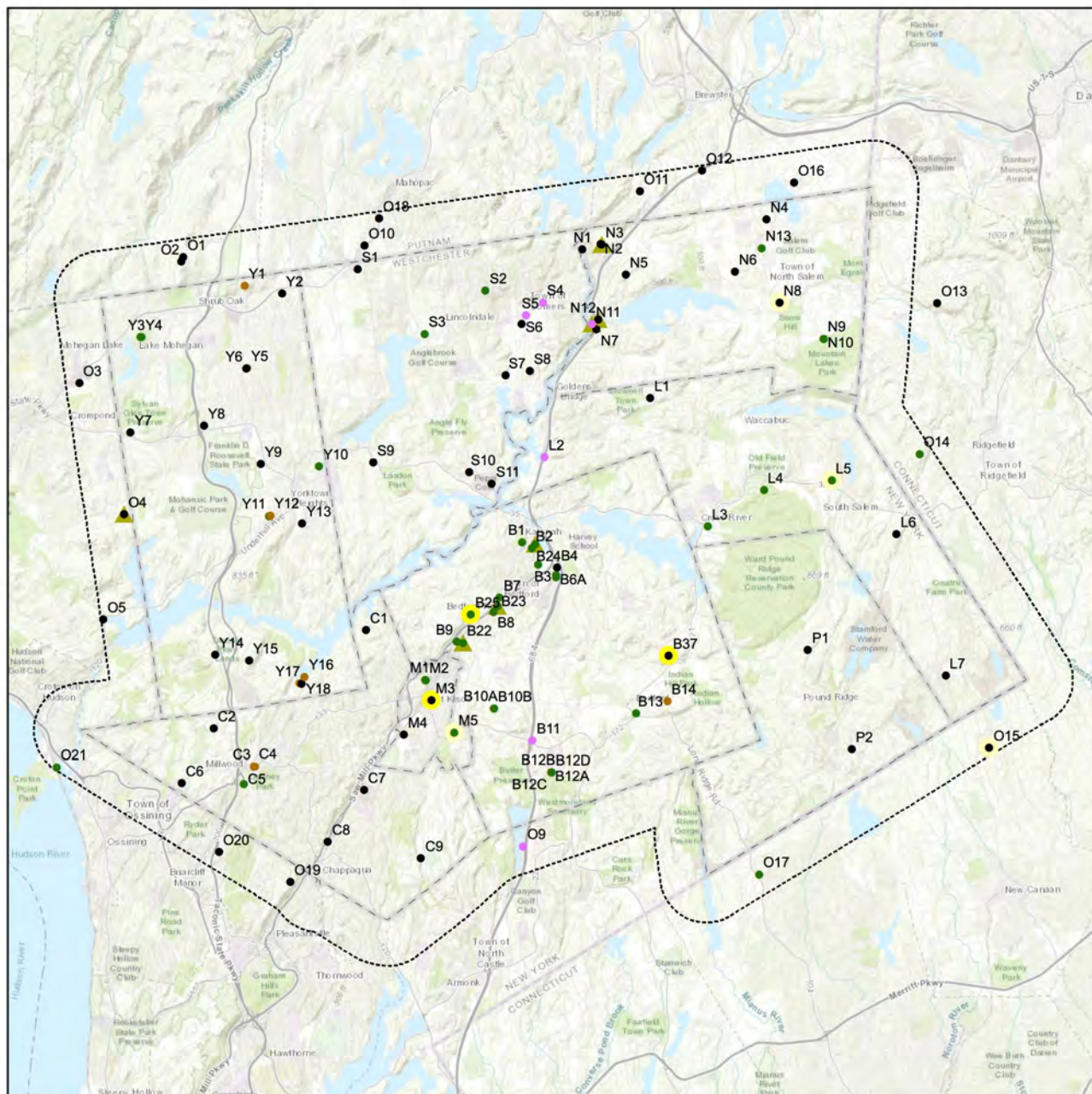
COMMUNITY	PUBLIC PROPERTY	PRIVATE PROPERTY	INSIDE ROW	UTILITY EASEMENT	TOTAL
Westchester County	38	54	6	8	106
Bedford	19	2	1	1	23
Lewisboro	3	3	1	0	7
Mount Kisco	3	2	0	0	5
New Castle	1	6	0	2	9
North Salem	3	9	1	0	13
Pound Ridge	0	2	0	0	2
Somers	2	7	2	0	11
Yorktown	4	9	0	5	18
One-Mile Perimeter	3	14	1	0	18

Table 7: Location of Infrastructure by Community

The following *Figure 4* illustrates all infrastructure inventory by location and represented by the following colored dots:

- Private Property
- Rights-of-way
- Public Property
- Utility Easement





Northern Westchester County Inventory by: **County**

**Cataloged Location**

- Private Property (54)
- Inside Right-of-Way (6)
- Publicly Owned (38)
- Utility Easement (8)
- Approved but Not Yet Built (3)
- Proposed and Under Review (4)
- ▲ Inquiry (7)
- ▭ City Boundaries
- ▭ 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 6/7/2023

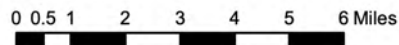


Figure 4: Wireless Facilities by Location

## DESIGN TYPE

Wireless facility design types are categorized as either non-concealed, concealed or semi-concealed. Non-concealed facilities mean the antennas, cables, antenna mounts and ancillary equipment are exposed and visible. The most widely used design type is non-concealed and are monopole, guyed or lattice tower.

Concealed towers and base stations are designed to look like something other than a communication facility and/or be disguised to fit in with surrounding architecture and viewsheds. With concealed sites, all antenna, cables, antenna mounts and ancillary equipment are designed to be blend into the existing structure. On buildings the equipment is located inside enclosures, behind shrouds or radio frequency transparent panels. Semi-concealed is considered where the equipment is still visible but painted to blend with the surrounding environment.

Catalogued are a total of 76 non-concealed, 23 concealed and seven semi-concealed wireless facilities in the study area.

The following *Table 8* details the cataloged antennas by design type.

	NWC	ONE-MILE PERIMETER	TOTAL
<b>DESIGN TYPE</b>	<b>88</b>	<b>18</b>	<b>106</b>
<b>Non-Concealed</b>			
Existing	58	13	71
Approved Not Built	1	0	0
Inquiry	3	1	4
<b>Subtotal Non-Concealed</b>	<b>62</b>	<b>14</b>	<b>76</b>
<b>Concealed</b>			
Existing	12	3	15
Approved Not Built	1	0	1
Proposed Under Review	3	1	4
Inquiry	3	0	3
<b>Subtotal Concealed</b>	<b>19</b>	<b>4</b>	<b>23</b>
<b>Semi-Concealed</b>			
Existing	6	0	6
Approved Not Built	1	0	1
<b>Subtotal Semi-Concealed</b>	<b>7</b>	<b>0</b>	<b>7</b>

Table 8: Infrastructure Inventory by Design Type

The following *Table 9* summarizes the inventory by design type and by community.

COMMUNITY	CONCEALED	SEMI-CONCEALED	NON-CONCEALED	TOTAL
Westchester County	23	7	76	106
Bedford	3	2	18	23
Lewisboro	1	1	5	7
Mount Kisco	2	1	2	5
New Castle	1	3	5	9
North Salem	3	0	10	13
Pound Ridge	1	0	1	2
Somers	5	0	6	11
Yorktown	3	0	15	18
One-Mile Perimeter	4	0	14	18

Table 9: Infrastructure Design Type by Community

The following *Figure 5* illustrates all infrastructure inventory by design type and is represented by the following colored dots:

- Concealed
- Semi-Concealed
- Non-Concealed



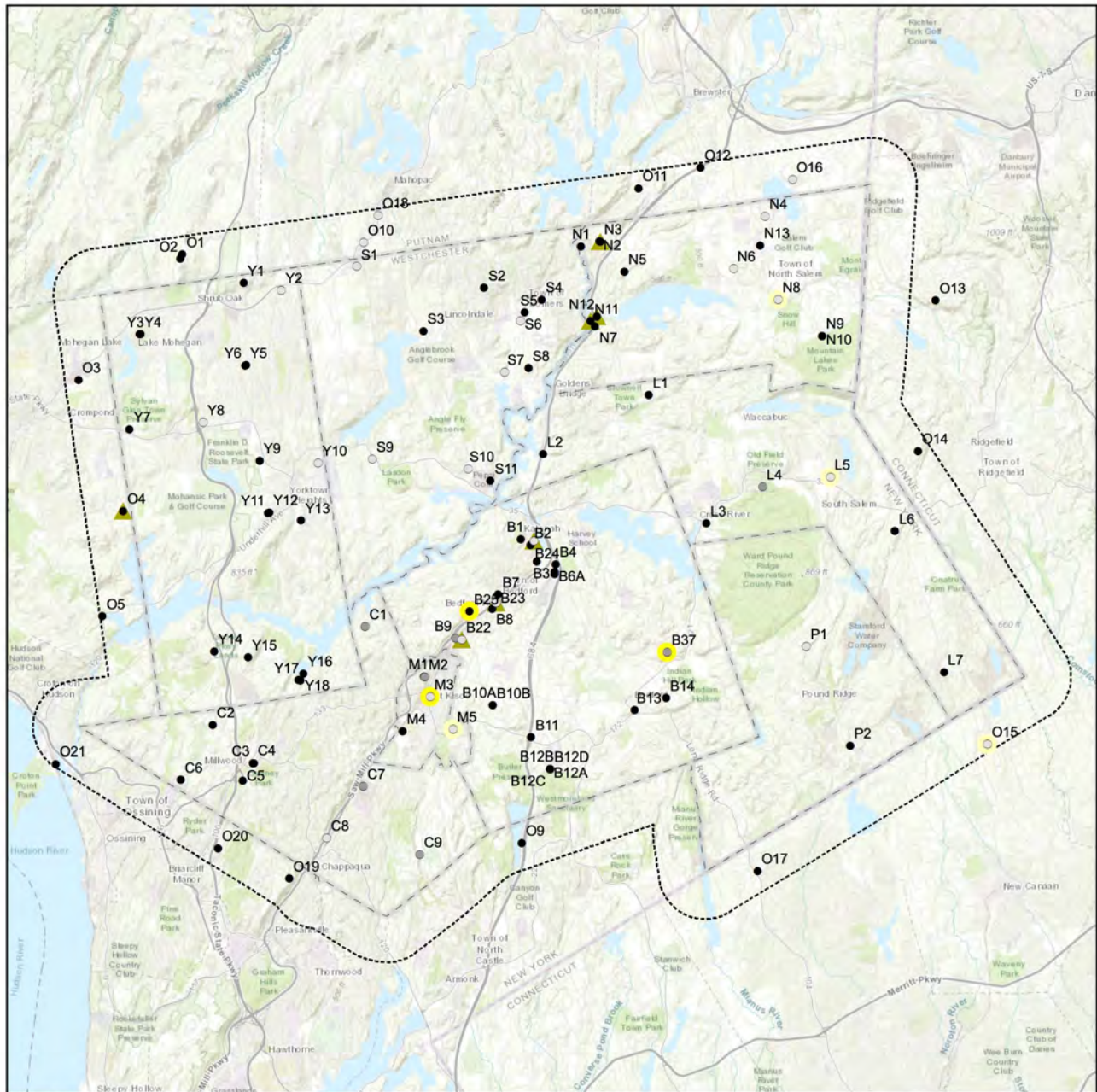
Site Y2 Concealed



Site C7 Semi-Concealed



Site Y18 Non-Concealed



Northern Westchester County Inventory by: **County**

**Cataloged Design Type**

- Concealed Tower or Base Station (23)
- Semi-Concealed Tower or Base Station (7)
- Non-concealed Tower or Base Station (76)
- Approved but Not Yet Built (3)
- Proposed and Under Review (4)
- ▲ Inquiry (7)
- ▭ City Boundaries
- ▭ 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 6/8/2023

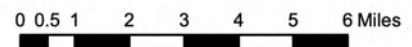


Figure 5: Wireless Facilities by Design Type



## CHAPTER 2

# **WIRELESS OVERVIEW**

AND

# **COVERAGE MAPPING**

# WIRELESS OVERVIEW

The current evolution of personal wireless technology is benchmarked by the underlying network platforms and referenced as first, second, third, fourth and fifth generations of wireless deployment (1G, 2G, 3G, 4G and 5G respectively). First and second generations provided the initial launch of personal wireless services. Third generation improved data transfer with the addition of multimedia messaging services, simple applications and games. Fourth generation substantially increased connection speeds which introduced Smartphones. This 4G platform has progressed to LTE as the industry transitions into full 5G technology. The concept of 5G and beyond is using existing bandwidth and new radio spectrum to enable more simultaneous reuse of the same channels and improve data speeds by using advanced antenna systems and other to-be-invented processes.

All wireless telecommunication networks operate using radio bands and frequencies on the wireless spectrum as shown in *Figure 6*. Radio bands contain the frequencies that are transmitted by wireless service providers. Radio frequency refers to a subset of electromagnetic energy, transmitted through an antenna, creating radio waves with a desired frequency and length. Frequency represents the number of waves passing by each second, while wavelength is the distance traveled per individual cycle of a radio wave.

Wireless technology discussed in the Plan refers to the radio frequencies that fall within the non-ionizing electromagnetic fields. Non-ionizing radio waves are not strong enough to directly affect the structure of atoms or damage DNA; however, it does cause atoms to vibrate which can cause them to heat up.<sup>1</sup>

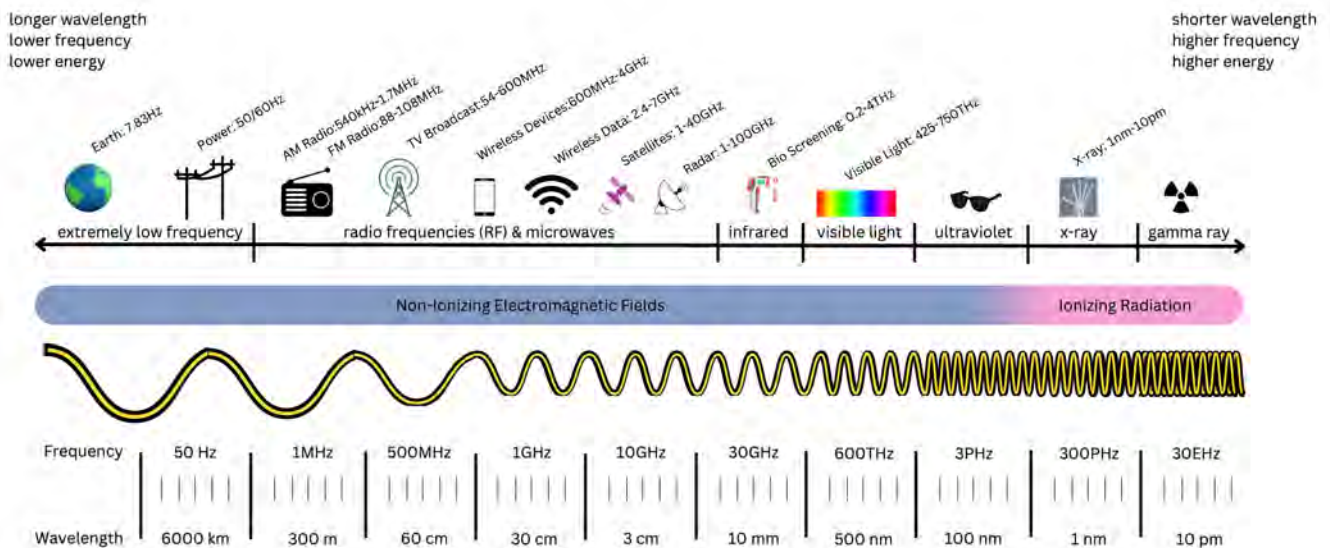


Figure 6: Frequency Wavelength Depiction

<sup>1</sup> www.EPA.Gov



The Federal Communications Commission (FCC) governs radio frequency emissions and sets the safety guidelines for all wireless devices and facilities.

Antennas mounted on towers and base stations transmit and receive the radio waves which provides signal to a designated geographic area. Wireless providers form their network with the connection of their antennas with the idea that subscribers can connect seamlessly. *Figure 7* details in simplistic form what a wireless network may look like and how a subscriber would connect. Each wireless service provider (AT&T, T-Mobile, Verizon, Dish) deploys, operates and maintains their own individualized network for their subscribing customers.

The wireless industry is rapidly upgrading existing 4G LTE equipment as it evolves into 5G infrastructure. The planned 5G standard is intended for true high-speed data. Currently almost all commercial wireless networks are operating within the mid-band frequencies and they are providing high bandwidth services through optimized software and hardware.

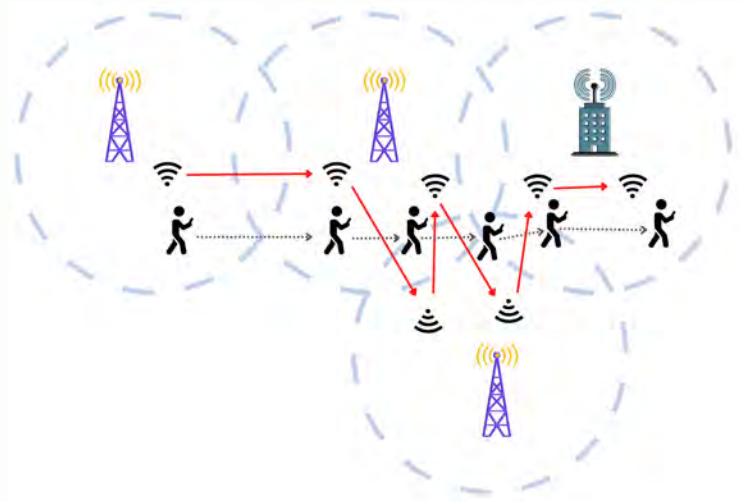


Figure 7: Simplified Wireless Network

The FCC, regulator for wireless services, continues to reallocate frequencies from other radio services to accommodate the evolving 5G technology. Frequencies previously unavailable or considered undesirable by the wireless industry are being tested and utilized for consumer wireless services. The 5G platform will continue to evolve over the next few years.

## WIRELESS COVERAGE VARIABLES

There are different types of radio systems using different frequency bands and each have their pros and cons. FM radio is at the lowest end of the wireless spectrum in the VHF band and has the advantage of overcoming terrain and foliage losses better than UHF and the lower radio bands where consumer wireless services are licensed.

For example, the FCC contour map in *Figure 8* illustrates coverage of the FM radio transmitter on Site B6B. The radio station WWES 88.9 FM signal covers a large portion of NWC.

Another example is Land Mobile Radio (LMR) networks or public safety networks, which use VHF and UHF frequencies to provide first responders with two-way radio communications on handheld and mobile devices. This public safety network consists of antenna on taller towers operating at higher power levels than commercial wireless networks. For this reason, only a few public safety facilities are required to cover NWC with LMR service.

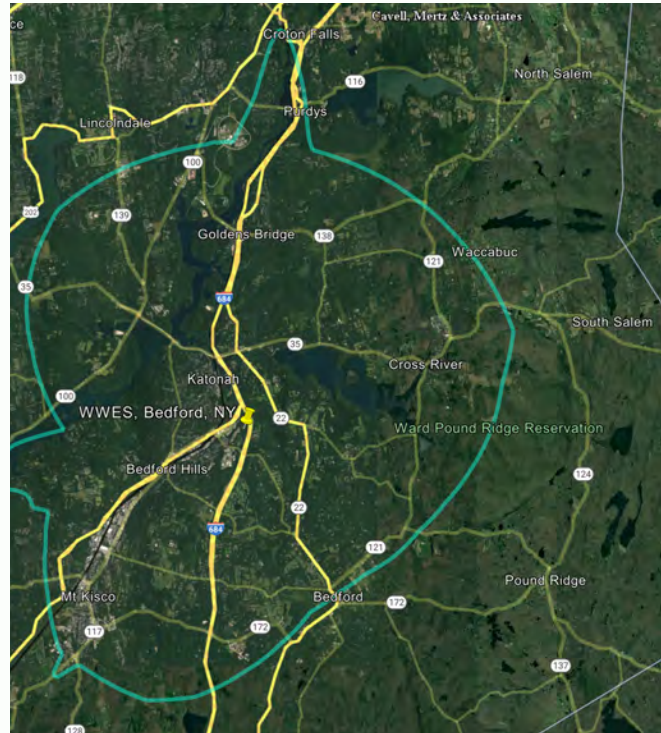


Figure 8: Contour Map Broadcast Coverage

Commercial wireless networks cover a smaller footprint than public safety and AM/FM broadcast networks. As indicated the low-band radio waves can travel greater distances.

The radio waves in mid-band frequencies penetrate buildings better and offer greater network capacity than compared to the low-band frequencies, but the distance the radio waves travel in this range, is limited and much shorter than the low-band.

In summary, operating frequencies used by commercial wireless providers have a variety of limitations and present radio frequency engineering challenges. For example, low-band antennas produce radio waves that provide coverages over a great distance but the signal has difficulty penetrating inside buildings. When compared to low-band, the mid-band frequencies deliver much faster throughput speeds, can enter buildings better and have greater capacity but cannot overcome terrain, are significantly impacted by foliage and provide coverages over a much shorter range. The transition to 5G service necessitates the need for higher-band frequencies above 6000 MHz (6 GHz) which provides significant increases in data transfer capability when compared to low and mid-band frequencies. However, high-band frequencies have a very limited transmission range from the antenna and the signal quickly deteriorates in foliage and terrain.

Geography and tree canopy are the most relevant reasons why there is limited wireless coverages throughout NWC. Heavily wooded regions with mature tree canopies along with hillsides in areas of NWC create terrain obstacles since leaves, trees and land mass absorb and scatter wireless signals. These factors limit the ability to cover distant residences and roadways necessitating wireless facilities in these areas for improved wireless coverages.

The following *Figure 9* demonstrates predicted radio coverage and shows how foliage is a major disruptive factor to wireless coverages. On the left is a 180' tower in the Town of Bedford (Site B6B) and on the right a residence .05 miles away on Harris Road just east of I-684. The signal path passes through free space without much loss before it has to traverse through approximately 100 feet of woods as well as a hillside. Both obstacles are enough to dramatically reduce the mid-band wireless signal levels. A list of limiting factors throughout all of NWC are as follows:

- Distance – Most towers are located in commercial zones or along highways which is quite a distance away from homes, leaving many residential areas without wireless coverages.
- Hillsides – There are rolling hills throughout all of NWC which creates terrain obstacles blocking wireless signals.
- Trees – Leaves on trees are significant absorbers and scatterers of UHF and microwave wireless signals, limiting the ability to cover distant areas. Chances are the coverages are better when the leaves have fallen from the trees during the winter months.

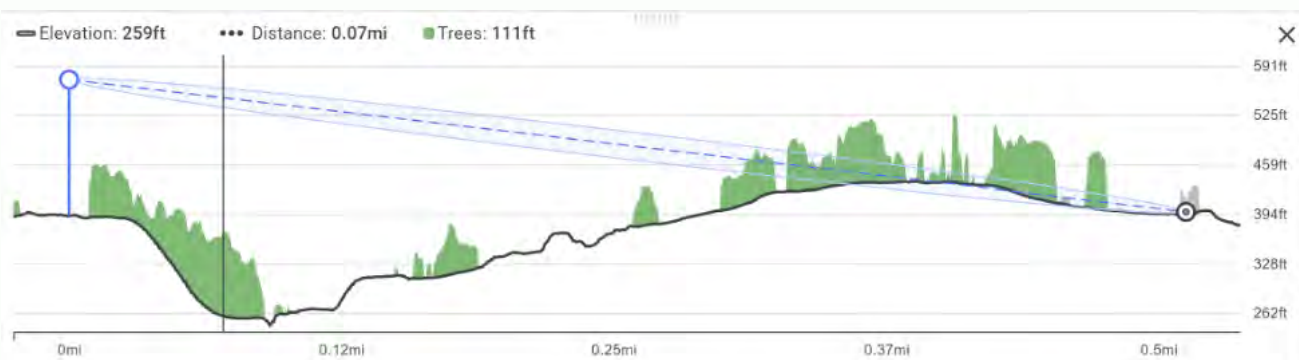


Figure 9: Signal Path From Tower to Residence

## WIRELESS COVERAGE

Wireless coverage is a measure of the area around a wireless transmitter (antennas and ground equipment at a tower or base station) that has sufficient signal strength for use by wireless devices to operate. In order to determine where there are gaps in wireless coverages propagation maps are created. Propagation mapping is a process that simulates wireless coverage from individual antenna sites.

Signal strength, in this exercise, is a term used to describe the level and operability of a wireless device. The stronger the signal between the elevated antenna and the wireless device the more likely the device and all the built-in features will work as expected.

A low or reduced signal can cause unsatisfactory service, results in slow download or upload speeds and can cause dropped calls. The distance between the elevated antennas and the physical location of the person using the wireless device is one factor determining signal strength.

Other factors affecting signal strength are any natural or man-made obstructions such as location of buildings, type of building materials or vegetation that comes between the antenna and devices. The use of devices indoors or outdoors is also a factor when determining signal strength. Consider this much like a light bulb in a lamp; the further away you are from the lamp, the dimmer the light becomes and any obstructions in between you and the lamp dims or obscures the light, just like signal strength.

Currently most of the radio spectrum that wireless providers own is within the mid-band frequencies, providing high bandwidth services through optimized software and hardware. Therefore, the following modeling and coverages use this range of spectrum. The following analysis is predicted coverage from the three most prominent wireless service providers (AT&T, T-Mobile and Verizon) in the 1.7 to 2.5 GHz (1700-2500 MHz) mid-band frequency where wireless service providers own most of their spectrum holdings for prioritized 5G deployments.

The level of propagation signal strength is shown through the gradation of colors from yellow to blue. The geographic areas in yellow identify areas where signal strength can penetrate indoors. The areas in green equates to areas with average signal strength typically for outdoor and in vehicle service. Areas shaded in blue symbolizes signal strength that is considered for mostly outdoor use only and gray shaded areas indicate where there is marginal, spotty or no signal.

To further explain; the closer the proximity to the antenna the brighter shades of yellow appear indicating better quality of wireless services. As the subscriber approaches the outer edge of the yellow or into the blue area, the signal strength becomes more prone to degradation, particularly as usage in the area increases or environmental conditions worsen.

A quick reference of the shades and descriptions are as follows in *Table 10*.

SIGNAL STRENGTH COLOR	dBm	SIGNAL STRENGTH DESCRIPTION
Yellow	> -75	In Building
Green	-95	In Vehicle
Blue	-105	Outdoor
Gray or White		Marginal or No Service

Table 10: Signal Strength Description

# COVERAGE MAPPING

The following propagation maps simulate coverages for wireless service providers operating throughout NWC. The maps were created using mid-band frequencies, assuming maximum operating power from each facility that currently contains personal wireless service equipment. It also considers a generic antenna model similar to those used by service providers and assumes each provider is located at the highest mounting height on each tower or base station represented.

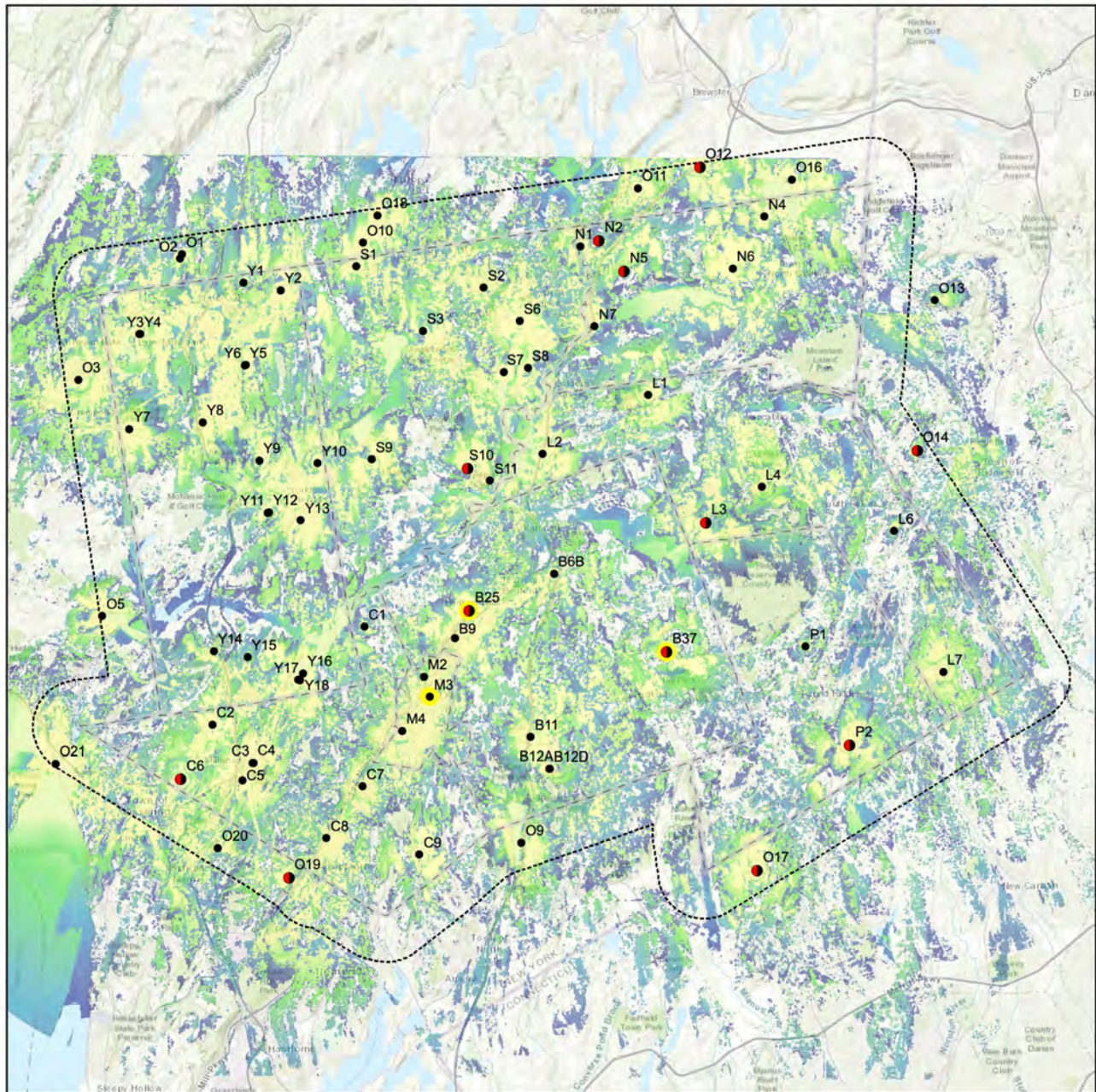
This modeling assumption gives an estimation of the wireless coverages in NWC if each service provider was located on each facility. However not all service providers are on every facility, but the goal is to maximize the existing infrastructure already in place to accommodate the others.

Out of the total 106 wireless facilities in the study area only 76 are PWSF sites. *Figure 10* illustrates simulated propagation from these PWSF sites using the mid-band frequency spectrum (1700-2400 MHz) range and includes both macro and small wireless facilities. The map includes locations that are approved but not yet built and excludes sites to be removed, sites under review or sites identified as an inquiry.

Throughout NWC the lack of continuous shades of yellow indicates that in building network coverage is spotty or non-existent between existing PWSF sites. To achieve seamless wireless coverages the map would ideally show more yellow and far fewer areas with no coloration. This map however is not the best representation of the overall coverage because not all existing sites contain every service provider on each tower or base station. In reality individual provider maps have more gaps.

Of the 76 existing PWSF antenna locations only 28 of those facilities have all three of the major commercial providers on the same facility. A more realistic representation of the actual coverage patterns is shown in *Figures 11-gh* because these maps are individual simulated propagation for the three different wireless service providers. All the service providers have significant gaps in their individual coverage areas with the only remedy being collocation on existing facilities where available or adding new infrastructure where collocation is not available.

Overall, the existing wireless sites are not evenly dispersed and have an inconsistent deployment pattern leading to many gaps in wireless coverages. Most of the facilities are in clusters along the major transportation corridors attempting seamless coverage along the most travelled thoroughfares.



Northern Westchester County Inventory by: **County**

**Cataloged PWSF Antenna Type**

- Macrocell Facility (64)
- Small Wireless Facility (0)
- Public Safety (0)
- Macrocell Facility and Public Safety (12)
- Draft Green Field Options (0)
- Other (0)
- Approved but Not Yet Built (3)
- Proposed and Under Review (0)
- ▲ Inquiry (0)
- City Boundaries
- ⋯ 1 Mile Buffer

**Mid-band Frequency PWSF Sites**

- Approximate Coverage
- Indoor (-75)
  - In Vehicle (-95)
  - Outdoor (-105)

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 6/9/2023

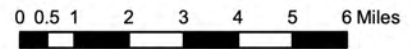
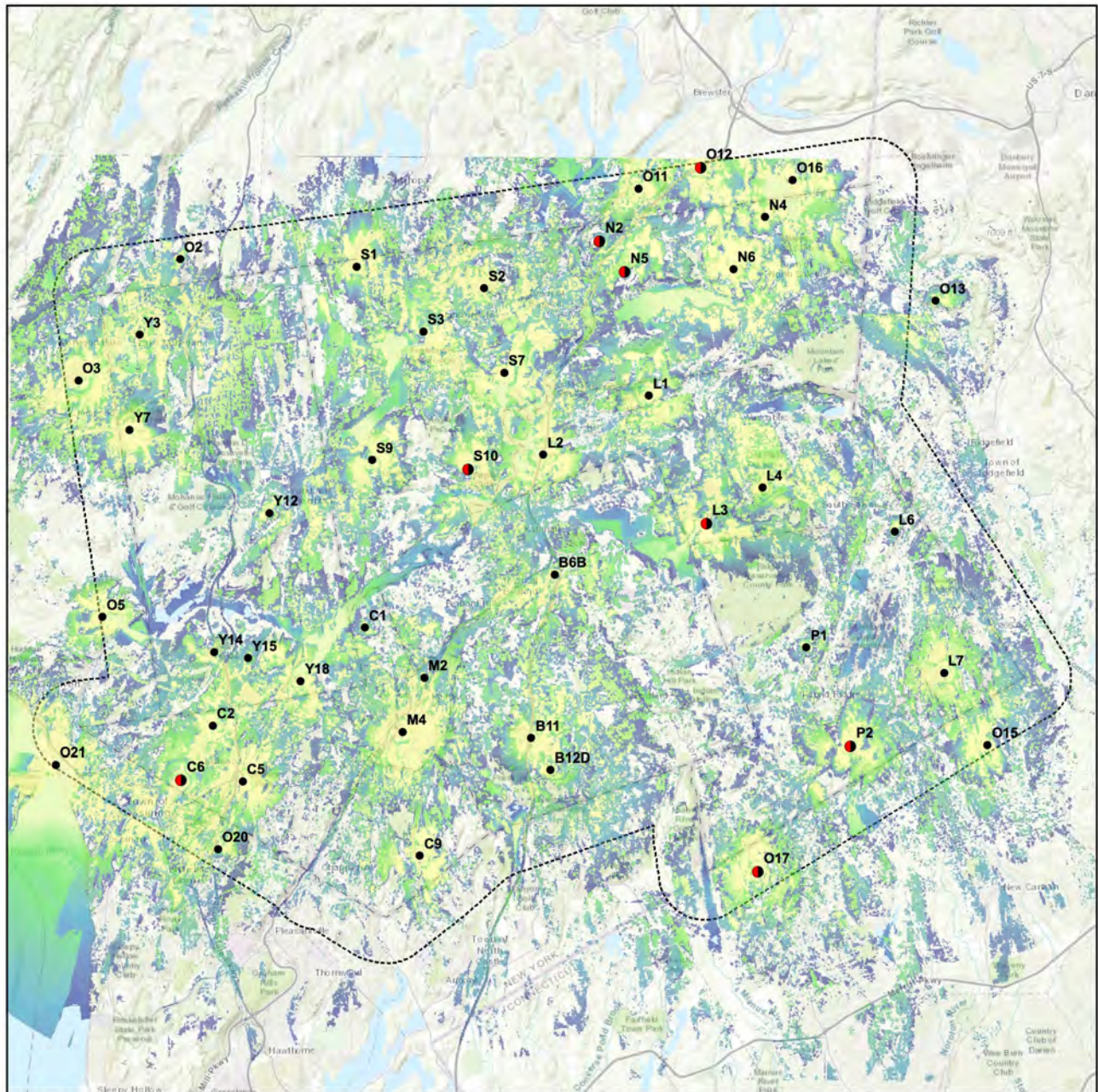


Figure 10: Simulated Coverage Map from PWSF Sites



Northern Westchester County Inventory by: **County**

**Cataloged Antenna Type Provider 1**

- Macrocell Facility (37)
- Small Wireless Facility (0)
- Public Safety (0)
- Macrocell Facility and Public Safety (8)
- Draft Green Field Options (0)
- Other (0)
- Approved but Not Yet Built (0)

**Mid Band Frequency Provider 1**

Approximate Coverage

- Indoor (-75)
- In Vehicle (-95)
- Outdoor (-105)

- ▭ City Boundaries
- ▭ 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 6/8/2023

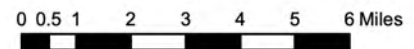
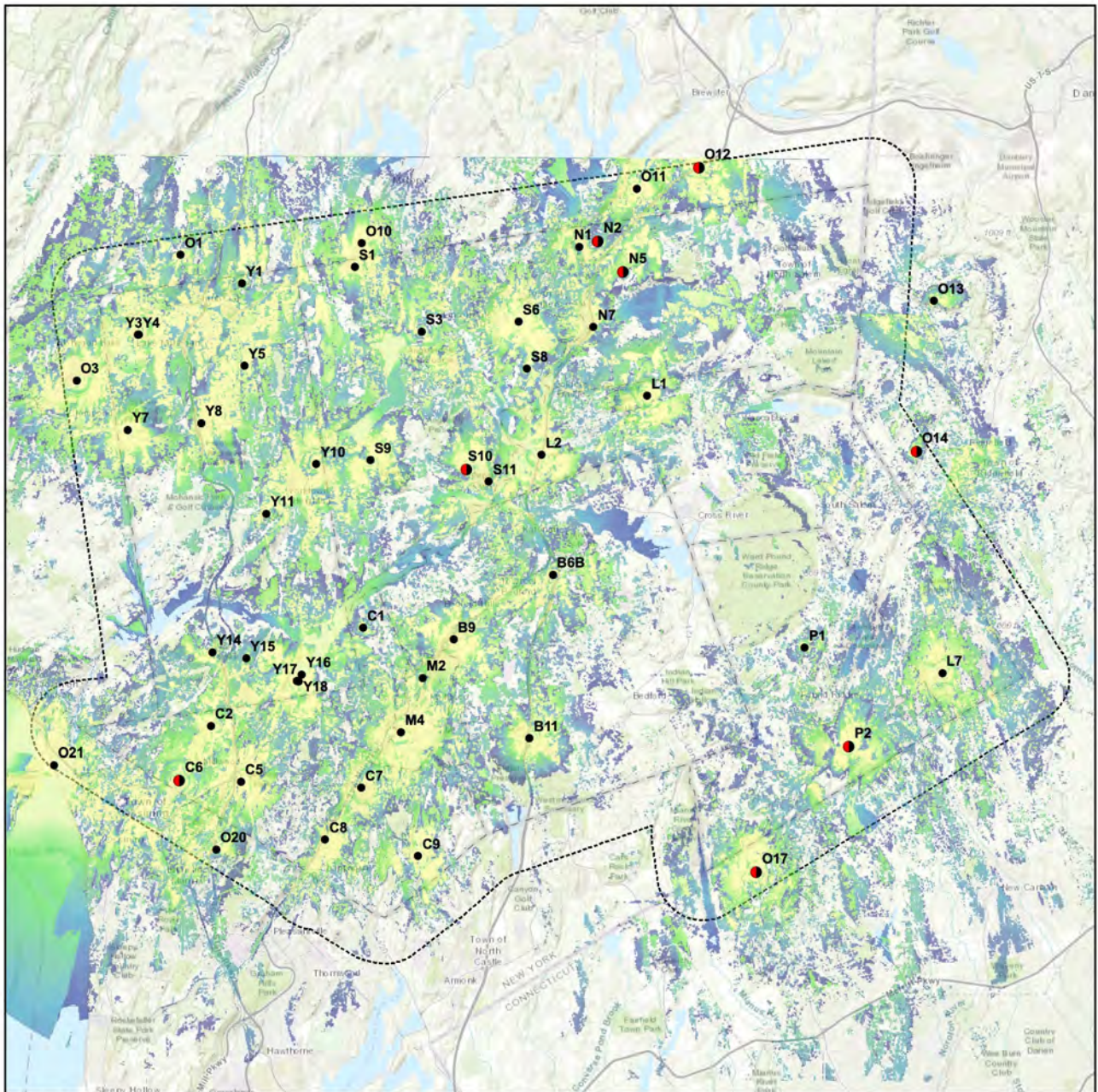


Figure 11: Simulated Coverage Map from Provider 1





Northern Westchester County Inventory by: **County**

**Cataloged Antenna Type Provider 2**

- Macrocell Facility (43)
- Small Wireless Facility (0)
- Public Safety (0)
- Macrocell Facility and Public Safety (8)
- Draft Green Field Options (0)
- Other (0)
- Approved but Not Yet Built (0)

**Mid Band Frequency Provider 2**

- Approximate Coverage
- Indoor (-75)
  - In Vehicle (-95)
  - Outdoor (-105)
- [Solid Line] City Boundaries  
 [Dashed Line] 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 6/8/2023



0 0.5 1 2 3 4 5 6 Miles



Figure 12: Simulated Coverage Map from Provider 2



## MAPPING ANALYSIS

As illustrated on the previous propagation maps there are significant gaps of coverages throughout NWC. There is not a single major north/south thoroughfare with continuous coverage and each community has gaps along local roadways and large areas with no service at all. Ridgelines which run north and south throughout the area creates geographic barriers for wireless radio waves which cannot transmit through the hillsides.

The Taconic State Parkway has coverage along most sections in New Castle but the southern half of the corridor in Yorktown has minimal to no coverage. Coverage along the Saw Mill River Parkway from New Castle through Mount Kisco and Bedford is moderate with some small gaps. Interstate 684 has gaps throughout Bedford, between Somers and Lewisboro and northward through North Salem. Highway 104 (Long Ridge Road), Highway 137 (High Ridge Road), Highway 121 (Old Post Road) and Highway 22 (Salem Road) all have many portions with minimal to no wireless service areas making it very difficult for motorists to reach help in case of emergencies.

Similar issues and concerns are present parallel the east/west thoroughfares of Highway 172 (South Bedford Road), Highway 35 (Cross River Road) and Highway 138 (Waccabuc Road).



Site Y14 Ground Equipment

The following *Table 11* below summarizes the findings by community.

COMMUNITY	MAPPING ANALYSIS SUMMARY
Bedford	There are coverage gaps outside of the Saw Mill Parkway and I-684 corridors because there are great distances between existing sites creating poor hand-off. Additionally, Katonah has spotty coverage due to topography and distances between sites. Some antennas are mounted at elevations below the tallest ridgelines which is blocking the signal from going further.
Lewisboro	I-684 has good coverages but the rest of Town has no continuous coverage due to the lack of sites which are spaced too far apart.
Mount Kisco	Mount Kisco has the greatest coverage of all the communities due to the small amount of land area of the Village/Town and the number of existing wireless facilities. Gaps are shown in the southeast but those areas will be filled in once the approved and not yet built site is constructed and if the proposed and under review sites are approved and built.
New Castle	Swaths of north/south gaps between major transportation corridors are present because antenna mounting heights are lower than tallest topographic features and sites are spaced too far apart for the type of topography in this region.
North Salem	The topography is disrupting hand-off between sites and there is not a PWSF in Mountain Lakes Park. This is creating holes and gaps in coverage between the existing facilities.
Pound Ridge	Pound Ridge only has two existing sites within the Town's zoning jurisdiction resulting in the largest gaps of coverage in comparison to the other communities in NWC. It is also the least populated community and likely one reason the industry is not actively deploying more infrastructure in the Town.
Somers	Eastern and central parts of the Town have better coverage than the rest of the Town. The ridgelines between sites are creating signal blockage. Many sites in the one-mile perimeter just outside the Town provide considerable coverage.
Yorktown	Northern, eastern and southern areas of the Town have large areas with coverage and small gaps while the western side of the Town has large gaps with minimal areas of coverage. The public lands that parallel the Taconic State Parkway, the New Croton Reservoir and Franklin D Roosevelt State Park provide limited or no PWSF opportunities resulting in large gaps in these areas.

Table 11: Mapping Analysis Summary by Community

## WIRELESS CAPACITY

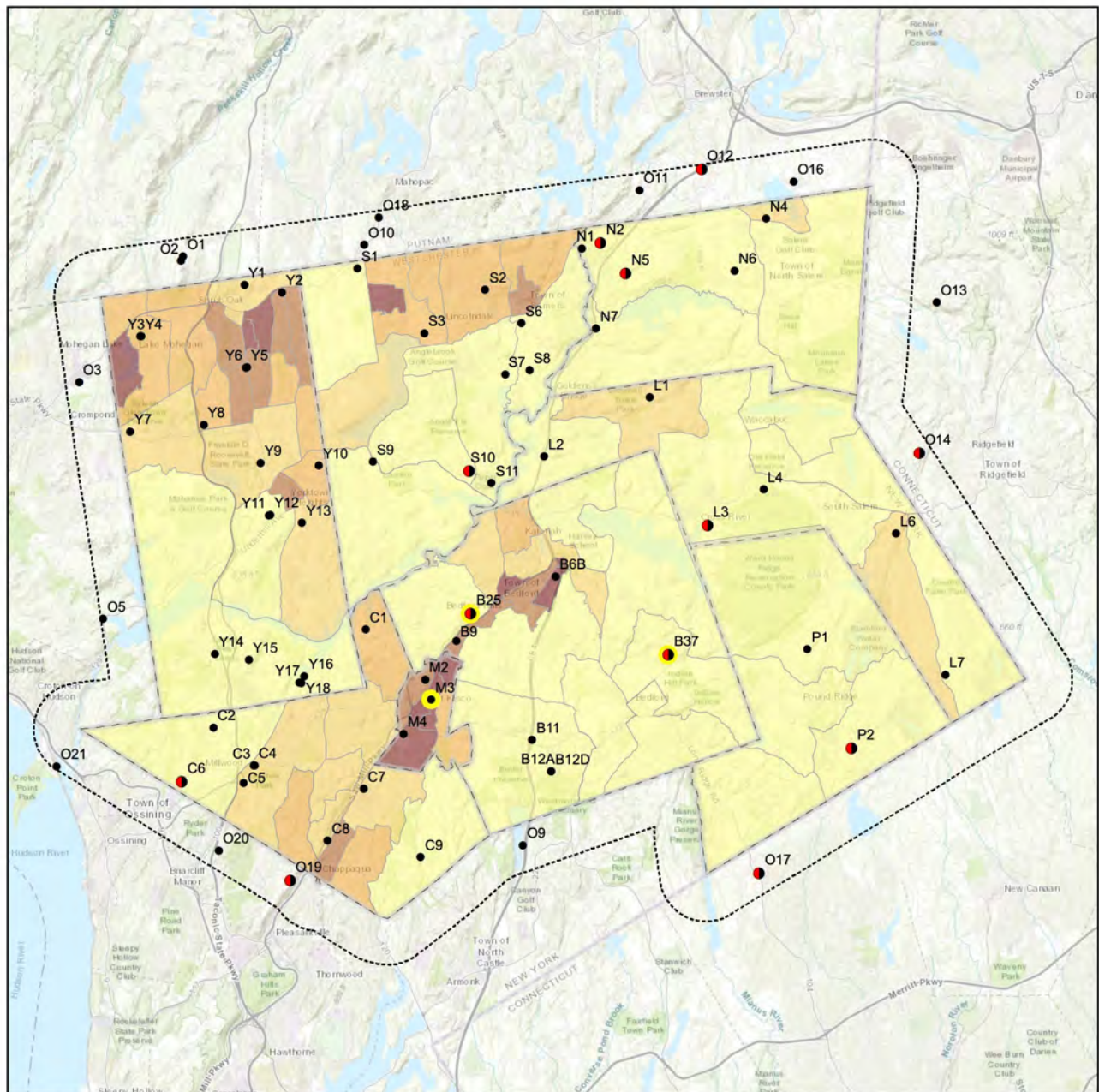
Coverage is not the only consideration when designing wireless networks. Due to increasing wireless communication usage, network capacity is a crucial element for consideration in the overall Plan.

Wireless capacity refers to the amount of wireless traffic that a service providers' network can handle within a specific location at any given time. When discussing capacity, it is referencing the amount of bandwidth being used simultaneously by way of voice calls and data usage. With nearly all Americans owning a mobile phone, wireless communication plays a key role in keeping Americans safe during emergencies and natural disasters like hurricanes, northeasters, flooding, snow and ice storms.<sup>2</sup>

Determining areas with network capacity issues is difficult, however examining high usage areas is one way to estimate areas with capacity concerns. Vehicular traffic volumes and patterns are impactful when discussing network capacity because these areas can be high volume depending on the time of day, year and season. Service providers typically want to provide seamless coverage for their subscribers as they move throughout NWC therefore eliminating gaps along major transportation corridors and thoroughfares. Seamless coverage will also be necessary as the industry transitions further into future technological 5G wireless services.

Another way to determine potential capacity concerns of a network is to analyze population density as a variable. Wireless service providers want to deploy as close to their subscriber base as possible which is why higher density residential areas, employment centers, recreational facilities and transportation thoroughfares are ideal locations for infrastructure.

The map in *Figure 14* identifies the existing PWSF facilities as an overlay on top of the NWC population density by US Census Block Group. The darkest shades of brown represent US Census Block Groups with over 3,000 people per square mile and are the highest population densities in the study area. It is not surprising to view existing towers and base stations along the roadways and in the most densely populated areas of NWC. A few high-density areas without any facilities are identified in Yorktown and Somers indicating problematic areas. But most areas in NWC are low density residential land uses with 500 or fewer people per square mile. Deploying in these areas do not net a great return on investment from the industry which is one reason the industry is slow to deploy new facilities in the areas shown in light yellow.



Northern Westchester County Inventory by: **County**

**Cataloged PWSF Antenna Type**

- Macrocell Facility (64)
- Small Wireless Facility (0)
- Public Safety (0)
- Macrocell Facility and Public Safety (12)
- Draft Green Field Options (0)
- Other (0)
- Approved but Not Yet Built (3)
- Proposed and Under Review (0)
- ▲ Inquiry (0)

**People Per Square Mile**

- 0 - 500
- 501 - 1000
- 1001 - 2000
- 2001 - 3000
- 3001 - 10000
- City Boundaries
- 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 6/8/2023



Figure 14: PWSF - Population Density with Wireless Facilities Overlay

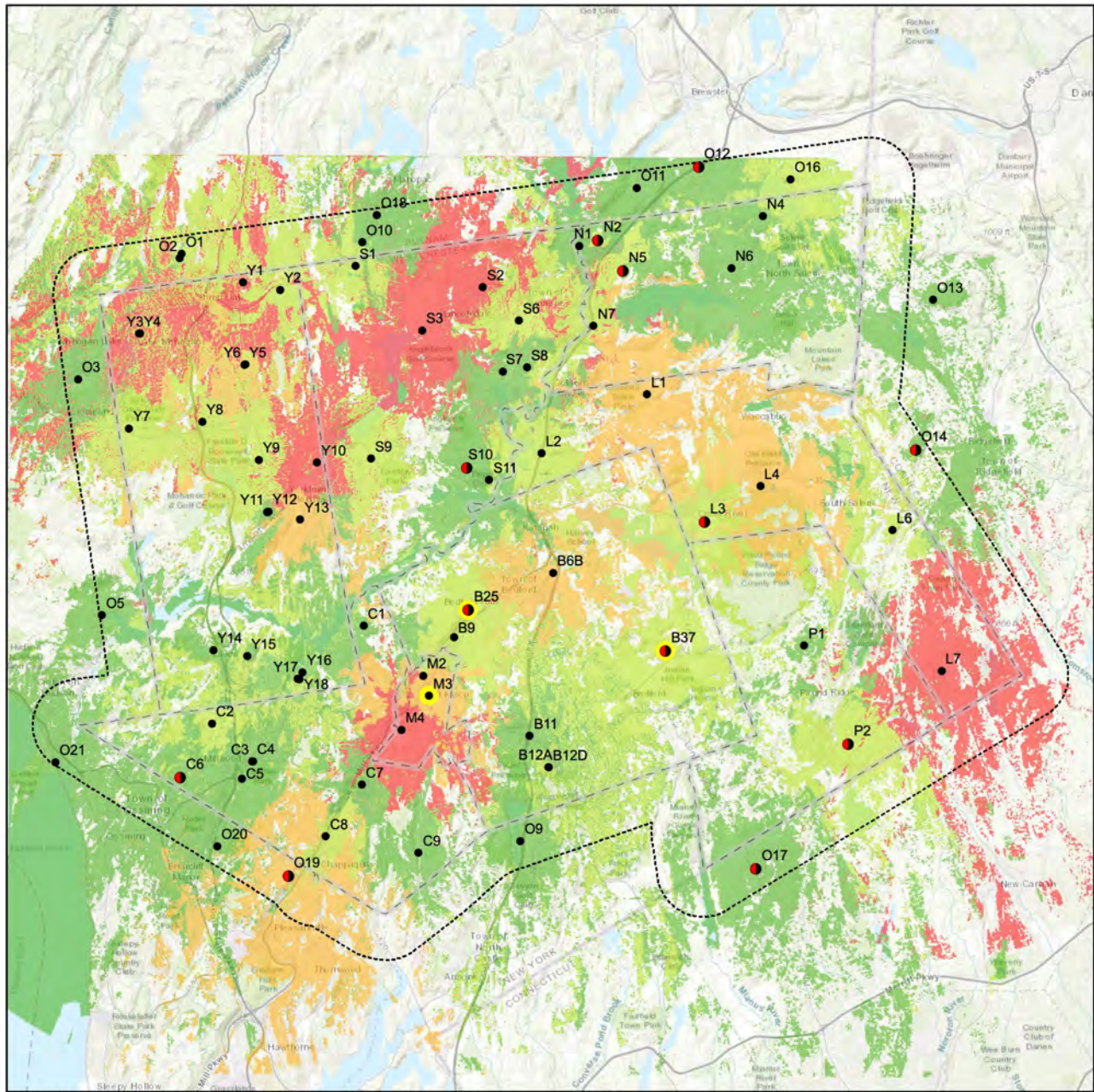
## NETWORK CAPACITY GAP ANALYSIS

Since each provider has their own usages, numbers and thresholds of need, it is difficult to accurately demonstrate network capacity. However, to best calculate and project the wireless facilities needed over the next ten years, network capacity needs to be taken into consideration. Therefore, people per household data from the US Census is compared to the existing facilities in an area and calculated to determine if there is a deficit of infrastructure. Heat maps are generated to illuminate which areas have the greater need for more infrastructure for anticipated network growth. Red and orange shaded areas are vicinities where the existing number of towers and base stations are proportionally insufficient to the number of existing households. Yellow and green shaded areas do not necessarily need immediate wireless densification (or the need for more sites), provided existing PWSFs inside those areas can accommodate collocations for other service providers. If collocation options are not available at the existing sites, then a wireless facility may be necessary to fill in that network gap.

It is noted that each wireless service provider's needs are different, and this map is provided for illustration purposes only to showcase the needs throughout the different areas of NWC.

As indicated in *Figure 15*, any area void of yellow, green, orange or red colorings represents gaps in wireless coverage and areas with immediate need of personal wireless service facilities.





Northern Westchester County Inventory by: **County**

**Cataloged PWSF Antenna Type**

- Macrocell Facility (64)
- Small Wireless Facility (0)
- Public Safety (0)
- Macrocell Facility and Public Safety (12)
- Draft Green Field Options (0)
- Other (0)
- Approved but Not Yet Built (3)
- Proposed and Under Review (0)
- Inquiry (0)
- City Boundaries
- 1 Mile Buffer

**Number Households**

- 1 - 500 (Acceptable Capacity)
- 501 - 1000
- 1001 - 1500
- 1501 - 3450 (Poor Capacity)

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 6/9/2023



0 0.5 1 2 3 4 5 6 Miles

Figure 15: Heat Map Approximating Network Capacity Areas of Concern



## LTE WIRELESS SERVICE GAPS

Wireless service providers are going through, or will be going through the shutdown process of their 3G networks, which rely on older technology. This change ushers in more advanced network services including 5G technology. AT&T began phasing out its 3G network in February 2022; T-Mobile completed the shut-down of Sprint's 3G CDMA network in March 2022 and T-Mobile's 3G UMTS network in July 2022; and Verizon anticipated turning off its 3G network by December 31, 2022.<sup>3</sup>

Long Term Evolution (LTE) is a 4G wireless communication standard currently used by wireless providers to offer voice and data services on mobile devices. LTE is a wireless network that is optimized to process a very high volume of data messages with minimal delay or latency. LTE and its successor 5G are both built on the same wireless technology platform that is designed to boost bandwidth efficiency needed for higher processing speeds.

The previous maps in *Figures 10-13* make assumptions that illustrate an overview of all providers at the highest mounting elevation, using maximum operating power. When designing LTE coverage there are standard thresholds or decibels used for LTE signal strength that differs from the propagations shown in the previous maps.

Decibels are used in radio engineering to best describe the signal strength variations between radio signals. Radio signals have strong levels nearest the transmitting antenna, but they reduce their intensity the further they are away. Much like the ripple on the surface of the water when a rock is thrown in a pond.

This makes describing radio signal values difficult in a linear fashion.



For example, many radio systems can tolerate signal degradations to 0.0000000000000001% (or  $10^{-16}$ ) of the original transmitter power. When this is expressed in decibels ( $10 \cdot \log$  (linear value)) it is easier to describe the signal changes as  $10^{-16}$ , also known as -160 decibels.

<sup>3</sup>FCC "Plan Ahead for Phase out of 3G Cellular Networks and Service"

Signal power is typically described in units of dBm (decibels referenced to one milliwatt). A received signal level of -80 dBm usually provides excellent radio service, but represents only 10-11 of a watt (10-8 milliwatts). Typically, radio coverage maps will show various signal levels to represent fringe/marginal outdoor coverage at the lowest usable signal level up to signal levels that are strong enough to penetrate buildings and provide indoor wireless service from outdoor locations. Whereas a typical vehicle's glass will absorb or reflect 90% of the radio signal due to the metal impregnations for safety glass as well as for UV protection, creating a 10 dB loss, building walls and windows, particularly in modern, energy efficient buildings, can absorb and reflect over 99% (20+ dB of loss) of the incoming radio signals, which is why different thresholds for outdoor/fringe, in-car and in-building coverage are presented in coverage maps.

The minimum usable LTE coverage level is -115 dBm Reference Signal Received Power (RSRP). This level is useful for outdoor coverage only and too low to provide decent coverage indoors or in a vehicle. The typical minimum service level for outdoors is -105 dBm, which makes for reliable text, call and data sessions. Residential structures tend to lose 10-20 dB signal level indoors versus outdoors. Therefore, residential indoor service tends to require a minimum of -95 dBm RSRP which contains a 5 dB margin added to ensure reliable indoor services.

As an example the following *Figures 16, 17 and 18* are representations of simulated LTE coverage. Each of these figures use the following RSRP signal level as shown in *Table 12*.

SIGNAL STRENGTH COLOR	dBm	SIGNAL STRENGTH DESCRIPTION
Yellow	> -90	In Building
Green	-90 to -105	In Vehicle
Blue	-105 to -115	Outdoor

Table 12: LTE Signal Strength Description

When examining coverage to individual residences, the wireless coverage prediction tool considers buildings in NWC including residential structures.

In *Figure 16* the predicted modeling shows the residential area in green indicating most of the signal level is consistently above -105 dBm. The actual dwellings are represented in blue indicating the predicted signal levels are above the -115 dBm range. This concludes that although there may be moderate coverage outside the home there is minimal if any coverage inside the home.

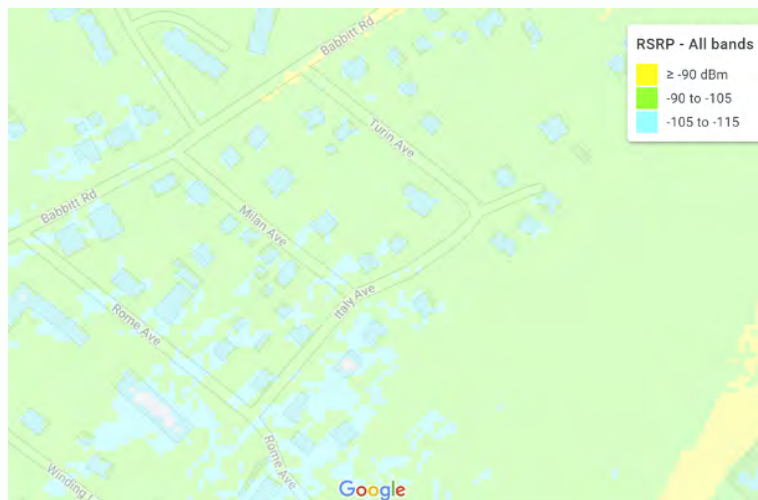


Figure 16: LTE Residential Coverage Prediction

*Figure 17* shows an area at the fringe of solid coverage where there is sufficient signal level for outdoor and in-vehicle services, but indoors shows very little solid or usable coverage as indicated by the brown or no color. The map background is an aerial photo, showing additional detail of the residential area.

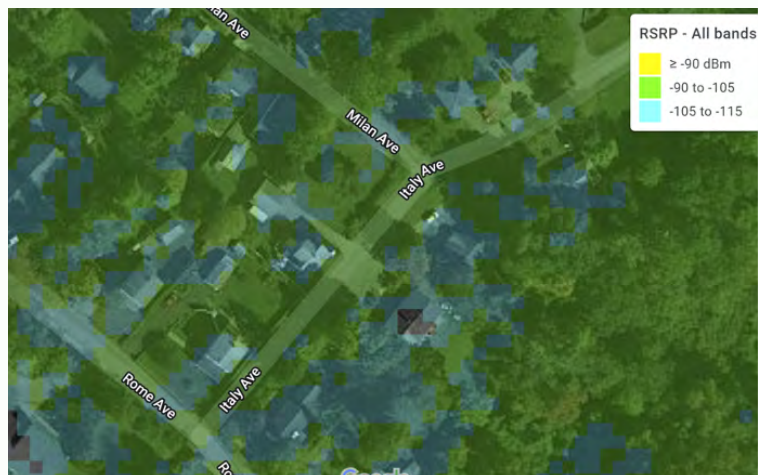


Figure 17: LTE Residential Aerial Coverage Prediction

The following *Figure 18* is a depiction of simulated LTE coverage from all cataloged sites throughout NWC study area noticing the best coverages are from the areas closest to the existing tower or base station.



## POTENTIAL SOLUTIONS

The estimations in *Table 13* list each community and the number of new macro and small wireless facilities predicted for the next ten years. These projections are based on the analysis of US Census per household data, the total number of wireless facilities in the same geographic area, trends of the wireless industry and propagation of the suggested fill-in sites. The results are shown on the LTE solution maps for each community located in the Appendices of this Plan.

Both macro wireless facilities and small wireless facilities are suggested as solutions to fill in network gaps. The suggested facilities are as follows:

- Macro cell towers or base stations on commercial or public property at 80’ to 130’ in height. Most are contemplated on agricultural lands and public properties with the goal of shielding their view from residential areas.
- Small wireless facilities on approximately 50’ existing utility poles along most of the roadways in NWC. The assumption is that small wireless antenna can be added to the top of existing utility poles or the pole can be replaced to accommodate the antenna.

There are no new facilities suggested in open space or sparsely populated areas that have some outdoor coverages since these are considered low priority locations by the wireless industry.

COMMUNITY	PROJECTED MACRO	PROJECTED SMALL	TOTAL
Westchester County	36	118	154
Bedford	8	34	42
Lewisboro	6	7	13
Mount Kisco	3	0	3
New Castle	5	26	31
North Salem	1	6	7
Pound Ridge	4	6	10
Somers	6	16	22
Yorktown	5	23	28

Table 13: Estimated Ten-Year Projections by Community



## CHAPTER 3

# COMMUNITY SURVEY

# COMMUNITY SURVEY

Community involvement and participation was highly promoted through public meetings and on-line surveys. The main objective was to solicit information from citizens in each community regarding thoughts, concerns, and preferences of wireless infrastructure facilities. Opinions gathered from the survey pertaining to wireless connectivity, aesthetics and placement of future infrastructure can be used to guide public policies for future wireless deployments. *Table 14* provides the dates for the survey in each community and the total responses.

COMMUNITY	START DATE	END DATE	TOTAL RESPONSES
Westchester County	July 28, 2021	July 26, 2022	4002
Bedford	February 15, 2022	March 23, 2022	655
Lewisboro	July 28, 2021	September 7, 2021	477
Mount Kisco	October 7, 2021	December 16, 2021	119
New Castle	June 23, 2022	July 26, 2022	475
North Salem	October 29, 2021	November 16, 2021	307
Pound Ridge	September 1, 2021	September 26, 2021	365
Somers	September 8, 2021	October 25, 2021	671
Yorktown	July 29, 2021	September 8, 2021	933

Table 14: Community Survey Dates and Number of Respondents

The survey was offered in English and in Spanish in the Village/Town of Mount Kisco and the Town of Bedford. Collectively there were a total of 4,002 unique responses.

On average, those who participated in the survey have six wireless devices (cell phone, tablet, watches etc.) in their household that rely on wireless services for functionality. These devices are used primarily for either recreational/leisure, personal and/or employment purposes. Additionally, wireless devices are used to access telehealth, medical devices and/or educational learning. Verizon has the most subscribers of the participants and just over half of the respondents use network extenders to booster their network signal.

Less than ten percent indicated they have excellent wireless coverage at their residence with the majority identifying service as poor. Poor or inconsistent service while traveling throughout the study area was reported at 61%. Eighty-eight percent entirely agreed the quality of wireless service is important to them and 61% indicated they would rely more on their device if the network was better.

Overall respondents support taller towers that can accommodate multiple collocations; concealed towers, base stations, and small wireless facilities over non-concealed towers and 52% support the use of public property for wireless infrastructure as a revenue source for the community and method to control aesthetics and long-term maintenance of the infrastructure.

The most notable observation of responses are as follows:

#### **Use of Devices**

- 85.84% - Personal, Recreation/Leisure
- 63.33% - Employment Related
- 61.64% - Personal Use & Employment
- 48.64% - Smart Devices
- 45.60% - Telehealth
- 44.12% - Educational
- 11.93% - Medical Devices
- 0.13% - Do Not Own a Wireless Device

#### **Personal Wireless Service Provider**

- 29.31% - AT&T
- 12.71% - T-Mobile/Sprint
- 63.26% - Verizon
- 03.0% - Other

#### **Wireless Coverage at Residence**

- 08.70% - Excellent
- 34.33% - Acceptable
- 36.65% - Poor
- 19.26% - Inconsistent
- 01.04% - Not Applicable

#### **Wireless Coverage at Work**

- 35.37% - Excellent or Acceptable
- 32.60% - Poor or Inconsistent
- 32.83% - Not Applicable

#### **Wireless Coverage Traveling Around NWC**

- 37.18% - Excellent or Acceptable
- 61.88% - Poor or Inconsistent
- 00.93% - Not Applicable



### **Network Extender (Booster)**

- 56.65% - No
- 43.35% - Yes

### **What is Most Important**

- 56.24% - Excellent Connectivity
- 38.71% - Good Connectivity & Minimal Visual Impact
- 01.20% - Aesthetics
- 03.80% - Worse Service for Less Infrastructure

### **Would Rely More on Device if Network Services were better**

- 61.90% - Entirely Agree

### **Quality of Wireless Service is Important**

- 87.64% - Entirely Agree

### **Height Preference**

- 44.64% - Taller with Multiple Collocations
- 33.84% - Shorter but More
- 22.54% - No Preference

### **Design Type Preference**

- 62.09% - Non-Concealed Monopole
- 70.11% - Concealed Flagpole
- 78.65% - Concealed Rooftop
- 89.99% - Concealed Small Wireless Facilities in ROW

### **Location Preference**

- 60.88% - Anywhere

### **Support the Use of Public Property for Revenue and Aesthetic Control**

- 52.18% - Yes



## CHAPTER 4

# **FEDERAL** AND **STATE** **REGULATIONS**

# FEDERAL REGULATIONS

Local government agencies are allowed to regulate personal wireless service facilities as a permitted land use provided local code aligns and does not exceed federal regulations already in place for the industry to follow.

Local codes and land development standards can address concerns related to: proximity of infrastructure to other land uses, zones and scenic viewsheds; visual concerns related to location, height and pedestrian views of a structure's height and ground equipment; setbacks outside rights-of-way; fencing; signage; parking, and certain lighting types.

The Telecommunication Act of 1996 preserves local siting authority but contains several provisions that require municipalities to follow federal restrictions. Subsequent congressional legislation and federal regulations adopted by the Federal Communications Commission (FCC) provides definitions and timelines referenced as "shot clocks" that state and local governments must follow when regulating wireless infrastructure.

## **Telecommunication Act 1996 Section 704(a) (47 U.S.C. § 332(c) (7))**

The Federal Telecommunications Act of 1996 includes Section 704(a) (47 U.S.C. § 332(c) (7)) and preserves local governments the authority to regulate wireless infrastructure. Section 704 states in relevant part that:

- Land use development standards may not unreasonably discriminate among the wireless providers and may not prohibit or have the effect of prohibiting the deployment of wireless infrastructure.
- Local governments must act on applications for new wireless infrastructure within a "reasonable" amount of time.
- Land use policies may be adopted to promote the location and siting of telecommunications facilities in certain designated areas.
- Encourages the use of third-party professional review of site applications.
- Prohibits local government from denying an application for a new wireless facility or the expansion of an existing facility on the grounds that radio frequency emissions are harmful to human health so long as the wireless service provider meets federal standards.

## **(47 USC § 1455) Section 6409(a) Middle Class Tax Relief and Job Creation Act of 2012**

Section 6409(a) of the Middle Class Tax Relief and Job Creation Act of 2012, referenced as the "Spectrum Act" was enacted by Congress to promote wireless

deployments of broadband for public safety and commercial purposes. As stated in the Spectrum Act,

“...a State or local government may not deny, and shall approve, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station.”

After much debate between the wireless industry and local government the FCC issued a response clarifying definitions and meaning to the Spectrum Act in a Report and Order released October 21, 2014 in W.T. Docket 13-238.

The **2014 Report and Order**, clarified the Spectrum Act stating:

“[n]otwithstanding section 704 of the Telecommunications Act of 1996 or any other provision of law, a state or local government may not deny, and shall approve, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station.”

Several other subsequent Report and Orders have since been vetted and approved by the FCC and the regularity definitions and shot clocks are provided in the Code of Federal Regulations: Title 47, Chapter I, Subchapter A, Part 1, Subpart U Titled State and Local Government Regulation of the Placement, Construction and Modification of Personal Wireless Service Facilities.

### **Code of Federal Regulations Reasonable Time Periods to Act on Siting Applications**

When an applicant requests a modification, a state or local government may require the applicant to provide documentation or information only to the extent reasonably related to determining whether the request meets and does not exceed the definitions and requirements for collocation or modification. A state or local government may not require an applicant to submit any other documentation, including but not limited to documentation intended to illustrate the need for such wireless facilities or to justify the business decision to modify such wireless facility.

The shot clock date for a siting application is determined by counting forward, beginning on the day after the date when the application was submitted, by the number of calendar days of the shot clock period and including any pre-application period asserted by the siting authority, provided, that if, the date calculated in this manner is a “holiday” or a legal holiday within the relevant state or local jurisdiction, the shot clock date is the next business day after such date.

The presumptively reasonable periods of time for PWSF applications is as follows in *Table 15* unless mutually agreed upon in writing.

INSTALLATION TYPE	TIME PERIOD FOR DECISIONS	REVIEW AND INITIAL TOLLING PROCESS	RESUBMISSION APPLICATIONS TOLLING PROCESS FOLLOWING A NOTICE OF DEFICIENCY
-------------------	---------------------------	------------------------------------	--

**Small Wireless Facilities (SWF)**

New SWF Structure	90 Days*	10 days after submission to determine if application is incomplete and to specifically identify missing information including specific rule or regulation creating the obligation	If incomplete, the shot clock date calculations <u>restart at zero</u> on the date on which the applicant submits all the documents and information identified by the siting authority to render the application complete. If still an incomplete application, then the review and tolling process continues until application is deemed complete.
Collocation Existing SWF Structure	60 Days*		

**Macro Wireless Facilities**

New Macro Facility Structure	150 Days**	30 days after submission to determine if application is incomplete and to specifically identify missing information including specific rule or regulation creating the obligation	If incomplete, the shot clock date calculations <u>restart where it left off in the count</u> the day after applicant submits all the documents and information identified by the siting authority to render the application complete. Ten days after that if still an incomplete application, then review and tolling process continues until application is deemed complete.
Collocation Existing Macro Facility Structure	90 Days**		

\*In the event the reviewing authority fails to approve or deny a request seeking approval, under the shot clock stipulations the request shall be deemed granted. The deemed granted does not become effective until the applicant notifies the applicable reviewing authority in writing after the review period has expired (accounting for any tolling) that the application has been deemed granted.

\*\*In the event of FCC shot clock expiration for a new macro facility or collocation on an existing PWSF, the applicant is entitled to bring an action in federal court seeking to compel the jurisdiction to grant the permit, which the court is supposed to hear on an expedited basis. The community faces a rebuttable presumption that it violated 47 USC §322 by failing to timely adjudicate the application. The community can then defend and explain why it was unable to do so within the allowable timeframes.

Table 15: Federal Shot Clock Timelines

# STATE REGULATIONS



In New York, wireless providers are afforded the status of public utilities for the purposes of zoning applications (*Cellular Tel. Co. v. Rosenberg*, 82 N.Y.S. 2d 364 (1993)), so the traditional use variance standards do not apply. An applicant seeking a use variance for a cell tower therefore need not show an unnecessary hardship or that the subject property will not yield a reasonable return for any permitted use in the zoning district.

Rather, their applicants are reviewed under the “public necessity” standard established in *Consolidated Edison Co. v. Hoffman*, 43 N.Y.2d 598 (1978). This standard provides that “[r]ather than granting a variance only on a showing of ‘unnecessary hardship,’ a local zoning board must consider whether the public utility has shown ‘a need for its facilities’ and whether the needs of the broader public would be served by granting the variance.” *Cellular Telephone Co. v. Town of Oyster Bay*, 166 F.3d \_\_\_, 490, 494 (quoting *Consolidated Edison Co. v. Hoffman*, 43 N.Y.2d at 608-10.). This has been interpreted in the context of zoning decisions for telecommunications facilities to require that “[a] telecommunications provider that is seeking a variance for a proposed facility need only establish [1] that there are gaps in service, [2] that the location of the proposed facility will remedy those gaps, and [3] that the facility presents a minimal intrusion on the community”. *Site Acquisitions, Inc. v. Town of New Scotland* 2 A.D. 3d 1135 (3d Dep’t 2003); see also *Omnipoint Comm’ns, Inc. v. City of White Plains*, 430 F.3d 529, 535 (2d Cir. 2005); *New York SMSA Ltd. Partnership v. Vil. of Floral Park Bd. of Trustees*, 812 F. Supp. 2d 143, 154 (E.D. N. Y. 2011).

The burden of proof for necessity is on the applicant. The utility must show more than the location it has selected will enable it to render cheaper service or that the location is appropriate and the need for the installation is great. *Long Island Lighting Co. v. Incorporated Village of East Rockaway*, 279 App. Div. 926, 110 N.Y.S. 2d \_\_ (1952), *aff’d*, 304 N.Y.S. 932 (1953); *New York State Elec & Gas Co. v. McCabe*, 32 Misc. 2d 898, (N.Y. Supp. Ct. 1961) 224 N.Y.S. 2d 527. It must be demonstrated that the proposed site is necessary to enable the company to render safe and adequate service, and that no alternative sites are available which could be used with less disruption of the community’s zoning plan. *Niagara Mohawk Power Corp. v. City of Fluton*, 8 A.D.2d 523, 188 N.Y.S. 2d 717 (4th Dep’t 1959); *Video Microwave, Inc. v. Zoning Bd. of Appeals of Town of Lewisboro*, 77 Misc. 2d 798, 354 N.Y.S. 2d 817 (1974) (denial of variance and permit was upheld on the grounds that, among other things, the applicant has not demonstrated that alternative sites were not available, and the visual harm to the developed residential neighborhood could not be prevented by conditioning the permit).



## CHAPTER 5

# **REGULATORY RECOMMENDATIONS**

AND

# **CONCLUSION AND ACTION ITEMS**

# REGULATORY RECOMMENDATIONS

Each community’s wireless telecommunication codes were reviewed comparatively to the Code of Federal Regulation. Several of the communities have made revisions in the last several years to address FCC mandates to streamline reviews of eligible facility requests and expedite timelines for review of new wireless infrastructure. However, the Code of Federal Regulation changes often therefore communities need to continually monitor revisions and update their local codes frequently to stay current with federal standards.

*Table 16* below summarizes Code revision recommendations by community.

COMMUNITY	SUMMARY OF CODE ANALYSIS
Bedford	Code revised in 2018 and is mostly consistent with federal standards. Definitions section should be revised to align with the Code of Federal Regulations.
Lewisboro	Existing Code updated recently to include treatment of “eligible facility request” and comprehensively address wireless deployment. Recommend modifications to certain sections to harmonize with Code of Federal Regulations; specifically shot clock, application requirements, interference and alterations, amendments and waiver of application requirements.
Mount Kisco	The PWSF Overlay District likely needs expansion to address future site locations; definitions, shot clock timelines and small wireless facilities in the ROW should be added to the existing Code.
New Castle	Town’s Code recently amended to address Code of Federal Regulations; no other changes are recommended at this time.
North Salem	Certain code sections are not consistent with federal code and should be updated; definition of substantial change and criteria for development subsections related to height and bulk should be revised or eliminated to prevent perceived barriers to entry.
Pound Ridge	Separation between property boundaries and/or residences and setbacks from property lines should be reviewed and revised to prevent perceived barriers to entry.
Somers	Requiring Link Budget and Special Permit for collocations needs to be reviewed and likely revised to meet federal shot clocks and processes. Setback, tower lighting, location on parcels and along scenic roadways provisions needs be reviewed and revised to prevent perceived barriers to entry.
Yorktown	Definitions, shot clock timelines and small wireless facilities in the ROW need to be added to the existing Code. The frequency, modulation, and class of service and NIER operating standards should be reviewed and harmonized with federal regulations.

Table 16: Code Recommendations by Community



In addition to the code amendments related to Federal definitions and regulations, all communities should consider harmonizing text amendments based on the common survey responses. This could improve visual appearance of the wireless infrastructure and ease deployment throughout the study area.

Developing a list of preferred locations and designs for new facilities in each Town/Village Code as a preferred site list or hierarchy of preferred wireless facility types and location is an option. Based on NWC citizen participation during the Plan process the most preferred option for new infrastructure would be listed first in the preferred list. The least preferred option last. When alternatives are proposed, the applicant must demonstrate through relevant information why the preferred options are not technically feasible, practical or justified given the location of the proposed facility. The applicant must provide this information in the application in order for the application to be considered complete.

For Example:

1. Collocation on existing base station or tower
2. Concealed small wireless facility
3. New concealed base station
  - a. on public property
  - b. on private property
4. New concealed tower
  - a. on public property
  - b. on private property
5. New non-concealed base station
  - a. on public property
  - b. on private property
6. New non-concealed tower
  - a. on public property
    - i. Monopole
    - ii. Lattice
    - iii. Guyed
  - b. on private property
    - i. Monopole
    - ii. Lattice
    - iii. Guyed

Very few of the Towns have adopted small wireless facility criteria. The Plan suggests 118 small wireless facilities throughout NWC to close coverage gap in areas near residential viewsheds where a macro cell would be more visible. Small wireless facilities offers a plausible solution for densification in those specific census blocks.

The Towns/Village could develop standards for small wireless facility design in public rights-of-way that promotes concealed facilities, placement of ancillary ground equipment and other development standards such as nearby tree pruning.

Backup power during electrical outages is a shared concern articulated by Board members. The FCC requires one in every three sites to be “hardened” meaning operating on backup power for at least 72 hours. Given the number of power outages throughout NWC over the course of a year, codes could be amended to require each wireless service provider to show which sites meet this standard and indicate a preference that each site be designed for backup power.



Generator at Site L1

# CONCLUSION AND ACTION ITEMS

The NWC Wireless Communications Master Plan takes a comprehensive look at each community within the defined NWC study area analyzing the existing wireless facilities, wireless coverages and identifies gaps in services. Identification of wireless service network gaps has been a driving force for this study, first by Board members concerned about access to public safety in remote areas and second, by citizens who voiced, in the surveys, frustration over lack of wireless services.

Smart phone penetration is nearly 100% throughout each community and demand in wireless services is growing at an ever-increasing rate. These concerns can only be addressed by adding wireless facilities. However, network improvements are not free of financial obligations by the wireless industry. Wireless facilities, even small cells, are expensive to build and encumber the wireless providers with operational expenses for rent, utilities, and technician hours to keep sites operational.

When a wireless service provider considers a new site to their existing network, the provider considers the area the new facility will serve and how much revenue that site will generate. If the population is dispersed on mostly single-family lot (1/4 acre or larger), the number of wireless users per site drops rapidly. Areas with terrain variations (hills) and significant tree cover also significantly reduce the coverage area from a wireless facility, making it difficult to justify a return on investment from a financial perspective in low density suburban and rural areas. This, combined with pricing pressures that are restricting the Average Revenue Per Unit (ARPU) per subscriber that providers receive, creates disincentives to adding new wireless facilities, especially in non-urbanized low growth census blocks.

After many high-profile anti-zoning encounters regarding new wireless locations, most wireless providers are not as motivated to add wireless facilities in certain areas with the impression that residents are more likely to oppose a new tower. Consequently, areas with minimal vegetation and higher residential density, roadways with significant traffic counts and commercial and employment centers with greater concentrations of wireless subscribers are more enticing locations for the wireless industry to seek deployment of new wireless infrastructure.

One last point for the near future is the stark influence that increased interest rates have on the technology industry, especially wireless. The steep losses in technology valuations and technology funding are occurring due to higher costs of bonds to finance technology expansion projects. Capital to fund new wireless facilities is raised in the bond market and the cost for that capital has risen considerably in the past six months (end of 2022), which will likely restrict future capital projects from all the wireless providers.

Jurisdictions that want to promote improved wireless coverages throughout their communities can work together to proactively interest wireless service providers. The following action items can help ease wireless deployment.

1. Pinpoint specific appropriate locations and acceptable infrastructure design for each suggested facility identified in the gap areas.
2. Develop unified development standards, including but not limited to, siting preferences for future infrastructure. This will create visual continuity of future towers and base stations throughout NWC.
3. Establish procedures for permitting wireless facilities that allows the applicant to confidently budget the time and expense associated with obtaining permits.
4. Adopt expedited approval processes for facilities meeting location and visual design expectations. This can streamline review and permitting by the community. Meeting federal shot clocks will generate confidence from the wireless providers that their proposed facilities can be permitted without risk of delayed buildout timelines.
5. Communicate with utility pole owner(s) to ascertain their willingness to allow small cells on their poles. If allowed, then share design objectives of the community and support streamlined processes for review of plans and lease agreements.
6. Prepare standard lease agreements for use of community owned property and buildings with pre-approved terms by the Board to expedite the lease process.
7. Invite wireless and fiber providers to a stakeholder meeting to present goals for improving wireless coverage and problem solve together on how to expand services, including fiber in each community.
8. Work with the local cable TV franchisee to verify their fiber infrastructure is available for wireless providers backhaul.
9. Obtain fiber maps from cable franchisees, the local phone company and others that have obtained fiber installation permits for the jurisdiction, preferably in a GIS-compatible format for entities interested in obtaining fiber backhaul. Maps of TV/internet Cable fiber infrastructure should include hybrid fiber-coax (HFC) lines in neighborhoods to determine if spare fiber capacity is accessible for small cell fiber backhaul.
10. Map current fiber by ownership and identify any spare capacity for future broadband and wireless growth.
11. Create a broadband plan that expands delivery of fiber optic cables and includes all wireless communication facilities.
12. Consider fiber optic cables to underserved areas at the jurisdictions' expense with the goal of obtaining dark or lit fiber leasing revenue from wireless providers and others interested in high-speed fiber backhaul.



# APPENDIX A

# WIRELESS DEFINITIONS

# WIRELESS DEFINITIONS

For purposes of the Plan the following terms are used throughout and provided as reference as follows:

**Antenna** - An apparatus designed for the purpose of emitting radio frequency (RF) radiation, to be operated or operating from a fixed location. For most services, an antenna will be mounted on or in, and is distinct from, a supporting structure such as a tower, structure or building.

**Bandwidth** - A range of frequencies used to transmit a signal. The channel width (bandwidth) affects how much data can transmit per unit time. Each service provider has their own designated finite amount allocated to them by the Federal Communications Commission (FCC).

**Base Station** - Equipment and non-tower supporting structure at a fixed location that enables wireless telecommunications between user equipment and a communications network. Examples include transmission equipment mounted on a rooftop, water tank, silo or other above ground structure other than a tower. The term does not encompass a tower as defined herein or any equipment associated with a tower. "Base Station" includes, but is not limited to:

- Any structure other than a tower that supports or houses radio transceivers, antennas, coaxial or fiber optic cable, regular and back-up power supplies and comparable equipment, regardless of technological configuration; and
- Equipment associated with wireless telecommunications services such as private, broadcast, and public safety services, as well as license-free wireless services and fixed wireless services such as microwave backhaul and broadband.

**Concealment** - A tower, base station or utility pole that is not readily identifiable as a wireless communication facility and that is designed to be aesthetically compatible with existing and proposed building(s) and uses on a site or in the neighborhood or area. Some of the types of concealment found in the City are faux dormers, faux facades, parapets, steeples, faux chimneys and unipoles.

**Macro Wireless Facilities or Macro Cell** - Traditional support structures for personal wireless service facilities (PWSF) identified as macro cell facilities consist of multiple provider use towers and base stations. Macro facilities are taller infrastructure usually between 50 and 200 feet in height and have been the most commonly utilized infrastructure over the last thirty years. Macro facilities are considered the backbone of the network and allow service providers the most flexible options when deploying their usable spectrum and providing signal over the greatest area. It also allows the flexibility to target the desired signal to a specific location.

**Personal Wireless Service Facilities (PWSF)** - Facilities for the provision of personal wireless services. Personal wireless service facilities include transmitters, antennas, structures supporting antennas and electronic equipment that is typically installed in close proximity to a transmitter that provides commercial wireless services.

**Radio Frequency (RF)** - A range of frequencies that are allocated to be transmitted/received through the air without wires, with the use of transmitters/receivers and associated antennas. Radio waves are generated for fixed and/or mobile communication. A frequency or band of frequencies suitable for use in telecommunications.

**Radio Spectrum** - A general term used to define a portion of the entire radio band. Examples are the low-band, mid-band and high-band spectrum that are used for wireless services. Each of these three "bands" of spectrum contain a number of individual wireless bands as well as radio bands used by other services.

**Small Wireless Facilities or Small Cell** - Small wireless facilities have antennas mounted on structures at lower heights, generally the height of a utility pole. The equipment is mounted on or inside these smaller poles and are interconnected with fiber optic cables which allows for greater bandwidth and faster transmission speeds. For a single service provider, the small wireless facilities are typically spaced every 650 feet, although there are many variations, creating a densification of the transmitting signals for the network. The ideal service area for a small cell is a specified corridor or neighborhood. According to federal rules small wireless facilities must meet each of the following conditions:

- Are mounted on structures 50 feet or less in height including their antennas; or
- Are mounted on structures no more than 10 percent taller than other adjacent structures; or
- Do not extend existing structures on which they are located to a height of more than 50 feet or by more than 10 percent, whichever is greater.

**Tower** - Any support structure built for the primary purpose of supporting antennas and associated facilities for commercial, private, broadcast, microwave, broadband, public, public safety, licensed or unlicensed, and/or fixed or wireless services. A tower may be concealed or non-concealed.

**Utility Pole** - Any pole or structure designed to maintain, or used for the purpose of lines, cables, or wires for communications, cable, electricity, street lighting, other lighting standards, or comparable standards.



# TOWN OF POUND RIDGE

## WIRELESS TELECOMMUNICATION INFRASTRUCTURE ANALYSIS





# OVERVIEW

Smartphones and smart wireless devices are a fixture of every-day life for millions of people. In 2021, the number of unique mobile internet users globally was 4.32 billion with over 90% using a wireless device to connect.<sup>1</sup> Consumers using these devices expect fast and uninterrupted network connections to the internet, maps, files, videos, news, music, along with the myriad of available applications. For these devices to function optimally a lot of bandwidth is required. To facilitate the device demands, antennas mounted on towers or other elevated infrastructure is necessary.

Functionality is best when the signal transmits directly from the antenna to the consumer's wireless device(s) without obstruction from buildings, trees and/or ridgelines. Macro cell wireless facilities provide the greatest flexibility and coverages for wireless service providers. Without obstructions these facilities can generally cover a two-mile geographic radius in more densely populated areas and about a four-mile radius in suburban and rural areas. Small wireless facilities can be utilized in more populated areas to provide additional services where capacity overloads may be an issue or in areas with viewshed sensitivities. These small wireless facilities typically have approximately a quarter mile service radius.

Coverage gaps result from having facilities with a lot of obstructions, too few antennas within a particular service area or in areas where network capacity overloads occur. Capacity overloads are when the number of wireless subscribers using their devices simultaneously exceeds the performance capability of the wireless facility. Additional antenna infrastructure would be necessary to improve these coverage and/or capacity concerns.

Understanding, evaluating and planning for a well-designed wireless system begins with identifying all existing towers and base stations.

---

<sup>1</sup> Statista, October 18, 2022

# WIRELESS INFRASTRUCTURE INVENTORY

The existing wireless facilities in Pound Ridge have been assessed, mapped and analyzed in order to estimate the new wireless facilities anticipated in the Town over the next ten years.

The Pound Ridge Study Area is defined as the Pound Ridge jurisdictional boundary and a one-mile perimeter surrounding the Town. As of January 1, 2023 there are a total of 9 facilities verified within the Pound Ridge Study Area. The facilities consist seven existing towers and two proposed and under review towers in the Pound Ridge study area.

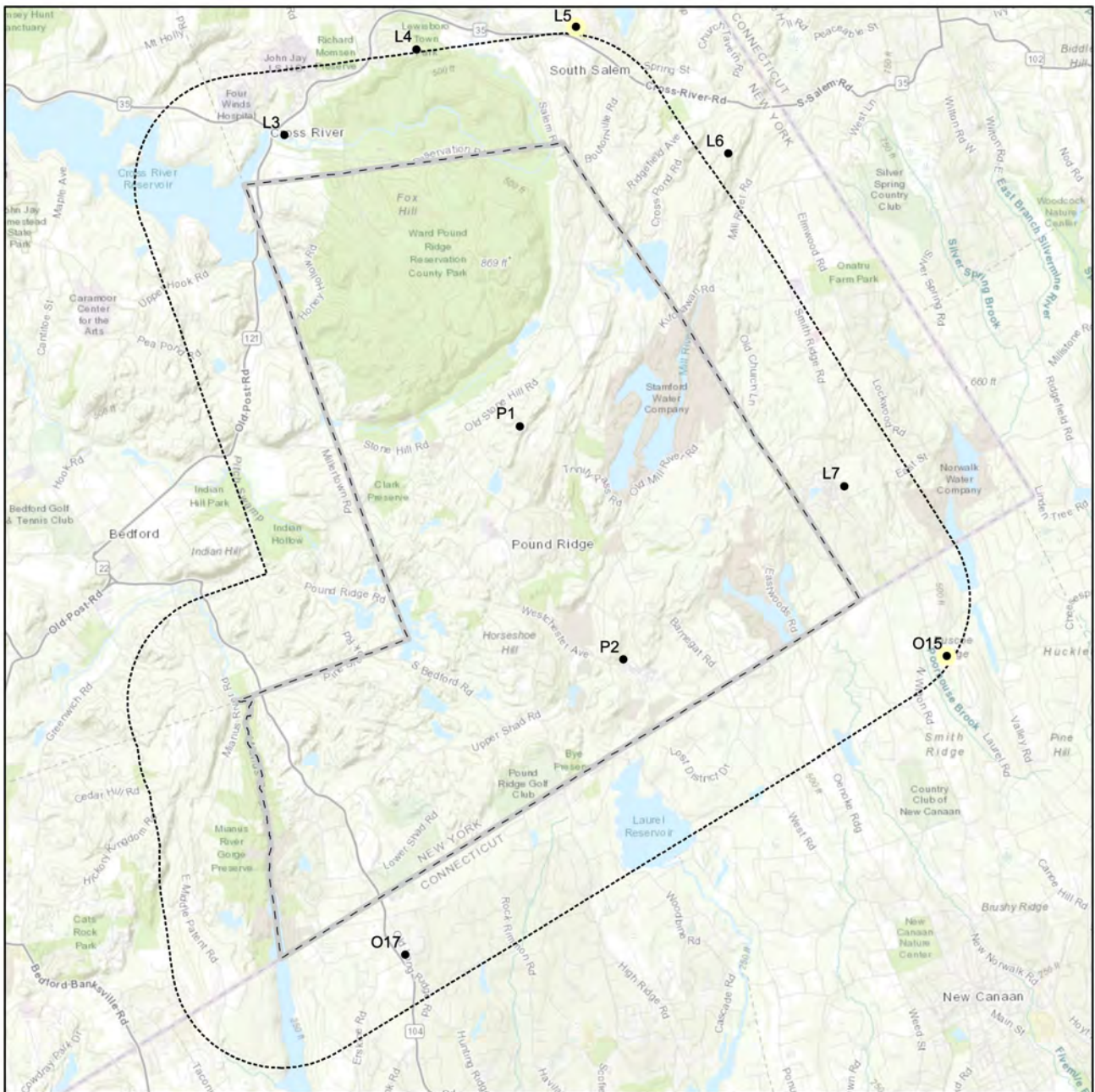
Within the Pound Ridge jurisdictional boundary there are two existing towers, Sites P1 and P2. Both towers are on private property and support commercial wireless antennas. Site P1 is a concealed tower and the tower at Site P2 is non-concealed. Site P2 also has public safety equipment mounted on the tower.

The following *Table P1* summarizes the total number of sites and identifies the inventory by structure type, antenna type, location and design. The inventory of facilities are further depicted on corresponding maps as follows: *Figure P1* Structure Type, *Figure P2* All Antenna Type, *Figure P3* PWSF Antenna Type, *Figure P4* Location and *Figure P5* Design Type.

Greater site detail including facility picture, location map, ownership, providers, type of facility along with any other pertinent individual site information can be found in the Pound Ridge Wireless Inventory Catalog in *Appendix G1*.

Pound Ridge Study Area		INSIDE JURISDICTION				ONE-MILE PERIMETER			
TOTAL	Existing	Approved Not Built	Proposed Under Review	Inquiry	Existing	Approved Not Built	Proposed Under Review	Inquiry	
9									
<b>STRUCTURE TYPE</b>									
Towers	9	2	0	0	0	5	0	2	0
Base Stations	0	0	0	0	0	0	0	0	0
<b>ANTENNA TYPE</b>									
Macro Wireless	6	1	0	0	0	3	0	2	0
Small Wireless	0	0	0	0	0	0	0	0	0
Public Safety/Macro	3	1	0	0	0	2	0	0	0
Public Safety	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0
<b>LOCATION</b>									
Private Property	6	2	0	0	0	3	0	1	0
Public Property	3	0	0	0	0	2	0	1	0
Utility Easement	0	0	0	0	0	0	0	0	0
ROW	0	0	0	0	0	0	0	0	0
<b>DESIGN TYPE</b>									
Concealed	3	1	0	0	0	0	0	2	0
Semi-Concealed	0	0	0	0	0	0	0	0	0
Non-Concealed	6	1	0	0	0	5	0	0	0

Table P1: Inventory by Structure Type



Northern Westchester County Inventory by: **Pound Ridge**

**Cataloged Structure Type**

- Tower (9)
- Base Station (0)
- Approved but Not Yet Built (0)
- Proposed and Under Review (2)
- ▲ Inquiry (0)
- ▭ City Boundary
- ⋯ 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 10/8/2022

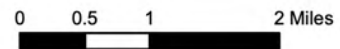
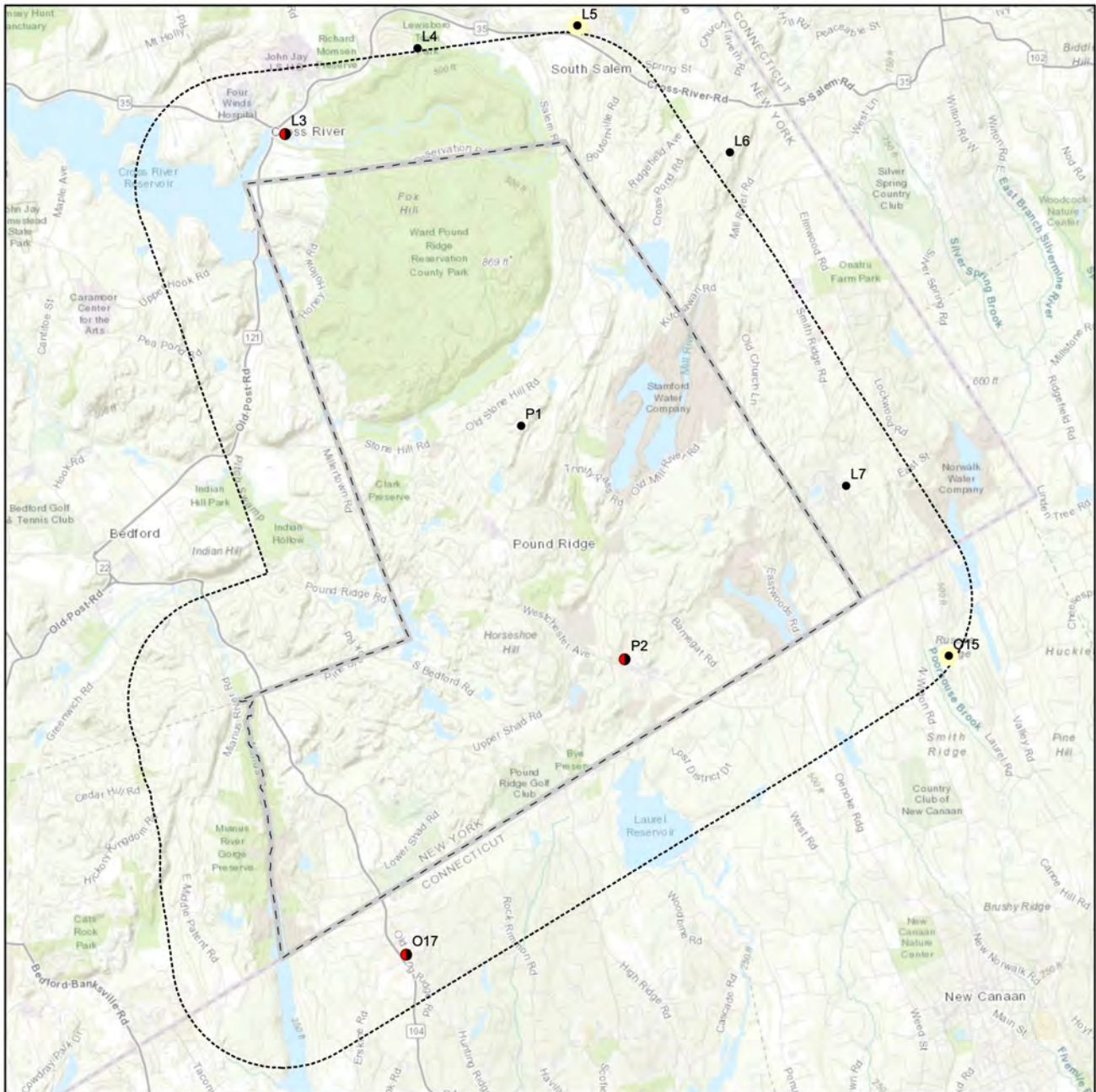


Figure P1: Map of Existing Inventory by Structure Type



Northern Westchester County Inventory by: **Pound Ridge**

**Cataloged Antenna Type**

- Macrocell Facility (6)
- Small Wireless Facility (0)
- Public Safety (0)
- Macrocell Facility and Public Safety (3)
- Draft Green Field Options (0)
- Other (0)
- Approved but Not Yet Built (0)
- Proposed and Under Review (2)
- ▲ Inquiry (0)
- ▭ City Boundary
- ▭ 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 10/8/2022

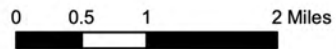
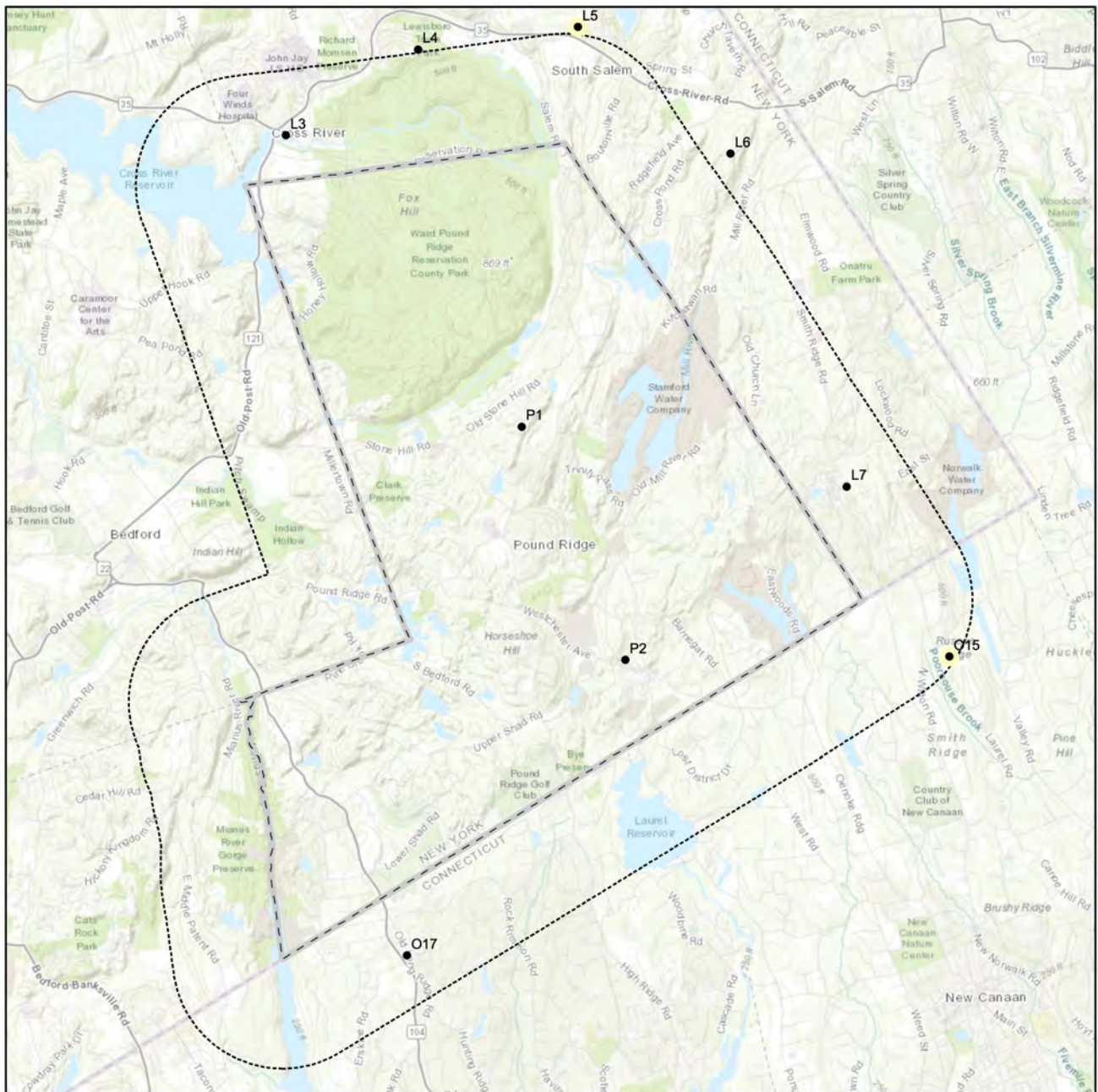


Figure P2: Map of Existing Inventory by All Antenna Type



Northern Westchester County Inventory by: **Pound Ridge**

**Cataloged Existing PWSF Antenna Type**

- Macrocell Facility (9)
- Small Wireless Facility (0)
- Approved but Not Yet Built (0)
- Proposed and Under Review (2)
- ▲ Inquiry (0)
- ▭ City Boundary
- ▭ 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 10/8/2022

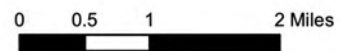
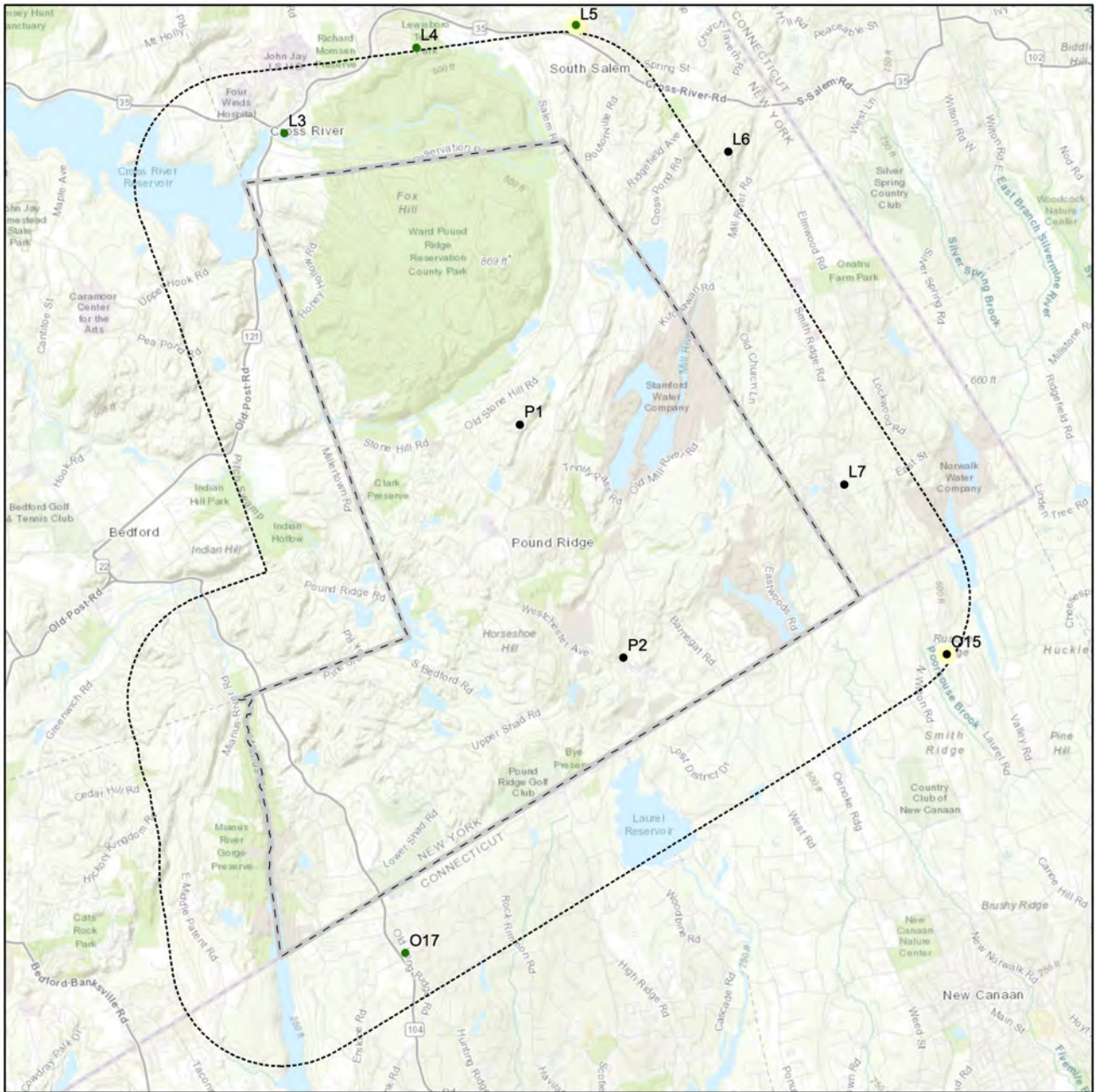


Figure P3: Map of Existing Inventory by PWSF Antenna Type



Northern Westchester County Inventory by: **Pound Ridge**

**Cataloged Location**

- Private Property (5)
- Inside Right-of-Way (0)
- Publicly Owned (4)
- Utility Easement (0)
- Approved but Not Yet Built (0)
- Proposed and Under Review (2)
- ▲ Inquiry (0)
- ▭ City Boundary
- ⋯ 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 10/8/2022

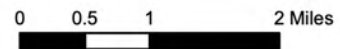
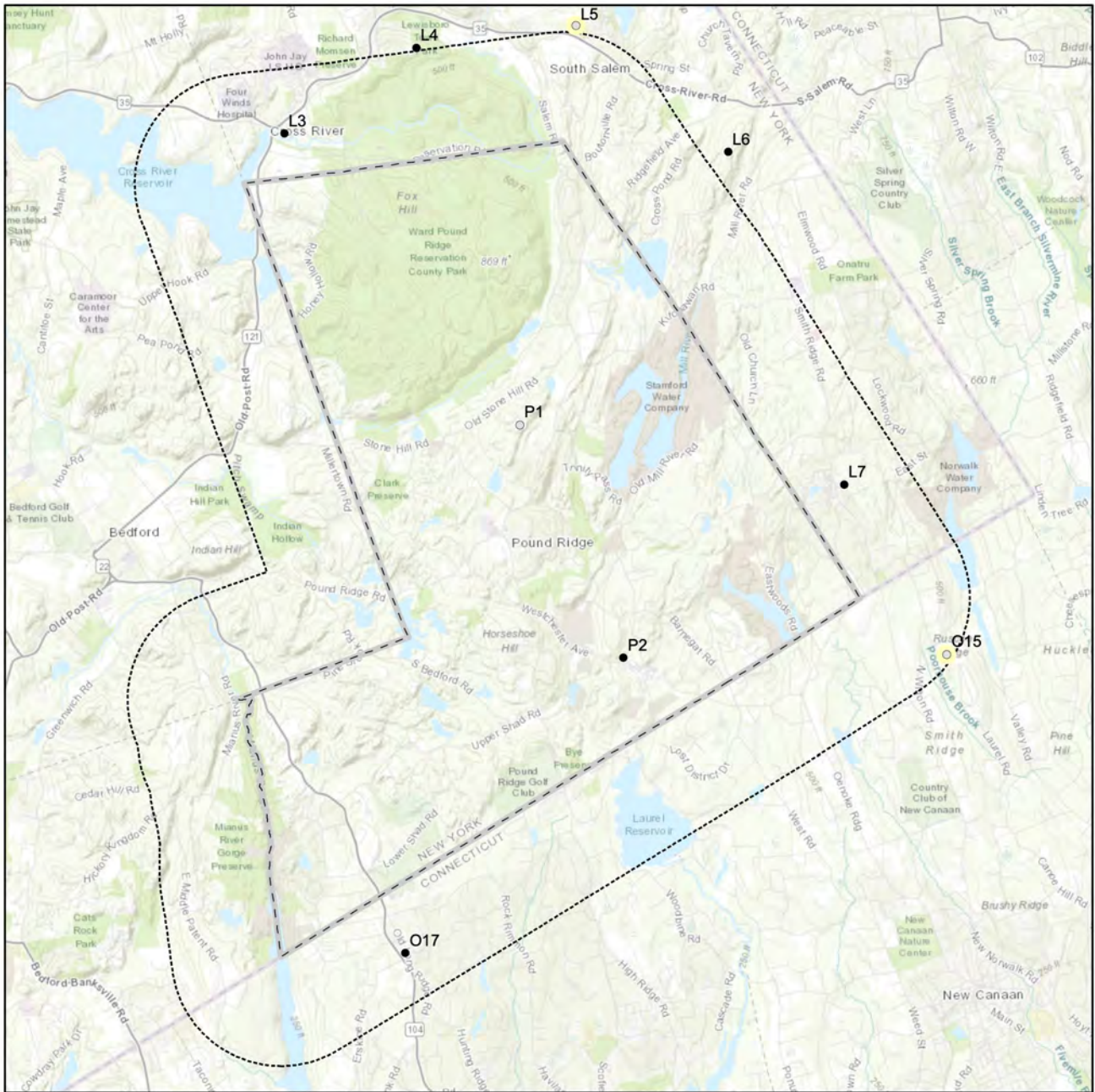


Figure P4: Map of Existing Inventory by Location



**Northern Westchester County Inventory by: Pound Ridge**

**Cataloged Design Type**

- Concealed Tower or Base Station (3)
- Semi-Concealed Tower or Base Station (0)
- Non-concealed Tower or Base Station (6)
- Approved but Not Yet Built (0)
- Proposed and Under Review (2)
- ▲ Inquiry (0)
- ▭ City Boundary
- ▭ 1 Mile Buffer

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 10/8/2022

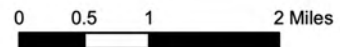


Figure P5: Map of Existing Inventory by Design Type



# PROPAGATION MAPPING AND SIGNAL STRENGTH

Propagation mapping is a tool used to simulate antenna signal strength. Signal strength is a term used to describe the level and operability of a wireless device. The stronger the signal between the elevated antenna and the wireless handset device the more likely the device and all the built-in features will work as expected. As a wireless device approaches the outer edge of the antenna's service area, the signal strength becomes more prone to degradation, particularly as usage in the area increases or environmental conditions worsen.

A reduced signal causes unsatisfactory service, results in slow download or upload speeds and can cause dropped calls. Other factors affecting signal strength are any natural or man-made obstructions such as location of buildings, type of building materials, vegetation, humidity or weather that comes between the antenna and devices. The use of devices indoors or outdoors is also a factor when determining signal strength. Consider this much like a light bulb in a lamp; the further away you are from the lamp, the dimmer the light becomes. Any obstructions in between you and the lamp dims or obscures the light, just like signal strength.

The following propagation map provided in *Figure P6* illustrates simulated predicted coverage from the existing and approved but not built personal wireless service facility (PWSF) sites for wireless service providers operating in the Town. The map is generated using mid-band frequency spectrum 1700-2400 MHz assuming maximum operating power from each of the towers or base stations. This simulated propagation considers a generic antenna model similar to those used by wireless service providers and assumes each provider is located at the highest mounting height on each facility represented.

The gradation of colors from yellow to blue represents the signal strength emanating from each personal wireless service facility. The geographic areas in yellow identify superior outdoor and indoor signal strength, green equates to areas with average in vehicle signal strength and shades of blue symbolize acceptable or poor outdoor signal strength. Areas with no shades show marginal, spotty or no signal. A quick reference of the shades and descriptions are as follows in *Table P2*.

SIGNAL STRENGTH COLOR	dBm	SIGNAL STRENGTH DESCRIPTION
Yellow	> -75	In Building
Green	-95	In Vehicle
Blue	-105	Outdoor
Gray or White		Marginal or No Service

Table P2: Signal Strength Description

This modeling assumption gives an estimation of the wireless coverages in the Town if each service provider was located on each facility. It is noted that not all service providers are on every tower or base station but the goal is to maximize the existing infrastructure already in place to accommodate the other providers.

Of the two tower facilities in the Town of Pound Ridge, P2 on Westchester Avenue provides the greatest coverage, but it is limited to servicing the vicinity of Scotts Corner because of the surrounding topography. A small area in the northern part of Pound Ridge is served by Site L3 in Lewisboro, some of the southeast corner is getting coverage from Site L7 in Lewisboro and a pocket of the southwest corner of Pound Ridge has service from Site O17 which is outside the Town's jurisdiction but inside the one-mile perimeter making up the study area.

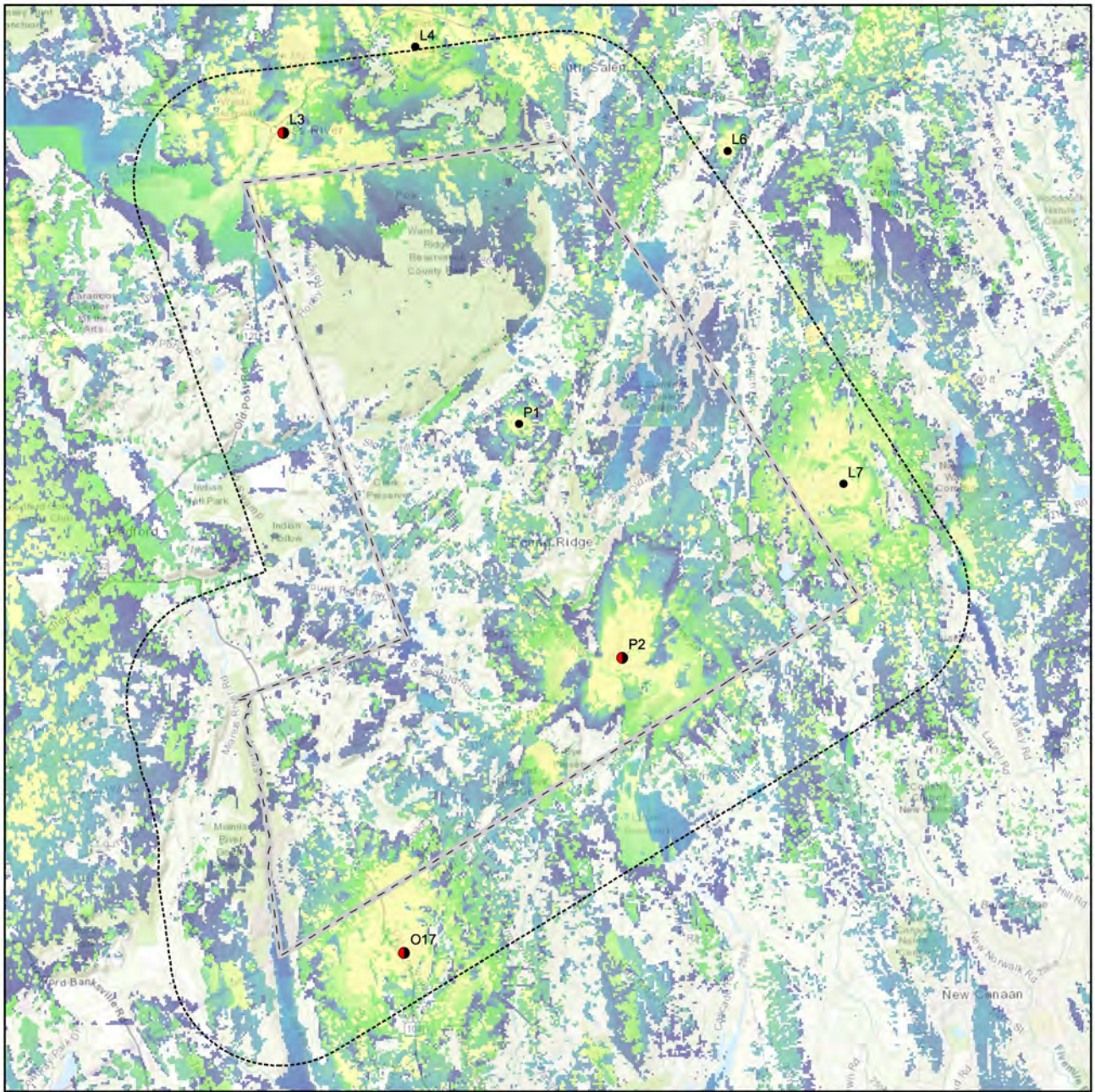
As shown in *Figure P6* there is limited wireless network connectivity throughout Pound Ridge because the distance between the existing macro cell sites is too far and forested hills and ridgelines create obstructions.



Site P1



Site P2



Northern Westchester County Inventory by: **Pound Ridge**

**Cataloged PWSF Antenna Type**

- Macrocell Facility (4)
- Small Wireless Facility (0)
- Public Safety (0)
- Macrocell Facility and Public Safety (3)
- Draft Green Field Options (0)
- Other (0)
- Approved but Not Yet Built (0)
- Proposed and Under Review (0)
- ▲ Inquiry (0)
- ▭ City Boundary
- ⋯ 1 Mile Buffer

**Mid-band Frequency PWSF Sites**

- Approximate Coverage
- Indoor (-75)
  - In Vehicle (-95)
  - Outdoor (-105)

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 10/12/2022

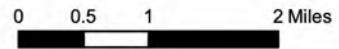


Figure P6: Simulated Coverage Map from PWSF Sites

# POPULATION DENSITY AND LAND CLASSIFICATION

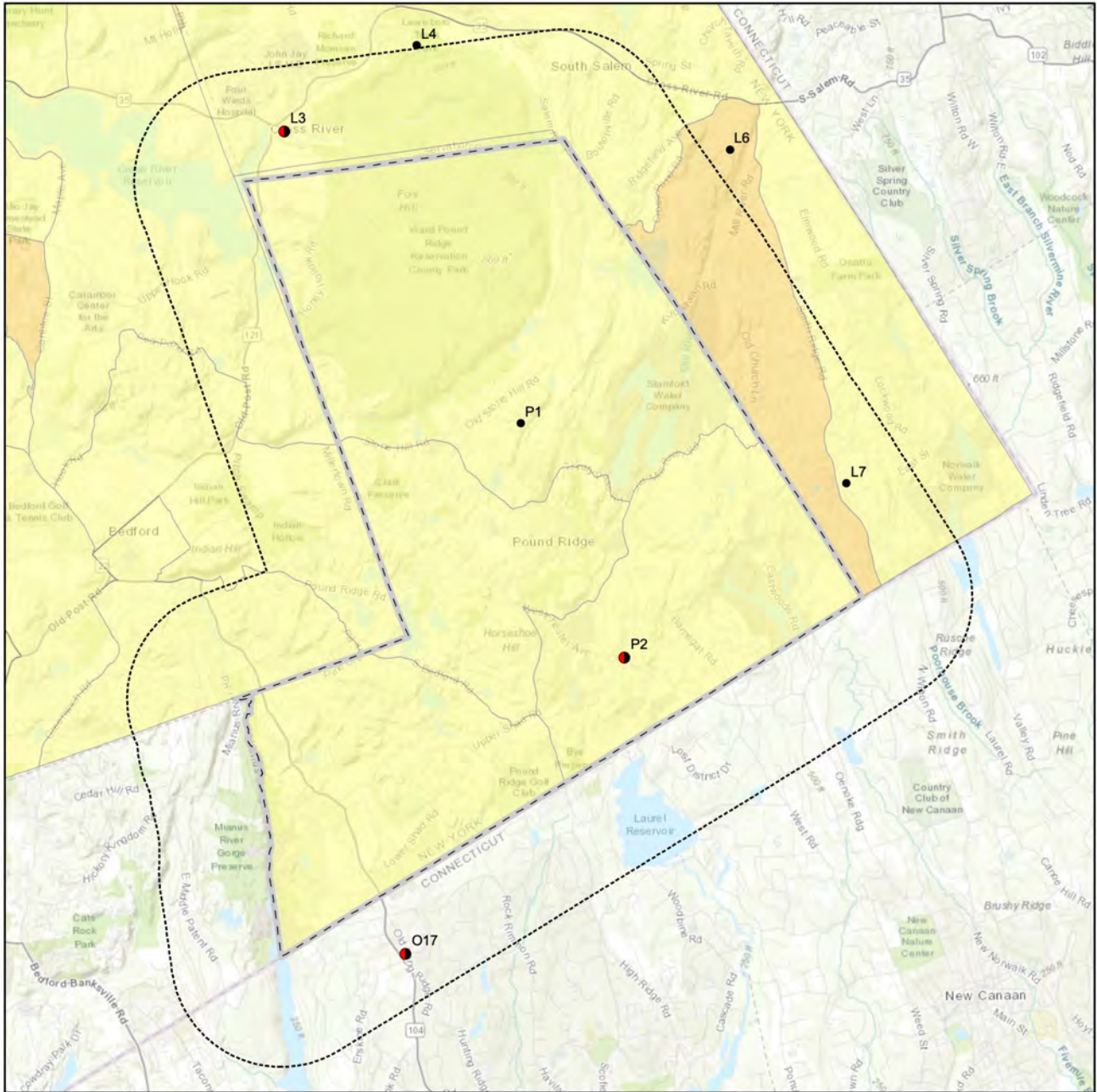
Population density is a variable affecting wireless networks. Wireless service providers want to deploy as close to their subscriber base as possible which is why residential areas, employment centers, recreational facilities and along major highways/thoroughfares are ideal locations for infrastructure. Examining population density is a key component in determining where there is likely to be the greater demand of wireless networks.

*Figure P7* is a map of population density by US Census Block Group with an existing and approved but not built macro wireless facilities overlay. Pound Ridge is the most rural Town in the study area with less than 500 people per square mile throughout the entire Town which is likely the reason the industry is slow to deploy additional infrastructure in this part of the NWC study area.

*Figure P8* is the Town's Land Classification map also with the existing and approved but not built wireless facilities as an overlay.

When comparing *Figure P6* (propagation map) to *Figure P7* (population density map) and *Figure P8* (land classification map) the notable wireless facility deployment pattern is indicative of rural and low-density residential land use characteristics which equates to very few wireless facilities because the proportions of subscribers per census block are less than wireless industry business model justifications for new wireless sites.





Northern Westchester County Inventory by: **Pound Ridge**

**Cataloged PWSF Antenna Type**

- Macrocell Facility (4)
- Small Wireless Facility (0)
- Public Safety (0)
- Macrocell Facility and Public Safety (3)
- Draft Green Field Options (0)
- Other (0)
- Approved but Not Yet Built (0)
- Proposed and Under Review (0)
- ▲ Inquiry (0)
- ▭ City Boundary
- ▭ 1 Mile Buffer

**People Per Square Mile**

- 0 - 500
- 501 - 1000
- 1001 - 2000
- 2001 - 3000
- 3001 - 10000

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 10/12/2022

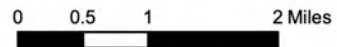
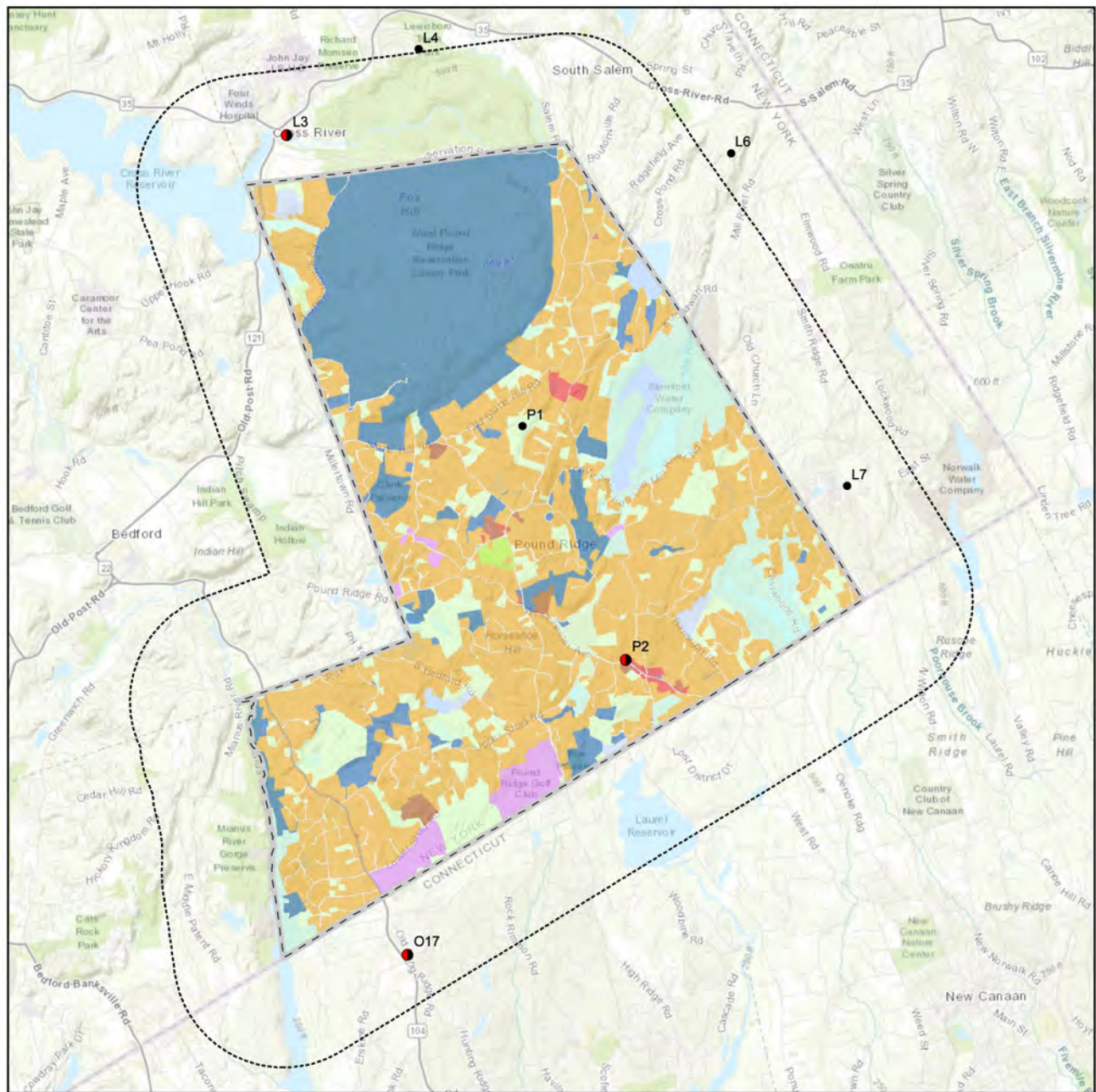


Figure P7: Population Density with PWSF Overlay



Northern Westchester County Inventory by: **Pound Ridge**

**Cataloged PWSF Antenna Type**

- Macrocell Facility (4)
- Small Wireless Facility (0)
- Public Safety (0)
- Macrocell Facility and Public Safety (3)
- Draft Green Field Options (0)
- Other (0)
- Approved but Not Yet Built (0)
- Proposed and Under Review (0)
- Inquiry (0)
- ▭ City Boundary
- ▭ 1 Mile Buffer

**Land Classification**

- Residential
- Commercial
- Community services
- Industrial
- Public services
- Recreation & entertainment
- Agricultural
- Wild, forested, conservation lands and public parks
- Vacant land
- Unclassified

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 10/12/2022



0 0.5 1 2 Miles

Figure P8: Land Classification Map

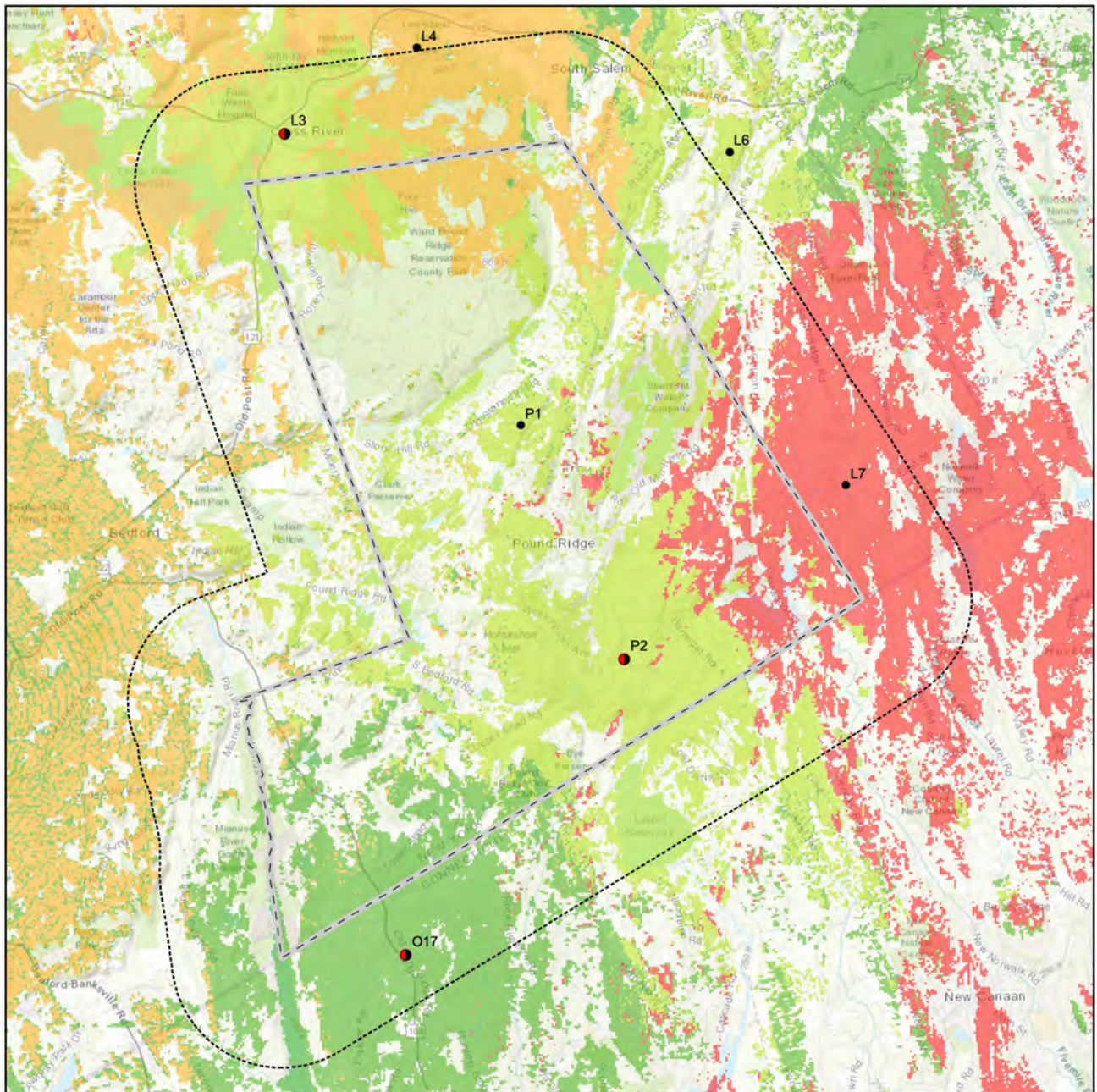
# WIRELESS NETWORK DENSIFICATION

Modern and advancing technologies continue to transform how the wireless industry builds out their networks. Each wireless service provider is in a different stage of fifth generation (5G) deployment and use different technologies and spectrum to compete in the 5G race. In the evolution of wireless communications, some smartphones still use 4G technologies but they are rapidly transitioning to 5G wireless networks. Both platforms incorporate broadband technology enabling all the Smartphone applications like global positioning services (i.e. Google Maps, Waze Navigation); public safety, medical and banking services; weather, educational, music, games, on-line reading and countless other on demand services. These applications require significant amounts of information to be sent and received within the same radio signal boundary. Network densification is often needed within the coverage area to improve network capacity.

Network capacity is the amount of wireless traffic that a service provider's network can handle at any given time within a specific location. Capacity takes into account the amount of bandwidth being used simultaneously by way of voice calls, and data usage. In order to estimate network capacity, consideration and analysis of the distinct characteristics of the community is studied and portrayed.

Network densification means wireless service providers need to add more capacity to their networks to handle all the usage and network speeds subscribers expect. There are several ways to add capacity to a network. One is providers buying more spectrum, two is making spectrum more efficient and third adding more wireless facilities to areas in need. Commercial wireless providers are pursuing all three methodologies to prepare for and meet network speeds and improvements.

The following *Figure P9* theorizes geographic areas needing network coverage and capacity densification. Red and orange shaded areas are vicinities where the existing number of towers and base stations are proportionally insufficient to the number of existing households. Yellow and green shaded areas do not need immediate densification, provided existing PWSFs inside these colorings can accommodate collocations for other service providers. If collocation options are not available at the existing sites in the yellow and green shaded areas, then a new PWSF will be necessary to accommodate additional antennas. Any area void of yellow, green, orange or red colorings represents places in the Town with immediate need of personal wireless service facilities.



Northern Westchester County Inventory by: **Pound Ridge**

**Cataloged PWSF Antenna Type**

- Macrocell Facility (4)
- Small Wireless Facility (0)
- Public Safety (0)
- Macrocell Facility and Public Safety (3)
- Draft Green Field Options (0)
- Other (0)
- Approved but Not Yet Built (0)
- Proposed and Under Review (0)
- Inquiry (0)

- ▭ City Boundary
- ▭ 1 Mile Buffer

**Number Households**

- 1 - 500 (Acceptable Capacity)
- 501 - 1000
- 1001 - 1500
- 1501 - 3450 (Poor Capacity)

Sources: US Census Bureau, Cityscape Consultants, Inc, USGS

Map Created by Cityscape Consultants, Inc. on

Date: 10/12/2022

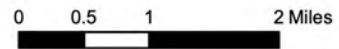


Figure P9: Heat Map Approximating Network Capacity Areas of Concern



# POTENTIAL SOLUTIONS

Long Term Evolution (LTE) is a 4G wireless communication standard used by commercial wireless service providers offering high-volume data and faster internet speeds with minimal delay or latency. Transitioning to LTE modeling requires a slight change in the propagation model. Residential indoor service tends to require a minimum of -95 dBm RSRP (LTE Reference Signal Received Power) which contains a 5 dB margin added to ensure reliable indoor services. The typical minimum service level for in vehicle is -90 to -105 dBm, which makes for reliable text, call and data sessions, and the minimum usable outdoor LTE coverage level is -115 dBm.

The following figures are representations of simulated LTE coverage assuming all service providers are on each facility since this is the best possible collocation scenario. Each of these figures uses the following RSRP signal level shown in *Table P3*.

SIGNAL STRENGTH COLOR	dBm	SIGNAL STRENGTH DESCRIPTION
Yellow	> -90	In Building
Green	-90 to -105	In Vehicle
Blue	-105 to -115	Outdoor

Table P3: LTE Signal Strength Description



## POUND RIDGE OVERVIEW

The following *Figure P10* provides a closer look at the LTE coverage predictions from all the existing personal wireless facilities in the Pound Ridge Study Area. The areas outlined in blue illustrate very poor to non-existent wireless coverage and the areas in greatest need of wireless infrastructure.

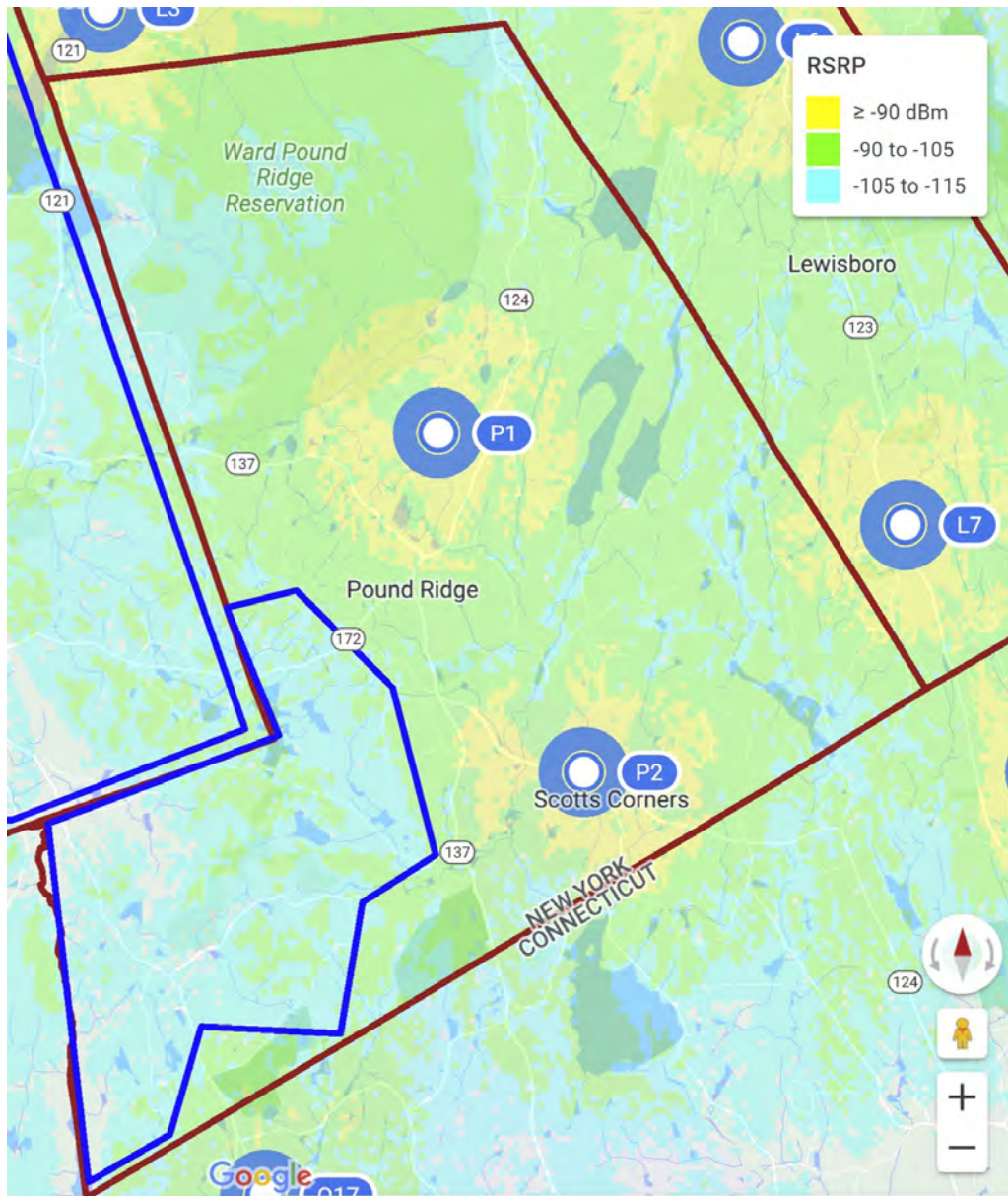


Figure P10: LTE Coverage Predictions Existing or Approved PWSF Sites

The map in *Figure P11* provides an in depth look at specific underserved areas and offer potential solutions to fill-in these gaps. Suggested new macro cell towers or base stations are represented as new tower (NT) followed by a number. Small wireless facilities may provide a feasible solution closer to residential areas or those areas with viewshed concerns. Small wireless facilities on NYSEG poles or new poles in the ROW are identified as NP followed by a number.

In order to improve the poor or no wireless coverage areas in the many residential areas of Pound Ridge it is anticipated to take a minimum of four macro cell facilities, either towers or base stations at approximately 120' in height in the vicinities shown on the maps.

All suggested locations are on properties identified on a map by the Town titled, "Non-Residential Alternative Wireless Sites." The potential macro cell at Site P-NT-PG1 would provide connectivity between existing Sites P1 and P2. If a macro cell was constructed at P-NT-PG2 then hand off from existing Site L3 in Lewisboro would bring coverage into northern Pound Ridge. Sites P-NT-PG13 and P-NT-PG14 would provide coverage along Upper Shad Road along the southern part of the Town.

Additionally, six small wireless facilities are suggested on existing NYSEG utility poles or new utility 50' poles in the same vicinity as follows:

- o P-NP1, P-NP2, P-NP3, P-NP4, P-NP5, P-NP6

These recommended locations would bring coverage to the Long Ridge Road corridor in southwest Pound Ridge.

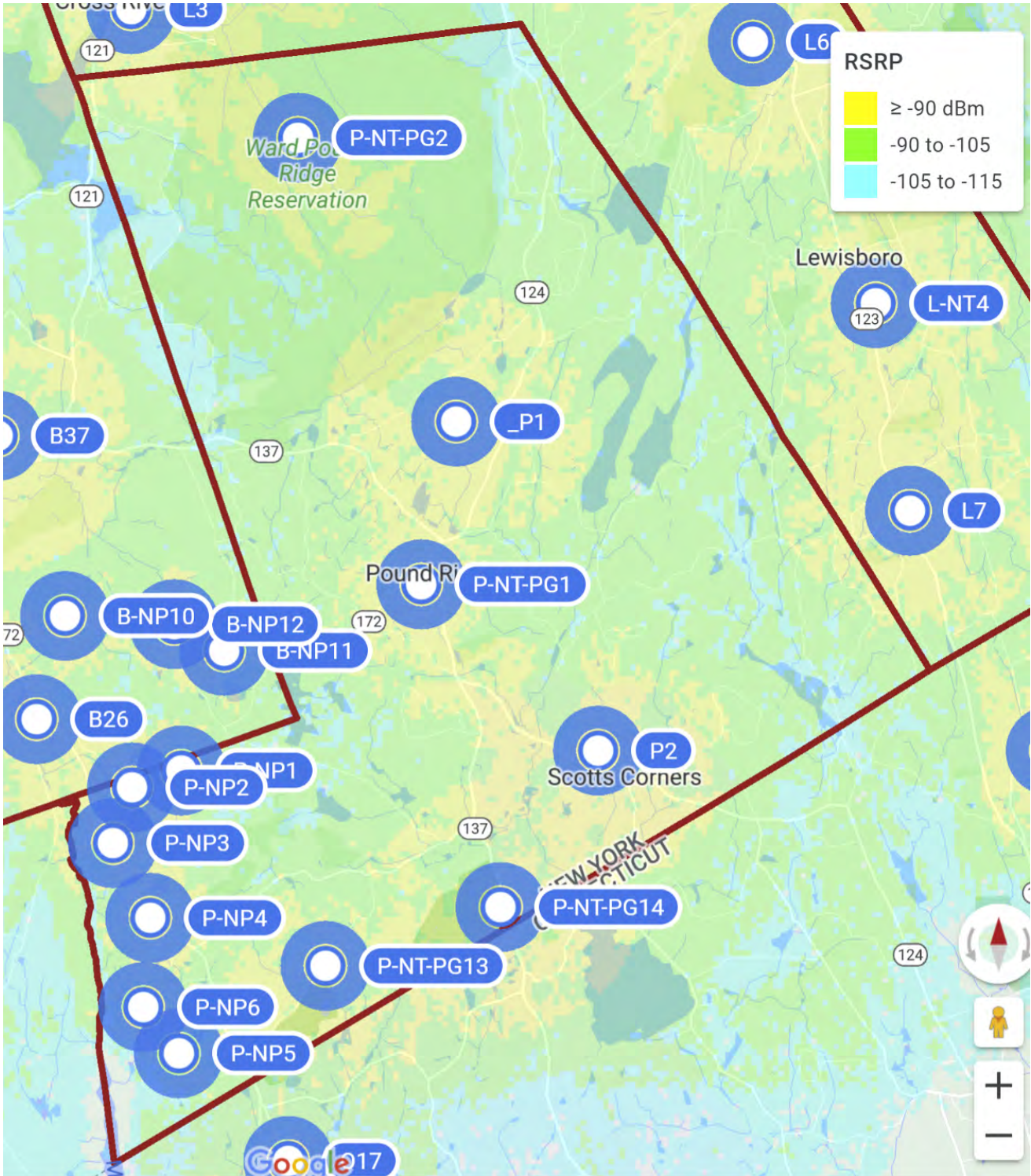


Figure P11: Predicted LTE Coverage North Pound Ridge

The following *Table P4* provides a summary of all the suggested macro cell fill in sites for the Town.

MACRO CELL SUGGESTED SITES				
SITE #	SITE NAME	LATITUDE	LONGITUDE	HEIGHT
P-NT-PG1	Town House, Park, Cemetery & Other	41.207423	-73.576087	120'
P-NT-PG2	Ward Pound Ridge Reservation	41.249447	-73.591504	120'
P-NT-PG13	Wellspring Zendo	41.171504	-73.588060	120'
P-NT-PG14	Pound Ridge Golf Club	41.177033	-73.566186	120'

Table P4: Suggested Macro Fill-In Sites

The following *Table P5* provides a summary of all the suggested small wireless mounted on existing NYSEG utility pole sites or on new poles in the same vicinity.

SMALL CELL SUGGESTED SITES			
SITE NAME	LATITUDE	LONGITUDE	HEIGHT
P-NP1	41.18990	-73.6061	50'
P-NP2	41.18831	-73.6123	50'
P-NP3	41.18307	-73.6147	50'
P-NP4	41.17603	-73.6100	50'
P-NP5	41.16326	-73.6064	50'
P-NP6	41.16762	-73.6109	50'

Table P5: Suggested Small Wireless Fill-In Sites

# COMMUNITY SURVEY AND ZONING

In order to facilitate effective regulations that takes community input into consideration, the Town promoted a Wireless Telecommunications Infrastructure Survey (Survey) to engage the townspeople. The main objective was to solicit information regarding thoughts, concerns and preferences as it relates to wireless infrastructure facilities.

The Survey solicited opinions and experiences regarding the importance of the current state of wireless connectivity and aesthetics of the infrastructure in the Town. The Pound Ridge survey opened on September 1, 2021 and closed on September 26, 2021 and during that time 365 people participated in the survey. The responses are very similar to those collected for the larger study area.

Those who participated in the survey indicated that wireless connectivity and quality of service is very important to them at home, work and while travelling around town is generally poor or inconsistent. There is support for use of public property for future sites and prefer concealed base stations, towers, and small wireless facilities over non-concealed and semi-concealed infrastructure.

The most notable observations from the survey and compared to the entire NWC study area are shown in *Table P5* with the entire collection of responses and comments provided in *Appendix G2*.



RESPONSES	Pound Ridge	NWC
<b>PARTICIPANTS</b>	365	4002
<b>Average Number of Devices</b>	6	6
<b>Use of Devices</b>		
○ Personal Recreation/Leisure	78.30%	85.84%
○ Employment Related	59.10%	63.33%
<b>Wireless Coverage at Residence</b>		
○ Excellent or Acceptable	31.50%	43.03%
○ Poor or Inconsistent	66.10%	55.91%
<b>Wireless Coverage at Work</b>		
○ Excellent or Acceptable	26.80%	35.37%
○ Poor or Inconsistent	46.10%	32.60%
<b>Wireless Coverage Traveling Around Town</b>		
○ Excellent or Acceptable	16.70%	37.18%
○ Poor or Inconsistent	82.4%	61.88%
<b>Would Rely More on Device if Network was Better</b>		
○ Entirely Agree	71.9%	61.90%
<b>Quality of Wireless Service Is Important to Me</b>		
○ Entirely Agree	88.70%	87.64%
<b>What is Most Important to You</b>		
○ Excellent Connectivity	48.10%	56.24%
○ Good Connectivity and Minimal Visual Impact	47.00%	38.71%
<b>Prefer Taller Tower Supporting Multiple Collocations</b>	36.90%	44.64%
<b>Non-Concealed Tower Preference - Monopole</b>	56.20%	62.09%
<b>Concealed Tower Preference - Flag Pole</b>	71.50%	70.11%
<b>Rooftop Preference - Concealed</b>	77.70%	78.65%
<b>Small Wireless Facility Preference - Concealed</b>	91.60%	89.99%
<b>Locational Preference in Town - Anywhere</b>	60.70%	60.88%
<b>Support Use of Public Property for Revenue and Aesthetics - Yes</b>	50.00%	52.18%

Table P5: Summary of Notable Survey Responses

Overall, additional macro and small wireless facilities are needed throughout the Town to provide initial coverages in areas where no service is currently available and in other areas where the ratio of subscribers exceeds the number of wireless facilities. Based on survey responses, the community supports and desires additional wireless infrastructure to improve the wireless network.

Standards for wireless telecommunication services facilities § 113-58.1 was added to the Town Code in 1998 and while it is thorough, promotes collocation and has standards addressing visual appearances of new sites, it is outdated and should be revised to include small wireless facilities and macro cells that align with the Code of Federal Regulation. Attention should be given to existing setback and separation requirements to avoid the appearance of potential barriers to entry.



## APPENDIX G1

# WIRELESS INFRASTRUCTURE INVENTORY



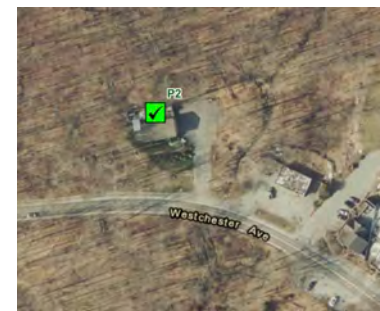
Site P1	29 Adams Lane	Pound Ridge
---------	---------------	-------------

<b>STRUCTURE TYPE:</b>	Tower
<b>FACILITY TYPE:</b>	Monopine
<b>ANTENNA TYPE:</b>	Macro Cell
<b>DESIGN TYPE:</b>	Concealed
<b>FACILITY OWNER/ID:</b>	American Tower Corporation - 413118
<b>FACILITY SITE NAME:</b>	Pound Ridge Relo
<b>SERVICE PROVIDERS:</b>	AT&T, T-Mobile, Verizon
<b>FCC ASR:</b>	
<b>HEIGHT:</b>	150'
<b>LOCATION:</b>	Private Property
<b>LATITUDE/LONGITUDE:</b>	41.222740 N, -73.571712 W
<b>PARCEL ID:</b>	
<b>ZONING:</b>	
<b>NOTES:</b>	



Site P2	89 Westchester Ave	Pound Ridge
---------	--------------------	-------------

<b>STRUCTURE TYPE:</b>	Tower
<b>FACILITY TYPE:</b>	Monopole
<b>ANTENNA TYPE:</b>	Macro and Public Safety
<b>DESIGN TYPE:</b>	Non-Concealed
<b>FACILITY OWNER/ID:</b>	American Tower Corporation - 373361
<b>FACILITY SITE NAME:</b>	Lions Ambulance - South Pound Ridge
<b>SERVICE PROVIDERS:</b>	AT&T, T-Mobile, Verizon
<b>FCC ASR:</b>	
<b>HEIGHT:</b>	133'
<b>LOCATION:</b>	Private Property
<b>LATITUDE/LONGITUDE:</b>	41.1917699 N, -73.554047 W
<b>PARCEL ID:</b>	
<b>ZONING:</b>	
<b>NOTES:</b>	



**Site L3****779 Route 35****Lewisboro**

<b>STRUCTURE TYPE:</b>	Tower
<b>FACILITY TYPE:</b>	Monopole
<b>ANTENNA TYPE:</b>	Macro and Public Safety
<b>DESIGN TYPE:</b>	Non-Concealed
<b>FACILITY OWNER/ID:</b>	Homeland Towers/ NY143
<b>FACILITY SITE NAME:</b>	Katonah - Lewisboro Volunteer Ambulance Corp
<b>SERVICE PROVIDERS:</b>	AT&T, Verizon
<b>FCC ASR:</b>	1310704
<b>HEIGHT:</b>	170'
<b>LOCATION:</b>	Public Property
<b>LATITUDE/LONGITUDE:</b>	41.261525 N, -73.612357 W
<b>PARCEL ID:</b>	05300600010470000000
<b>ZONING:</b>	R-1/2A
<b>NOTES:</b>	

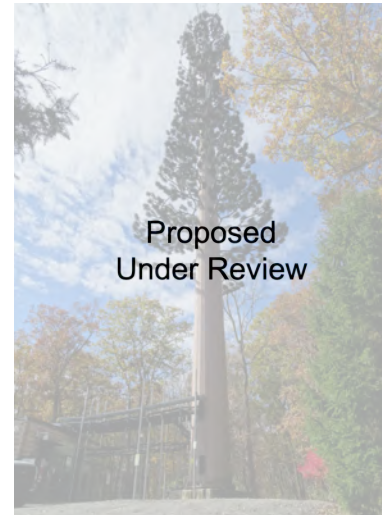
**Site L4****1081 Hwy 35****Lewisboro**

<b>STRUCTURE TYPE:</b>	Tower
<b>FACILITY TYPE:</b>	Monopole
<b>ANTENNA TYPE:</b>	Macro Cell
<b>DESIGN TYPE:</b>	Non-Concealed
<b>FACILITY OWNER/ID:</b>	American Tower Corp, 413114
<b>FACILITY SITE NAME:</b>	Cross River NY -Lewisboro Town Park
<b>SERVICE PROVIDERS:</b>	AT&T, Verizon
<b>FCC ASR:</b>	1285599
<b>HEIGHT:</b>	161'
<b>LOCATION:</b>	Public Property
<b>LATITUDE/LONGITUDE:</b>	41.272692 N, -73.589110 W
<b>PARCEL ID:</b>	4200400030140000000
<b>ZONING:</b>	Town Park Land
<b>NOTES:</b>	



**Site L5****81 Spring Street****Lewisboro**

<b>STRUCTURE TYPE:</b>	Tower
<b>FACILITY TYPE:</b>	Monopine
<b>ANTENNA TYPE:</b>	Macro Cell
<b>DESIGN TYPE:</b>	Concealed
<b>FACILITY OWNER/ID:</b>	Homeland Towers
<b>FACILITY SITE NAME:</b>	
<b>SERVICE PROVIDERS:</b>	
<b>FCC ASR:</b>	
<b>HEIGHT:</b>	
<b>LOCATION:</b>	Public Property
<b>LATITUDE/LONGITUDE:</b>	41.275431 N, -73.561115 W
<b>PARCEL ID:</b>	4301500010070000000
<b>ZONING:</b>	R-2A
<b>NOTES:</b>	Proposed and under review

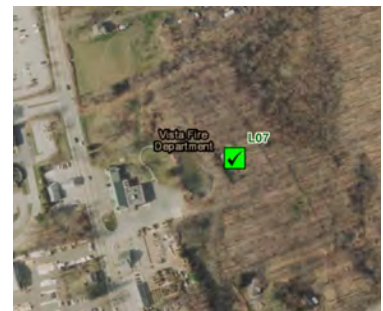
**Site L6****Smith Ridge Road****Lewisboro**

<b>STRUCTURE TYPE:</b>	Tower
<b>FACILITY TYPE:</b>	Lattice
<b>ANTENNA TYPE:</b>	Macro Cell
<b>DESIGN TYPE:</b>	Non-Concealed
<b>FACILITY OWNER/ID:</b>	American Tower Corp, 88166
<b>FACILITY SITE NAME:</b>	South Salem - Leon Levy Preserve
<b>SERVICE PROVIDERS:</b>	AT&T, Verizon
<b>FCC ASR:</b>	
<b>HEIGHT:</b>	127'
<b>LOCATION:</b>	Private Property
<b>LATITUDE/LONGITUDE:</b>	41.258479 N, -73.534699 W
<b>PARCEL ID:</b>	5500100030160000000
<b>ZONING:</b>	R-4A
<b>NOTES:</b>	

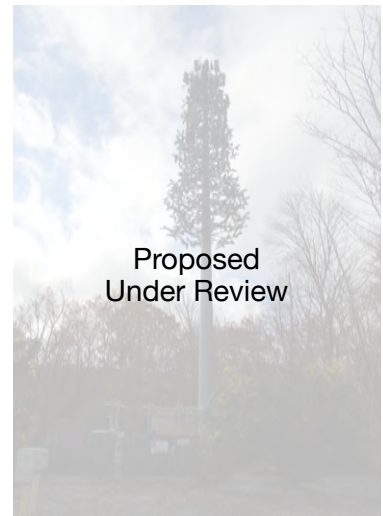


**Site L7****377 Smith Ridge Road**

<b>STRUCTURE TYPE:</b>	Tower
<b>FACILITY TYPE:</b>	Monopole
<b>ANTENNA TYPE:</b>	Macro Cell
<b>DESIGN TYPE:</b>	Non-Concealed
<b>FACILITY OWNER/ID:</b>	InSite Towers, LLC, NY001
<b>FACILITY SITE NAME:</b>	East Woods
<b>SERVICE PROVIDERS:</b>	AT&T, T-Mobile, Verizon, Sprint
<b>FCC ASR:</b>	1276640
<b>HEIGHT:</b>	150'
<b>LOCATION:</b>	Private Property
<b>LATITUDE/LONGITUDE:</b>	41.214346 N, -73.515038 W
<b>PARCEL ID:</b>	7701100020090000000
<b>ZONING:</b>	R-1A
<b>NOTES:</b>	

**Site O15****377 N Wilton Road****Other**

<b>STRUCTURE TYPE:</b>	Tower
<b>FACILITY TYPE:</b>	Monopine
<b>ANTENNA TYPE:</b>	Macro Cell
<b>DESIGN TYPE:</b>	Concealed
<b>FACILITY OWNER/ID:</b>	
<b>FACILITY SITE NAME:</b>	
<b>SERVICE PROVIDERS:</b>	AT&T
<b>FCC ASR:</b>	
<b>HEIGHT:</b>	90'
<b>LOCATION:</b>	Private Property
<b>LATITUDE/LONGITUDE:</b>	41.219386 N, -73.487977 W
<b>PARCEL ID:</b>	
<b>ZONING:</b>	
<b>NOTES:</b>	Proposed Under Review



<b>STRUCTURE TYPE:</b>	Tower
<b>FACILITY TYPE:</b>	Lattice
<b>ANTENNA TYPE:</b>	Macro and Public Safety
<b>DESIGN TYPE:</b>	Non-Concealed
<b>FACILITY OWNER/ID:</b>	
<b>FACILITY SITE NAME:</b>	Fire Department
<b>SERVICE PROVIDERS:</b>	AT&T, T-Mobile, Verizon
<b>FCC ASR:</b>	
<b>HEIGHT:</b>	
<b>LOCATION:</b>	Private Property
<b>LATITUDE/LONGITUDE:</b>	41.153129 N, -73.59271 W
<b>PARCEL ID:</b>	
<b>ZONING:</b>	
<b>NOTES:</b>	





## APPENDIX G2

# WIRELESS INFRASTRUCTURE SURVEY RESULTS

# Wireless Infrastructure Poll

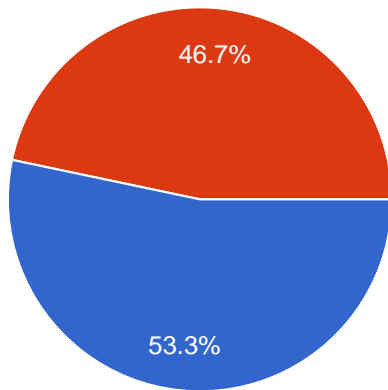
365 responses

[Publish analytics](#)

Thank you for taking the time to complete this poll. Please tell us a little about yourself.

 [Copy](#)

364 responses

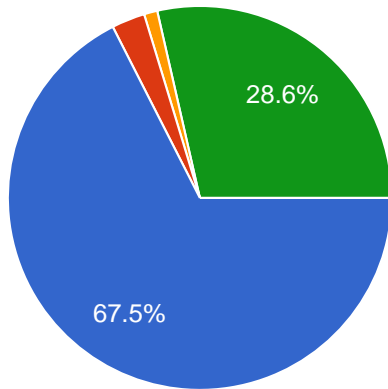


- I am answering these questions on behalf of myself
- I am answering these questions on behalf of my household

Choose which best describes you:

 [Copy](#)

357 responses

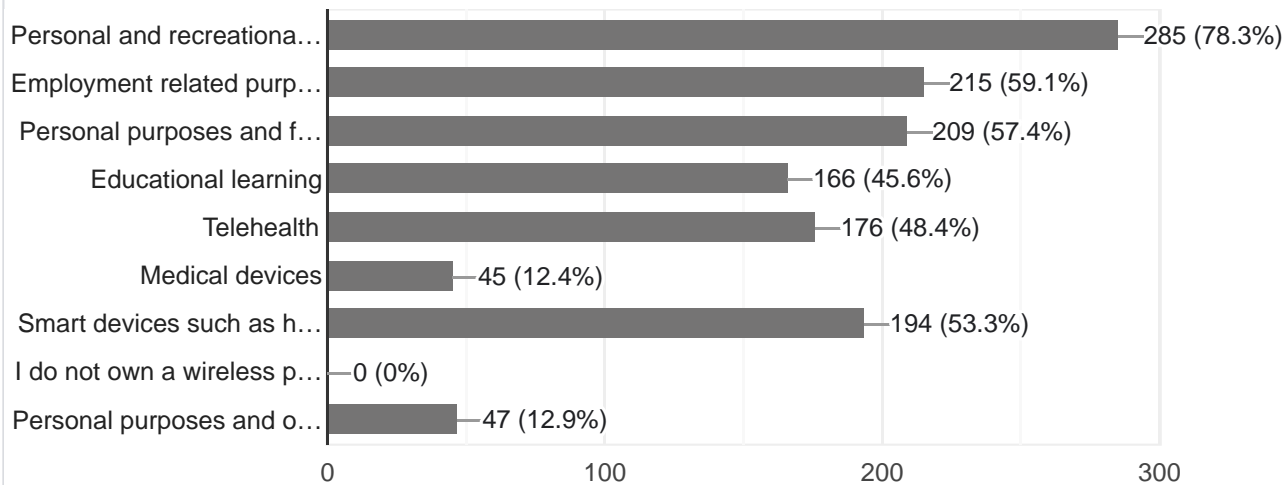


- I live and work in Town year-round
- I live and work in Town seasonally
- I live outside Town but work in the Town
- I live in Town but work outside the Town

## I use personal wireless services for (check all that apply):



364 responses



## Please identify the area where you live by one of the following: Address, Zip Code, Hamlet, Use Area, Lake District, General Area

363 responses

10576

10506

Pound ridge

Tatomuck Road

Upper Shad Rd

 High Ridge Road, Pound Ridge NY 10576

10576. Scott's Corner area

Ebenezer Lane

 Cradle Rock Road East

 Eastwoods Rd, Pound Ridge, NY 10576



Saddle Ridge Rd., 10576

Stone Hill Road, Pound Ridge NY

Major Tallmadge Lane 10576

Waring Road

nancys lane

Samuel Dann Way

Col Sheldon Ln

Highcliff Terrace

High Ridge Rd 10576

old pound road, pound ridge ny 10576

Fox Run Rd, 10576, Pound Ridge

Lost Nations Road, Pound Ridge, NY

10576, business distrtict

London Rd Pound Ridge, NY 10576

Pine Drive Pound Ridge 10576

Westchester Ave

10576 west lane

Scott's Corners

Pound Ridge, NY

Patterson Rd.

Fox Run Rd, Pound Ridge, NY 10576

10577

Fancher Rd

Kitchawan

Upper Shad Road Pound Ridge 10576

Lower Trinity

Hamlet

Eastwoods Rd

South Bedford Road

Poundridge/ Bedford

Saddle Ridge Road 10576

High Ridge rd

Miller rd , pound ridge, ny

SW Pound Ridge

Siscowit Road

Upper Shad Road

Off of rt 137

Long Ridge rd, Bedford 10506

## Lake Kitchawan area

 Sarles Road, Pound Ridge NY 10576 Fox Hill Road, Pound Ridge, NY 10576 Trinity Lane, Scott's Corners, NY 10576

## Barnegat Rd area

CALF PASTURE LANE 10576

## Light horse lane

 Old Stonehill Road S Bedford Rd

## Kendall Rd

 Fox Run Rd, Pound Ridge NY 10576 Dingee Road London rd 10576

## Autumn Ridge Rd

 S. Bedford Road, Pound Ridge, NY 10576

## Winterbottom Lane

## Zip code

## Great hill farms road

 Old Stone Hill Rd

☒ Salem Road, Pound Ridge, NY 10576

☒ Beech Hill Lane Pound Ridge NY 10576

☒ London Road Pound Ridge

10576, across from police station.

Upper Shad Road, Pound Ridge

☒ Barnegat Road, 10576

Dann Farm Rd, 10576

☒ Light Horse Ln, 10576

10576, horseshoe hill area

☒ Salem Rd., Pound Ridge, NY 10576

Scott's Corners

☒ Gorge lane 10576, Mianus River Gorge Preserve

☒

Kinnicutt Road

☒ Westchester Ave., Pound Ridge, NY 10576

☒ Park View Place 10576

☒ Salem Rd

Salem Road

☒ Old Mill River Rd, Pound Ridge, NY 10576

10576, NE corner of Pound Ridge near Cross River

Saddle Ridge Rd

Apple Tree Lane, Pound Ridge

Upper Shad Rd.

upper shad road

Shad road west pound ridge

General

Old stone hill road

Calf pasture lane PR

Fox Run Rd 10576

Old Pound Rd

Siscowit Road

Scotts Corners

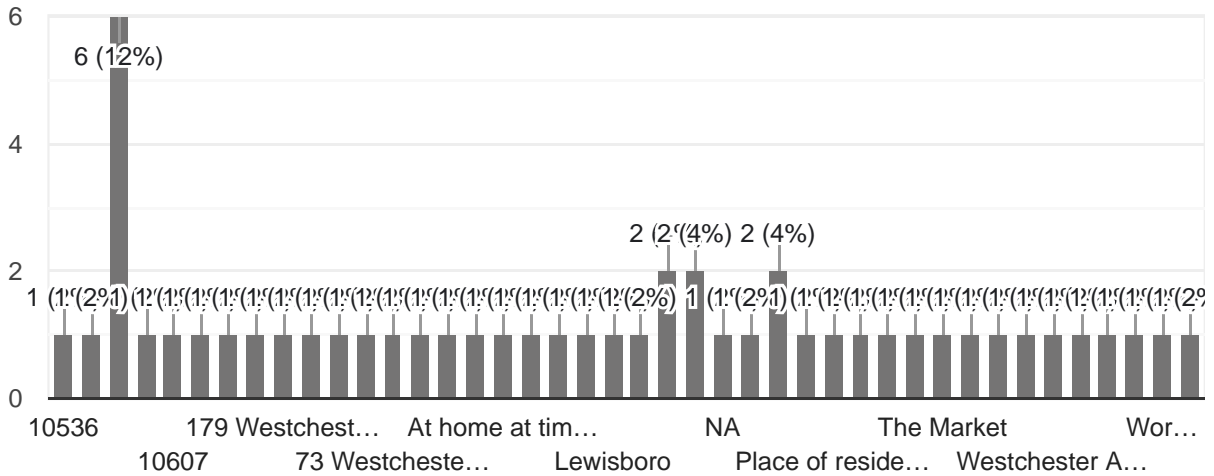
Barnegat Road 10576

126 more responses are hidden

If you work in Town at a fixed location other than your place of residence then please identify where you work by one of the following: Address, Zip Code, Hamlet, Use Area, Lake District, General Area



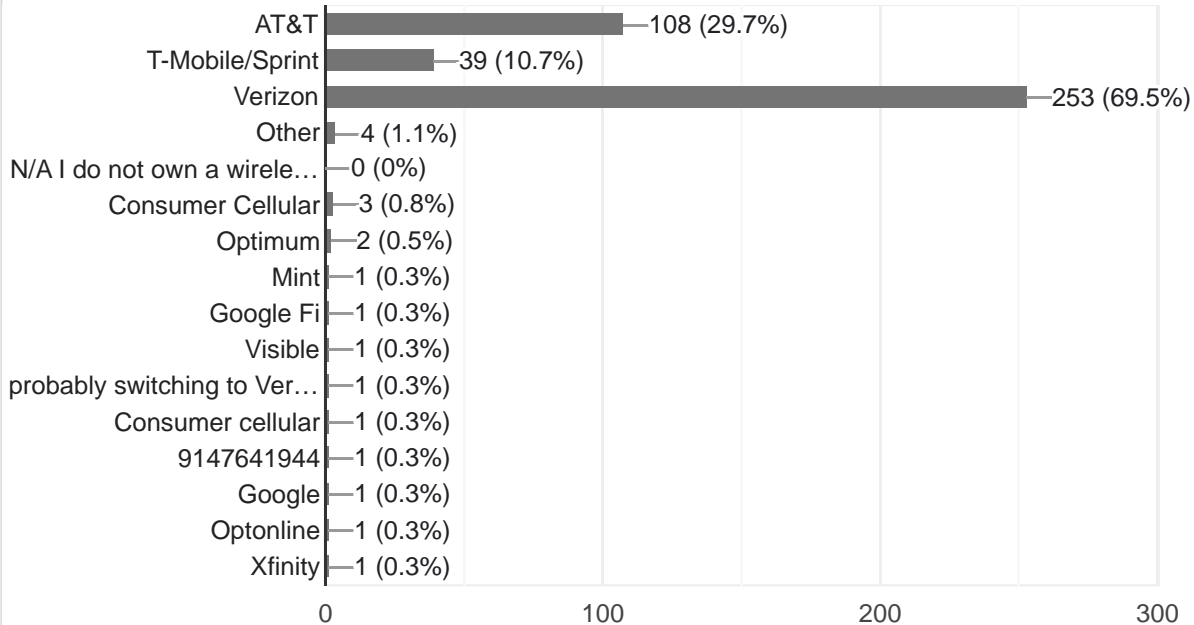
50 responses



My Wireless Service Provider is (if you have multiple wireless providers then please mark all that apply):



364 responses



How many wireless devices are used in your household? (Devices would include but not be limited to; wireless phones, laptops, tablets, watches, computers NOT using your home internet provider. Do not include items like garage door openers or smart home items.)

361 responses

4

5

6

10

8

7

2

12

3

15

9

Five

20

1

20+

Two

11

13

0

18

30

2 cell phones, 2 laptops, 1 ipad

4 cell phones; laptops use wifi, so are NOT considered in above answers

6

More than 10

We use all of these. All are through our provider because we do not have any service here.

2 iPhones, 2 ipads, kindle, Sonos radio, guest and contractor devices

25

4-6

3-4

5-10

Wireless phones, laptops, computers, watch, Alexa

6 devices

7+

10+



2 phones, 2 tablets

Over 10

Phone, laptops, TV

Confusing question

20+ if game systems include

6-8

8 devices

8 +/-

all of our devices use our home internet provider.

8-10

Seven

Six

All use Verizon

One

Too many to count if using home internet

20 +

2 wireless phones

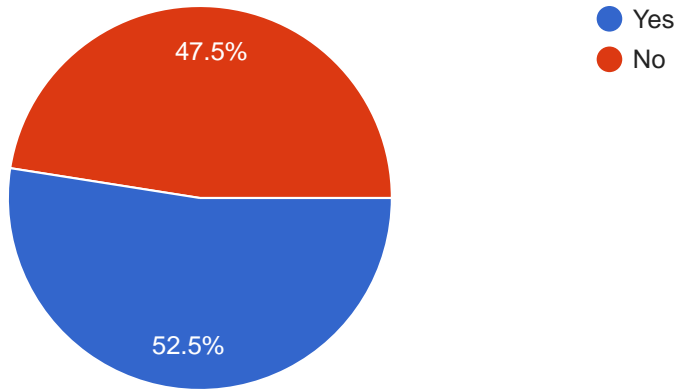
>10

Over 10 sometimes 15, depending on who's home

### Do you have a network extender (booster) to enhance your wireless service from your provider?



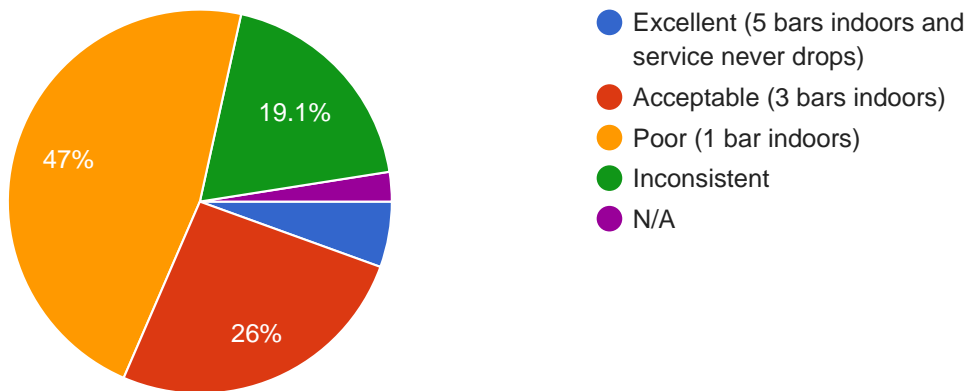
362 responses



### Wireless network coverage where I reside is:



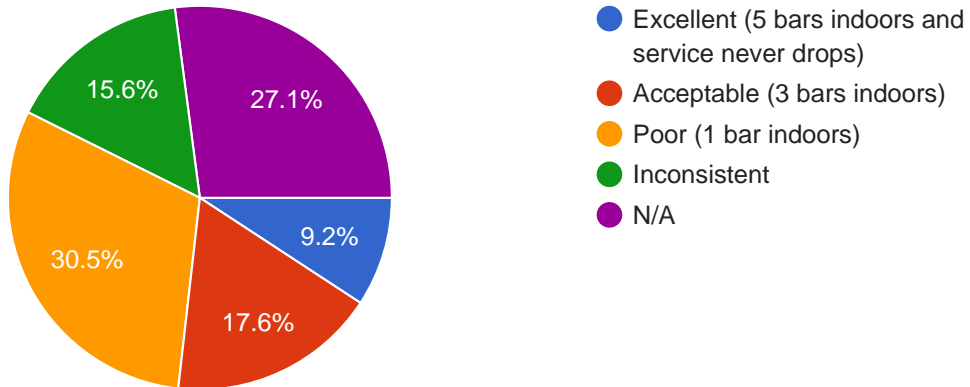
362 responses



### Wireless Network coverage where I work is:



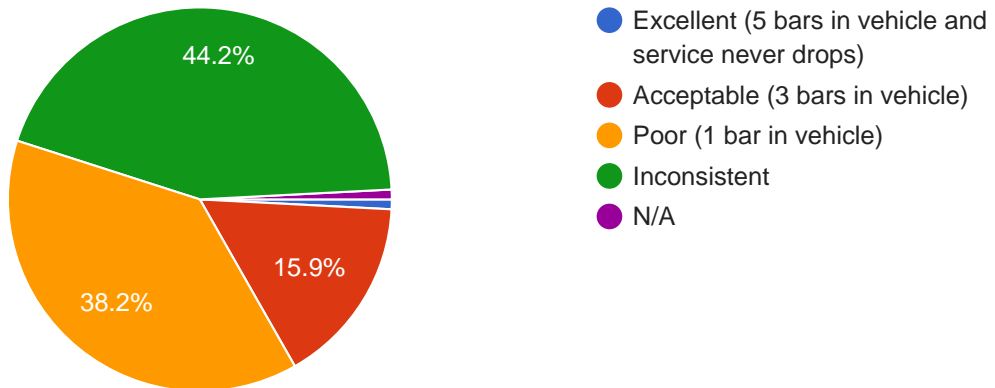
347 responses



### When I travel in and around the Town my network coverage is:



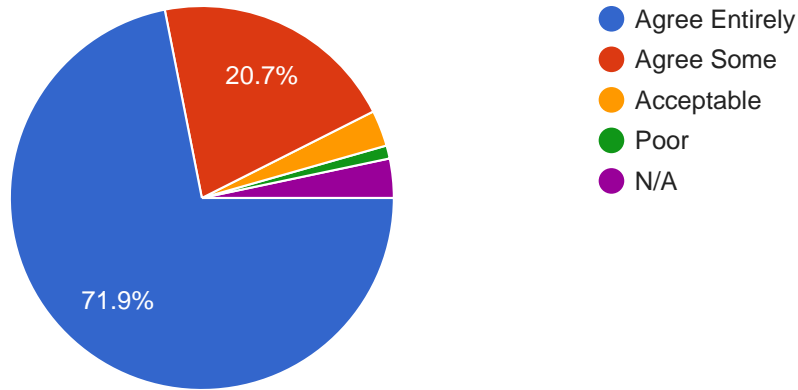
364 responses



I would rely more on my mobile device(s) if the network service was better.



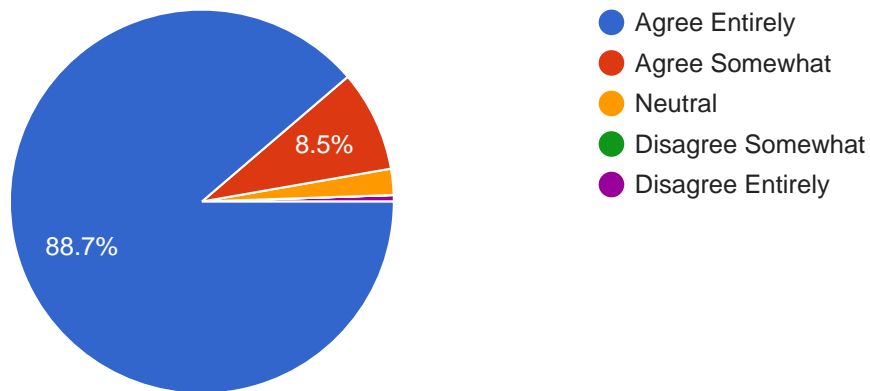
363 responses



The quality of wireless service is important to me.



364 responses



Are there specific areas of Town where your service is poor? If yes, please explain below.

287 responses

Everywhere

Town Park

In town

Home

Long Ridge Road

Throughout Pound Ridge

My home.

Poor in Scotts Corners Business District, poor in town park, poor in pound ridge ward reservation

Most of Town is awfik

Saddle Ridge Rd., Scotts Corners

My home/work: there is NO service. When power goes out we have no way to contact outside world unless we drive to town.

My home. Driving too Scott's corner. Driving on 137. Town Park

Long Ridge Rd, Pine Brook Rd, South Bedford Rd - none have any coverage

Pretty much everywhere except for the northern part of Salem Road – cell service is completely nonexistent!!

Crossing upper shad road, town park

Samuel Dann Way has very poor reception. We have no signal in our house and this is a big problem for us.


Town Park parking lot

At the market. Near my house. Most places. Good service is the exception not the rule.

Service in town is non-existent

High Ridge Rd approx. 1 mile past the New York border.

long ridge road, upper shad

My Home at  Fox run rd, and at Pound Ridge Tennis club

The park, near PRES, along 172, 124

any proximity outside of the main road of town. That includes busy intersection of High Ridge and Upper Shad, in the Town Park where kids can play on their own and have no service, driving in my neighborhood by London Rd and Long Ridge, and many other locations. It's scary to drive in bad weather because if you have an accident, you never know if you will be able to call for help. When my kids go out and bike, i worry they can't call for help if they have an accident. it's more than a convenience, this is a safety issue.

My home (London Rd) and the surrounding area on Long Ridge Rd. I have no service to 1 bar both inside and around my house which concerns me in an emergency situation.

Inconsistent in scotts corners, or near shops.

Various roads in PR, town park, parts of the path in pound rideg

On the walking path by the Town Park—I won't take calls on a walk down that way anymore because of it.

In between the Mobil and Shell gas stations on the opposite sides of Bedford Village

Through out the whole town.

Scott's corner

172 en route to Bedford

All over the place it is spotty. Really stinks. Can only get consistent service when I'm town.

Fox Run Road

I live on the lower end of Honey Hollow Rd, and service at my house is Very Poor!

Everywhere. service is poor

All over pound ridge esp near park and police station is terrible — cross into new Canaan and it's perfect

My house

South Bedford Road - No Service at all

Honey Hollow Road , on 137 to Scott's corners and then in Bedford

Mostly where I live

High Ridge rd in both directions

Yes, where I live we barely have coverage from any provider

Near the police station and on Westchester Ave near High Ridge Road and by the pound ridge tennis club

Long ridge, upper Shad

Upper Shad Road, Siscowit & Eastwoods Road, South Bedford Road,

Everywhere. We get no cell service anywhere.

It seems worse right where I live (Upper Shad and South Bedford)

Service is terrible on 121, high ridge road. Very concerning that cell service is spotty at PRES.

Long Ridge Road and Bedford Village

Town park. Elementary school. 172

My house. Upper shad and high ridge

Residence has very poor cell reception even with a booster.

In my house, on my street and on the surrounding streets, long ridge road.

Scott's Corners despite the proximity to the cell tower, very strange.

PRES and town park areas

NO BARS AT HOME, NO BARS FROM HOME TO HIGH RIDGE ON UPPER SHAD ROAD

Town park. Town house

I have No service in when I am in Bedford

North RT 124

SOUTH BEDFORD ROAD AREA

Long Ridge Rd, Lower Shad Rd, Kendall Rd

Home. Pound ridge road to Bedford village.

Our house and immediate vicinity gets no reception. We solely rely on wifi.

It poor Everywhere except in scotts corner. I do not have any service in this area.

Not really more in Bedford!

Home which abuts the back of the town park

My home. Westchester Avenue west of Scotts corner

ATT service Very poor to non-existent West of High Ridge road, and north of Scott's Corner

Winterbottom, Trinity Pass

Yes. Home.

Parts of Long Ridge And also Upper Shad

Route 137, corner of 137 and 121, the park,



Northern edge of Pound Ridge, specifically intersection of Parkview Rd and Salem Rd / 124 North to Reservation Rd has 0 bars. South of Parkview Rd on Salem Rd / 124 South to the library has inconsistent service.

Route 172 Pound Ridge into Bedford, Bedford Village into the Farms residential development.

At home

Most importantly at my home. No service. Rely on Wifi and landline. Needs in area made clear during storm last year. Trees down, etc. took 2 hrs to get home from Mt Kisco to PR. I get it was trees, storms etc. What was really isolating - No service, no GPS when roads were blocked. Separately, long ridge has drop zones, upper shad, most of my neighborhood near rockrimmon, etc.

there is nowhere that it is good

Yes, between police station and town.

Near town park, near inn at pound ridge, other areas

Our house and many clear dead spots in town while driving (on main roads) - cell service consistently drops in the same areas every time I'm driving there

My house, my street, most of the town.

Home. Cradle Rock Rd E

Dann Farm Rd and Northern Pound Ridge towards Lewisboro as well as the area towards Vista and New Canaan could all use improvement

West Road, East Woods (parts), home (inconsistent, unpredictable; For example, unusable during recent FIOS outage). Simply not reliable as you drive around; hard to describe the number of times I've tried to make calls in car and failed or lost call. Other times it'll be fine.

passing the park, near the golf course

Pound Ridge side of NY-124 toward Cross River, along Parkview Rd., along Boutonville Rd., in and around the Ward Pound Ridge Reservation

Pound Ridge Park and Pound Ridge Elementary

Trinity Pass Lake area, Lower Trinity Pass, Ponus Ridge into New Canaan

My home and immediate surrounding area

Between the shopping district and my home on kitchen Road

Around my home (internal / external); town of Pound Ridge

Besides our home, the town park and the adjacent stretch of Westchester Avenue, as well as countless main roads and side roads throughout town.

Park View Road; Bedford in general; Route 172 for most of the route to 684 from town; Orchard Square in Cross River

my house

Near my home, within a 2 mile radius. Particularly spotty on Old Church Lane

Around the Cross River Reservoir

Upper Shad Road & Long Ridge Road

Near my house and on Rt 121

Where I live broadband services are awful...in Scotts Corner is ok

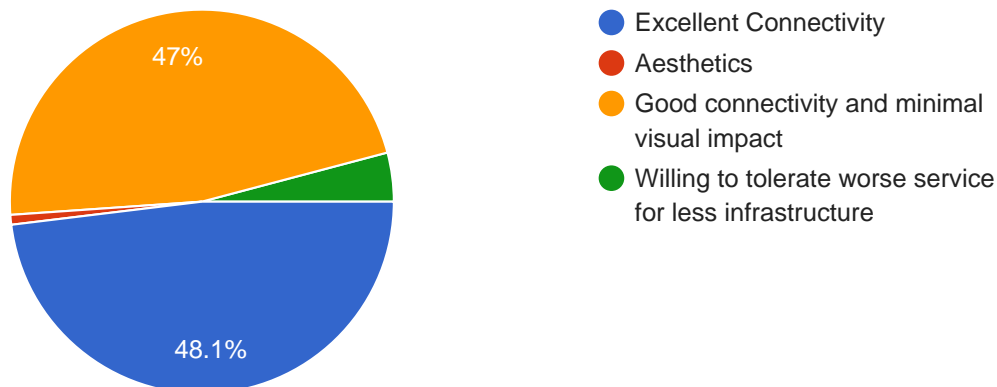
173 more responses are hidden

Aesthetics and Location

### What is most important to you?



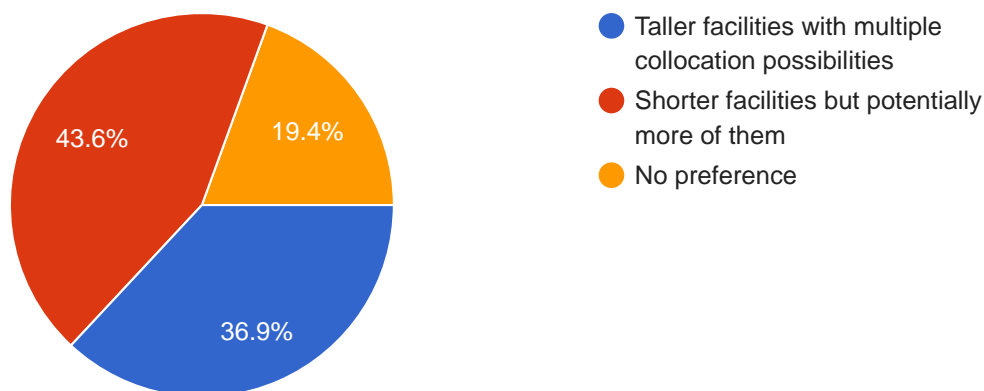
364 responses



Taller traditional macro towers remain the backbone of the wireless network. Taller towers allow for more collocations but are more visible in the landscape. Building shorter tower are less visible in the landscape but limit collocations so more towers are required. Please choose which you prefer.



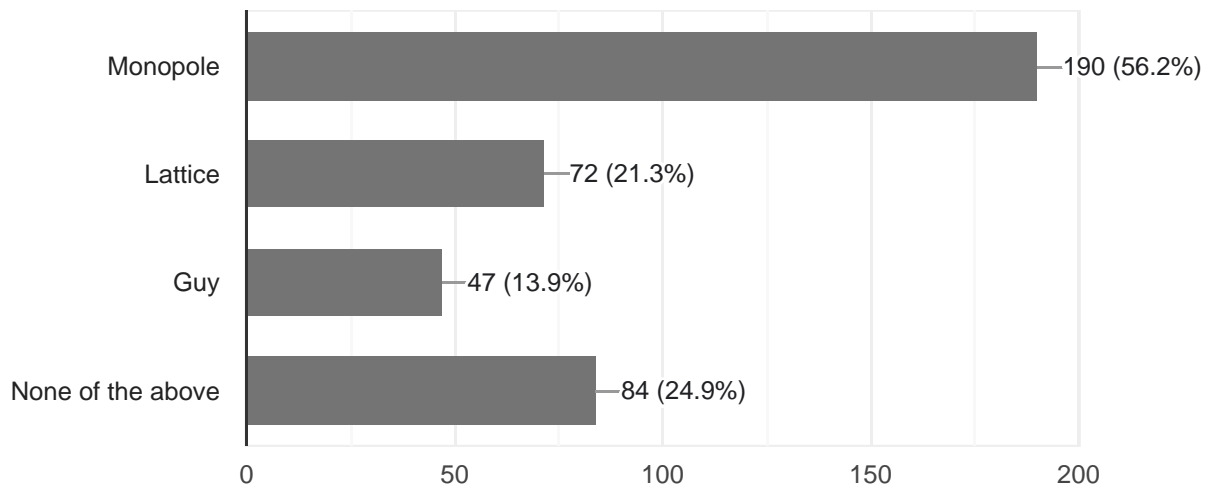
360 responses



Which non-concealed macro tower facility do you prefer? Check all that apply.



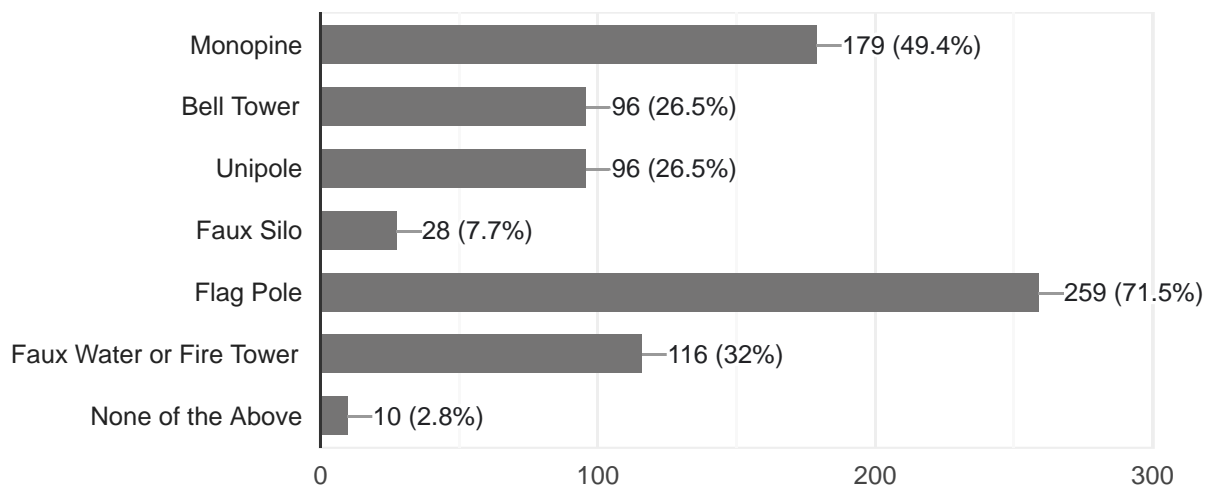
338 responses



Which concealed macro tower do you prefer? Check all that apply.



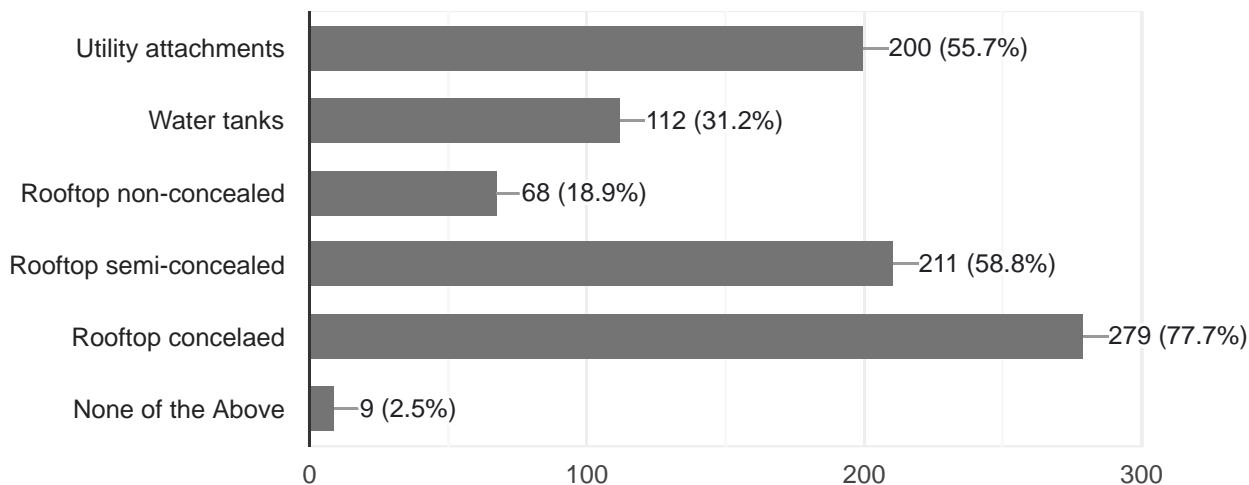
362 responses



A "base station" is any existing structure other than a tower that can accommodate wireless antennas. Examples include rooftops, water tanks, stadium lights, electrical utility poles. Which macro base station do you prefer? Check all that apply.



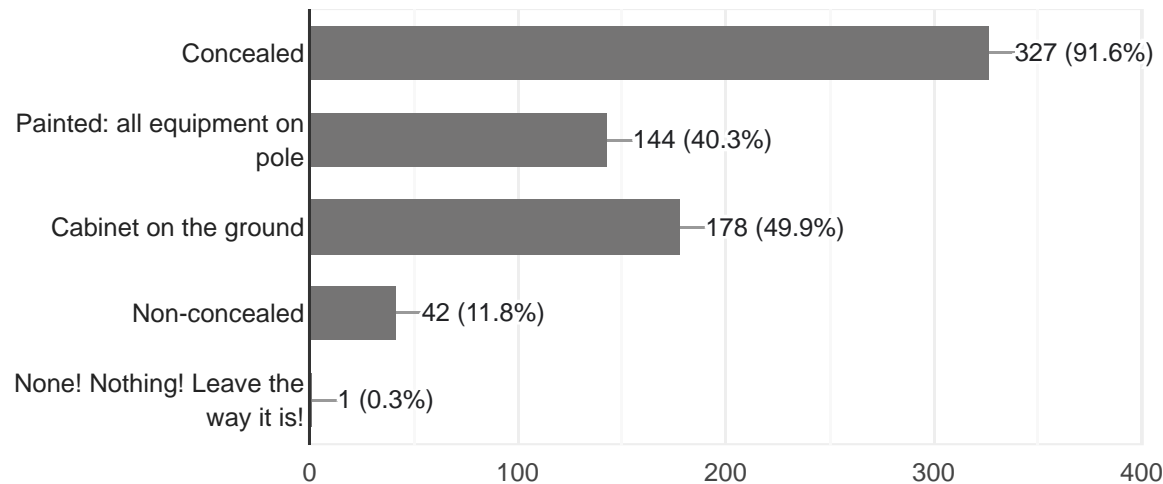
359 responses



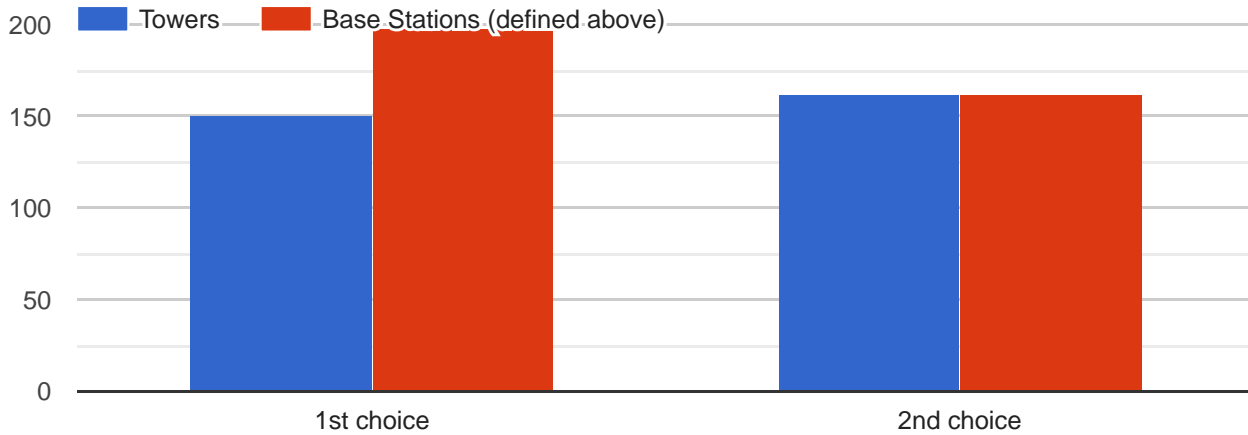
Which small wireless facilities do you prefer? Check all that apply.



357 responses



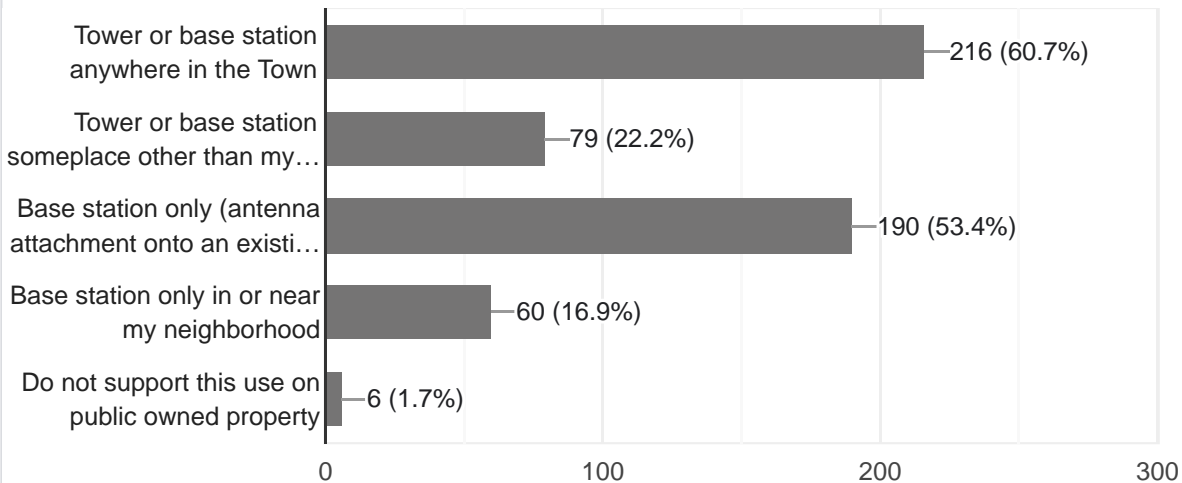
### Which do you prefer?



Town owned, school board or quasi public property (fire, ambulance core etc.) could be used to fill in wireless network coverage and capacity gaps in certain areas. Please check all that you would support.



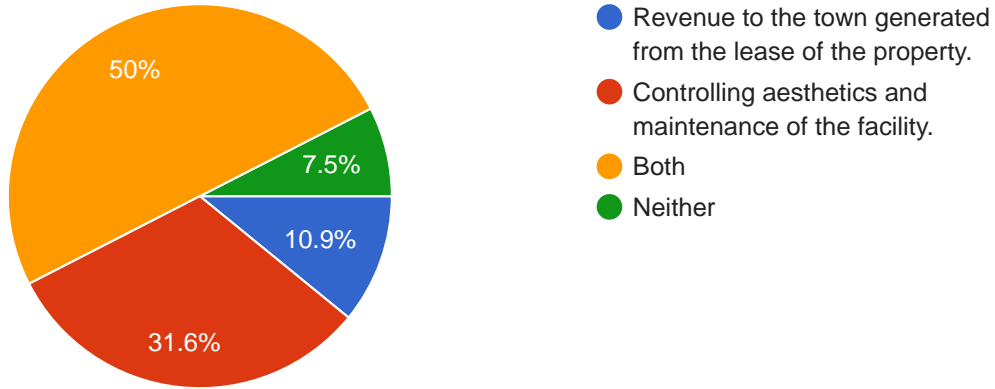
356 responses



If you support using Town owned, school board or quasi public property (fire, ambulance core etc.) property please choose which is more important to you.



358 responses



Name or email address \*email will not be used for anything other than this poll

365 responses

- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]

- Col Sheldon Ln
- Conant Valley Rd pound ridge
- old pound road, pound ridge ny
- Fox Run Rd
- Lost Nations Road
- pine drive pound ridge
- Westchester Ave
- Great Hill Farms Rd
- Saddle Ridge Road
- Honey Hollow Rd
- Pound Ridge Rd
- South Bedford Road
- Saddle Ridge Road
- High ridge rd pound ridge
- Miller rd pound ridge ny 10576
- Siscowit
- Honey Hollow Road
- Upper Shad
- Sarles Road



Fox Hill Rd, Pound Ridge, NY 10576

Fox Hill road

Trinity Lane

CALF PASTURE LANE

Light horse on

S Bedford Rd

South Bedford Road. Pound Ridge NY

Fox Run Rd, Pound Ridge NY 10576

Dingee Road

London rd

Autumn Ridge Rd

Beech Hill Lane

S. Bedford Road Pound Ridge NY 10576

Upper Shad Rd. 10576

Old Stone Hill Rd

Salem Rd, Pound Ridge, NY 10576

West Lane

London Road Pound Ridge

Barnegat Road, 10576

Cradle Rock Rd E

Light Horse Ln, Pound Ridge, NY 10576

Westchester Avenue, Pound Ridge, NY 10576

Gorge Lane

Lost Nations Road

Kinnicutt Rd

Westchester Ave., Pound Ridge, NY 10576

Salem Rd

Old Mill River Rd, Pound Ridge, NY 10576

Saddle Ridge Rd

Apple Tree Lane, Pound Ridge

Upper Shad Rd.

Horseshoe Hill Rd, Pound Ridge

Upper Shad Road

Sherwood rd Pound Ridge New York 10576

Old Pound Rd

Siscowit Road

Kitchawan Rd

Miller

Major Lockwood Lane

West Road

upper shad

Highcliff Terrace

Austin Hill Rd

Horseshoe Hill Rd

Shad Road W

Waterbury Way

High Ridge Road

High ridge road, pound ridge

Bedford Road

Peters Lane

Eastwoods Road, close to New Canaan border

Heerdt Farm Lane

Upper Shad Rd

S bedford rd

west rd

Pine Brook Rd

- Peters Lane
- high ridge rd
- UPPER SHAD ROAD
- Knapp Rd.
- West Ln., pound Ridge, NY. 10576
- Eastwoods rd. 10576
- Rocky Nook RD
- White Birch Lane
- Indian Hill Rd, Pound Ridge
- Saddle Ridge Road
- trinity pass pound ridge
- Dann Farm Rd
- Brook Farm Road East, Bedford,NY,10506
- old church
- Patterson Road
- S Bedford Road
- Highview Rd
- Nancys Lane Pound Ridge NY 10576
- Eastwoods Road

Tatomuck Road PR

honey hollow rd

29 more responses are hidden

## Comments or suggestions

117 responses

Some of the questions I could not answer because there were not enough options or I did not like any of the options. We really need to improve our cell service! Thank you!

Painting a dark color blends. White stands out.

would LOVE to have better connectivity in Pound Ridge -- this has become a safety concern as well as a convenience.

Nothing on the school

The silent majority wants better cell reception. I haven't met a single neighbor who hasn't complained. I hope many chime in via this survey!

has terrible coverage. We have no reception at our house and this is a big problem for us.

The town desperately needs better cell service. We lost Verizon FIOS service for a day recently when someone knocked over a pole. Our cell service was not adequate even to retrieve emails. So my husband and I were not able to work at all. If the cell service has been adequate, we would've been less affected by the FIOS outage.

We need a reasonable solution ASAP.

Thanks so much for taking this on. I really appreciate the opportunity to be polled and comment.

My wife and I both work from home. When we lose power or Internet, cell service is so poor that we can't work. I recently spent a day working out of the Townhouse for internet. If one of us needed medical assistance, we might not be able to reach police or ambulance during an emergency when we lost power.

It's scary to drive in bad weather because if you have an accident, you never know if you will be able to call for help. When my kids go out and bike, i worry they can't call for help if they have an accident. it's more than a convenience, this is a safety issue.

I think consistent cellular service will make this already great town greater. Many people who visit me are shocked when they get to my neighborhood and can't retain cell service. It also offers a sense of comfort during power outages or when walking in the neighborhood to know I can dial out on my cell phone in an emergency.

Please improve cell service, our livelihoods depend on it!

Shame on us for not having complete coverage in today's world!

I am very pleased that the Town is taking this issue seriously and look forward to an improvement in my wireless connectivity.

Survey should have better distinguished between wifi & wireless reception. Survey answers were often not mutually exclusive. Finally, and significantly, the signal strength map in the draft Master Plan under-estimates signal strength and appears to be misleading.

This is really needed!!!

If possible, putting a cell tower in the Pound Ridge Reservation, up on Pell Hill would be Fantastic!

Pound Ridge must avoid the use of tall fake-tree towers--which are the worst of all

Please update our town with appropriate communications technology - we are way, way behind which leaves people in danger during accidents and power outages.

Your questions about living/working, should include Retired Persons and disabled or homebound persons and persons who do not work. Many of us are "communication stranded" when the power is out and our Landlines don't work.

My daughter was injured in a car accident on long ridge rd in town about 15 years ago. It took over half an hour for an ambulance to arrive because the ambulance volunteers on duty never got the call because of lack of service in town. Life safety is severely compromised in Pound Ridge due to lack of cell phone service.

I have no service where I am and this is becoming really problematic, particularly in light of the unreliability of internet/electricity.

I would really like to see this improved.

I recently moved from PR to Long Ridge in Bedford. Hope it was ok to fill this out. Also, regarding cell service questions. I answered "N/A" as there is no service/no bars in this house. You did not give that choice other than the "N/A" Thank you.

Much better cell reception would be appreciated as my husband and I are seniors.

I don't have a landline at home, and rely on wifi calling, so reliable wireless service is a safety issue for me in case FiOS drops out.

We rely solely on our cell phones for communication and as it is now, we cannot make a call or access directions until we have driven 10 minutes in either direction on Long Ridge Road. To rely on communication through WiFi alone is limiting and unavailable. I am concern about not having cell service when jogging outside in my neighborhood.

We are rural for a reason. Towers should not be obvious. Everyone knew moving here no cell service. This should not be an issue but seems to be.

ZERO BARS AT OUR HOUSE, NEED TO USE WIFI EXTENDER, BAD WHEN POWER IS OUT NO WAY TO USE PHONES OR COMPUTERS

It is spelled Ambulance "corps" not "core". Questions about putting on public property were poorly drafted as were listed options

Micro Cell sites on utility poles or existing buildings are much less visible and probably more widely acceptable than Large Monopoles with or without faux pine branches.

The lack of cell service in Pound Ridge and the surrounding areas has become a critical issue. It is dangerous not to be able to have reliable cell service. Our family has taken to leaving Pound Ridge prior to storms to ensure we have a means of communication. Further, we realized recently that because we are working off of a network extender we are unable to get emergency notifications. I believe you need to be connected to a tower to get alerts. This was never more evident than during the recent tornado activity near PR. With no notifications this could have been a catastrophic situation. Please please please address this!!

Lack of cell service is a major issue for navigation and a safety issue during storms.

You can put one in my backyard. Haha. We have no service when we walk the neighborhood and we have a small child. If anyone gets hurt, we still don't know how we call for help. It's terrible over on our side.

I think the last three choices for the "rely on your mobile devices" question are wrong. Should be neutral, disagree, etc.

Fixing this problem should be a top priority as for some it is a safety issue.

I strongly encourage the town to prioritize this project. Working from home has been a real struggle for me given connectivity issues.

We need more wireless coverage

Thank you for soliciting this input!

Adequate reception is long overdue. The European model should be used.

Cellular service here across all carriers is abysmal and it is dangerous, particularly during power outages or internet outages, when one cannot use wi-fi calling or other internet-based modes of communication. It is my strong opinion that the town should prioritize improving signal by whatever means possible. One look at cellmapper.net illustrates the issue in Pound Ridge and Bedford very clearly. I appreciate the fact that the town is doing this survey and I hope we can come to some agreement on an effective solution.

It's public safety and basic infrastructure now. Aesthetics and revenue? What about connectivity? We lose power a lot. I have a generator, others don't. We shouldn't be that isolated. I like hiking trails too but wireless connectivity is too important to today's basic needs and economy not to have it.

Would not want a base station on/next to a school

I think there is no excuse for a town like this to be left behind in terms of digitalization. Cell phone service should not even be a debate in 2021. We have zero service at our house. And when we're driving we cannot hold a call because it drops consistently in multiple places. This isn't just about the ability of residents and taxpayers being able to conduct business, but it's important for safety and is more or less a basic standard of living requirement. If we don't do this now, it will hurt all residents in Pound Ridge and will make the town less competitive in terms of new residents and businesses. It's honestly ridiculous that people are rejecting this proposal.



Thank you for doing this. I think that it is critical to improve the quality of wireless service throughout Pound Ridge.

Good survey. It could be expanded to include "public" wifi through town. And I'd like to see the town bring in more competition or regulation to control internet providers. We switched from optimum last year after a 14-day outage that only ended after I found the location of the break affecting four residents and Supervisor Hansen raised the specific issue with the company. It took me six months and a complaint to the NY Atty General's office to get a refund. Verizon FIOS has been better in all respects but even they recently had an almost 24 hour outage due to a pole being hit by a truck - that kind of consequence of a single failure shouldn't happen either.

Inexplicably during the outage last summer we were able to use our cell phones as hotspots, but during the recent FIOS outage, we were unable to get a signal to do that. No change in provider or location.

The cellular service situation is beyond dire—it is a major safety hazard. Not only are more of our community members working from home amid the pandemic but climate change is knocking on our door in a way that we can no longer ignore. The lack of cell service is not just a minor inconvenience for some NIMBY-supporters, it is a lifeline that our town has left its people without. We cannot cross our fingers and hope to be unaffected by storms. They are here and they will continue to come. Our emergency service providers, including doctors, and essential workers, including post people, should not be left without the security of stable cell connection in case of emergency. Landlines have increasingly gone by the wayside and mobile phones are by and large our only way to make contact with our children these days. I do not feel comfortable or safe knowing my child can be stuck and unable to make a call all because some people don't like the look of a tower or would rather engage in petty tiffs over the revenue of leasing land. We cannot afford to be without reliable cell service and the more we argue about it, the longer we will be tempting fate. We shouldn't wait for a catastrophe. By then, it will be too late. Ensuring cell service is the ethical thing to do.

PR Park needs to have better cellular options or better wi-fi coverage. We moved here knowing cell coverage is not optimal in our home or while driving around - we live with it and it's fine. Our coverage at home is awful on a good day and non-existent during a power outage. I think the real problem is during an emergency and I think of people who live alone or are disabled in some way preventing them to get to a neighbor's home. We've had a few emergencies during power outages but everything turned out ok in the end (a fire sparked when tree fell on power line - no power/cellular to call yet we had a fire to report). We have a house phone also but it goes out when the power is out since it's tied into the cable/wifi.

Unified regional improvements a must. Bedford, Lewisboro, Fairfield County

The high ground in Ward Pound Ridge Reservation, where the old fire watch tower was located years ago, might provide an acceptable location as well as having the required height for greater line of sight transmission.

Pound Ridge is a wonderful town for so many reasons, but connectivity clearly isn't one of them. With so many of us working remotely these days, the need for reliable wireless coverage is greater than ever. Thank you for doing this!

Thank you for addressing this. I witnessed a car accident on Rt 121 recently and neither I nor 3 other cars were able to call for assistance due to the lack of cell service.

Why can't use the tower on long ridge (near long ridge tavern) to add providers...the signal should reach this section of town

Focus on businesses is disturbing. Home owners are equally in need of service. I have none.

The beauty of this town is why I am here. Cell service should be improved ONLY to the extent absolutely necessary for emergency services, and I am not convinced this is a real issue.

The abysmal cell service in the area is, first and foremost, a public safety issue.

Thank you for doing this improvement is needed

The lack of cell service at Pound Ridge Town Park is a major safety concern. Without being able to contact 911 immediately minutes are lost that could save a life.

Please stop dithering. Perfect is the enemy of good. The wireless coverage situation in Pound Ridge and Bedford/Cross River/Waccabuc is dangerous. Help.

I'd like to know the health implications of these cell towers/base stations

In the absence of good cell service, having a Google phone number will allow messages by text and email and many times will work where a phone call does not.

I need better wireless for personal and work

Thank you for sending this survey. I really appreciate your time and asking the public for input.

This is needed. We are young residents but It is a matter of safety for us all. We are consistently facing poor, unreliable service and it is a big concern of ours. I feel there are

tasteful ways this can be done so as not to be too flashy to upset residents overly concerned with the disruption of a tower. The base stations seem like a good alternative

More bases so coverage is contiguous. Dropped calls from 684 to Pound Ridge is every trip every day. I can't make a call that doesn't drop going from my house to almost anyplace in any direction. Really frustrating and annoying. Quality of life issue!

Thank you for addressing this.

Small cell towers on telephone polls are the least obtrusive throughout town and I believe the least likely to impact property values.

I really appreciate the survey though it offers suggestions I cannot form an opinion on without more detail. While there might be some great ideas here, more information is needed to understand the implications. I also want to share that I strongly oppose tall towers of any kind. The benefits are unbalanced - given the destruction of landscape and view. I would personally be devastated if I had to look at one from my home. It also seems that some people - with vast resources - are able to successfully keep them out of their sight and neighborhoods while others - with less financial resources or representation - are not so fortunate. I also strongly oppose more towers or infrastructure that doesn't work. How could our town allow construction of a huge tower in Scott's Corner that would not provide cell service in the town or nearby park? In response to some questions of what I would support, I checked options I would be open to learning more about and possibly support. More info is really required! Thank you!

We support better wireless coverage all over town, no matter the aesthetics!

You can integrate wireless into existing areas with minimal or no visual impacts. The town is in dire need of wireless expansion. Just do it right. You can't undo ugly once it's up.

I literally have no service in all of pound ridge and it's a major issue. The entire town agrees and something needs to be done.

Let's get better coverage in our town. Sort out the indifference with our residents and get it DONE. Wireless connectivity is NOT ever going away and only more demand in the future.

If Optimum WiFi is out, I rarely can get connected inside the house, and not always outside.

Our cell service is actually quite good in our house and on (and near) our property. We sympathize with other PR residents who live in other parts of town with poor cell coverage.

Nevertheless, we DO NOT want to see tall cell towers erected anywhere else in Pound Ridge. For us, aesthetics is paramount.

We need to act on this sooner rather than never. People periodically get stuck on the town roads and they are unable to get a call out due to no cell reception. Let's do this before some tragedy strikes our town as a result of someone being unable to call for emergency assistance.

Ambulance Corps, not Ambulance Core. Sorry, can't not be an editor. ;)

Interesting survey... I was not really aware of the various options

Please do not put a cell phone tower on a school property or other town property.

I don't want to see cell towers and am fine with living in rural community without access. It's a country town!

Given Covid changes in the workplace dynamic, efficient wireless service is essential in order to be able to work from home. I am currently struggling.

Thank you. This is important work. Using aesthetically smart towers like bell towers, flag poles, etc. is very smart and highly preferable. The massive pine tree is goofy and nearly as bad if not worse than naked towers.

We do need better wireless service. GPS goes out, calls are dropped.

Good cell service throughout the town is very important!

Thank you for asking. Reliable cell service is important for emergency and health reasons such as elderly people with medical alerts.

It seems you are trying to get answers to support base stations. The question starting with "Town owned" does not have a choice for tower only. I do not want base stations or MMW installations. Put up a proper tower, which allows more collocations, and run 4G from it, if you need more connectivity. We don't want 5G. Thank you.

Thanks

Don't rush, but keep moving on this issue toward a resolution.

Pls let's enter 2021 and beyond --- very DANGEROUS!

Get it done. It's embarrassing to read in the Record Review how long Bedford has been fighting over this issue which is hurting first responders along with residents.

love and fully support all the wonderful improvements made to our town!

This is a hilly town. No amount of cell towers (tall or short) will provide 100% 5 bar coverage. Coverage depends on line-of-sight. I do not want my line-of-sight to include faux trees or random fake towers. That said, cell service AT HOME is only necessary when land lines go down - - which for Verizon didn't happen until very recently. PLEASE consider having more trees cut down next to wires (not just power lines) and consider burying more lines in general. thank you.

Aesthetics are important but so is effective coverage.

I don't care what it looks like, just make it better.

Leave as is, we're a small town with very few businesses and no public transportation & we would like to keep things as is! As close to nature as possible. If your service sucks, get yourself an extender/boost and you'll be fine! "Improvements" are unnecessary and I'm sure our time/investments/thoughts/ideas/improvements can be better utilized than cell towers.

Thanks for survey

Thank you----better internet service would be a huge improvement

Dependable wireless service is a safety issue. We need to be able to depend upon service if there is a sudden health emergency anywhere in town. Not just on roads, but also on our trails, parks, and preserves.

All cell towers should be backed up by generators or batteries as well.

Wireless connectivity is very important to us because whenever there is a power outage (which is quite frequent and sometimes lengthy) we have no ability to call someone because we do not have a landline. If we were to have an emergency during a power outage (ie fire) we would have to drive to get phone coverage

Having better cell coverage is extremely important. We have electric power lines but people don't want another few poles for cell coverage? Cell coverage helps me be able to work and live. It encourages people to enjoy our town and feel safe because they have cell coverage. More coverage will improve our town and quality of life.

My internet goes down 10x a day on average

17 more responses are hidden

This content is neither created nor endorsed by Google. [Report Abuse](#) - [Terms of Service](#) - [Privacy Policy](#).

Google Forms

