

## Attachment 1

# Radio Frequency Analysis Report

---

SR 1252 Bridgewater North



---

February 8, 2013



C Squared Systems, LLC  
65 Dartmouth Drive, A3  
Auburn, NH 03032

Phone: (603) 644-2800  
Fax: (603) 644-2801  
Support@csquaredsystems.com

## Table of Contents

|                                     |   |
|-------------------------------------|---|
| 1. Overview.....                    | 1 |
| 2. Coverage Objective.....          | 1 |
| 3. Conclusion.....                  | 5 |
| 4. Statement of Certification ..... | 5 |
| 5. Attachments .....                | 6 |

## List of Tables

|   |   |
|---|---|
| Table 1: Estimated Existing Coverage Gap Statistics ..... | 2 |
| Table 2: Coverage Statistics.....                         | 4 |

## List of Attachments

|   |    |
|---|----|
| Attachment 1: 3-D Terrain Map .....   | 6  |
| Attachment 2: Map of Distance to Neighbor Sites – Bridgewater North.....  | 7  |
| Attachment 3: Neighbor Site Data and Distance to Proposed Site .....  | 8  |
| Attachment 4: “Existing Coverage” for the Current AT&T network.....   | 9  |
| Attachment 5: “Existing & Proposed Coverage” for the AT&T network with Bridgewater North site .....   | 10 |
| Attachment 6 “Existing & Future & Proposed Coverage” for the AT&T network with Bridgewater North site and Roxbury candidate SR1876A.....        | 11 |
| Attachment 7 “Existing & Future & Proposed Coverage” for the AT&T network with Bridgewater North site <b>and</b> Roxbury candidate SR1876B..... | 12 |
| Attachment 8 “Existing & Future Coverage” for the AT&T network and Roxbury candidate SR1876A.....   | 13 |
| Attachment 9 “Existing & Future Coverage” for the AT&T network and Roxbury candidate SR1876B .....  | 14 |
| Attachment 10: Connecticut DOT Average Annual Daily Traffic Data.....   | 15 |

## 1. Overview

C Squared Systems was retained by New Cingular Wireless PCS, LLC (“AT&T”) to investigate the extent of coverage that could be potentially obtained by constructing the proposed wireless communications facility at 111 Second Hill Road in Bridgewater, CT at 160 feet AGL.

AT&T is licensed by the FCC to provide wireless communications services throughout the State of Connecticut including the Town of Bridgewater where the proposed facility would be located.

This report addresses AT&T’s need for a facility in this area and analyzes the proposed site to address the coverage gaps in their wireless communications network. C Squared Systems has reviewed and conducted this coverage analysis that confirms AT&T has a gap in reliable service that exists in Bridgewater, and that the Proposed Facility provides AT&T with coverage in that service gap. Included as attachments in this report are coverage maps detailing the existing network and expected coverage from the proposed facility, along with additional terrain and network layout maps.

## 2. Coverage Objective

There is a significant coverage deficiency in the existing AT&T wireless communications network along New Milford Road (State Route 67), Main Street North (State Route 133) and the surrounding roads and areas in Bridgewater. A deficiency in coverage is evidenced by the inability to adequately and reliably transmit/receive quality calls and/or utilize data services offered by the network. Seamless reliable coverage provides users with the ability to successfully originate, receive, and maintain quality calls and/or utilize data applications throughout a service area. Overlapping coverage is required for users to be able to move throughout the service area and reliably “hand-off” between cells to maintain uninterrupted calls.

Due to terrain characteristics and the distance between the targeted coverage area and the existing sites, AT&T’s options to provide services in this area are quite limited (maps of the terrain in this area and the distance to neighboring AT&T sites from the proposed site are included as Attachments 1 & 2, respectively.) AT&T’s network requires deployment of antennas throughout the area to be covered, which are connected to receivers and transmitters that operate in a limited geographic area known as a “cell.” AT&T’s wireless network, including their wireless handsets and devices, operate by transmitting and receiving low power radio frequency signals to and from these cell sites. The signals are transferred to and from the landline telephone network and routed to their destinations by sophisticated electronic equipment. The size of the area served by each cell site is dependent on several factors, including the number of antennas used, the height at which the antennas are deployed, the topography of the land, vegetative cover and natural or man-made obstructions in the area. As customers move throughout the service area, the transmission from the portable devices is automatically transferred to the AT&T facility with the best connection to the device, without interruption in service provided that there is overlapping coverage from the cells.

In order to define the extent of the coverage gap to be filled, both propagation modeling and real-world drive testing has been conducted in the area of Bridgewater. Propagation modeling uses PC software to determine the network coverage based on the specific technical parameters of each site including, but not limited to, location, ground elevation, antenna models, antenna heights, and also databases of terrain and ground cover in the area. Drive testing consists of traveling along area roadways in a vehicle equipped with a sophisticated setup of test devices and receivers that collect a variety of network performance metrics. The data are then processed and mapped in conjunction with the propagation modeling to determine the coverage gaps.

Analysis of the propagation modeling and drive testing in Bridgewater reveal that AT&T's network is unreliable throughout much of the area due to gaps in coverage, and that there is a service deficiency as a result. In order to fill in these coverage gaps and improve the network reliability to Bridgewater, a new facility is needed in the area.

Table 1 below approximates the current coverage gap in the vicinity of the proposed site.

|                               |                              | Existing Coverage Gap |
|-------------------------------|------------------------------|-----------------------|
| <b>Population:</b>            | "In-Building"<br>(≥ -74 dBm) | 4291                  |
|                               | "In-Vehicle"<br>(≥ -82 dBm)  | 2497                  |
|                               |                              |                       |
| <b>Area (mi<sup>2</sup>):</b> | "In-Building"<br>(≥ -74 dBm) | 22.01                 |
|                               | "In-Vehicle"<br>(≥ -82 dBm)  | 14.87                 |
|                               |                              |                       |
| <b>Roadway (mi):</b>          | Main:                        | 7.70                  |
|                               | Secondary:                   | 50.36                 |
|                               | <b>Total:</b>                | 58.06                 |

**Table 1: Estimated Existing Coverage Gap Statistics<sup>1</sup>**

---

<sup>1</sup> Estimated coverage gap statistics assume coverage that will come from the forthcoming facility at Wewaka Brook Road approved in Siting Council Docket 412 and other approved or proposed sites. While two candidates are proposed in Docket 428(Roxbury), due to factors including terrain and distance, those two candidates differ minimally in their coverage into Bridgewater.

Included with this report are Attachments 1-8, which are explained below to help describe AT&T's network in and around Bridgewater, and the need for the proposed facility.

- Attachment 1: *3D Terrain Map* details the terrain features around the area of deficient service being targeted by the proposed site in Bridgewater. These terrain features play a key role in determining site designs and dictating the unique coverage achieved from a given location. This map is included to provide a visual representation of the ridges and valleys that must be considered when siting a wireless facility. The lighter green and blue shades correspond to lower elevations, whereas the yellow and orange shades indicate higher elevations.
- Attachment 2: *Map of Distance to Neighbor Sites – Bridgewater North* provides an overview of AT&T's network of sites in the area, with distances shown from the proposed Bridgewater North site to the existing, approved or proposed sites in the surrounding area.
- Attachment 3: *Neighbor Site Data and Distance to Proposed Site* provides site specific information of existing neighboring sites used to perform the coverage analysis provided in Attachments 5-8.
- Attachment 4: *"Existing Coverage"* depicts coverage from existing sites and demonstrates that there are currently gaps in coverage effecting service along New Milford Road (State Route 67), Main Street North (State Route 133), and the surrounding neighborhoods. The coverage gaps are where the signal strength is < -82 dBm required for reliable in-vehicle coverage and < -74 dBm for in-building reliability. In an effort to provide the required level of coverage to these areas, AT&T is proposing to install a wireless facility at the proposed location.
- Attachment 5: *"Existing & Proposed Coverage with Bridgewater North site"* shows how this proposed site would fill in the existing coverage gaps and improve AT&T's network in this area (before the coverage of the future sites is added) .
- Attachment 6: *"Existing, Proposed & Future Coverage with Bridgewater North site"* shows how this proposed site would fill in the coverage gaps and improve AT&T's network in this area after the coverage of the future sites is added. As shown in Table 2, the Bridgewater North site provides an additional 4.82 miles of main road coverage and an additional 30.16 miles of secondary road coverage.
- Attachment 7: *"Existing & Future Coverage"* for the Bridgewater North site shows how the future sites affect the coverage of AT&T's network in this area. Even with the future sites added, there are still significant coverage gaps in this area.
- Attachment 8: *Connecticut DOT Average Annual Daily Traffic Data* shows the available vehicular traffic volume data for the subject area from the Connecticut Department of Transportation. This data shows as many as 6,200 vehicles per day passing through the subject area on New Milford Road (State Route 67) and as many as 2,600 vehicles a day on Main Street North (State Route 133).

Table 2 below lists the coverage statistics that were compiled for the proposed site:

|                                       |                                    | Incremental Coverage from Proposed Site |
|---------------------------------------|------------------------------------|---|
| <b>Population Coverage:</b>           | "In-Building"<br>( $\geq -74$ dBm) | 2332                                    |
|                                       | "In-Vehicle"<br>( $\geq -82$ dBm)  | 1860                                    |
| <b>Area Covered (mi<sup>2</sup>):</b> | "In-Building"<br>( $\geq -74$ dBm) | 10.74                                   |
|                                       | "In-Vehicle"<br>( $\geq -82$ dBm)  | 8.32                                    |
| <b>Roadway Coverage (mi):</b>         | Main:                              | 4.82                                    |
|                                       | Secondary:                         | 30.16                                   |
|                                       | <b>Total:</b>                      | 34.98                                   |

Table 2: Coverage Statistics<sup>2</sup>

<sup>2</sup> Coverage Statistics reflect "incremental" or new coverage added, based on the 850 MHz network, assuming coverage from SR1876A (Docket 428 Roxbury). Again, for purposes of the area which is the subject of this docket, the coverage difference between those two candidates is considered minimal

### 3. Conclusion

AT&T has identified an area of deficient coverage affecting a significant portion of Bridgewater, including key traffic corridors through Town. The proposed Bridgewater North facility provides AT&T with needed coverage to this deficient area, including significant portions of New Milford Road (State Route 67) and Main Street North (State Route 133).

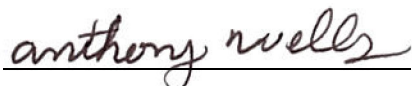
No existing structures were identified and available to provide the coverage requirements needed for this area. The location and the minimum height selected were chosen to achieve an optimal balance between meeting coverage objectives, overcoming the tree line for signal propagation, minimizing the aesthetic impact to the community, and future collocation.

As discussed in this report and depicted in the attached plots, the proposed AT&T site will provide the public need for service in this area, by providing an appropriate coverage footprint for the Bridgewater community along with effective connectivity to the rest of AT&T existing network.

Without a site in this area, at the height requested, significant gaps in service will exist within the Town of Bridgewater, and the identified public need for reliable wireless services in this area will not be met.

### 4. Statement of Certification

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



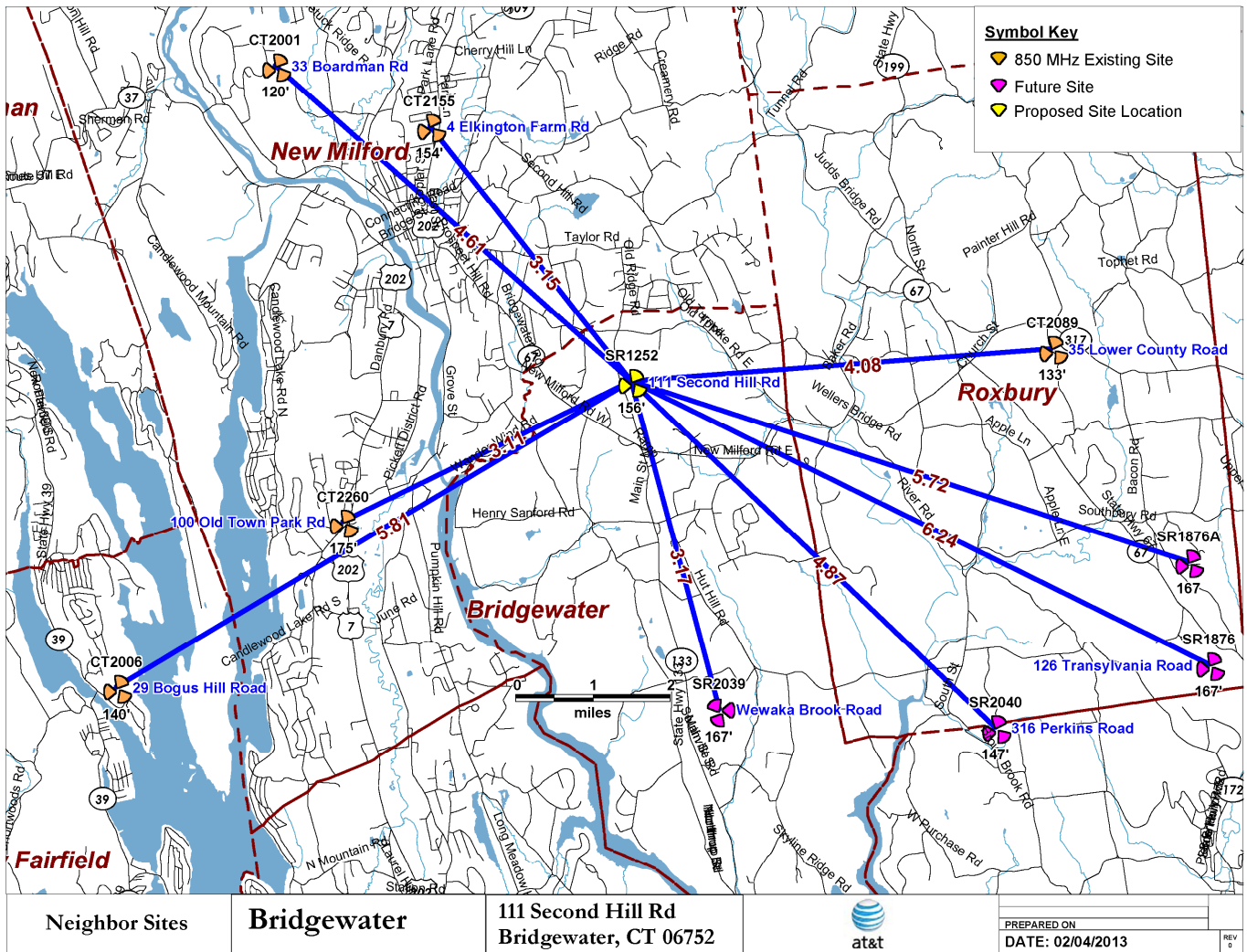
Tony Wells  
C Squared Systems, LLC

February 8, 2013

Date



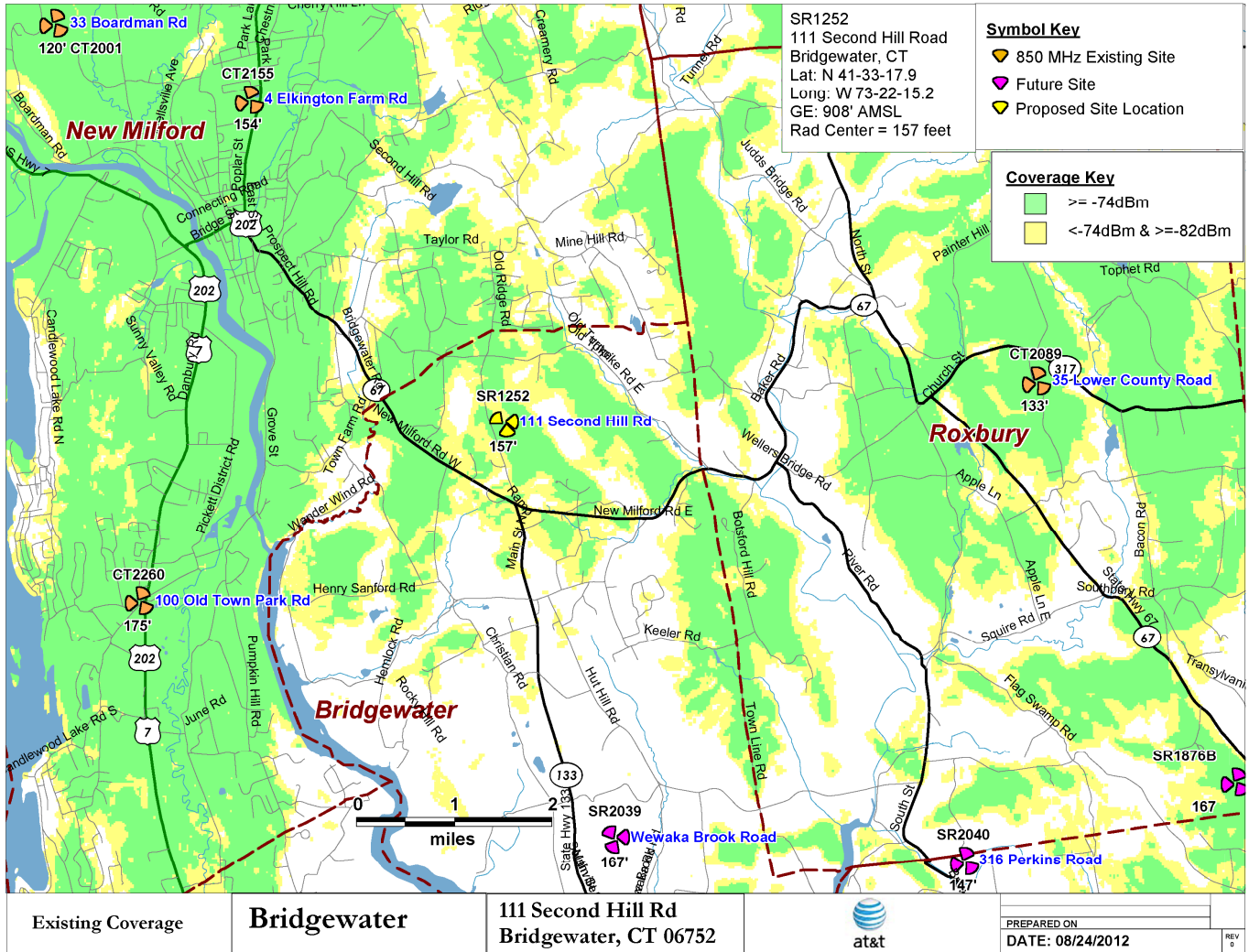




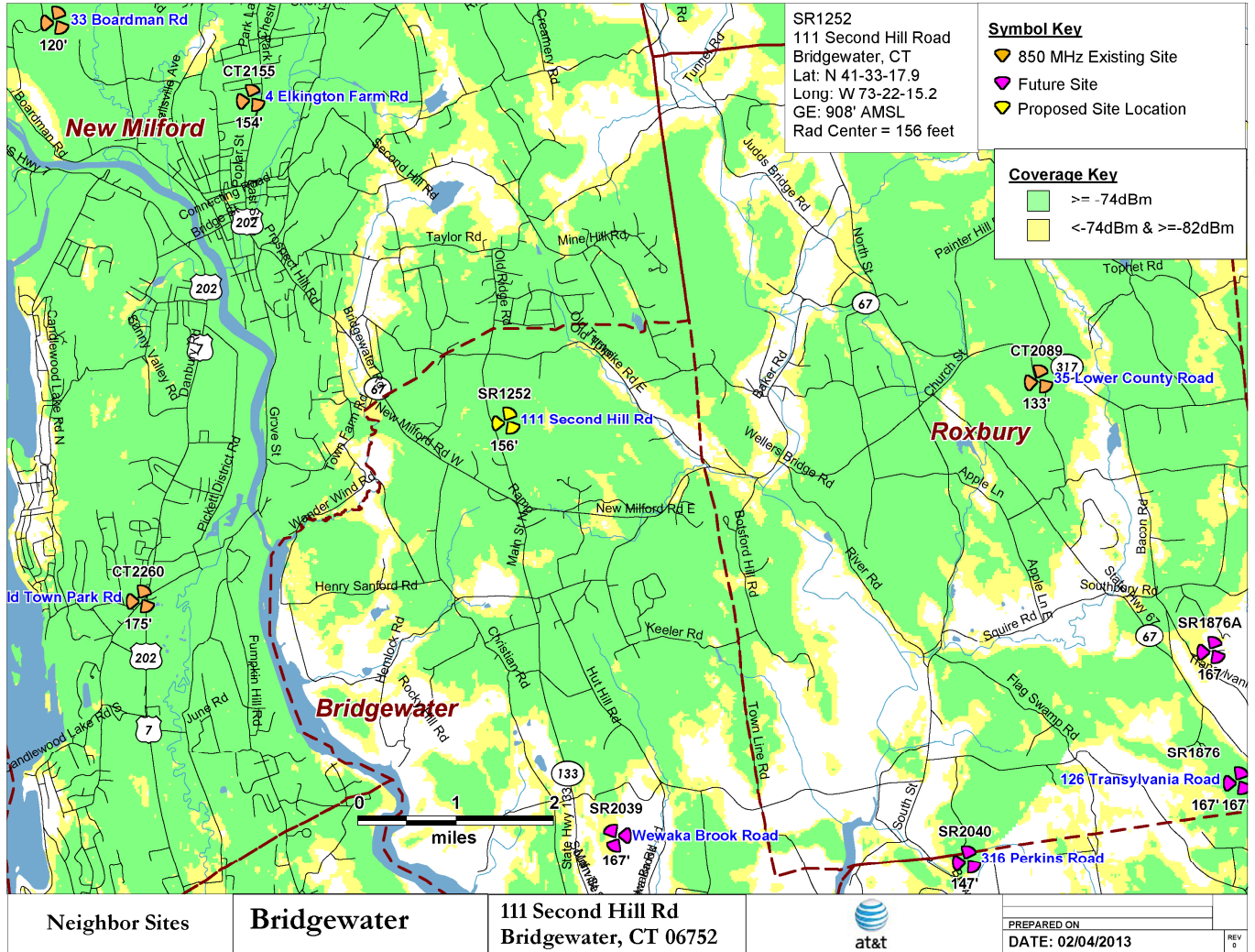
Attachment 2: Map of Distance to Neighbor Sites – Bridgewater North

| Site Name | Address              | Town          | Latitude | Longitude | Antenna Centerline (feet) | Distance to Proposed Site | Structure Type          | Status   | Ground Elevation (feet) |
|-----------|----------------------|---------------|----------|-----------|---------------------------|---------------------------|-------------------------|----------|-------------------------|
| CT2006    | 29 Bogus Hill Road   | NEW FAIRFIELD | 41.5118  | -73.4672  | 140                       | 5.81                      | monopole                | Existing | 619                     |
| CT2001    | 33 BOARDMAN ROAD     | NEW MILFORD   | 41.5994  | -73.4375  | 120                       | 4.61                      | monopole                | Existing | 564                     |
| CT2089    | 35 Lower County Road | Roxbury       | 41.5596  | -73.2922  | 133                       | 4.08                      | self-supporting lattice | Existing | 855                     |
| CT2155    | 4 Elkington Farm Rd  | New Milford   | 41.5909  | -73.4086  | 154                       | 3.15                      | monopole                | Existing | 478                     |
| CT2185    | 761 Federal Rd.      | Brookfield    | 41.4788  | -73.4083  | 97                        | 5.61                      | power mount             | Existing | 287                     |
| CT2260    | 5 OLD TOWN PARK ROAD | NEW MILFORD   | 41.5351  | -73.4249  | 175                       | 3.11                      | power mount             | Existing | 254                     |
| SR1252    | 111 Second Hill Rd   | Bridgewater   | 41.555   | -73.3709  | 157                       | 0.00                      | monopole                | Proposed | 905                     |
| SR1876A   | 126 Transylvania     | Roxbury       | 41.5295  | -73.2667  | 167                       | 5.72                      | monopole                | Future   | 813                     |
| SR1876B   | Southbury Road       | Roxbury       | 41.5149  | -73.2628  | 167                       | 6.24                      | monopole                | Future   | 723                     |
| SR2039    | Wewaka Brook Road    | Bridgewater   | 41.5087  | -73.3544  | 167                       | 3.31                      | monopole                | Future   | 593                     |
| SR2040    | 316 Perkins Road     | Southbury     | 41.5062  | -73.3029  | 147                       | 4.87                      | monopole                | Future   | 599                     |

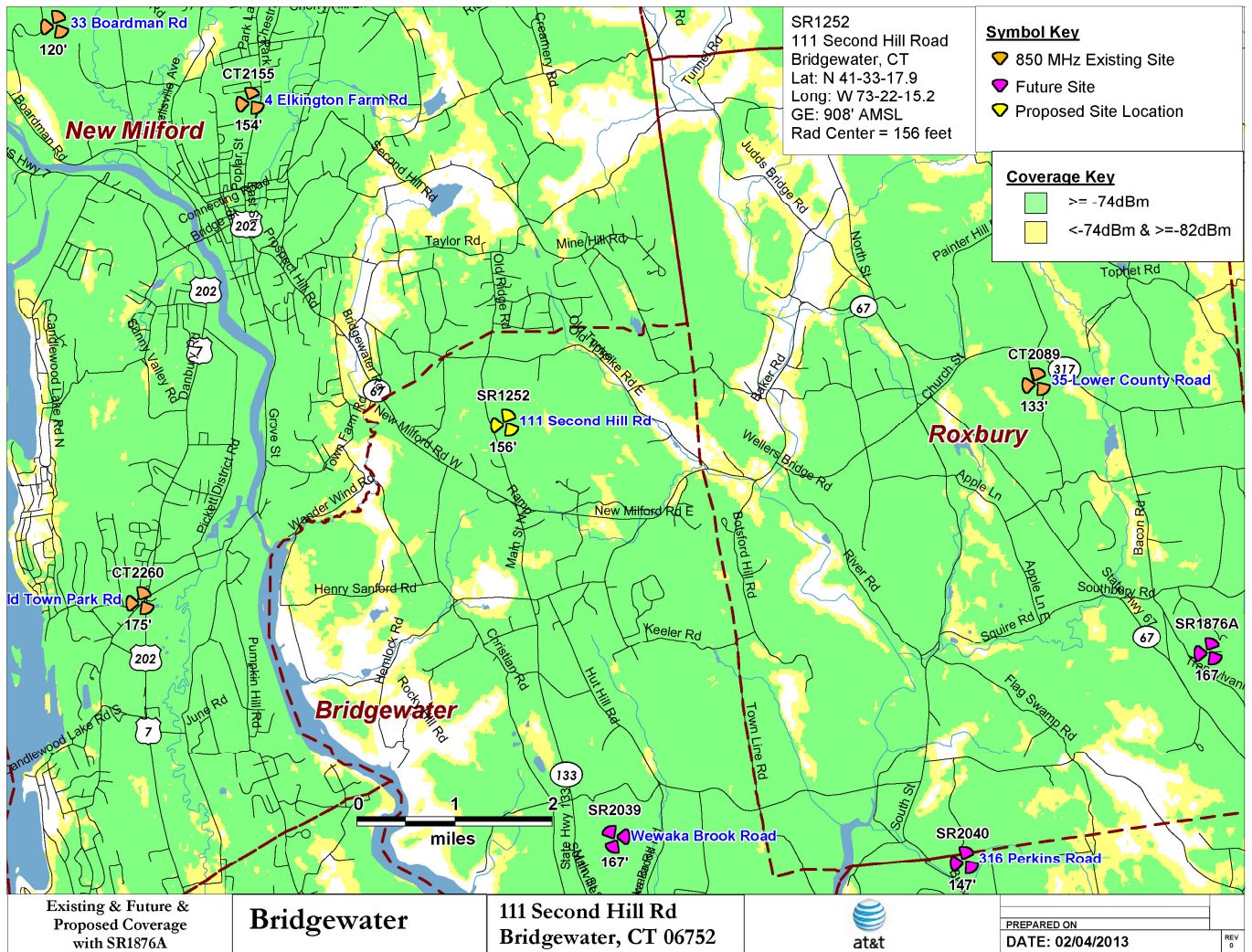
Attachment 3: Neighbor Site Data and Distance to Proposed Site



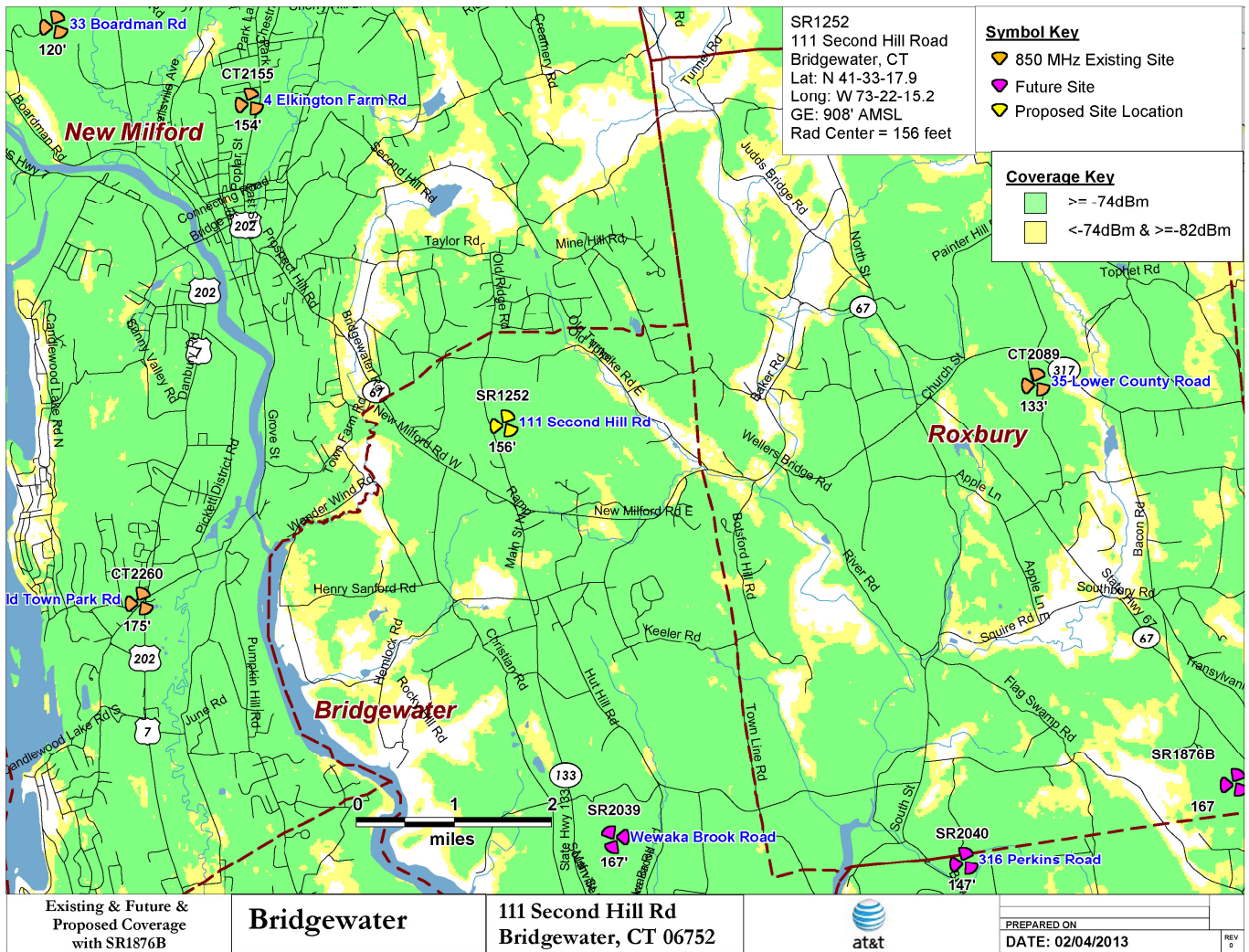
Attachment 4: "Existing Coverage" for the Current AT&T network



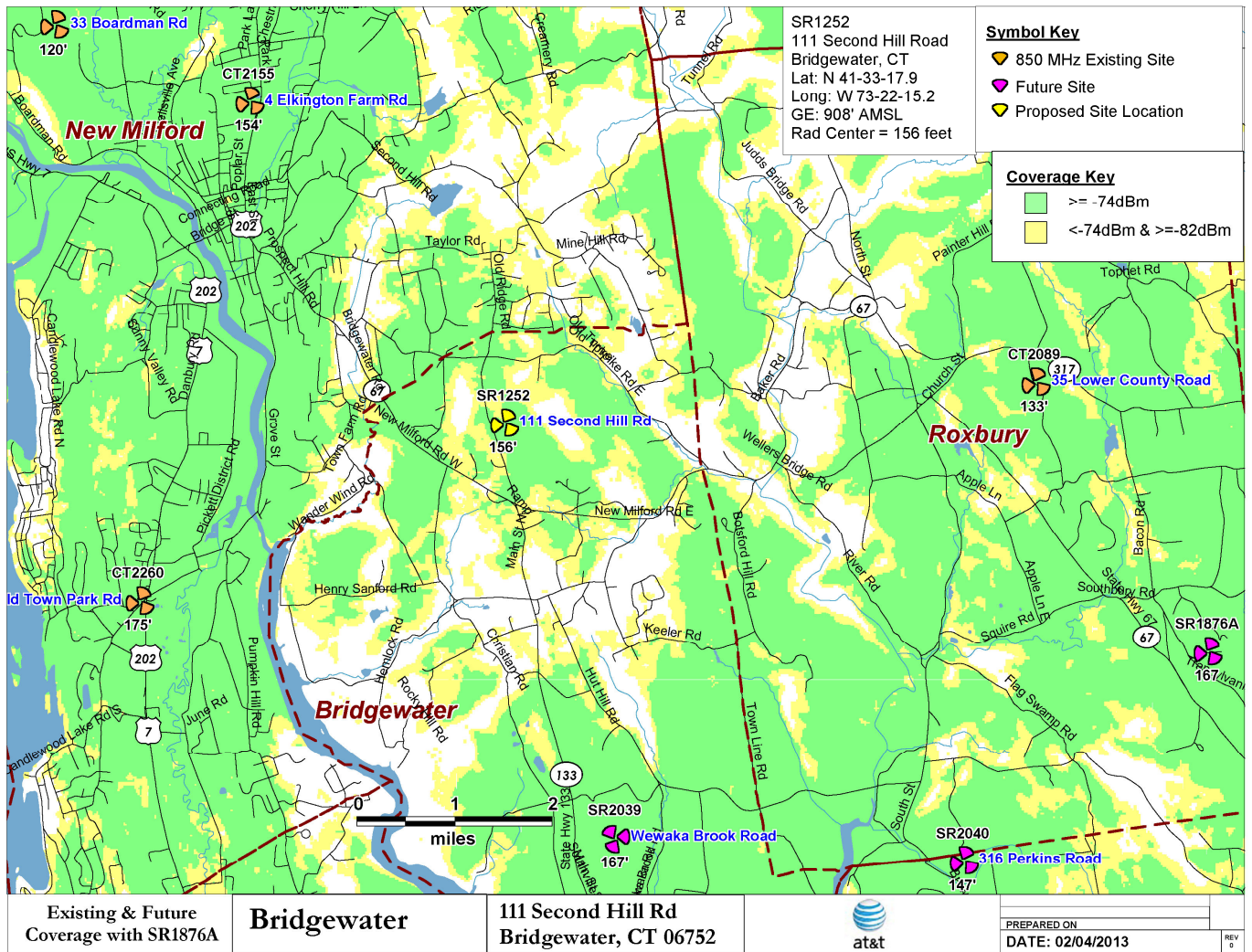
Attachment 5: "Existing & Proposed Coverage" for the AT&T network with Bridgewater North site



Attachment 6: “Existing, Future & Proposed Coverage” for the AT&T network with Bridgewater North site and Roxbury candidate SR1876A

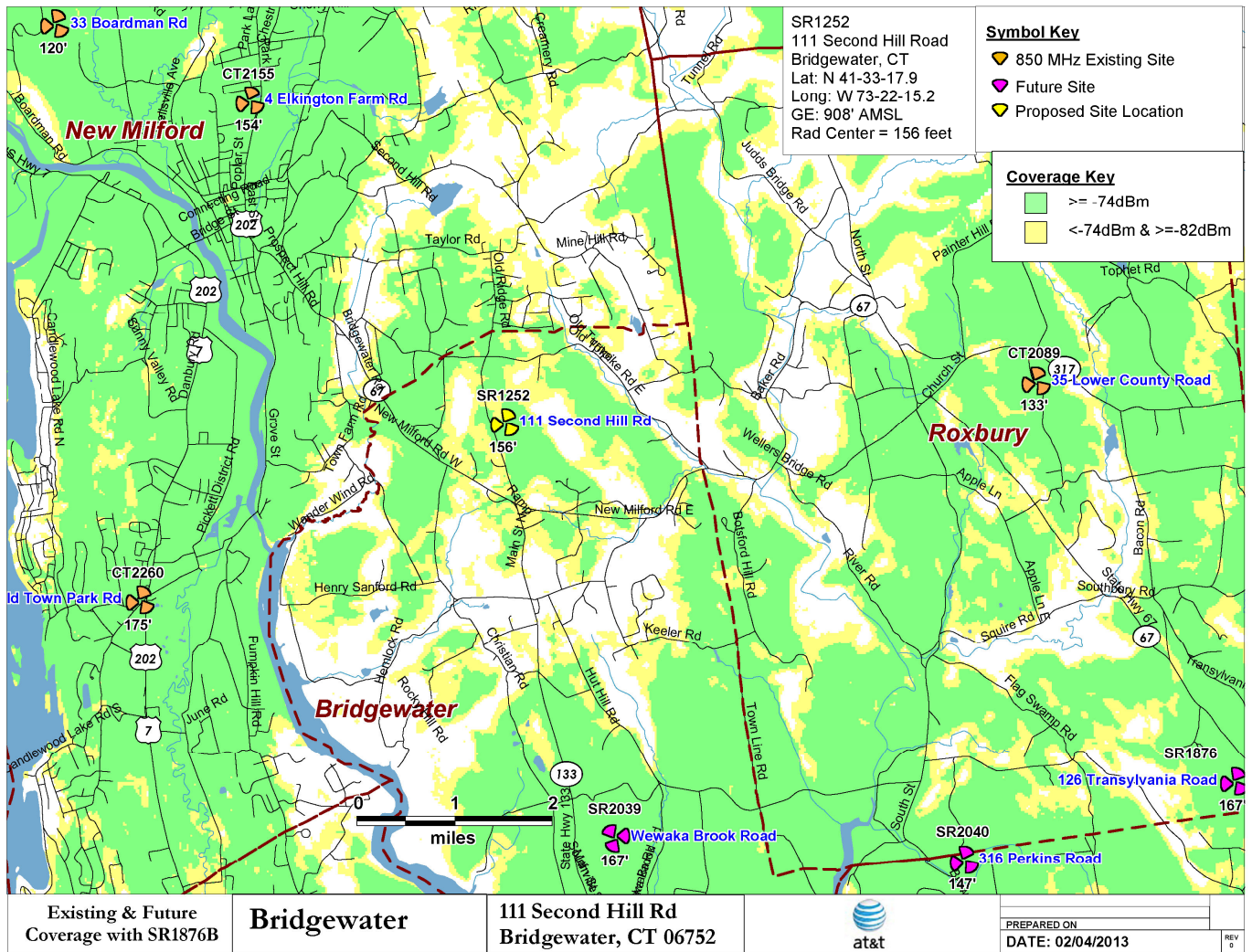


Attachment 7: “Existing, Future & Proposed Coverage” for the AT&T network with Bridgewater North site and Roxbury candidate SR1876B

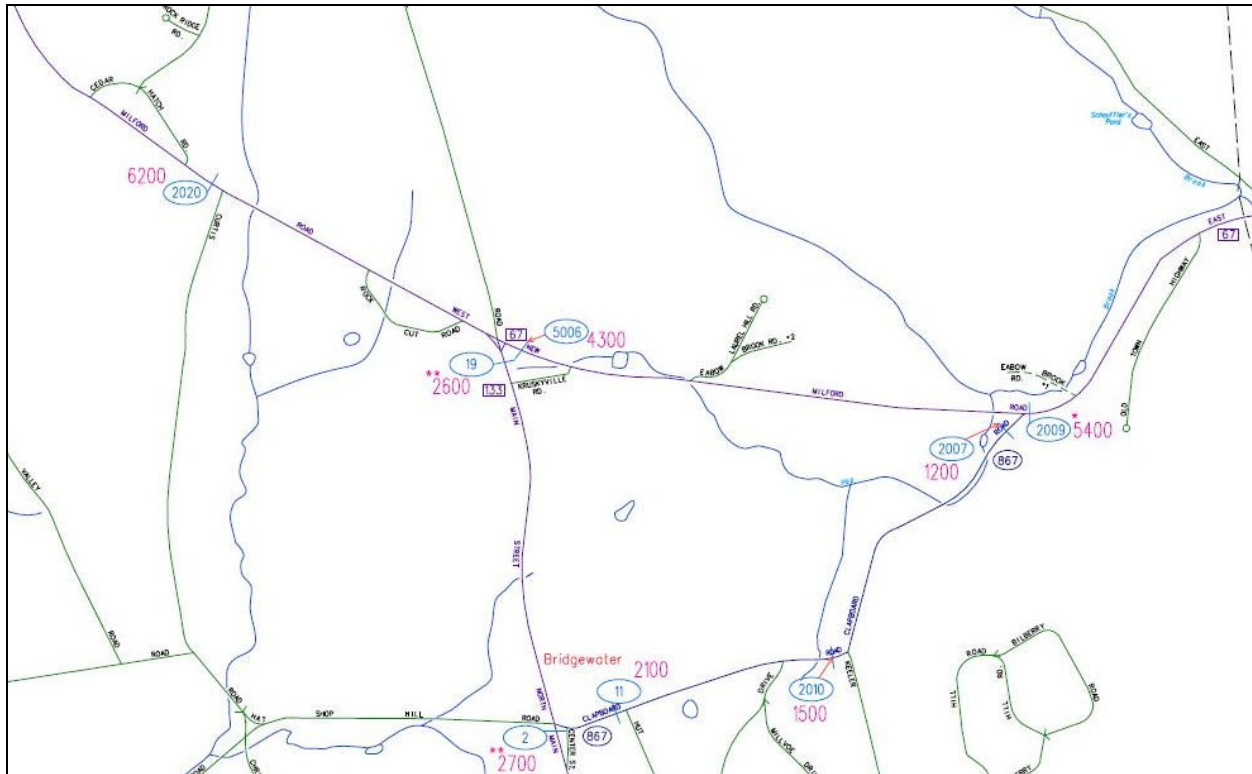


Attachment 8: "Existing & Future Coverage" for the AT&T network with Bridgewater North site and Roxbury candidate SR1876A





Attachment 9: “Existing & Future Coverage” for the AT&T network with Bridgewater North site and Roxbury candidate SR1876B



Attachment 10: CTDOT Average Annual Daily Traffic Data