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March 25, 2014

Roberta Brien
Chairwoman – Zoning Board of Appeals
Town of Paxton
697 Pleasant Street
Paxton, MA 01612

RE: Response to Ronald E. Graiff Report dated January 12, 2014 regarding New Cingular Wireless PCS, LLC “AT&T” Application to construct a wireless facility at 196 West Street, Paxton, MA

Dear Chairwoman Brien and Members of the Zoning Board of Appeals:

The following addresses the issues, concerns and questions raised by the Town Consultant, Ronald E. Graiff and his review and comments provided to the Board in his letter dated January 12, 2014 regarding New Cingular Wireless PCS, LLC Application to construct a personal wireless facility at 196 West Street in Paxton, MA. As a point of introduction, I am a radiofrequency (RF) Engineer for C Squared Systems, LLC and have been contracted by AT&T to provide supplemental radio frequency support for this Application.

I have reviewed the data submitted to date by both AT&T and the Town’s consultant, Ronald Graiff, including but not limited to: the narratives, coverage plots and drive test data. I have also had further discussions with the AT&T RF design engineers regarding: the existing sites in Paxton and the neighboring communities, the proposed “Site”, AT&T’s existing coverage, the continuous wave (“CW”) and baseline drive test data collected by C Squared Systems at the request of AT&T, and AT&T’s objectives and network requirements for this area of Paxton. Based on my review of all the data and discussions with the AT&T RF engineers, C Squared Systems completed additional propagation analyses and prepared supplemental coverage plots for review and consideration by Mr. Graiff and this Board.

The supplemental information contained within the attached report serves to address the issues and questions elicited by Mr. Graiff. It also provides supporting evidence of the substantial coverage gap that currently exists in AT&T’s network within the Town of Paxton and the need for the proposed site at 196 West Street.

We hope that the information contained in the attached Supplemental Report will satisfy the questions and issues raised by the Town’s consultant and that the Board will look favorably upon this application.

Sincerely;

A handwritten signature in black ink, appearing to read 'Dan Goulet', with a stylized flourish at the end.

Dan Goulet
C Squared Systems, LLC
Contractor to AT&T Mobility

Radio Frequency Analysis Report

Site MA-4388

196 West Street
Paxton, MA 01612



March 26, 2014



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FAA 1A Certification

1. Overview

In response to the Mr. Graiff's Peer Review Report submitted to the Board on January 12, 2014, C Squared Systems, at the request of AT&T, has performed an independent review of all the data and materials submitted to the Town by both AT&T and the Town's consultant. These materials included the narratives, coverage plots, existing and proposed site information, and the baseline and continuous wave ("cw") drive tests completed earlier this month. The following describes our findings based upon the completion of our review and supplemental analyses concerning the proposed "Site".

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 196 West Street, Paxton, MA at 138 feet AGL.

This report addresses AT&T's need for the proposed wireless facility and confirms that there are no other suitable existing structures that could address the substantial coverage gaps in their wireless communications network. The coverage analysis completed by C Squared Systems confirms: AT&T has a gap in reliable 4G service in Paxton, 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, pertinent site information, drive test and network layout maps.

2. Technology Advances & Design Evolution

AT&T provides digital voice and data services using 3rd Generation (3G) UMTS technology in the 800 MHz and 1900 MHz frequency band, and is in the midst of deploying advanced 4th Generation (4G) services over LTE technology in the 700 MHz and 1900 MHz frequency bands as allocated by the FCC. As part of their network expansion and ongoing technology advancements in Massachusetts and elsewhere in the Country, the 4G LTE network rollout will build on the existing 3G data services that utilize UMTS technology. These data networks are used by mobile devices for fast web browsing, media streaming, and other applications that require broadband connections. The mobile devices that benefit from these advanced data networks are not limited to basic handheld phones, but also include devices such as smartphones, PDA's, tablets, and laptop air-cards. With the evolving rollout of 4G LTE services and devices, AT&T customers will have even faster connections to people, information, and entertainment.

It is important to note that with AT&T's migration from 3G to 4G services come changes in the base station infrastructure and resultant changes in the operating thresholds required by the LTE network. In the past, AT&T has presented receive signal thresholds of -74 dBm for their in-building coverage threshold and -82 dBm for their in-vehicle coverage threshold. Those thresholds were based on network requirements to support 2G/3G data speeds and past usage demand. Today, customers expect low latency and faster data speeds as evidenced by increasing data usage trends and customer demand.

AT&T's 4G LTE technology is designed to thresholds of -83 dBm and -93 dBm for their 700 MHz LTE and -86 dBm and -96 dBm for their 1900 MHz LTE.¹ The stronger thresholds (-83 dBm and -86 dBm) yield greater throughputs and improved customer experience. The -93 dBm and -96 dBm thresholds are the minimum acceptable levels required

¹ The threshold range differences between the 700 MHz and 1900 MHz frequency bands directly correlates to the type of branch diversity receivers deployed in AT&T's receiver design.

to meet customer expectations for 4G service. Where this discussion will focus on the 700 MHz 4G base layer, and in consideration of the fact that Paxton is a predominantly suburban-rural environment, the majority of the plots included in this report show the AT&T minimum threshold requirement of -93 dBm (the exception being any exhibits were drive test data in shown).

Due to the terrain characteristics and the distance between the targeted coverage area in Paxton and the existing sites, AT&T's options are quite limited to address the coverage gaps identified within the Town. In order for AT&T's LTE network to function effectively, there must be adequate but not excessive overlapping coverage between the "serving cell" and adjoining cells. This not only allows access to the network, but once connected allows for the transfer or "hand-off" of calls from one cell to another, and prevents unintended disconnections and slow data rates or "high latency". AT&T's antennas also must be located high enough above ground level to allow transmission (a.k.a. propagation) of the radio frequency signals above trees, buildings and other natural or man-made structures that may obstruct or diminish the signals. Areas without adequate 4G service will have substandard service, characterized by slow data connections and transmissions, (low "throughput" rates and high latency) difficulties in establishing connections, or no wireless service at all. These areas are commonly referred to as "coverage gaps".

3. Independent Review and Findings

In response to Mr. Graiff's Peer Review Report submitted to the Board on January 12, 2014, C Squared Systems, at the request of AT&T, has performed an independent review of all the data and materials submitted to the Town by both AT&T and the Town's consultant. These materials included the narratives, coverage plots, existing and proposed site information, and the baseline and continuous wave ("cw") drive tests completed earlier this month. The following describes our findings based upon the completion of our review and supplemental analyses concerning the proposed "Site".

4. Coverage Objective

AT&T's goal is to design and maintain a wireless network that will meet the needs and expectations of its users. This includes meeting customer demand for quality voice and high-speed data services. In order to provide competitive service, AT&T must continue to be responsive to changes in the wireless industry and to proactively work to accommodate usage patterns and demand. While 3G speeds may have been acceptable in the past, users today expect 4G services and AT&T is committed to meeting that demand. There is a significant coverage deficiency in the existing AT&T wireless communications network along State Highway 31 (West St and Maple Ave), MA Route 122 (Pleasant St), Davis Hill Rd and the surrounding residential areas in Paxton, MA, herein referred to as the "Targeted Coverage Area". A deficiency or gap 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 connections.

Due to terrain characteristics and the distance between the targeted coverage area, the existing sites, and the nearby airport, AT&T's options to provide services in this area are quite limited (a map of the subject area and the distance to neighboring AT&T sites from the proposed site is included as Exhibit 1 of the Attachments.) AT&T's network

requires a deployment of facilities throughout the area to be covered. The facilities include antennas that 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 Paxton around the subject areas. 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 predictive coverage, associated propagation model, and the drive test data demonstrates that AT&T’s network is unreliable throughout much of the area due to substantial gaps in coverage and, that the consequence of this substantial gap in coverage is a service deficiency in Paxton. In order to fill in these substantial coverage gaps and improve the network reliability within Paxton, a new facility is needed in the area.

5. Coverage Plots

Included with this report are Exhibits 1-15, which are explained below to help describe AT&T’s network in and around Paxton, and the need for the proposed facility.

- Exhibit 1: *AT&T Existing and Planned 4G Network – Paxton and Surrounding Communities* provides an overview of AT&T’s network of sites in the area, with distances shown from the proposed Paxton site to the existing sites in the surrounding area.
- Exhibit 2: *Existing AT&T’s Existing 3G Coverage 850 MHz and 1900 MHz UMTS* shows the existing 3G UMTS coverage within Paxton being provided by the Asnebumskit Rd site, situated on the Paxton-Holden border, and other AT&T sites located in the neighboring towns. AT&T has no other facilities located within the Town of Paxton. Exhibit 2 shows that there is minimal 3G coverage in the central and western areas of Paxton, especially in the areas defined by the “Targeted Coverage Area”. This represents a substantial coverage gap in AT&T’s wireless network.
 - As noted in the introduction, AT&T is currently utilizing both the cellular spectrum and the PCS spectrum for their 3G service. The 800 MHz cellular band served as the initial platform for their wireless voice and data services and the added 1900 MHz band provides capacity relief. Exhibit 2 shows two color ranges. The lighter green represents the 1900 MHz (PCS) layer of their 3G service while the darker underlying green represents the 800 MHz (cellular) layer of their 3G UMTS service. You may note that the 1900 MHz layer shows much less coverage than the 800 MHz layer. This is

primarily due to the propagation characteristics of 800 MHz vs. 1900 MHz signals and the impact of foliage at the respective bandwidths.

- Exhibit 3: *Existing AT&T 4G 700 MHz LTE Network Overlay and Propagation Model* shows the measured RSRP (Reference Signal Receive Power) of the 4G system at the minimum threshold (-93 dBm) for reliable service in rural-suburban area. The drive test data and tuned model presented in Exhibit 3 clearly show the substantial coverage gaps within Paxton and the need for the “Site”.

You will note that in this exhibit, the baseline drive data is presented as an overlay of the predicted coverage. The propagation model used to generate the coverage prediction shown in Exhibit 3 is the same model assigned to all subsequent analyses presented within this report.

Two signal strength ranges (green and orange) are provided on this plot merely to show the transition areas of the drive data versus the propagation model and the relative accuracy of the model. As can be seen in this exhibit, the predictive models closely match the measured signal strengths recorded during the drive test data collection.

It is important to note that where this drive test was performed during the end of the winter season, the absence of foliage is reflected in the slightly optimistic readings shown in the drive data when compared to the predicted coverage. This is due to the fact that for network design purposes, the propagation model necessarily takes foliage into account and presents “summer” conditions.

In designing wireless communications networks such as AT&T’s network, in order to design a network that will provide reliable wireless service coverage within the Targeted Coverage Area throughout the entire year, the commonly accepted and standard industry practice is to take the negative impact of foliage on the propagation of radio frequency signals into account when determining both (i) existing network coverage and (ii) anticipated coverage from a proposed facility.

- Exhibit 4: *AT&T 700 MHz LTE Existing Coverage to Minimum Design Threshold* depicts the same coverage as Exhibit 3 but presents it as a single 4G LTE coverage threshold (-93 dBm), which will be used for subsequent plots presented throughout the remainder of this report, with the exception of the CW drive test plots (Exhibits 12, 13 and 14).²
- Exhibit 5: *AT&T Wireless 4G 700 MHz LTE Coverage with Proposed MAL04388B (196 West St)* shows how the proposed “Site” would fill in the existing coverage gaps and improve AT&T’s 700 MHz LTE network within the targeted areas, as detailed in Table 1. As shown in this plot, much of the targeted area is covered by the proposed “Site” at 134’ centerline.

² The plots beyond Exhibit 3 involve comparative analyses between multiple candidates and multiple heights necessitating the transition to the use of a single threshold for the sake of clarity. Where the area in question is not a densely populated region, the AT&T minimum requirement was selected as the threshold reference.

Table 1 below lists the coverage statistics that were compiled for each frequency band of the proposed site:

	Incremental Coverage from		Incremental Coverage from	
	Proposed Site (700 MHz)		Proposed Site (1900 MHz)	
Population Coverage:	(\geq -93 dBm)	503	(\geq -96 dBm)	364
Area Covered (mi²):	(\geq -93 dBm)	1.77	(\geq -96 dBm)	1.33
Roadway Coverage (mi):	Main:	2.63	Main:	1.64
	Secondary:	5.33	Secondary:	4.00
	Total:	7.96	Total:	5.64

Table 1: Coverage Statistics

After a thorough search of the area, there were no existing structures identified that would be capable of meeting AT&T's coverage objectives for this area. As discussed in the following sections, any existing structures investigated for viability were not located in appropriate locations or did not have sufficient height to address the coverage needs in the Targeted Coverage Area defined above. As a result, AT&T determined that the proposed West St monopole is the only solution to address the significant gap in coverage of the Targeted Coverage Area. Table 2 below provides the details of the sites considered.

Table 2 lists details regarding the alternate candidates and a coverage assessment.

Site ID	Address	Lat	Long	Structure	Height	GE (Ft.)	Comments
MA4388A	West Street	42.309125	-71.949861	Raw Land	120	1067	Alternate - potential back-up raw land candidate
MA4388B	196 West St	42.310019	-71.946072	Raw Land	134	1062	Proposed. Meets coverage objectives
MA4388C	Major Moore Circle	42.305642	-71.955294	Raw Land	120	1071	Rejected. Excessive redundant coverage
MA4388D	576 Pleasant Street	42.305692	-71.920931	Lattice Tower	100	1131	Rejected. Does not meet coverage objective
MA4388E	1 Church Street	42.311825	-71.927906	Steeple	70	1137	Rejected. Does not meet coverage objective
MA4388F	62 MA RT. 31	42.313697	-71.922242	Water Tank	100	1220	Water Tank scheduled for removal by Town
MA4388G	Laurel and Marshall Street	42.291675	-71.947056	Transmission Tower	70	1073	Rejected. Does not meet coverage objective
MA4388H	82 South Street	42.298322	-71.955311	Transmission Tower	70	993	Rejected. Does not meet coverage objective

Table 2: Search Ring Candidates Considered

- Exhibits 6: *AT&T Wireless 4G 700 MHz LTE Coverage with Alternate MALH4388D (FD)* shows the incremental coverage from the alternate candidate, 576 Pleasant St FD Tower at 100'. This site is situated 1.3 miles east of the proposed search area and as shown in Exhibit 6 provides only limited fill-in coverage to portions of Pleasant St and West St and is not comparable in any way to the coverage provided by the proposed site and does not meet any of the targeted coverage objectives.

- Exhibits 7: *AT&T Wireless 4G 700 MHz LTE Coverage with Alternate MALH4388E (1 Church St)* shows the incremental coverage using the church steeple at a height of 70'. This site is situated .93 miles east of the proposed search area and as shown in Exhibit 7 provides fill-in coverage to portions of Pleasant St, West St Maple Ave and Richards St, it is not situated far enough west to adequately meet AT&T's coverage objectives.
- Exhibits 8: *AT&T Wireless 4G 700 MHz LTE Coverage with Alternate MALH4388G (Transmission Tower #1)* shows the incremental coverage using the existing transmission tower, located 1.25 miles south of the proposed site, at a height of 70'. As shown in Exhibit 8 this site does not meet any of the targeted coverage objectives of the search ring.
- Exhibits 9: *AT&T Wireless 4G 700 MHz LTE Coverage with Alternate MALH4388H (Transmission Tower #2)* shows the incremental coverage using the existing transmission tower, located .93 miles southwest of the proposed site, at a height of 70'. As shown in Exhibit 9 this site does not meet any of the targeted coverage objectives of the search ring.
- Exhibit 10 titled: *AT&T Wireless 4G 700 MHz LTE Coverage with MA4388B @ Reduced Height of 114 FT* shows the resultant coverage from the proposed site if the tower height was reduced from a height of 138' to 118' feet. As shown in this plot, a reduction in height to 114' would remove the needed coverage at the junction of Pleasant St, West St Maple Ave and Richards St, and the Paxton Town Center. Therefore, a facility at this height would not provide adequate coverage to the Targeted Coverage Area.
- Exhibit 11 titled: *AT&T Wireless 4G 700 MHz LTE Coverage with MA4388B @ Reduced Height of 80 FT* shows the resultant coverage from the proposed site if the tower height was reduced from a height of 138' to 80' feet. (The 80 ft. height was derived from the Paxton Zoning Bylaw.) As shown in this plot, a reduction in height to 80' would result in substantially smaller footprint than the proposed 138'. Exhibit 11 clearly shows further deterioration in coverage of the same key intersections discussed above. Therefore, a facility at this height would not provide adequate coverage to the Targeted Coverage Area.

Table 3 below lists the coverage statistics that were compiled during the height analysis by frequency band:

	Incremental Coverage from			Incremental Coverage from		
	Proposed Site (700 MHz)			Proposed Site (1900 MHz)		
		Height (ft)			Height (ft)	
Population Coverage:	(≥ -93 dBm)	134 ft	503	(≥ -96 dBm)	134 ft	364
		114 ft	353		114 ft	266
		80 ft	165		80 ft	127
Area Covered (mi²):	(≥ -93 dBm)	134 ft	1.77	(≥ -96 dBm)	134 ft	1.33
		114 ft	1.29		114 ft	0.96
		80 ft	0.61		80 ft	0.46
Roadway Coverage (mi):	Main:	134 ft	2.63	Main:	134 ft	1.64
	Secondary:		5.33	Secondary:		4
	Total:		7.96	Total:		5.64
	Main:	114 ft	2.16	Main:	114 ft	1.32
	Secondary:		3.69	Secondary:		2.79
	Total:		5.75	Total:		4.11
	Main:	80 ft	1.02	Main:	80 ft	0.77
	Secondary:		1.7	Secondary:		1.34
	Total:		2.72	Total:		2.11

Table 3: Height Analysis Coverage Statistics

- Exhibit 12: *CW Drive Data @ 134 Ft. and Tuned 750/850 MHz Propagation Model* shows the measured and predicted results of the March 7, 2014 CW drive test conducted at the proposed site, using a crane to support the test antenna at the proposed height of 134'. As can be seen in this plot, the measured drive data is slightly more optimistic than the predicted coverage shown. The cause of the slight variation is attributable to the fact that the drive test was conducted at the end of the winter season and the impact of foliage is minimal. (As noted earlier in the report the predictive model assumes full foliage.)
- Exhibit 13: *CW Drive Data @ 114 Ft. and Tuned 750/850 MHz Propagation Mode* shows the cw drive test and the predicted results with the crane lowered to provide an antenna centerline of 114 Ft. As noted above, the measured drive data will be more optimistic than the predictive model due the lack of foliage present.
- Exhibit 14: *CW Drive Data @ 80 Ft. and Tuned 750/850 MHz Propagation Mode* shows the cw drive test and the predicted results with the crane lowered to provide an antenna centerline of 80 Ft. As noted above, the measured drive data will be more optimistic than the predictive model due the lack of foliage present.
- Exhibit 15: *Proposed and Alternate Candidate Locations and Search Ring* provides a mapping of the alternate candidates considered and the radial distances from the search ring and the proposed site.
- Attachment 16 is a copy of the signed and sealed FAA 1A Certification, requested by Mr. Graiff. Mr. Graiff's report also recommends that an FAA Form 7460-1 be prepared and filed by AT&T. Based on the information provided to me by AT&T's representatives, the filing of FAA Form 7460-1 is typically not filed until after approvals for a facility have been obtained. However, pursuant to Mr. Graiff's report, I have been informed that AT&T has filed the FAA Form 7460-1. The final determination has not been received from the FAA. However, based on the TOWAIR determination, AT&T does not anticipate that the facility will require marking and lighting under FAA regulations.

6. Conclusion

AT&T has identified an area of deficient coverage affecting a significant portion of Paxton MA, including key traffic corridors through the residential areas of the city. The baseline drive tests conducted on March 7, 2014 validates the propagations models used in the predicted analyses completed prior to the testing and shows conclusively that there is a significant gap in AT&T's coverage within Paxton.

The proposed 196 West St facility will bring the needed fill-in coverage to significant portions of State Highway 31 (West St), State Highway 56 (Richards Ave), State Highway 122 (Pleasant St), the Town Center, and the residential neighborhoods in the vicinity of the Town Center and the aforementioned roads, all of which are currently within the "Targeted Coverage Area".

No existing structures were identified and available that would be able to satisfy 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. Therefore, based on the predictive coverage model as validated by the CW and baseline drive tests, my analysis of the drive data at the differing heights, and the information identified in this report, it is my professional opinion that AT&T's proposed facility is at the minimum height necessary and the only feasible alternative for AT&T to provide adequate coverage to the Targeted Coverage Area.

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 Paxton community along with effective connectivity to the rest of AT&T's existing network.

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

7. Statement of Certification

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

A handwritten signature in black ink, appearing to read "Dan Goulet", is positioned above a horizontal line.

Dan Goulet
C Squared Systems, LLC

March 26, 2014
Date

8. Attachments

Exhibit 1: AT&T Existing and Planned 4G Network - Paxton and Surrounding Communities

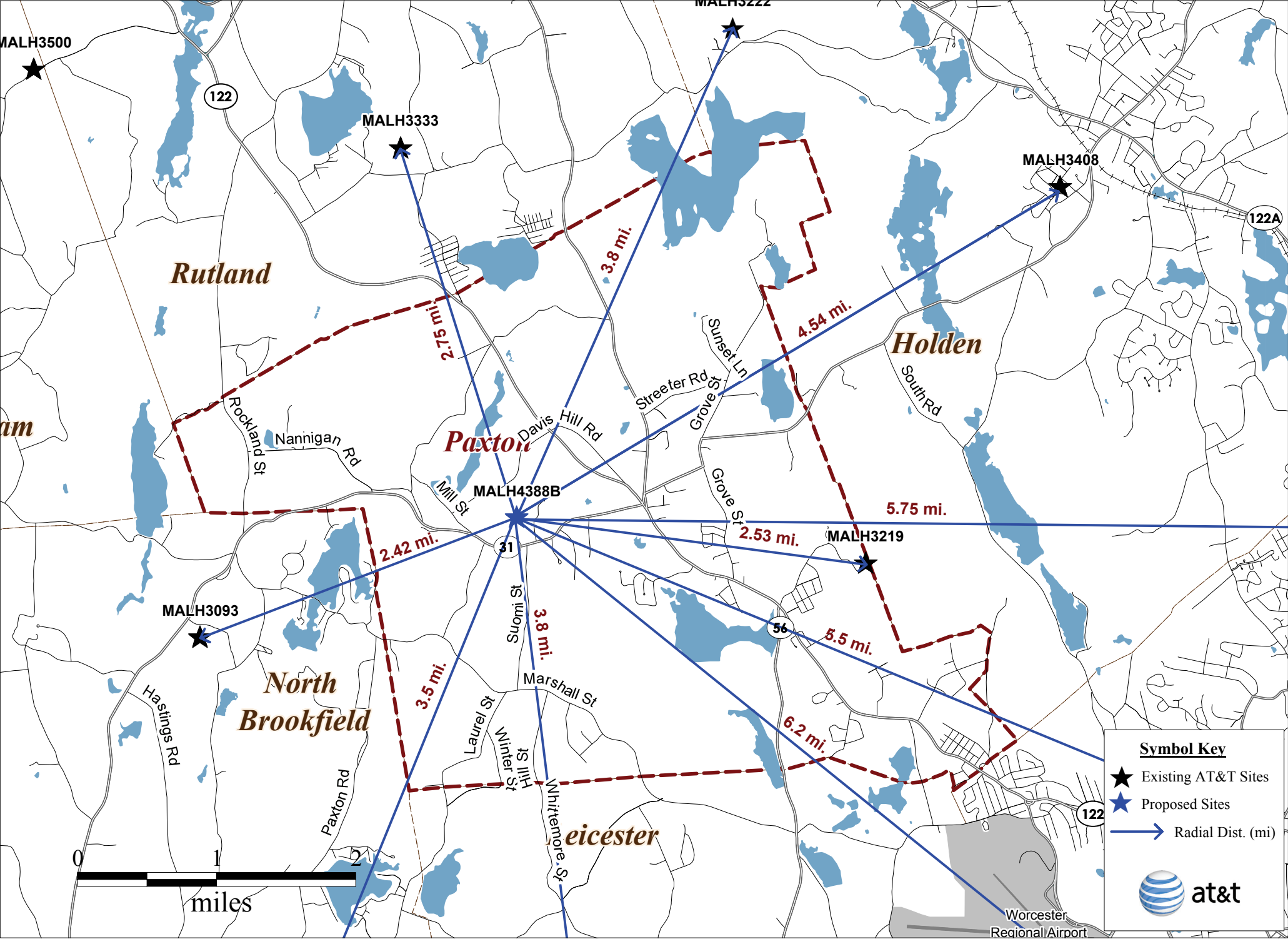


Exhibit 2: AT&T Existing 3G Coverage 850 and 1900 MHz UMTS

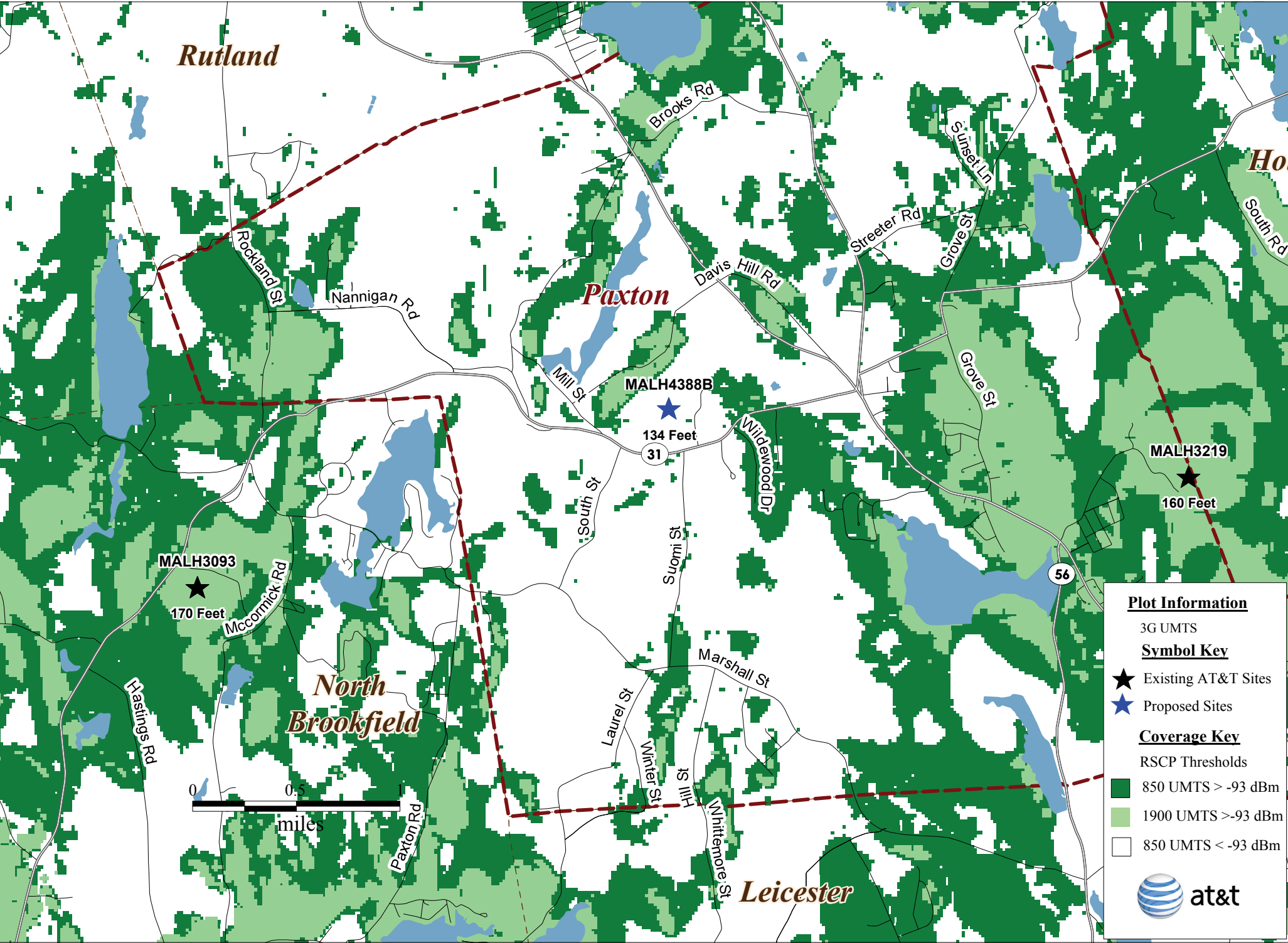


Exhibit 3: Baseline Drive - Existing AT&T 4G 700 MHz LTE Network Overlay and Propagation Model

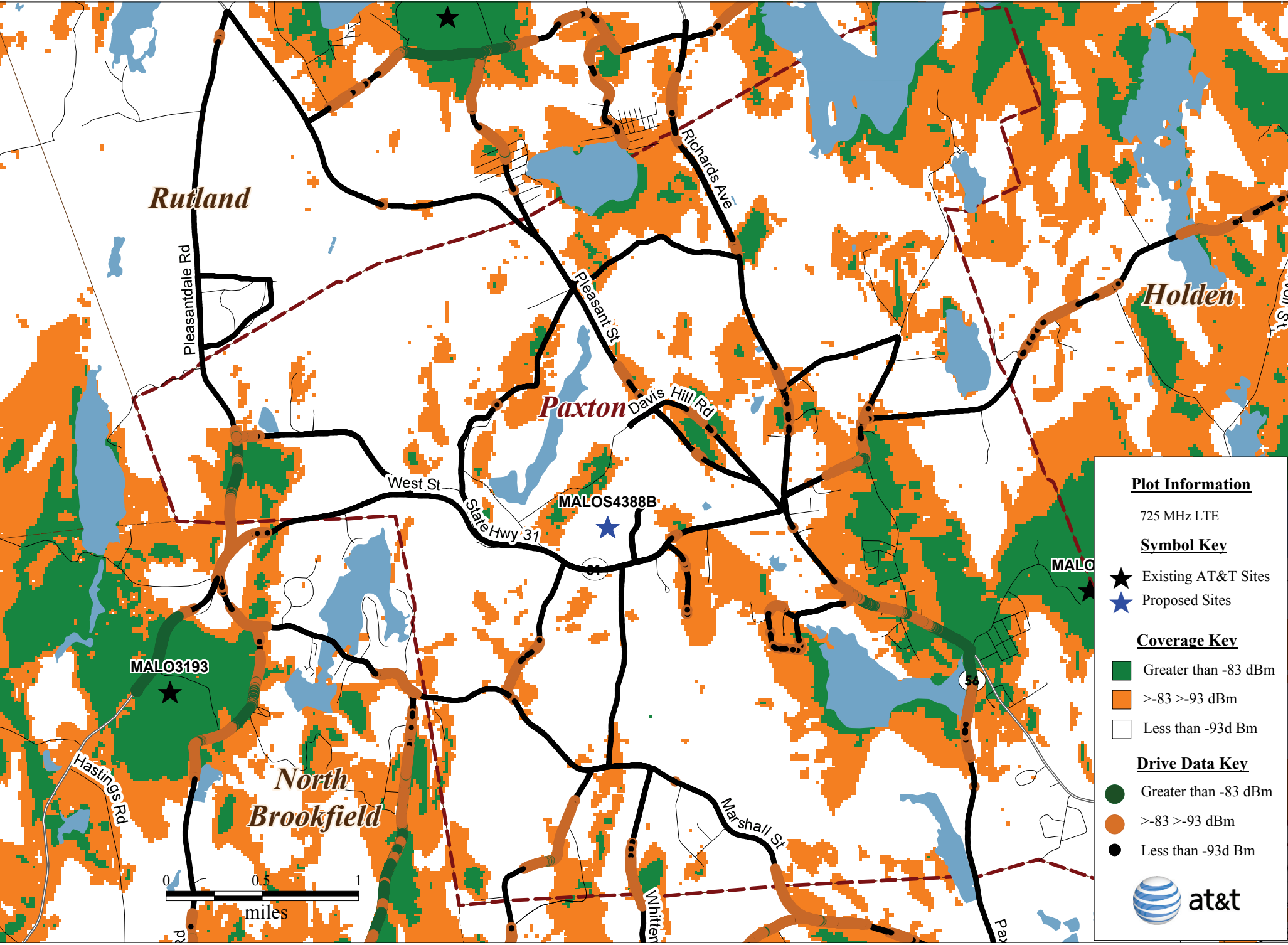


Exhibit 4: AT&T 4G 700 MHz LTE Existing Coverage to Minimum Design Threshold

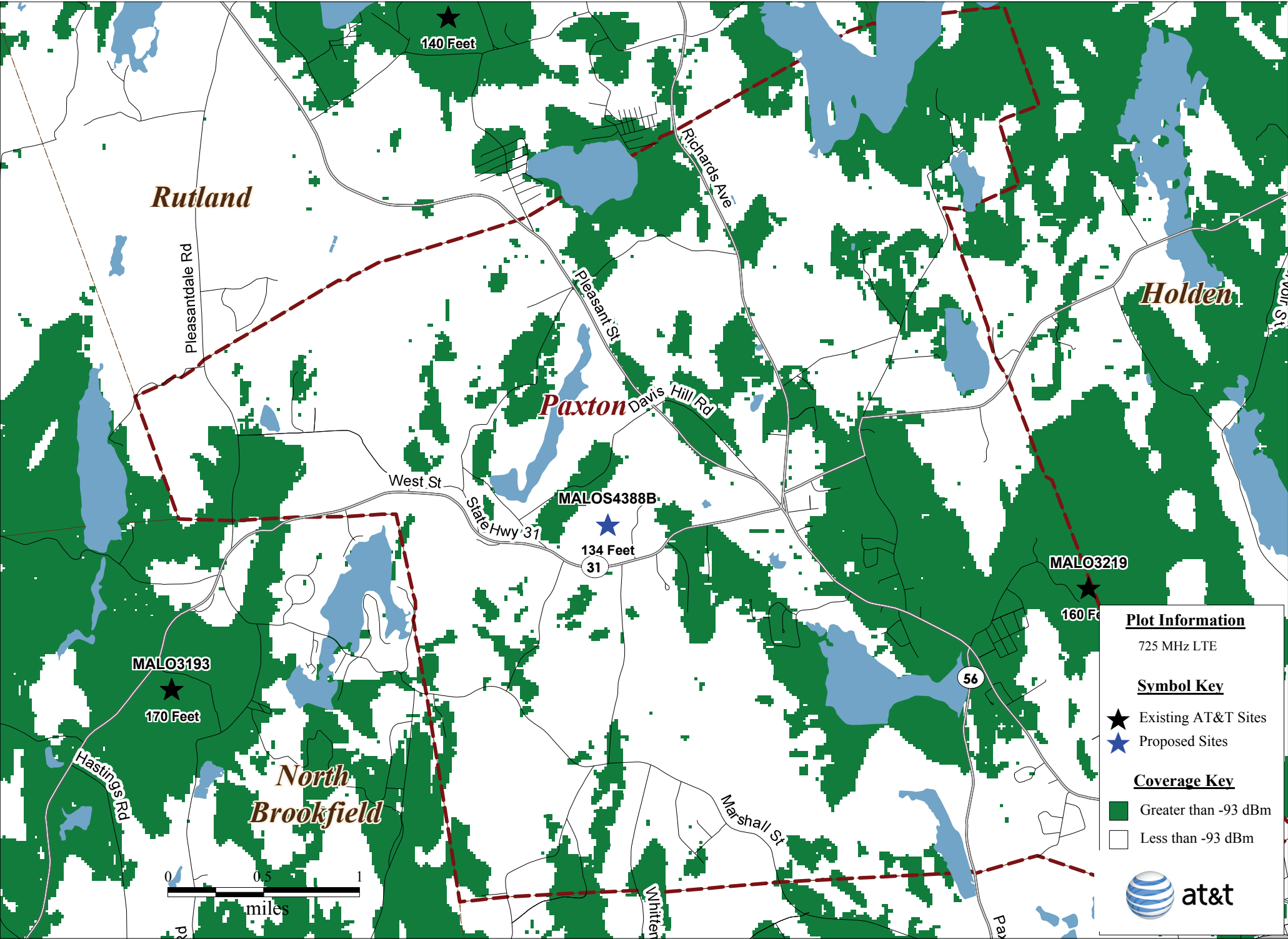


Exhibit 5: AT&T Wireless 4G 700 MHz LTE Coverage with Proposed MALH4388B (196 West St)

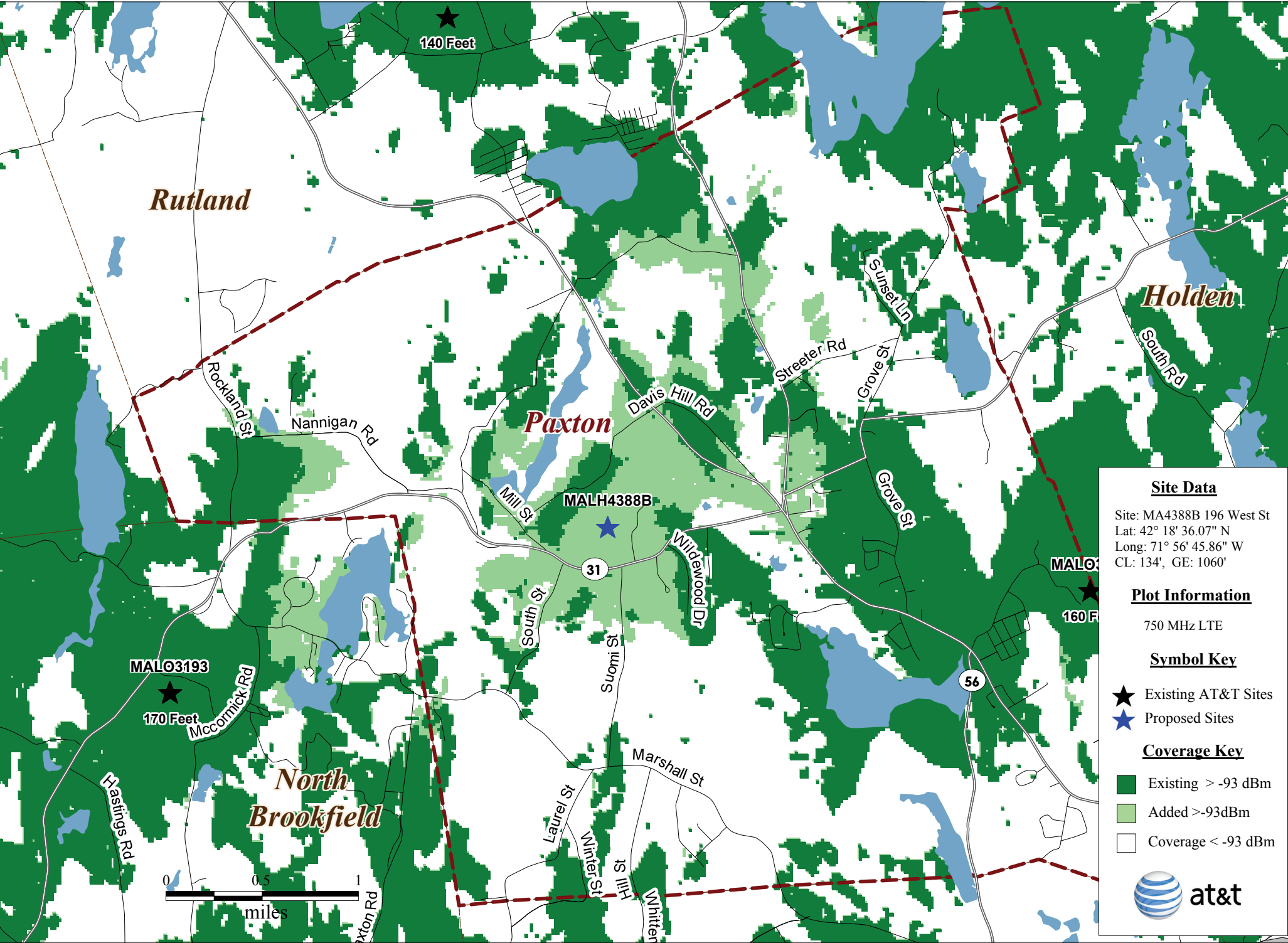


Exhibit 6: AT&T Wireless 4G 700 MHz LTE Coverage with Alternate MALH4388D (FD)

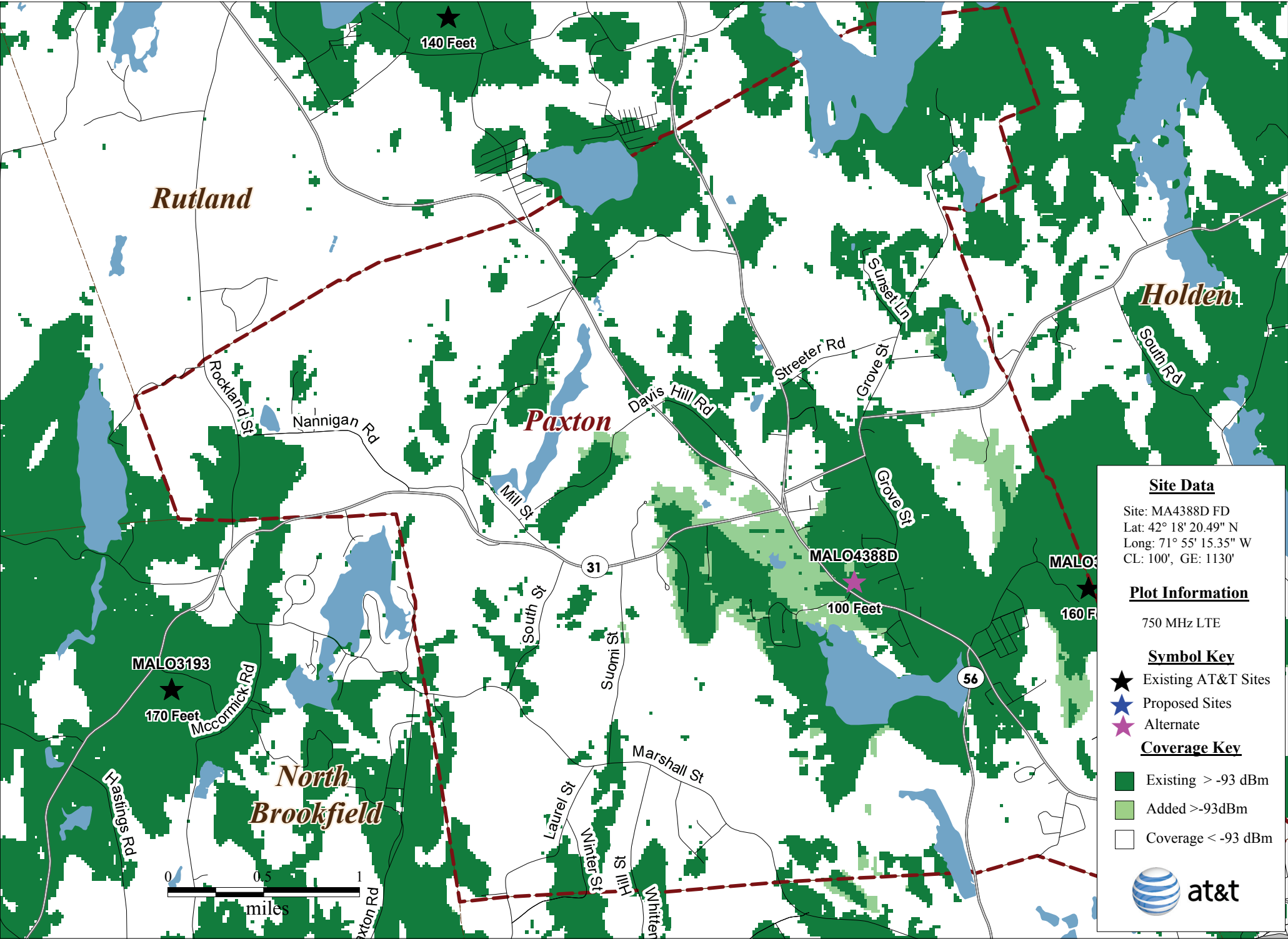


Exhibit 7: AT&T Wireless 4G 700 MHz LTE Coverage with Alternate MALH4388E (1 Church St)

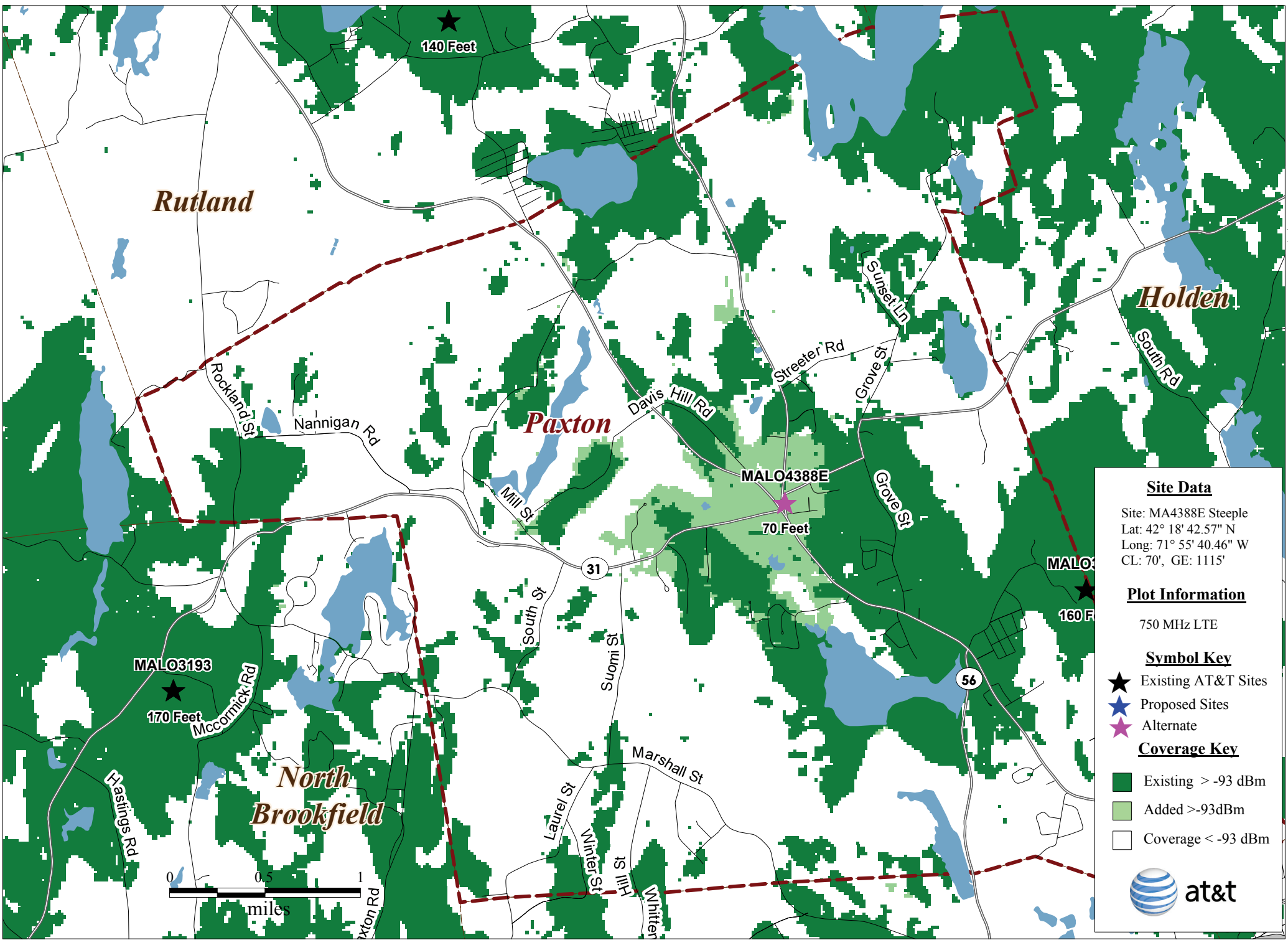


Exhibit 8: AT&T Wireless 4G 700 MHz LTE Coverage with Alternate MALH4388G (Transmission Tower 1)

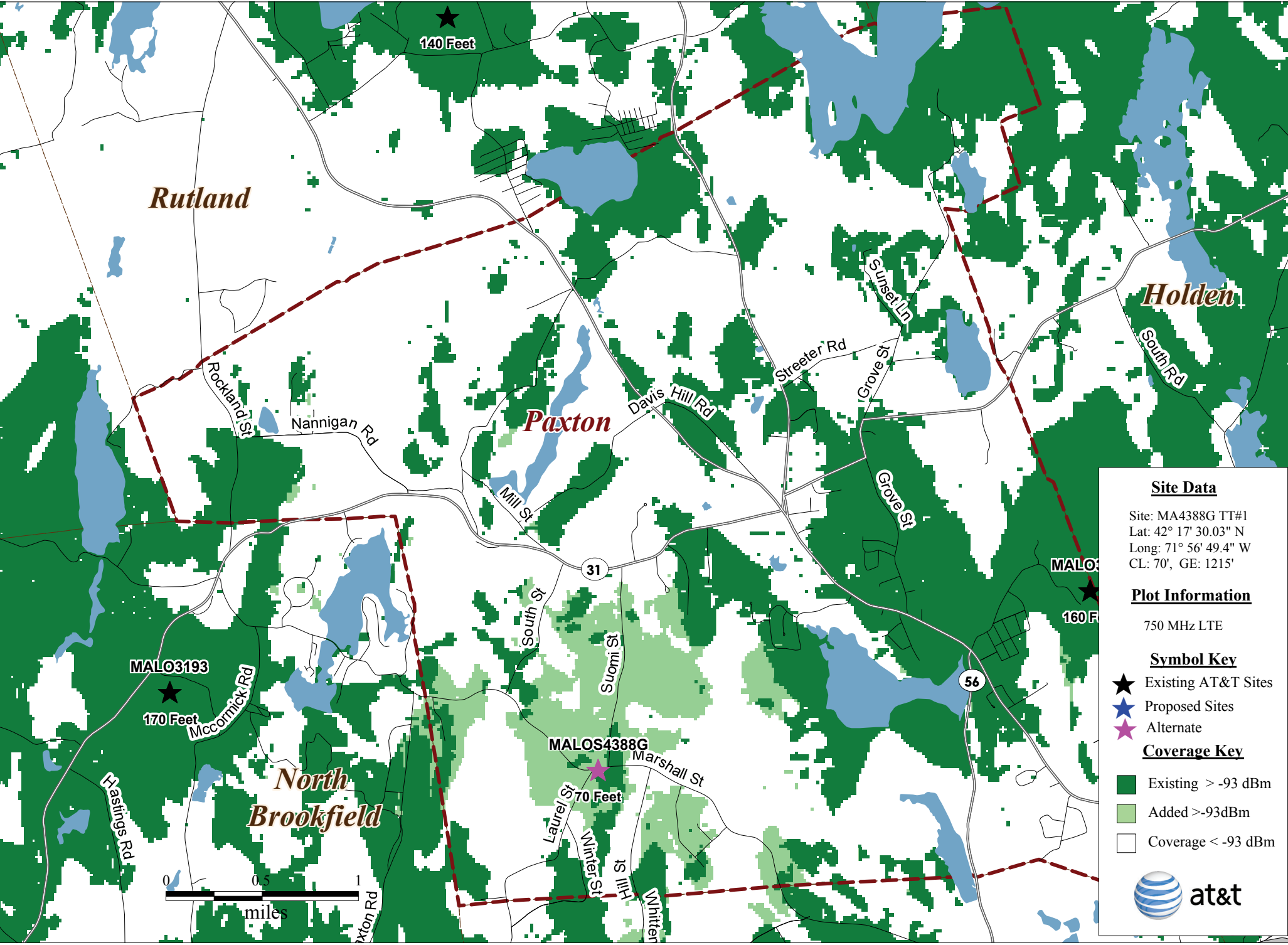


Exhibit 9: AT&T Wireless 4G 700 MHz LTE Coverage with Alternate MALH4388H (Transmission Tower 2)

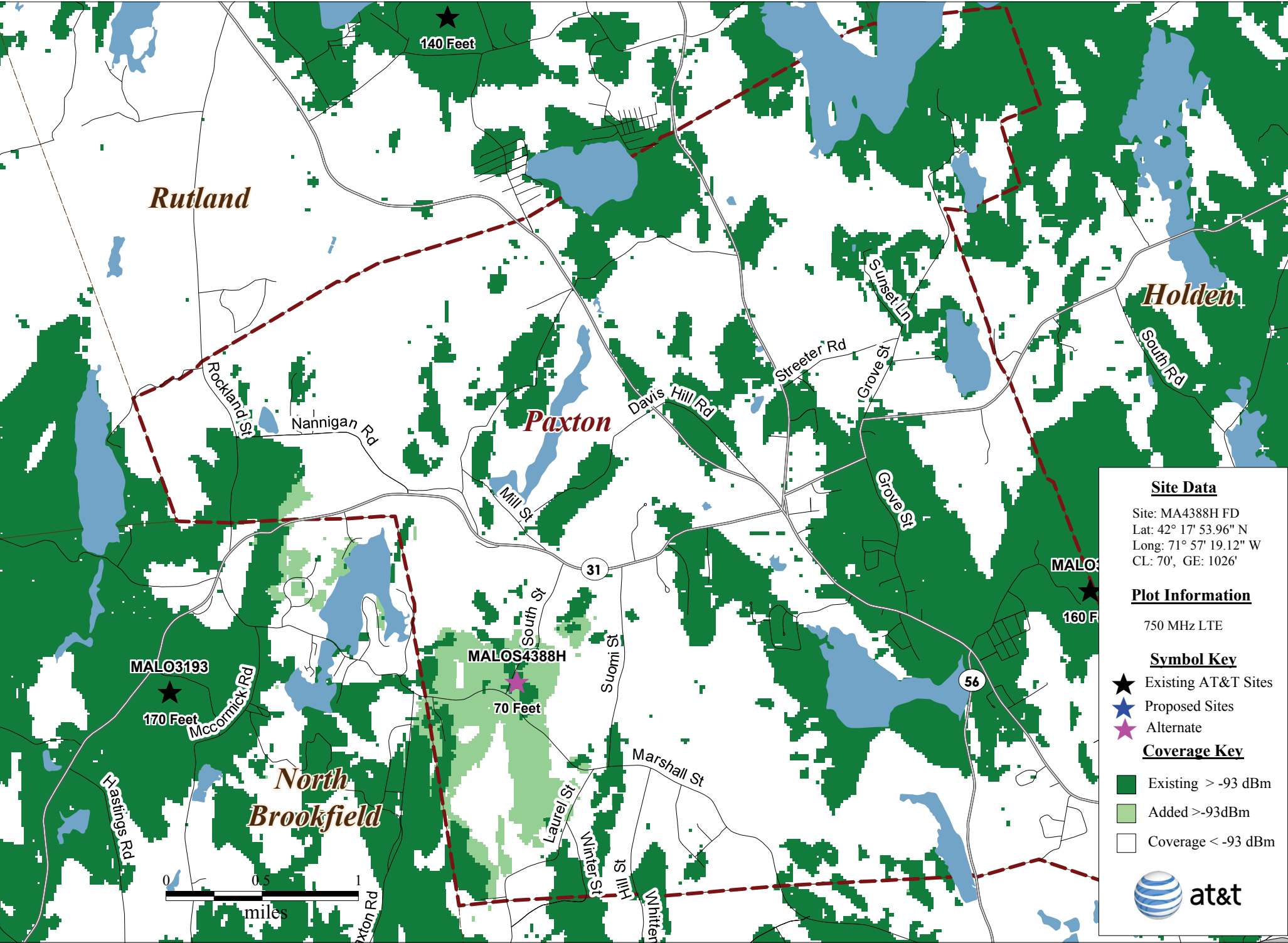


Exhibit 10: AT&T Wireless 4G 700 MHz LTE Coverage with MA4388B @ Reduced Height of 114 Ft.

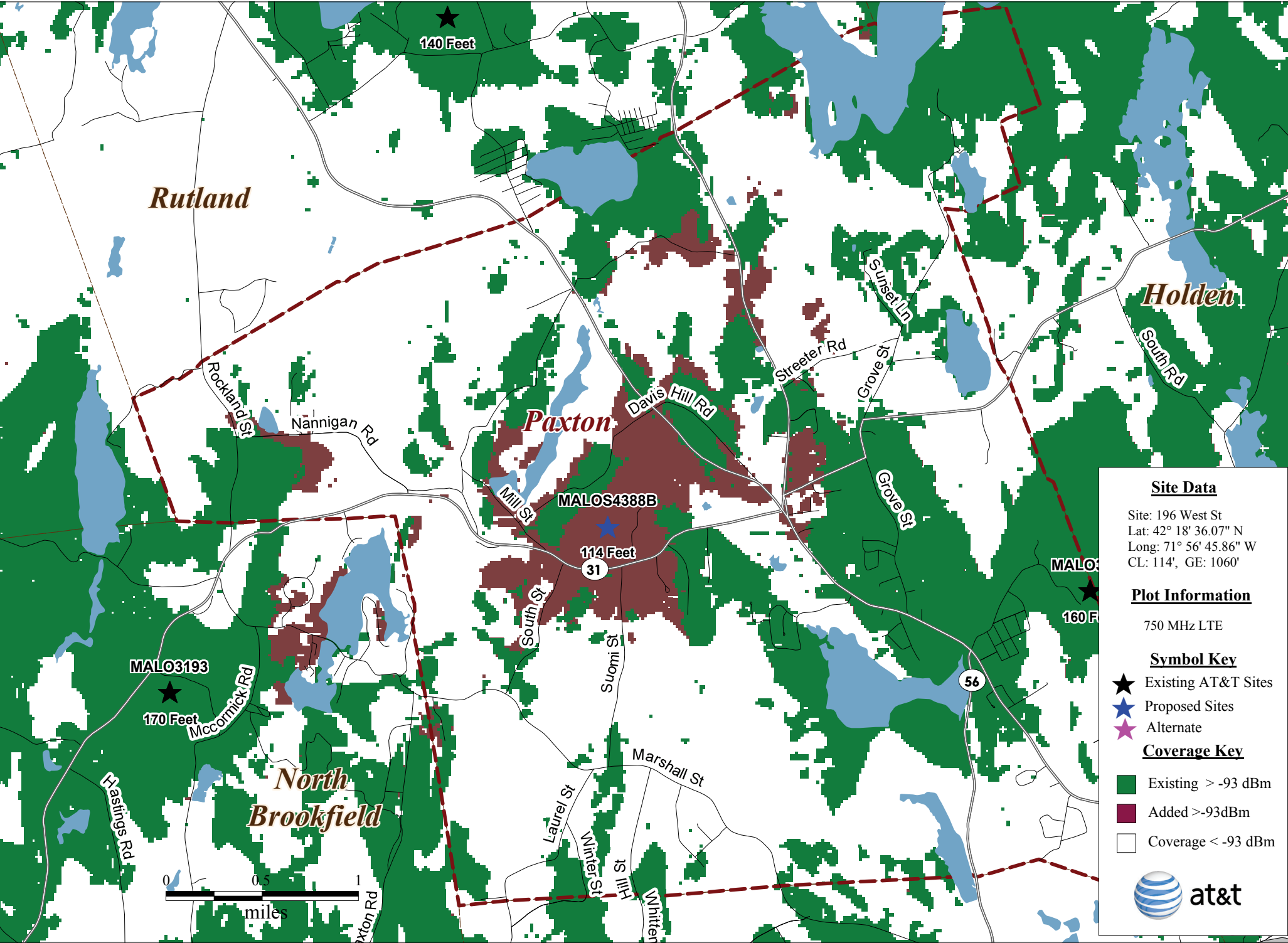


Exhibit 11: AT&T Wireless 4G 700 MHz LTE Coverage with MA4388B @ Reduced Height of 80 Ft.

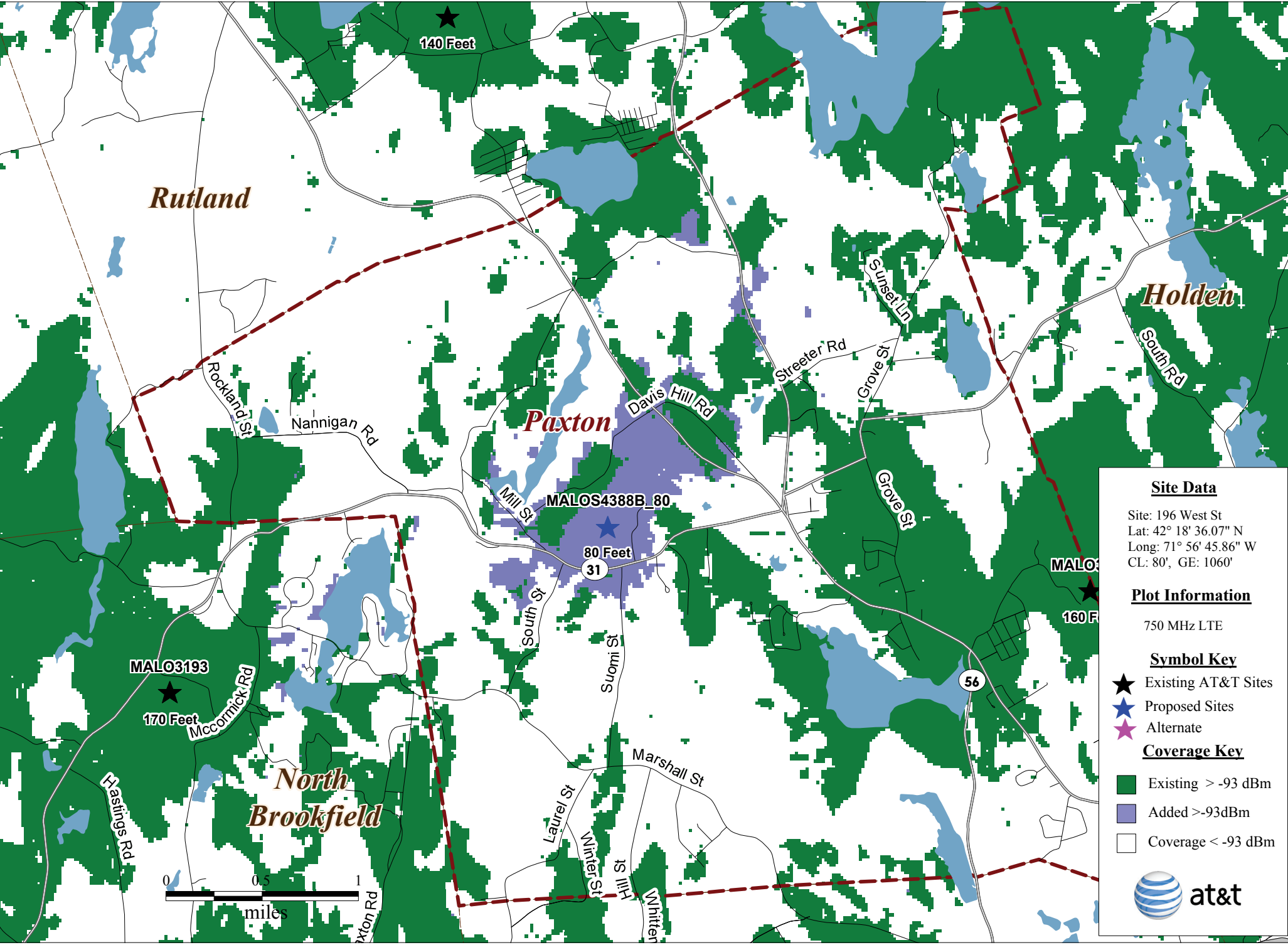


Exhibit 12: CW Drive Data @ 134 Ft. and Tuned 750/850 MHz Propagation Model

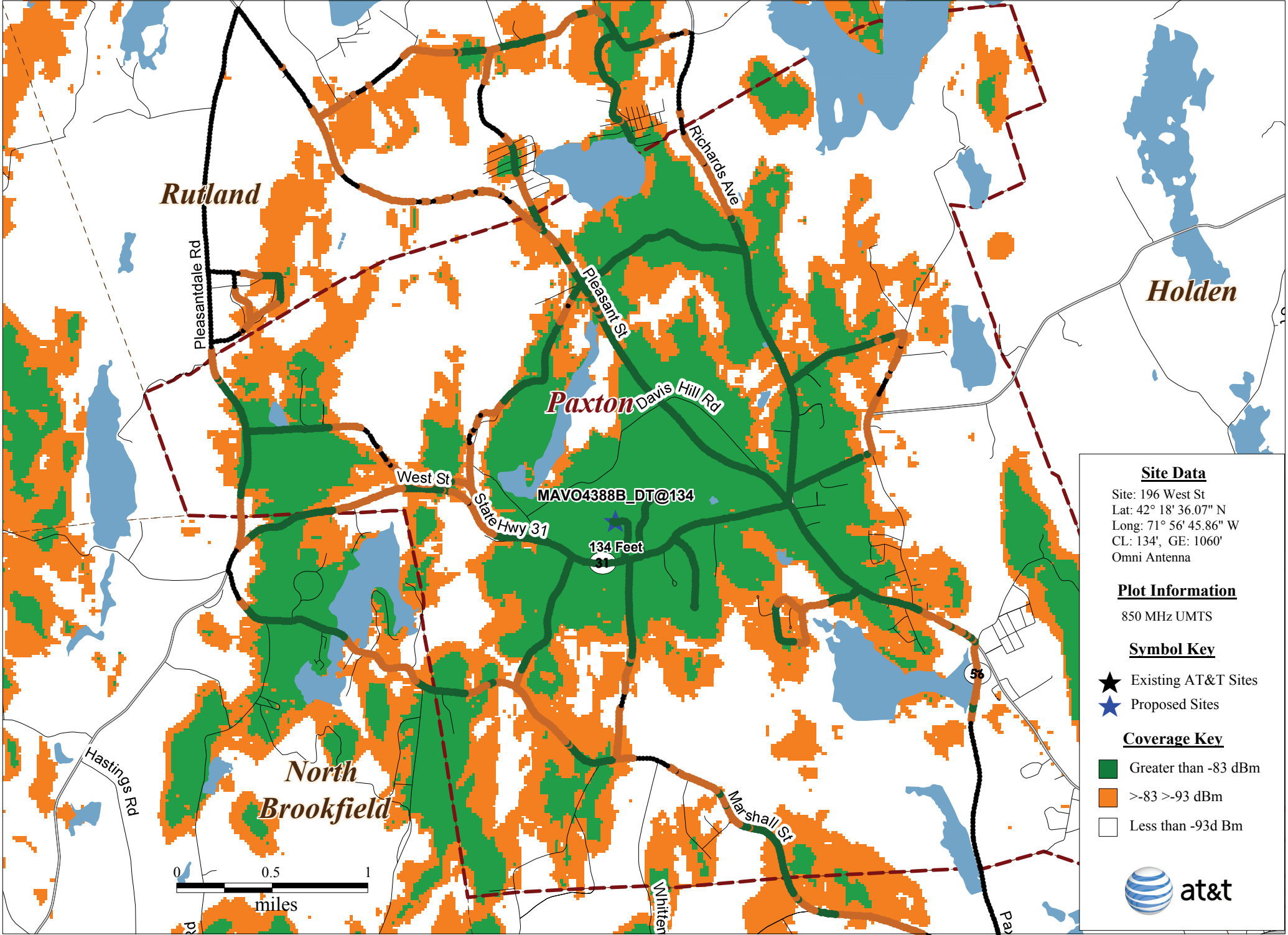


Exhibit 13: CW Drive Data @ 114 Ft. and Tuned 750/850 MHz Propagation Model

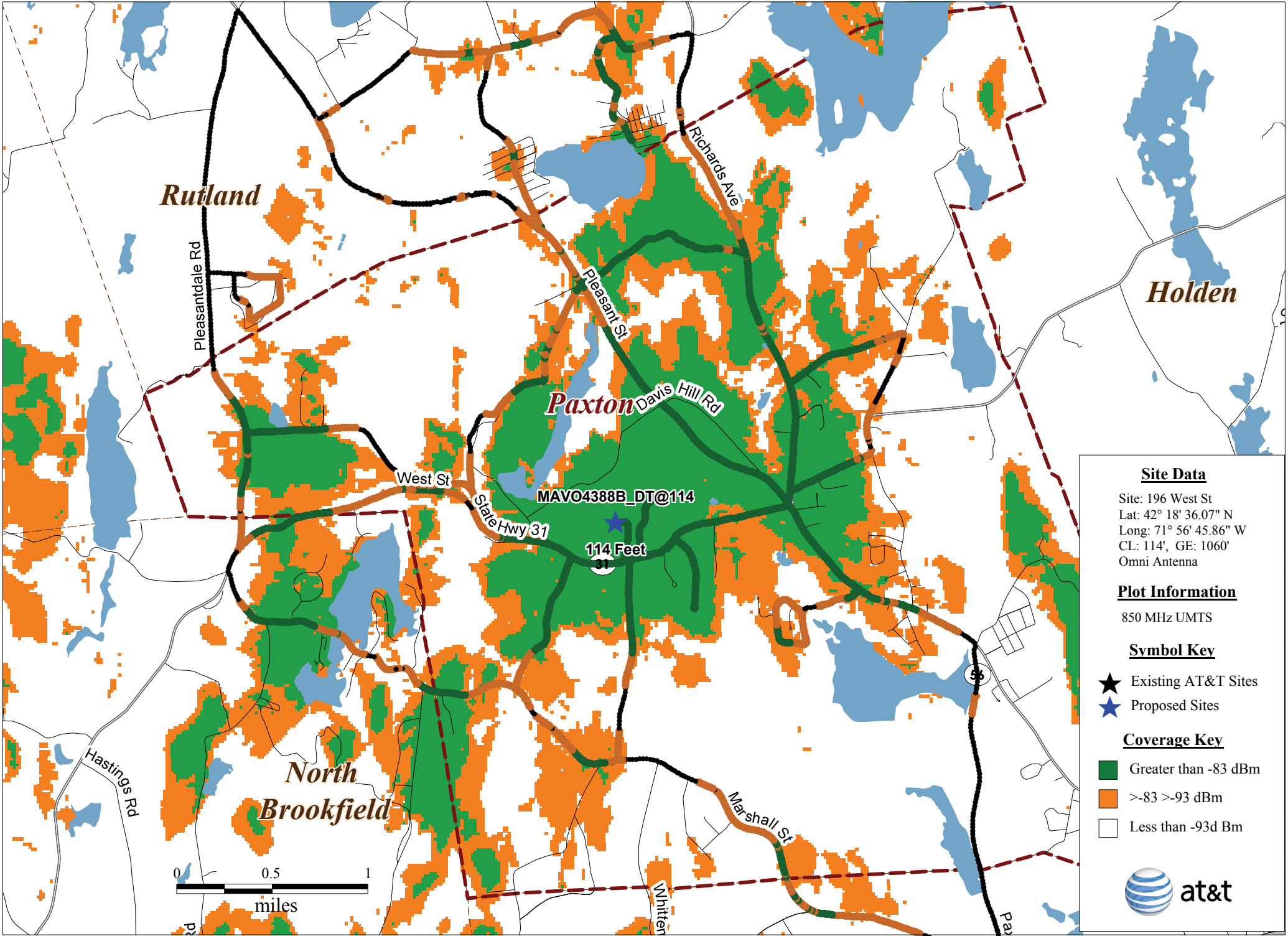


Exhibit 14: CW Drive Data @ 80 Ft. and Tuned 750/850 MHz Propagation Model

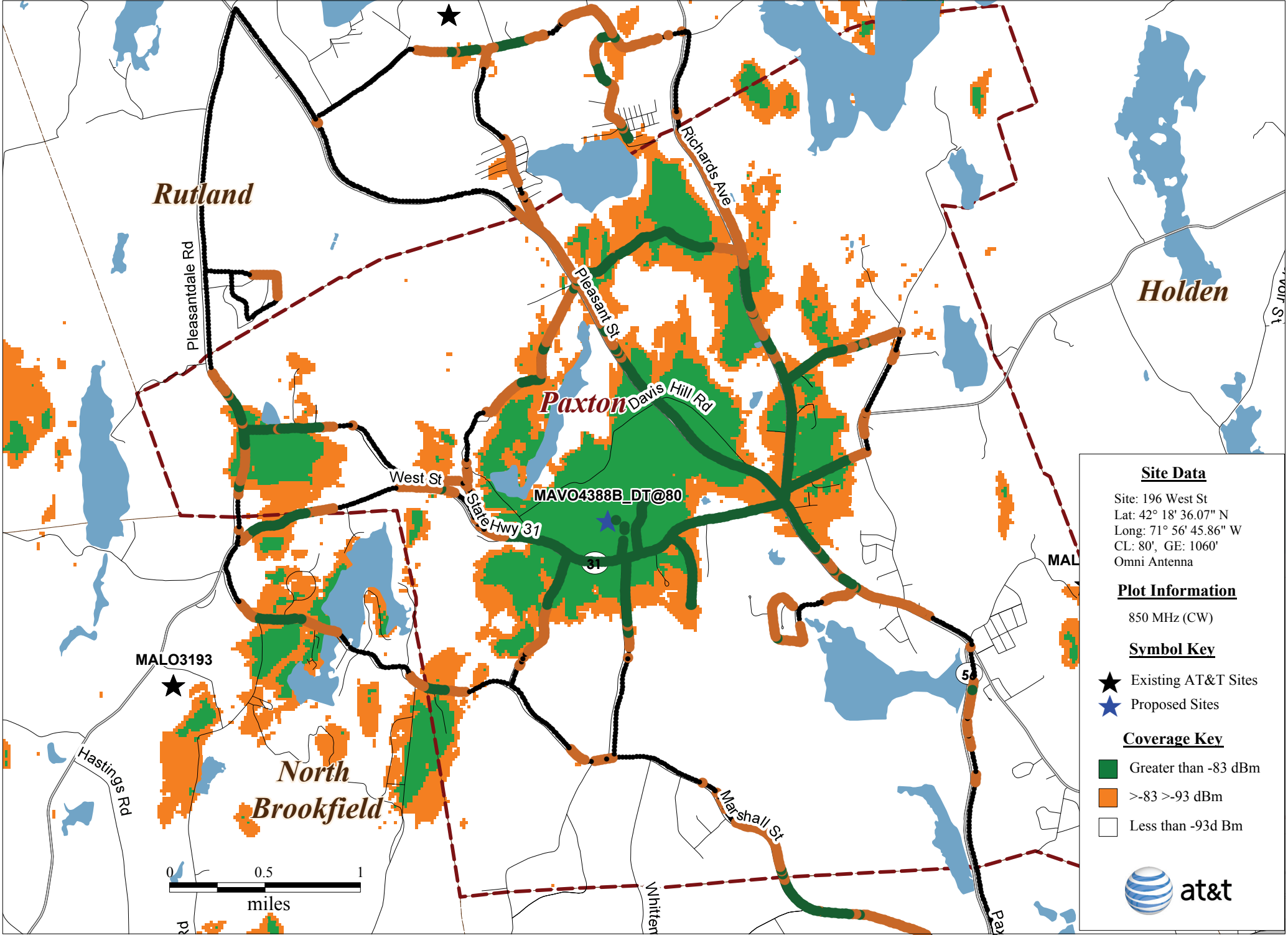
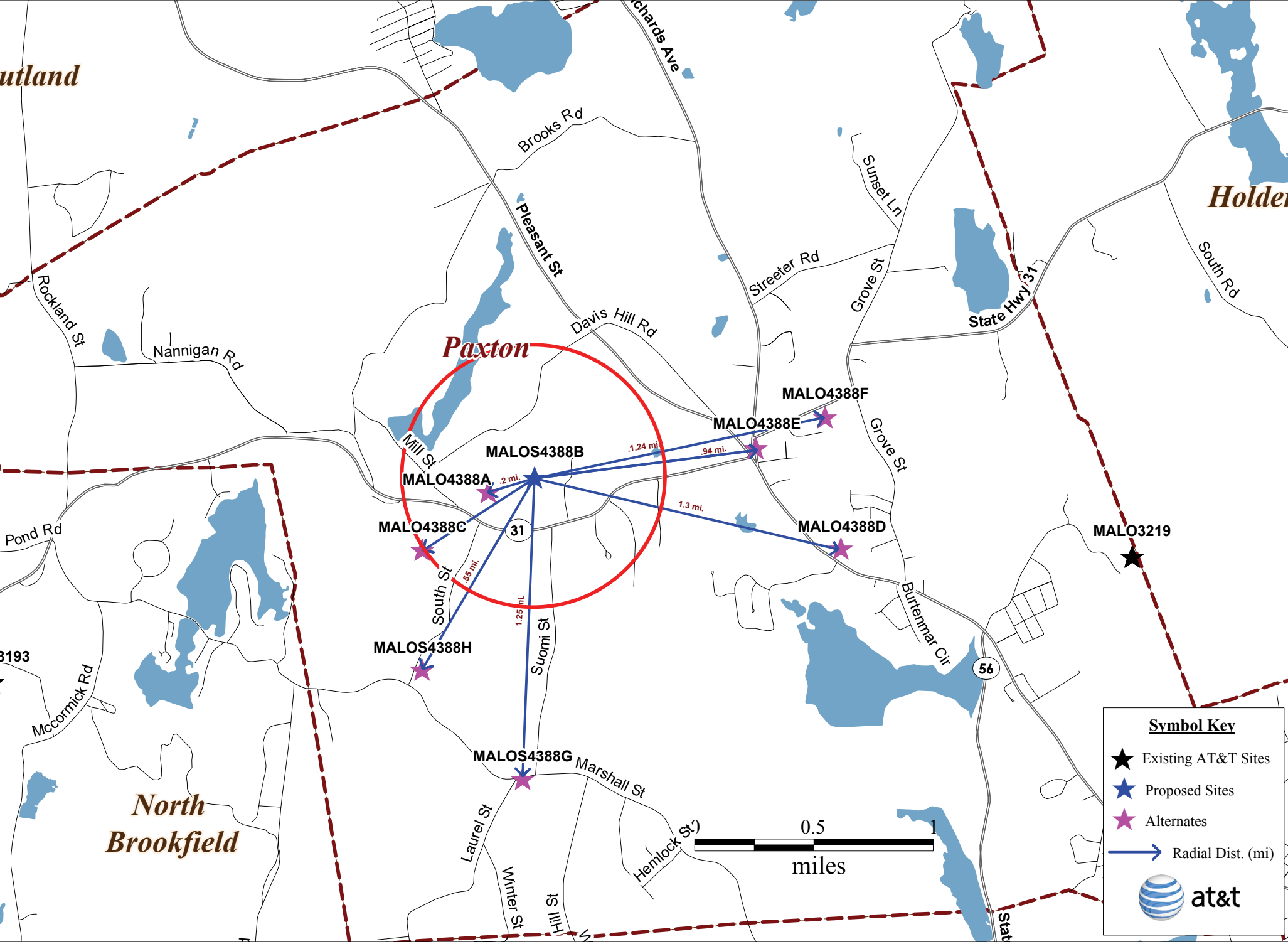


Exhibit 15: Proposed and Alternate Candidate Locations and Search Ring



FAA-1A CERTIFICATION

Applicant: AT&T Mobility, LLC
550 Cochituate Road
Suites 13 & 14
Framingham, MA 01701

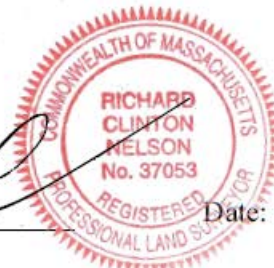
Site Name: Paxton, MA
Site No.: MA4388
Site Address: 196 West Street
Paxton, MA 01612

Horizontal Datum: ☒ GPS survey ☐ Ground Survey
Vertical Datum: ☒ NAVD 88 ☐ GPS Survey
Structure type: ☒ Proposed Monopole
Latitude: N 42° 18' 36.07" (NAD 83)
Longitude: W 71° 56' 45.86" (NAD 83)
Ground Elevation: 1061.9 feet (323.7 meters)
Top of Existing Tower Elevation: 1199.9 feet (365.7 meters)
138.0 feet (42.1 meters) A.G.L.
Highest Appurtenance: 1199.9 feet (365.7 meters)
138.0 feet (42.1 meters) A.G.L.
Centerline of Antennas: 1195.9 feet (364.5 meters)
134.0 feet (40.8 meters) A.G.L.
Tip of Proposed Antennas: 1199.9 feet (365.7 meters)
138.0 feet (42.1 meters) A.G.L.

Certification: I certify that the latitude and longitude are accurate to within ± 15 feet horizontally and that the site elevation is accurate to within ± 3 feet vertically. The horizontal data are in terms of North American Datum of 1983 (NAD 83) and are expressed in degrees, minutes, and seconds, to the nearest hundredth of a second. The vertical data are in terms of the National American Vertical Datum of 1988 and are determined to the nearest foot.

Company: Dewberry Engineers Inc.

Surveyor signature: 
Professional Land Surveyor



Date: 10/8/2013