



Report to Board of Selectmen on Telecommunications Infrastructure Review Project

Scope

The Board of Selectmen of Rye, NH engaged the services of Isotrope to guide the public process of evaluating the wireless infrastructure deficiencies in the Town. Included in the scope were the following:

- Kickoff meeting, face to face. Collect relevant local records, tour the town for the lay of the land-use, discuss history of local wireless deployment with committee, give general guidance on the nature of the current wireless ordinance, present general cases and seek direction on various ways of addressing wireless issues, identify town sites that might be useful pursuits for wireless facilities. DONE
- Evaluate coverage and prepare composite coverage maps of existing coverage... Provide draft coverage maps for committee review. Discussions by email and telephone. PRESENTED IN-PERSON TO FACILITATE DIALOG. DONE
- Prepare redline-and-comment markup of wireless ordinance, identifying counterproductive language, effective language, loopholes, risks, topics not addressed, etc. Discuss by email and telephone. DONE
- Prepare final composite coverage map identifying pressure points and potential ways to address them. DONE
- Meet face to face to discuss ordinance and gap issues and build consensus for how to proceed with the ordinance revisions. DONE
- Craft draft ordinance revisions. Share with committee and tweak by email and telephone. DONE
- Create draft report on the pressure points and recommended ways to address them. Include discussion of other relevant issues surfaced by the process. Share with committee and refine by email and telephone. PRESENTED IN-PERSON TO FACILITATE DIALOG. DONE
- Provide final report. ENCLOSED
- Attend Selectmen's meeting to present report and answer questions. SCHEDULED

Work Performed

To date, Isotrope has

- Met with the Selectmen once and the committee four times.
- Prepared a markup of the zoning ordinance.
- Provided generic existing coverage maps after fact-gathering (attached).
- Provided coverage maps from hypothetical sites selected with the committee (attached).



- Researched property restrictions.
- Guided the dialog regarding how to provide the optimal recommendation for adding sites to the Overlay District most likely to win approval.
- Provided a draft ordinance.
- Provided the Selectmen's report (herein) and the advice on funding tower sites (herein)

In completion of the scope of services, below is 1) a report on the process and 2) the funding discussion called for in the RFP.

Coverage Analysis

Some residents may perceive that if they have any wireless signal (e.g. "one or two bars"), there is no need to improve service at such locations. Indeed, a committee member heard this from a resident not keen on new towers. It is important to recognize that subscribers on the fringes of a cellular service area not only have less reliable connections, but their poor service robs those distant cell sites of capacity. Cell sites must commit more resources to supporting weak-signal connections, drawing down the quality of service provided to all subscribers connected to that cell site. The mapped coverage data (enclosed) is therefore a more reliable measure than the anecdotal experience of any single subscriber.

Moreover, with more homes in the USA having cut the cord to landline service than those keeping it, residents need good solid coverage to have reliable phone calling indoors at their homes.

Isotrope evaluated existing cell sites and modeled generic wireless coverage in town. Each carrier has different specifics based on their locations, their antenna heights and other design criteria. Isotrope modeled the 700 MHz coverage that is typical of the carriers. 700 MHz coverage is the best because it penetrates vegetation and buildings well. We used nominal antenna heights at existing locations of the carriers. See attached coverage maps. Individual carriers will have coverage that may differ from what is shown. The maps provide a good first-approximation of existing and potential coverage in Rye.

The results show that there is, as suspected by the community, a substantial amount of underserved area in the town. The existing tower off Grove Rd is the primary in-town source of coverage. Towers in Portsmouth provide only peripheral coverage to Rye. These towers are probably busy enough providing service to the main thoroughfares and dense development along Route 1 near Rye. Even if they reach into Rye, this is a secondary byproduct of their intent to serve the busy Rt 1 area.

Sprint has antennas in the church steeple in Rye center and on the Rye water tower. We did not model coverage from the steeple in the town center because it is not representative of coverage from multiple carriers – there is limited space for hiding wireless antennas in the steeple and the



antenna elevation above ground is minimal. We did model coverage from the Rt 1 water tower because there is the potential for additional carriers to attach to the water tower and the antenna elevation there can provide substantive coverage to the surrounding area.

The Port Way tower is in process in the northeast corner of town. We showed coverage from the 130-ft antenna height proposed by Verizon.

Coordinating with Rye Beach District

The southeastern part of town is a separate regulatory district: Rye Beach District. Since this process has no jurisdiction over selecting cell sites in that part of town, we limited our work there to identifying a potential cell site location in Rye Beach District to illustrate how it might affect selection of potential locations in Rye-proper. We considered a short mast at the St Theresa church property (820 Central Rd, 3 acres). A 50 foot mast could provide substantial coverage to the Rye Beach District area and complement the coverage from the existing Grove Rd tower and the proposed Recreation Area tower.¹

Rye Gaps

Essentially, in the area between Grove Rd, and Pioneer Rd, there is a dearth of wireless coverage. People may be able to get service from some carriers, but the signal levels are poor and the impact on the capacity of the existing cell sites is inefficient the farther one is from a cell site. New cell sites are necessary to provide reliable, good quality service throughout town. A new tower site at Port Way is currently being considered in planning and zoning hearings. If approved, this site will help address some of the coverage difficulties between Wallis, Sagamore and Pioneer Roads.

While the Town can regulate wireless facilities to guide carriers to the best locations from the community's perspective, the Town cannot compel carriers to build in any specific location or at any specific time. By strategically including the best locations in the Wireless Overlay District, cell site developers will have clear guidance on the Town's preferences. To be strategic, the Town must include parcels in the Overlay District that will provide coverage that complements existing coverage and that are viable for cell-site development. The committee considered the competing factors of wireless coverage and visual isolation from neighboring residences to identify the best parcels for possible future development.

Shorter Facilities of Limited Use

We discussed the role of shorter masts about 50 feet tall for wireless facilities. These would look like the masts used to support the Seabrook emergency horns. It will not be practical to cover the

¹ A potential cell tower was also modeled at Abenauqui Country Club, which would do as well, but would be taller and closer to the existing tower on Grove Road. Such a large installation is probably unnecessary, provided the Rye Beach District enables a shorter facility in its midst, such as at St Theresa church.



entire town with this type of facility, particularly away from the coast where there are heavily wooded areas. The town should create regulations for the use of the public way for such “small wireless facilities” because the FCC has mandated that towns have 10 days to determine if an application for such facilities is complete and 60 days to render a decision. The FCC mandate requires that decisions on such facilities must be based on clear rules laid down in regulations. Such regulations are not addressed in the proposed zoning ordinance changes.

Siting Options

Based on the foregoing, new towers will be needed in Rye to provide the umbrella of reliable coverage the carriers and their customers want. With the committee, we identified several town-owned parcels that are large and may provide visual isolation for placing a cell tower. Unfortunately, some are encumbered by conservation restrictions that strongly limit or preclude their use as cell sites. See table below.

With the committee, we identified the least intrusive way to add cell towers in the town to achieve the coverage expectations. Two prime goals are 1) to use large properties that are heavily wooded to minimize tower visibility to neighbors, and 2) to strategically locate the sites to achieve the most useful coverage with the least number of towers.

511 Sagamore Road

511 Sagamore Rd is a large wooded parcel including the soccer field, beside the elementary school. It is already in the wireless overlay district. It is well-positioned to provide coverage to the northwestern part of town, particularly along Sagamore Rd from town center to and including the area around the Rye traffic circle at Pioneer Rd (Foyes Corner). Coverage from this location complements the coverage that will be obtained from the Port Way tower. It would also complement coverage from the newly proposed site in the Recreation Area. Because existing coverage filters into the Sagamore Road area from Portsmouth, we expect this will be the last area carriers would seek to build a tower to improve service in Rye. Nevertheless, the 511 Sagamore Road parcel remains a key strategic location in the long-term wireless plan.

The 511 Sagamore Rd parcel is controlled by the Rye School District. The committee hopes the School District will be open to a new cell tower there, if and when a carrier expresses interest. It is an optimal location for completing town coverage, it will provide good service in and around the school, it is on a large non-residential parcel with substantial tree cover, and the revenue from site leasing would go to the School District.



Site	Address	Parcel	Area	Status
In Existing Overlay District				
School District parcel	511 Sagamore Rd	018-034-000	30 Ac.	Viable. Recreation/Conservation designation. Not restricted. In overlay district.
Recommended Addition to Overlay District				
Recreation Area	55 Recreation Rd	012-079-000	14 (within larger parcel)	Viable. Recreation use. Not conservation restricted.
Future Consideration, only if Current Plan Not Achievable				
Town parcel near Liberty Common and Sea Glass Lane	Wallis Rd	016-071-022	73	Both parcels acquired with federal funding. Would require federal clawback of a portion of the funding or an alternative conservation commitment to offset cell tower lease area.
Marden Woods	Washington Rd	016-129-001	24	
Fire Dept	555 Washington Rd	016-007-000	2	In Historic District. Possibly expand/replace existing tower.
Sites Considered but not Viable				
Town parcel behind Odiorne Dr	Wallis Rd	017-051-000	25	Deeded conservation.
Town parcel behind 204 Locke Rd	Locke Rd	012-002-000	12	Deeded conservation.

Table 1 - Table of Parcels Presently without Cell Towers and Considered by Committee

Recreation Land

The next optimal location is on the recreation land abutting the Town Forest. As a potential cell site, the recreation area location is optimally situated between the Grove Rd tower, Port Way and the Sagamore Rd site.

The Town Forest is under a conservation restriction.² The recreation area is excluded from this restriction. The recreation area is a 14-acre area heavily wooded around existing recreation

² The terms of the conservation easement allow the Town and County to negotiate changes to the restriction, but with the recreation area already set aside for development, any such changes in the Town Forest do not need to be contemplated.



development. According to documents, Town Meeting and Selectmen's approval are required to add development to the recreation area. The town must consult with the Town Forest custodian, but does not need their approval.

Other Sites

In the table above, the other sites considered are listed below the two prime sites. To simplify the process of modifying the overlay district and obtaining community support, the two prime sites are recommended for future cell tower use. Since these two sites can provide all the improved coverage that the town needs, and any further development after that should be handled by small wireless facilities on utility poles, the committee decided not to propose any other sites. Moreover, the 511 Sagamore Rd parcel is already in the overlay district. That leaves only the 55 Recreation Rd site to be added to the overlay district.

Ordinance

We marked up the wireless ordinance with comments and suggestions. The committee, in consultation with the Town Planner, recommends that the ordinance be replaced rather than simply updated. A proposed replacement draft has been produced. Separate documentation explains the intent of the proposed revisions.

Funding

The Selectmen also sought advice on how to fund and develop any proposed sites. We discussed the nature of the wireless facility development business with the committee and staff. Towers are almost never built on speculation. The best a town can do is to provide a clear, low-risk path to development of cell sites where the town is most interested in having them. In this case, because the prime locations are on Town property, there is a landlord component as well as the zoning component.

Once a site is added to the overlay district, the Town can line up the necessary internal approvals to enter into agreements with prospective wireless tenants. In the case of 55 Recreation Rd, the agreement establishing the Town Forest gives the Town Forest custodian the opportunity to consult with the Town on the proposed development on the Recreation Area, while approvals are required from Town Meeting and the Selectmen.

The committee recommends that this approval process be brought as far forward as possible so the Selectmen can be ready to strike when a carrier comes knocking. It would be most helpful if Town Meeting were to authorize the Selectmen to negotiate a lease with a prospective tenant, before a prospective tenant has come to the town. The lack of such pre-approval adds delay and risk to a carrier's effort to get approval to put a cell site on the parcel, creating a risk the carrier will move to easier-to-develop property outside the overlay district. The Selectboard would be given approval by Town Meeting to negotiate with a prospective cell-site developer. As the future landlord to the cell-site occupants, the Selectboard has the power to control the location and



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height of a new tower on the parcel and would do so in an open, public process when the time comes. With respect to the Recreation Area parcel, there is a requirement that any proposed development be devised in consultation with the Town Forest and Recreation committees.

The 551 Sagamore Rd site is controlled by the School District, and it would be prudent to have the School District deliberate the general question of having a future cell tower on the parcel, subject to negotiation with the future tenant, and go on record as being open to such negotiation. This paves the way for a carrier to have confidence that it will likely be successful entering negotiations to develop a cell site on the parcel.

The Town does not need to fund anything. Carriers will show up when they have internal authorization to develop a new site in the vicinity. The ordinance will point them to the town for discussion of the Town sites in the overlay district. Carriers are not easily swayed to build wireless facilities unless the sites have risen to the top of their priority lists. It may take time before another carrier comes to Town to add a tower. Carriers are likely to first attach to the Port Way tower (if it is approved), since it would already have been constructed for the first carrier.

In some instances, carriers delegate the site search process to a tower developer, or, in the absence of an immediate interest from any carriers, an enterprising tower developer could purchase lease options with landowners in anticipation of future interest from carriers. Involving tower developers as middlemen reduces some of the complications of dealing with multiple wireless tenants – the landowner has one paying tenant and the subtenants are all managed by the prime tenant. Some leases include a percentage-of-revenue component as more carriers are added to the tower. This makes the early life of the tower more cost-effective for the tower owner when there may be just one carrier on the tower. This is true whether the tower owner is the first carrier or a third-party tower company. As carriers are added to the tower, the landowner gets more revenue.

A less common model is when the landlord (the Town in this case) establishes ownership of the tower and realizes every penny of rent paid by each carrier tenant. This is more complicated to bring about. Either the Town must fund the construction of the tower, or it must have a simultaneous arrangement with multiple carriers to share the cost of construction and turn the tower over to the Town as part of the deal. As tower owner, the Town has additional responsibilities for adjudicating issues with and among the tenant carriers, and for maintaining the tower.

It is worth stating clearly: there is no way to compel carriers to come to town on the town's schedule. With all the best planning ahead and laying of groundwork, it may still take years for carriers to improve coverage in underserved portions of town.



Conclusion

Isotrope's work is complete with this submission and presentation to the Board of Selectmen. The committee has absorbed a decidedly complicated regulatory situation and has masterfully considered the options and developed a proposed way forward. Of most strategic importance is the addition of the Recreation Area to the Wireless Overlay District. This is in a part of town not well served by existing and potential cell sites. It complements the layout of other existing and potential cell sites throughout the Town. With this plan and the approval of the Port Way tower, it is expected that no more than two additional towers will be needed to provide good general coverage throughout the Town.

Also important is the updating of the Wireless Ordinance to be more consistent with the current federal and state requirements, and to give the Town better tools to control wireless facility siting and minimize the risk of undesirable results. Still open for discussion and not in the scope of this planning process, is how to regulate small wireless facilities in the public ways. To the extent zoning regulations do not apply, a separate grant-of-location process should be devised so carriers have clear guidance on Town expectations, to enable the Town to control the placement of small wireless facilities in the public way in light of federal law.

Respectfully submitted,

David Maxson, WCP
December 16, 2019

Attachments:

- A. Viewline examples of a possible tower location on the Recreation Area
- B. Coverage maps from existing, proposed and hypothetical sites



Attachment A – Viewlines from Possible Tower Location on Recreation Area

The approach to placing a tower near the playing fields on the Recreation Area at 55 Recreation Road is to minimize the visibility of the tower to residential neighbors while limiting its intrusion to the nearby Town Forest area. To illustrate a way to achieve this, the image below shows a potential tower location near the NW corner of the baseball field. This location was selected because it appears to be readily accessible, away from wetlands, and most importantly, away from the nearest residences.

This location is not a proposed location; it is an example of how to look for a low-visibility spot. More work needs to be done to select a location that works best for all stakeholders.

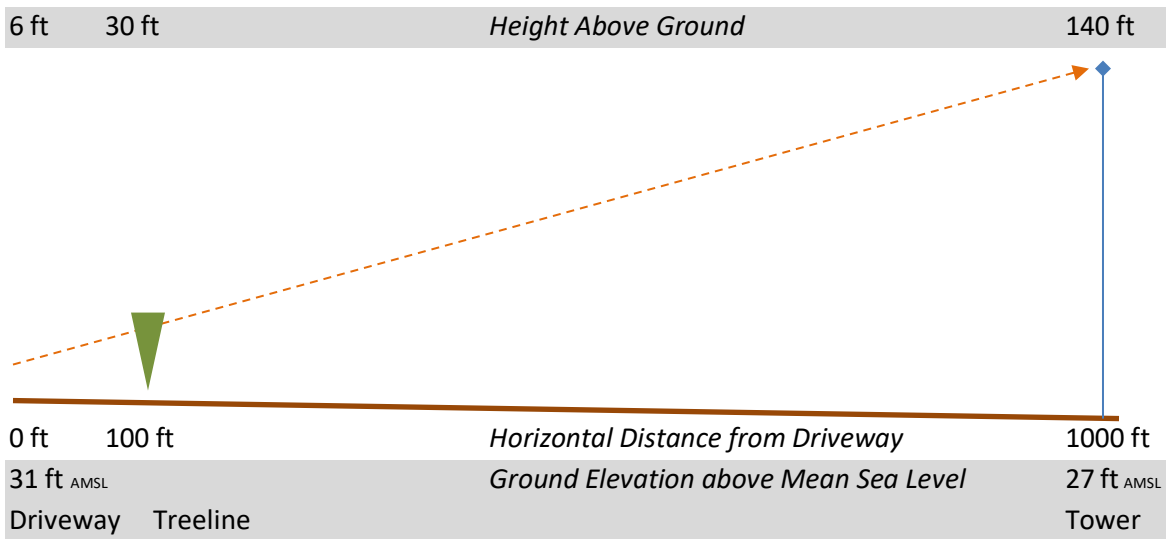
The image contains two lines illustrating the direction of view from the two closest residential parcels.



Viewlines to Two Nearest Residences



The orange line shows the direction of view from the front of the residence at 50 Recreation Road. The distance from the edge of the trees at the residence to the hypothetical tower location is about 900 feet. The trees are about 100 feet from the residence’s driveway. Using simple triangulation, one can estimate how high a tower would have to be to be visible above the tree line. Below, a 140-ft tower is simulated at 900 feet from the treeline and 1000 feet from the driveway. Trees are expected to be about 50 feet high, but a 30 ft height is used to err on the side of caution. The vertical scale is exaggerated to enhance readability without affecting the triangulation.



Example of View Obstruction by Vegetation from 50 Recreation Road Site

This diagram illustrates that a tower could be well screened visually from the 50 Recreation Road residence. This is a first approximation that indicates likely success. The next step in selecting a location on the Recreation Area and evaluating its visual impact would be to conduct a balloon test to determine at what height the tower would remain sufficiently screened by the vegetation.

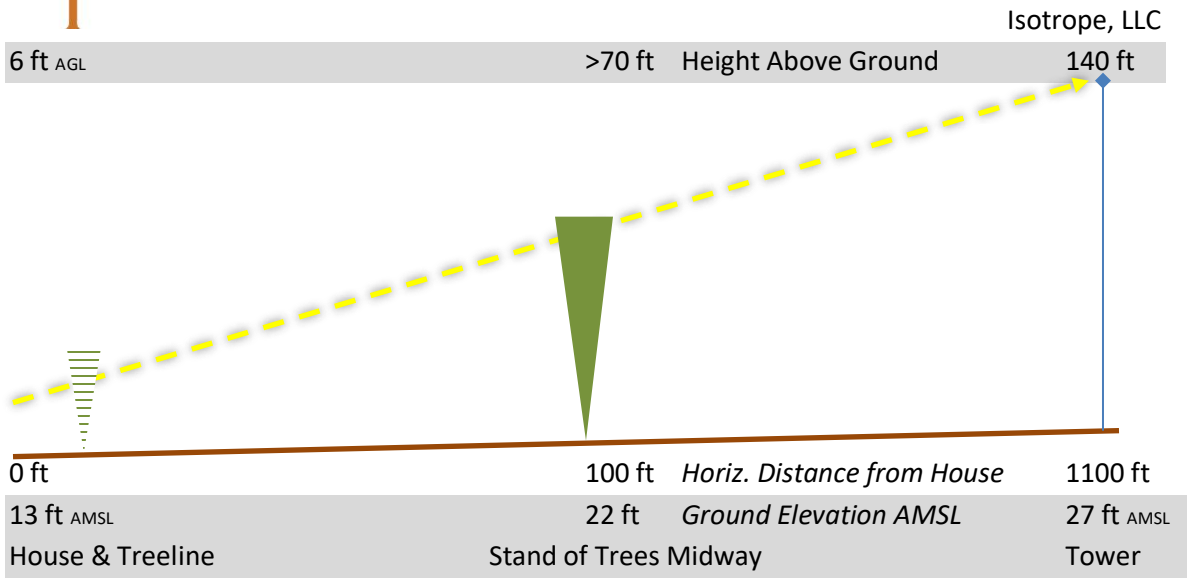
The second viewline is yellow, aimed south toward the 45 Recreation Road residence. The residence has no appreciable lawn space and is separated from the south ballfield by a 120-ft± stand of trees. The ballfield might still be partially visible especially in the winter. The yellow circle (above) indicates a 200-ft deep stand of coniferous trees at the midpoint between the hypothetical tower location and the residence. These trees are pictured, below, from the driveway of the Recreation Area (source – Google Street View).



Stand of Conifers between Ballfields, from Driveway

In the photo above, the estimated location and apparent height of a 140-ft tower is marked with an orange dashed arrow (toward left side of view). Because the trees screen the view from this spot, the tower would not be visible or might be screened by the trees. Bear in mind that the hypothetical tower location is some 800 feet from the spot of the camera, well behind the trees on the left. This is not a view from a residential location. It is merely used to illustrate the stand of tall trees between the two field areas on the Recreation Area.

Below, we have a viewline from the residence at 45 Recreation Rd, about 1100 feet from the hypothetical tower location. While there are trees surrounding the residence, one might be able to see through them across the nearby ball field. The stand of pine trees midway between the residence and the hypothetical tower location is simulated in the center of the graph below. It is likely that a tower as tall as 140 feet or more, would be hidden from residential view by that stand of trees.



Example of View Obstruction by Vegetation from 45 Recreation Road Site



View from Outfield Fence (near #45 Residence, which is ~150 ft behind camera)

In the last image above, a photograph captures the ball field between the residence at 45 Recreation Rd and the hypothetical tower location. The approximate location and apparent



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height of a 140-foot tower at the hypothetical location is marked with a dashed orange arrow. The tower would be about 950 feet from the camera, behind the trees. The trees would obstruct the view of the tower.

As with the prior viewline example, a field test using balloons could verify the location and height at which visibility of a tower would be minimized.

Reiterating, this location is not a proposed location; it is an example of how to look for a low-visibility spot. More work needs to be done to select a location that works best for all stakeholders.

Based on the distances to the nearest residences and the existing vegetation, it is highly likely that a tower of sufficient height to support several collocated carriers could be placed at a to-be determined location on the Recreation Area with no objectionable visibility to the residential uses in the area.

The exact location and height of a potential tower on the Recreation Area does not need to be selected now, knowing that it is likely that one or more successful locations exist. If and when a prospective cell-site developer (wireless carrier or tower company) is engaged to develop the site, the Selectmen retain control of the process to select the best location for minimal impact.



Attachment B – Coverage Maps from Existing & Potential Locations

The first coverage map below illustrates typical existing coverage in Rye. It combines coverage from sites out along Route 1, although individual carriers might not be at every site. The Grove Road tower is included, because all carriers are on it. Also, the Sprint installation in the steeple in Rye center is not modeled because of its limited height and coverage, and the inability to collocate all carriers in the steeple.

The water tank on Route 1 in Rye currently only supports Sprint antennas, so we did not show it on the first coverage map. Additional carriers could join the water tank site if they chose to, so we show coverage from it in the second map. Coverage from the water tank site on the SW edge of the town does not affect the decision-making process for the rest of the town. Note that while the water tank is technically on Breakfast Hill, we identified a cell site along I-95 that is near the other end of Breakfast Hill Road and uses that name.

The second coverage map adds the in-progress site on town property on Port Way and an additional site in the Recreation Area. The Recreation Area is the proposed addition to the Overlay District. This shows how much improvement these two locations could provide to Rye residents. Port Way and Recreation Road combine to provide a substantial reduction of the poor coverage in Rye.

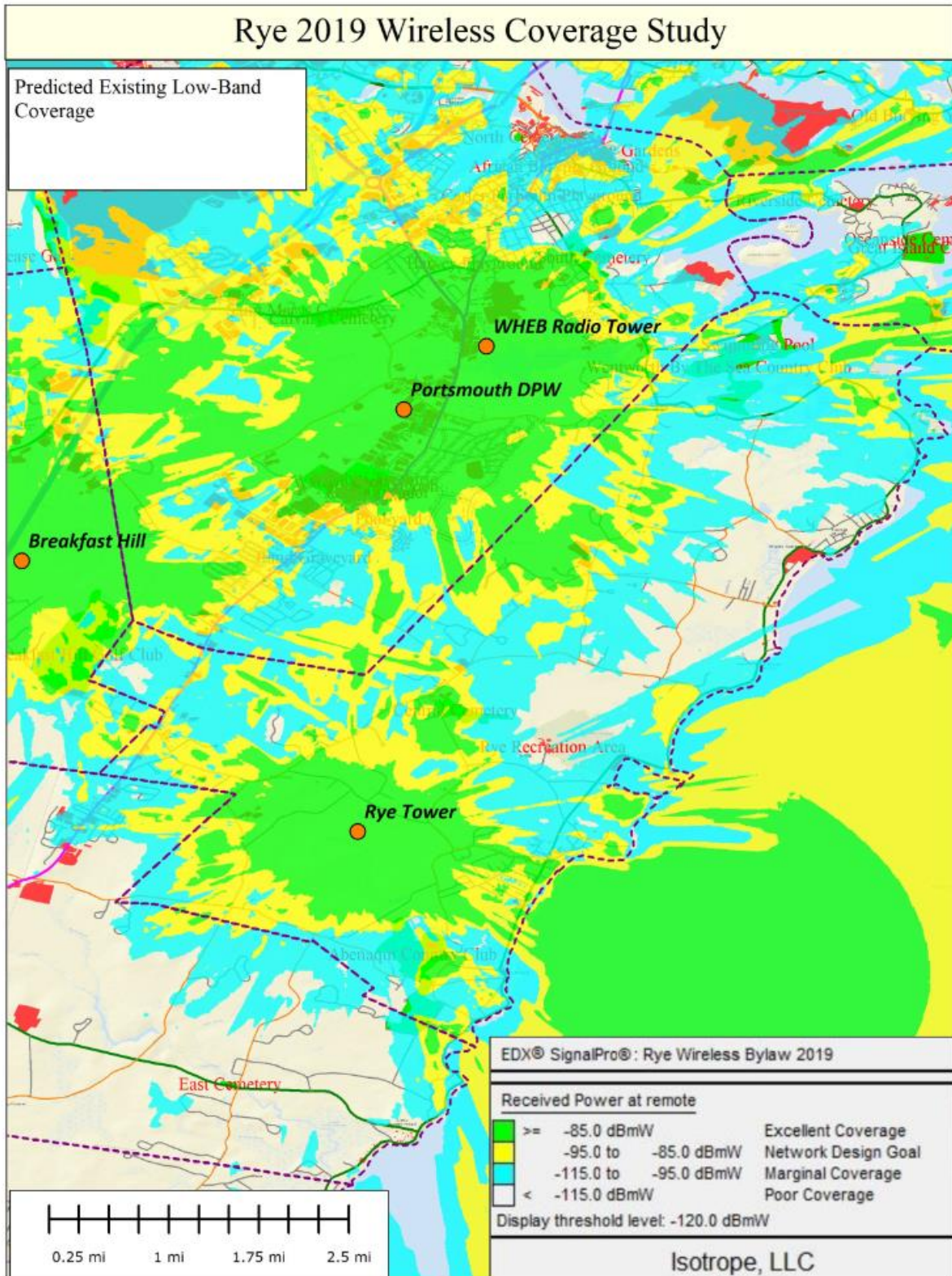
Some spillage of coverage from Route 1 in Portsmouth provides a smattering of service along the Sagamore Road area. When carriers have improved coverage to Rye from Port Way and from the Recreation Area, years from now, they might decide the need to relieve the capacity crunch on their Portsmouth facilities and improve coverage in this part of Rye. At this point, the 511 Sagamore Road location would be strategically located to complete the coverage in Rye and offload Rye network traffic from the Portsmouth towers. We do not expect a demand for a cell tower at 511 Sagamore Road right away.

The third coverage map is a conceptual plan of how essentially full coverage could be obtained in Rye, if a carrier chose to use the available locations. The 511 Sagamore Road site is added to the facilities shown on the previous map. 511 Sagamore Road is on the existing Overlay District and is the parcel beside the elementary school. We also added a short pole-mounted facility in Rye Beach District (in the parking lot of St Theresa church) just to illustrate how a pole could fill the need there.

Following that are two pairs of parcel maps and coverage maps. Each pair of maps depicts one additional parcel considered viable, but not optimally located. The Marden Woods parcel is near (2/3 mile SSW) the 511 Sagamore Road parcel, (the latter is already in the Overlay District, but in a pinch, this might be an alternate parcel, coverage-wise). Likewise, the parcel behind and beside Sea Glass Lane is about 0.8 mile SW of the 511 Sagamore parcel, also a potential coverage alternative to 511 Sagamore Road.

It must be noted that these two parcels are under the control of the Conservation Commission, having been acquired using the support of federal funds. It would be a complex and potentially costly process to recover a small lease area for a tower, which is a non-conservation use. By relying on the existing Overlay District parcel at 511 Sagamore and adding only one new parcel to the Overlay District at the Recreation Area, the best coverage is obtainable from the least change to the existing Overlay District table using sites that need no conservation-use mitigation.

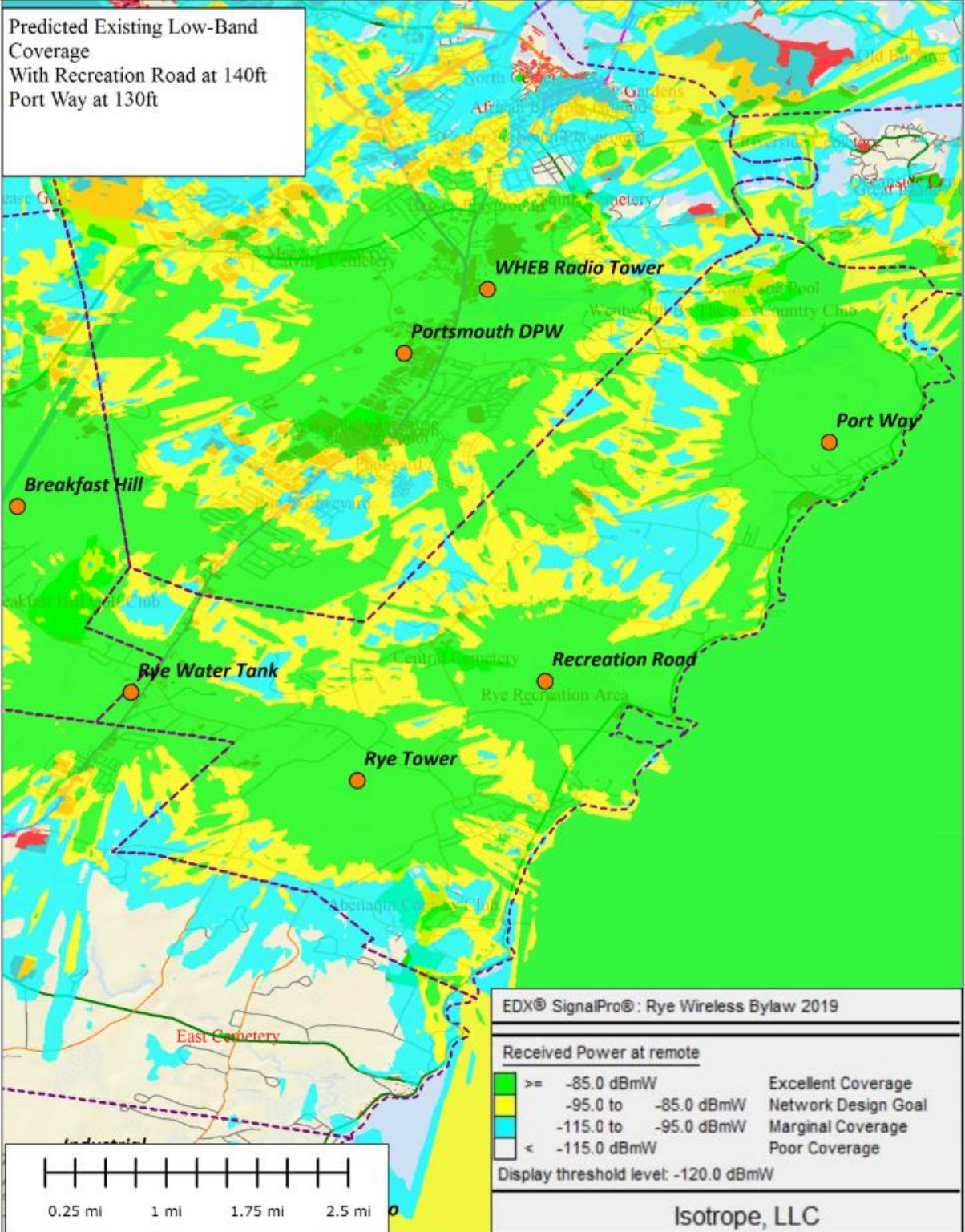
Another reason for adding the Recreation Area and continuing to rely on a potential future tower at 511 Sagamore, is that over time, the capacity of an additional tower in Rye will likely be stressed by the total residential population it would be expected to serve. The Recreation Area and the 511 Sagamore Road locations offer the best combination of viable sites, complementary coverage, and minimized community impact. For these reasons, the committee favors adding the Recreation Area to the Overlay District and holding off on trying to free up other sites to be added to the District.





Rye 2019 Wireless Coverage Study

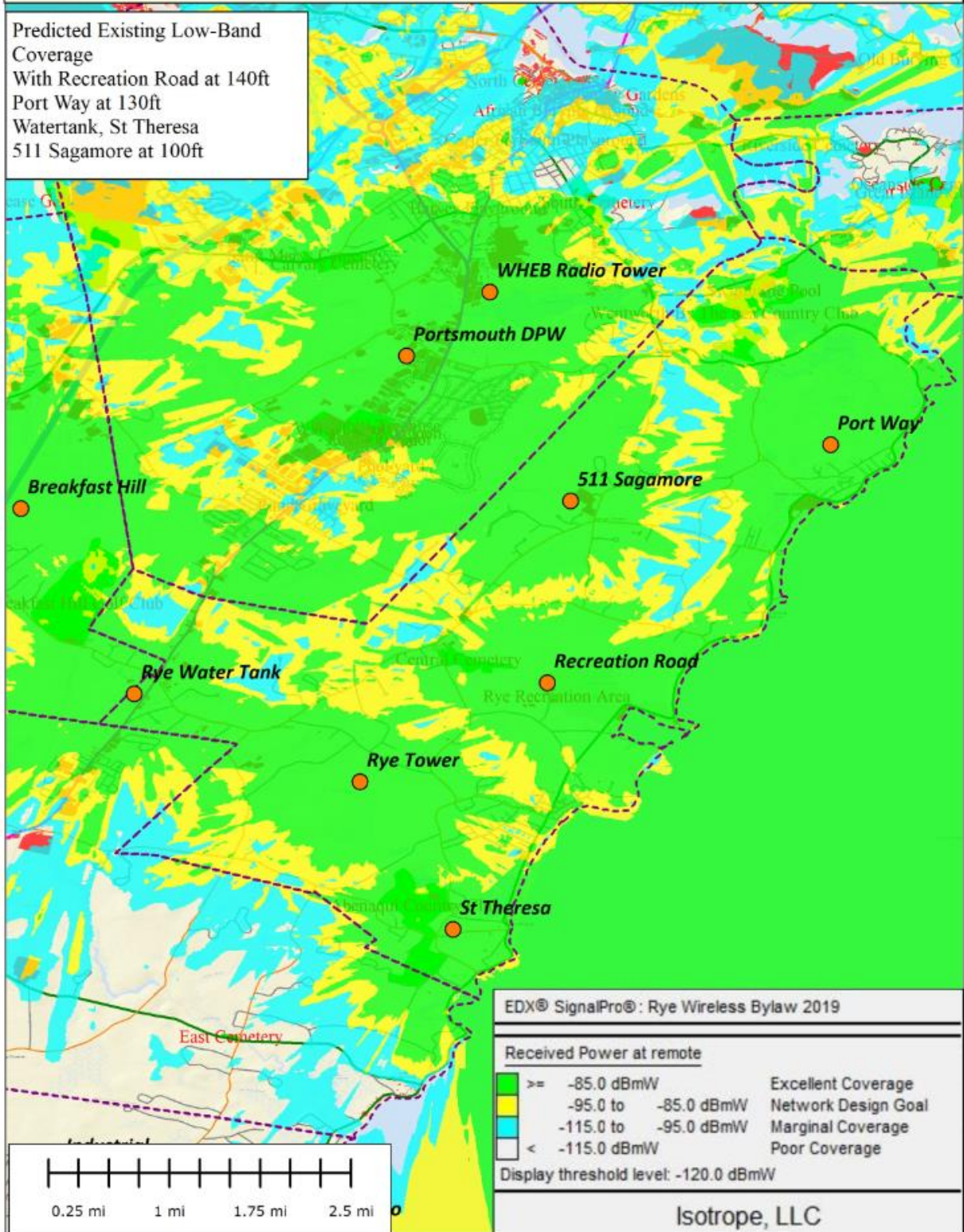
Predicted Existing Low-Band Coverage
With Recreation Road at 140ft
Port Way at 130ft

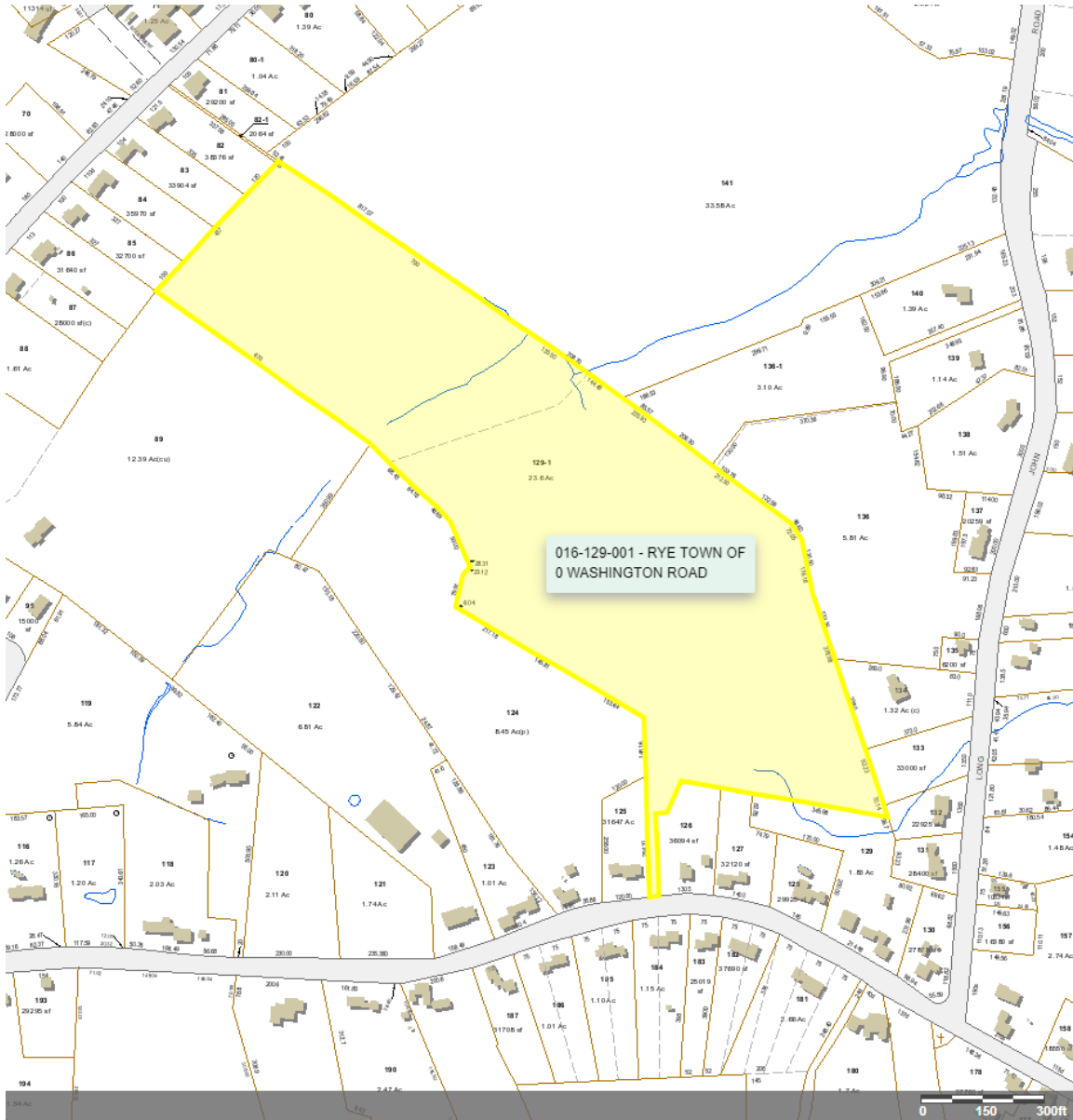




Rye 2019 Wireless Coverage Study

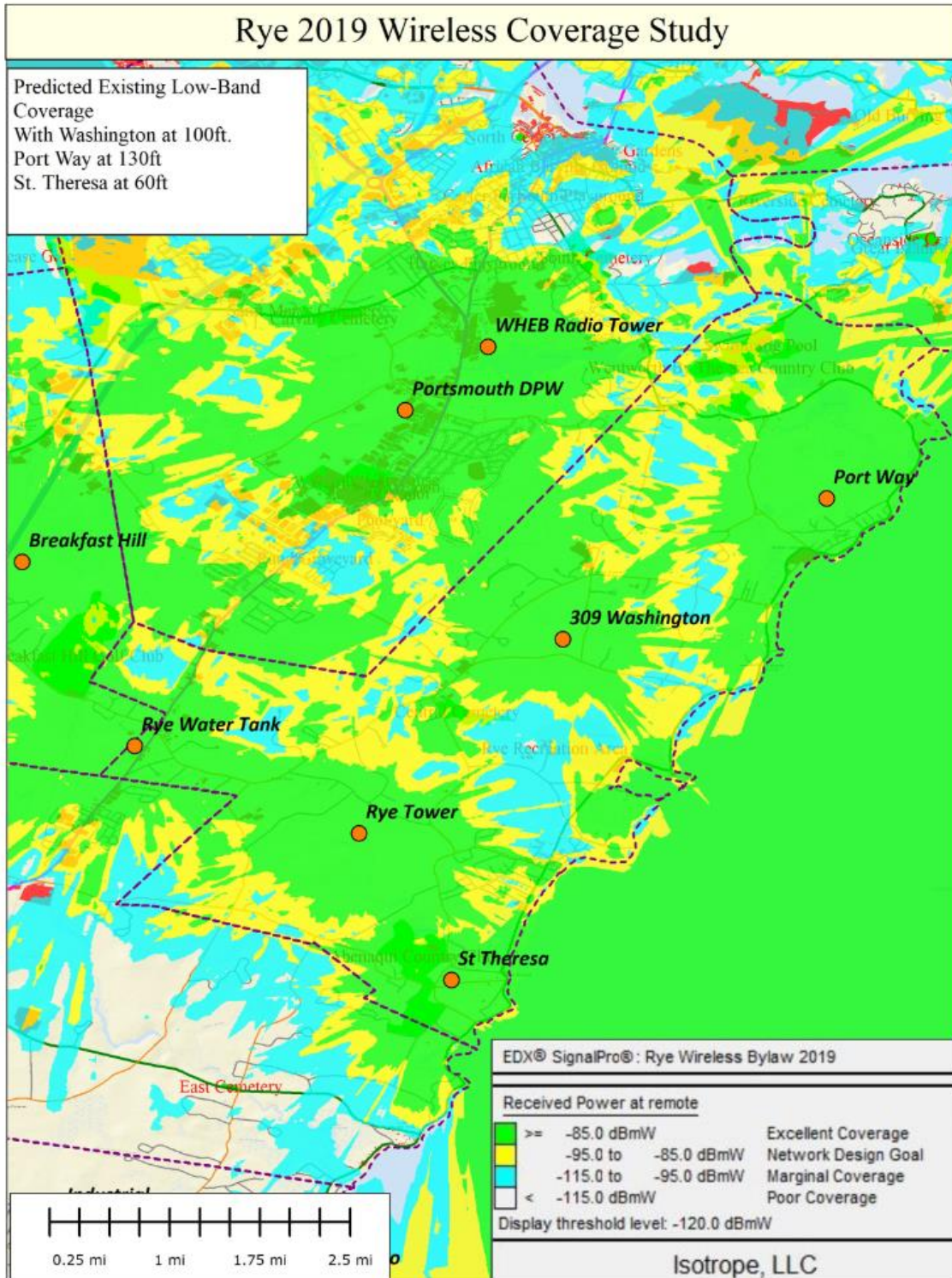
Predicted Existing Low-Band Coverage
 With Recreation Road at 140ft
 Port Way at 130ft
 Watertank, St Theresa
 511 Sagamore at 100ft

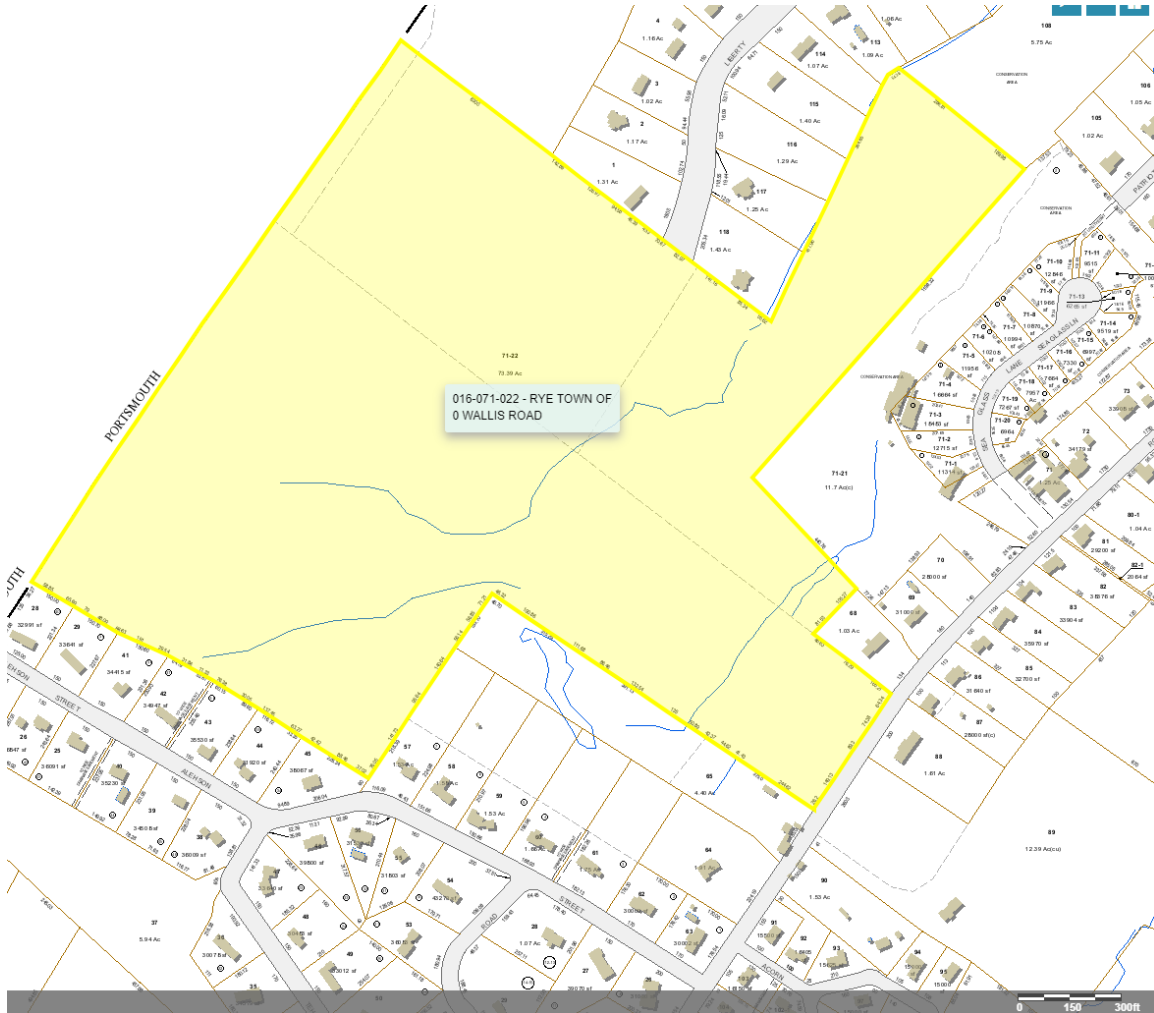




Marden Woods Parcel, between 305 and 315 Washington Rd (called “309 Washington” on coverage map)

The Marden Woods parcel (“309 Washington” on the coverage map) was acquired with support of federal funds and is in the custody of the Conservation Commission. Negotiation with NOAA would be necessary to set aside a lease area for a cell tower. Note that there is a town parcel abutting (016-133-000, 0 Long John Road) that might be utilized in a swap to maintain or increase protected land area while releasing a small tower lease area from the above parcel. This site is at best a backup to the plans proposed by the committee and no action need be taken at this time to consider it any further.





Parcel Between 537 and 587 Wallis Road (called Sea Glass on coverage map)

This parcel behind Sea Glass Drive is also controlled by the Conservation Commission as a result of a federal grant. Negotiation with NOAA would be necessary to set aside a small lease area for a cell tower. It could result in federal cost recovery from the town (or from wireless tenants) or an alternative land conservation commitment. This site is at best a backup to the plans proposed by the committee and no action need be taken at this time to consider it any further.

