



STATE OF NEW JERSEY
INFORMATION TECHNOLOGY



Comprehensive Public Safety Tower Plan for Pinelands

August 23, 2011
November 3, 2011 - Revised

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Executive Summary

The purpose of this study is to prepare a Comprehensive Plan on the placement of public safety towers in the New Jersey Pinelands Region. The major public safety agencies within the seven affected counties including Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, and Ocean have been engaged in this study to ensure stakeholder acceptance. In addition, V-COMM reviewed the requirements of the New Jersey State Police and New Jersey Transit.

The seven southern New Jersey counties lie within the areas administered by the New Jersey Pinelands Commission (PC). In addition, State of New Jersey agencies including OEM, NJT and others have statewide emergency communication responsibilities within the Pinelands. These counties and agencies must provide universal and reliable public safety communications within their respective jurisdictions and the state as well as interconnect into the State's E911 emergency communications system. In several of the counties, there is a need to erect additional radio towers to meet the critical goal of providing essential communications to the emergency first responders. These towers would be used to fill in coverage gaps where public safety communications do not exist or are not reliable. The purpose of this project is to identify viable and approvable sites that will allow timely approval of towers needed for emergency communications in supporting the overall mission of protecting property and the general public.

Over the past two decades, the New Jersey Pinelands Commission has worked with FCC licensed Commercial Wireless Carriers (CWC) to support the construction of new radio towers within the Pinelands jurisdiction. The CWCs have prepared several comprehensive plans over the years in support of the expansion of their communications coverage objectives and obligations under their FCC licenses.

The main goal of this Comprehensive Public Safety Tower Plan is to identify locations for new radio towers that meet the coverage needs and requirements of the public safety first responders and minimize the number and impact of radio towers, being fully observant of the needs to protect the Pinelands environment. This Comprehensive Public Safety Tower Plan has been developed identifying tower locations within the Pinelands Jurisdiction that address the present and anticipated future emergency communications gaps for county and state agencies, limiting impact to the Pinelands environment, consistent with the Commission's Regulations.

In reaching out to NJ Transit, V-COMM has identified their areas of concern along the bus and rail lines in an effort to coordinate these needs with the needs of the seven counties. Additionally, V-COMM analyzed the current and future coverage strategies for the New Jersey State Police.

V-COMM Background

Founded in 1995, V-COMM is a leading provider of integrated network engineering and support services to telecommunications companies, government and private industry clients across the United States and Internationally. With offices in Cranbury, NJ and Blue Bell, PA, V-COMM is comprised of three departments: Network Engineering Services, RF Engineering Services and Business Services. Through various partners and relationships with other companies, V-COMM has access to a global employee base of over 1,000 people with a vast array of resources and expertise to meet our client's needs. In addition to its two primary east coast locations, V-COMM has affiliate office facilities in over 50 additional cities located throughout the continental U.S enabling V-COMM to support projects requiring regional resources. V-COMM's company size and customer focus allows us to be flexible and quick to respond to changing demands while our network of partners provides additional resources and the ability to scale according to a project's specific requirements.

V-COMM became a leader in telecom engineering by providing clients with its innovative "Virtual Engineering Program." This product consists of a completely customized plan for each individual client that addresses all phases of planning, execution and maintenance of high-performance communications networks. To ensure success, V-COMM uses the combined talents of its entire staff to drive each project through completion, providing reliable, scalable and secure network solutions.

V-COMM's strength comes from the broad expertise of its professional staff, and over 75-years of combined experience within its exceptional executive leadership. Under this leadership, V-COMM has expanded its product offerings to include a full range of Network and RF Engineering support services for our Carrier, Enterprise, Healthcare, and Governmental clients including:

- Network and RF design and optimization services
- RF design tools
- Traffic and network capacity engineering, forecast and management
- System optimization
- FCC and FAA Licensing and Regulations
- Technology Evaluation
- Project management
- Business planning
- RFP generation and evaluation
- Network design tools
- Telecommunications Master Plans
- Measurement hardware
- Regulatory advisory assistance
- Expert witness testimony

V-COMM's expertise comes from years of operational experience in the wireless, wire line, vendor, RBOC and IXC world, providing the appropriate expertise ensuring project success.

Further, V-COMM's extensive operational experience includes working with all components of the management team along with infrastructure vendors, telecommunication carriers, cable companies, government agencies and end users. This enables us to plan and build networks that are efficient, reliable, and cost effective to produce a value to our clients, their employees and their customers.

V-COMM understands the availability requirements of critical communications networks. With experience designing and optimizing some of the largest commercial communications networks in North America, V-COMM has real world experience in planning network conversions and system migrations that necessitate little or no service impacting network outage to complete. As part of V-COMM's experience, our engineers have provided planning, design and project/vendor management for multiple switching systems and network transport migrations. Such large scale network migrations involve fixed network re-deployments, new switching design and implementation, switching system and transport cutovers, NXX and signaling (SS7/SIP/SIGTRAN) re-pointing and certification that could have extreme negative impact to network operations if not properly executed. Using our carrier class network experience allows V-COMM to provide the best possible solution with the least operational impact to meet the demands of the wireless industry.

V-COMM has successfully performed switching system migrations and vendor cutovers that have involved hundreds of radio sites and multiple switching offices that could have impacted operation to thousands of end users. Additionally, V-COMM has planned and managed transport network cutovers involving T-1 to OC-192 fiber transport systems including the addition or reconfiguration of fiber nodes resulting in minimal network outage. Using this expertise, V-COMM has assisted carriers, enterprise, and municipal clients in assessing requirements, developing and implementing the most cost efficient solutions while meeting or exceeding our clients' expectations.

V-COMM continues to play an important role in the telecommunications industry through relationships with our clients. Most recently, V-COMM is supporting an industry consortium led by Verizon in evaluating the efforts of co-licensed technologies on system performance. Additionally, V-COMM's work in the newly released 700 MHz broadcast spectrum, as well as studies submitted to the FCC Office of Engineering, have resulted in FCC regulatory changes. This allows V-COMM's clients to expand the usage of adjacent band frequencies, thus further enhancing their markets and service capabilities. With V-COMM's involvement, these projects are re-shaping the regulatory framework of the FCC regarding spectrum policy, and will for years to come.

V-COMM is qualified by the FCC and US Department of Justice as telecommunications engineering experts providing testimony and technical analysis on major industry initiatives.

Some of our other accomplishments include:

- Provided engineering support and FCC filings for a major 700 MHz licensee
- Performed technology assessment of OFDM infrastructure for nation-wide deployment to include long-term traffic and capacity capabilities based on voice, video and data service offerings, propagation studies to include in-building penetration, subscriber management capabilities and network security (AAA)
- Acted as engineering expert for major US city in development of specifications, RFP generation and vendor evaluation for next generation city-wide wireless data network for: emergency communications, high speed data, streaming video, real-time CAD and city data access to field, traffic control and in-building coverage requirements
- Performed engineering studies for carrier consortium for FCC filings regarding terrestrial network interference as result of proposed air-to-ground frequency reuse
- Served as expert witnesses providing testimony and exhibits in legal cases for commercial wireless and municipal transmission sites across the U.S.
- Performed network audits, technology assessments, and implementation management of new VoIP solutions for multiple Municipalities
- Performed network audits, transport redesign of voice telecommunications network and billing reconciliation for a major casino operator with three casinos in Atlantic City, NJ and corporate offices in New York, NY.
- Provided engineering resources to facilitate the launch of new technology applications across the US for a national PCS carrier
- Provided expert analysis, field-testing, and recommendations for municipal public land mobile systems
- Designed conversion of existing private fiber WAN supporting FDDI services into expanded network coverage supporting GigE networks for government and emergency communications
- Provided project management and design services for municipal public land mobile systems

V-COMM has experience in all aspects of voice, data and video communication network. Our technology experience includes wireless access such as LTE, OFDM, CDMA, TDMA, FDMA, Wi-Fi, WiMAX, APCO 16, APCO 25, EDACS™, SMARTNET™ as well as transport technologies, TDM, IP, SONET, ATM, frame relay, Fiber Optics, DS1/DS3/OC3 thru 192, Microwave and other point to point and Mesh Solution. V-COMM's switching experience includes both circuit switched and packet switched networks and includes a strong understanding of various WAN technologies (Frame Relay, ATM, MPLS) and other networking technologies including TCP/IP, DHCP, TFTP, VLAN, and QoS. V-COMM has also provided design and testing services for a wide variety of in-building systems including in-building antenna system

design with distributed discrete antenna system (DAS) design and leaky feeder design with link budget analysis.

V-COMM's unique combination of both RF and Network engineering expertise has resulted in V-COMM developing network solutions scaling from small office applications through nationwide carrier network deployments. V-COMM's designs have been implemented to provide voice, video, and data applications for our clients and have involved multi-vendor/multi-site markets and multi-jurisdictional regions, including four of the largest switching systems maintained in the US.

Through V-COMM's partners, we are able to provide additional traditional data center physical infrastructure and server consulting services including:

- Data Center Design and Development
- Outside Plant Design
- Cabling Design and Implementation Management
- IT & Data Center Re-location (Turnkey)
- Storage and Backup Solutions
- Power Management
- Application Development
- E-Services
- Firewall Solutions
- Operating System Upgrades
- Asset Tracking
- Email/Collaboration
- Virus Protection
- Remote Access Solutions

Pinelands Project Background

Since 1981, when the Pinelands Comprehensive Management Plan (CMP) went into effect, the construction of tall structures has been discouraged throughout much of the Pinelands Area. These regulatory limitations, which incorporated a 35-foot height limit in N.J.A.C. 7:50-5.4, were intended to prevent the littering of the Pinelands skyline with structures that significantly detract from the scenic qualities which federal and state Pinelands legislation called upon the Pinelands Commission to protect. There were, of course, exceptions to this requirement: certain structures were allowed to exceed 35 feet in height; and no restrictions were placed on height within the two most development-oriented Pinelands land management areas - Regional Growth Areas and Pinelands Towns.

However, in 1994, as the Pinelands Commission was nearing the end of its second full review of the CMP, representatives of the cellular telephone industry requested that the Commission take note of the growing need for portable telephone communications and the associated need for the placement of antennas higher than 35 feet in all parts of the Pinelands Area. To accommodate what it felt was a legitimate need, the Pinelands Commission in 1995 amended N.J.A.C. 7:50-5.4 to permit local communications facilities to exceed the 35-foot height limit if a comprehensive plan for the entire Pinelands is first prepared and approved by the Pinelands Commission. The regulations recognized that: local communications systems rely on a network of facilities to receive and transmit radio signals; the location of each cell within this network has an effect on the location of other cells; and a well designed and integrated network can avoid the proliferation of towers throughout the entire Pinelands Area, and, most importantly, in its most conservation oriented areas. Once a comprehensive plan is approved, the regulations anticipate that site specific siting decisions will be made and that individual development applications will be submitted and evaluated against a series of site specific development standards. These regulations were adopted by the Commission in June 1995 and went into effect on August 21, 1995.

The adopted regulations required providers of “the same type of service” to jointly submit a comprehensive plan, primarily to ensure that the least number of facilities is built in the Pinelands overall. Members of the cellular industry (comprising Verizon [formerly Bell Atlantic Mobile], Cingular [formerly Comcast], and Nextel) responded by submitting a regional plan (generally referred to as the Cellular plan) that was approved by the Commission in September, 1998. Almost immediately thereafter, representatives of the PCS industry (including Sprint Spectrum and T-Mobile [formerly Omnipoint]) made inquiries of the Commission regarding the procedures and components involved in an acceptable plan for their service. The Commission staff described the process and the necessary information for a complete plan and indicated that the PCS plan would need to incorporate and expand upon the siting array presented in the approved cellular plan (i.e., the PCS plan would effectively serve to amend the cellular plan). The PCS plan was approved by the Commission in January, 2000.

AT&T contacted the Commission in 2001 concerning an amendment to the PCS plan and submitted an initial draft amendment late that year. With the advice of the Commission staff, the

amendment was revised several times and a version was submitted on October 28, 2003 that was then deemed complete by the staff. AT&T's submission constituted an amendment to both the cellular and the PCS plans because the company's communications system functioned at both the cellular and PCS frequency bands.

Conformance With The Comprehensive Management Plan

N.J.A.C. 7:50-5.4 contains the standards against which this Comprehensive Public Safety Tower Plan is to be judged. If these standards are met, the Commission should approve the plan. If the standards are not met, the Commission cannot approve the plan, but may conditionally approve or disapprove it, depending on the extent and severity of the plan's deficiencies.

For purposes of review, the standards of N.J.A.C. 7:50-5.4 have been separated into ten criteria.

1. The amendment must be agreed to and submitted by all providers of the same type of service, where feasible. N.J.A.C. 7:50-5.4(c)6.

This requirement is intended to ensure that the greatest possible degree of coordinated planning occurs to minimize the number of new structures in the Pinelands Area. V-COMM, with the support of the State of New Jersey Office of Information Technology (OIT), has reached out to the major first responder agencies within the Pinelands jurisdiction, including the county communications officials from Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester and Ocean Counties, New Jersey State Police, New Jersey Department of Environmental Protection and New Jersey Transit. This Comprehensive Public Safety Tower Plan will incorporate the needs and/or input from all of the above agencies, and thereby comply with their criteria.

2. The plan must review alternative technologies that may become available for use in the near future. N.J.A.C. 7:50-5.4(c)6.

The purpose of this standard is to identify those other technologies which should, at the very least, be considered as the pending plan is reviewed. Over the past several years, the Commission staff became aware of the existence of a specific technology that may prove useful in reducing the need for intrusive new towers in select areas of visual sensitivity. The staff was contacted by representatives of a company engaged in this technology, referred to as Distributed Antenna Systems (DAS), and obtained some materials describing its potential applicability. The system employs a series of low-mounted antennas, generally attached to telephone poles and connected by fiber-optic cable, in lieu of a single tall tower. While this technology may have its place in dense urban and suburban environments for the CWCs, there is great uncertainty as the viability of this technology for use in large scale public safety systems in rural areas. The major factor being the absence of infrastructure to locate the DAS systems to cover the large stretches of the Pinelands where there are no roads, telephone poles or fiber optic backhaul. A DAS system requires multiple antennas having a limited signal distance that really would only cover the roadway near the antennas (presuming they are mounted on existing poles in the road ROW). Therefore, use of DAS technology to extend public safety systems in the Pineland's region would be ineffective at providing first responders communications capabilities in the large forested areas (areas which may be targeted for search and rescue operations).

3. The plan must show the approximate location of all proposed facilities. N.J.A.C. 7:50-5.4(c)6.

This Comprehensive Public Safety Tower Plan graphically presents the approximate location of all facilities that are proposed for seven counties' public safety agencies. There is an overall map showing all the proposed sites and also county by county maps. In addition, there are detailed tables providing specific location data for each proposed site, including geographic coordinates (latitude/longitude) and proposed height for each of them. The Plan describes each proposed facility in narrative form.

The design for Phase 3 of this plan, which identifies the facilities needed to support public safety's long term requirements for broadband data as part of the National Public Safety Broadband Data network, incorporates locations that are already approved by the Pinelands Commission as part of the Cellular and PCS Plan submissions and subsequent amendments. These specific locations will also satisfy the coverage requirements of the counties. Should an approved location not have a tower, then the individual county will petition the Pinelands Commission to take over that particular location's approval and erect the tower. However, if there is an existing tower at the approved location, that tower will need to be evaluated as to whether the facility is suitable for co-location based on antenna space availability, structural integrity and financial terms. Otherwise, a new structure will be required.

There are two proposed locations in Phases 1 and 2 where the existing approved facilities cannot support the planned antenna load for the new 700 MHz two-way voice communication system and the county has identified a new facility location to provide service in that part of the Pinelands. The two locations are in Burlington County, Medford 1 site and "Section 5 Maint" site in New Gretna, NJ.

The design for Phase 3 of this plan, which identifies the facilities needed to support public safety's long term requirements for broadband data as part of the National Public Safety Broadband Data network, incorporates locations that are already approved by the Pinelands Commission as part of the Cellular and PCS Plan submissions and subsequent amendments. These specific locations will satisfy the coverage requirements of the counties. Should the approved location not have a tower, then the individual county will petition the Pinelands Commission to take over that particular location's approval and erect the tower. However, if there is an existing tower at the approved location, that tower will need to be evaluated to whether the facility is suitable for co-location from both a structural and financial basis.

4. The plan must include five and ten year horizons. N.J.A.C. 7:50-5.4(c)6.

This Comprehensive Public Safety Tower Plan includes the projected tower locations for both immediate term (1 to 5 years) as well as long term requirements (5 to 10 years). As will be described later in this Plan, we initially focused on coverage requirements for two-way voice communications and identified the tower locations needed to insure that first responders had two-way voice coverage throughout the Pinelands areas. The second part of the analysis focused on the coverage needed to support the implementation of broadband data technology within the

Pinelands and the future of public safety communications. With the launch of CWCs LTE 4G networks and the recent action by Congress to promote the implementation of a Nationwide Broadband Public Safety Network, we identified the tower locations needed, in addition to those identified in this two-way voice analysis, to insure that first responders had broadband data coverage throughout the Pinelands areas.

5. The plan must demonstrate that every facility proposed in the Pinelands Area is needed to provide adequate service. N.J.A.C. 7:50-5.4(c)1.

As part of this Comprehensive Plan, V-COMM prepared detailed coverage analyses of each of the seven counties' public safety communications systems. The coverage analyses included importing the existing radio parameters for each of the counties into an industry standard radio propagation modeling tool. We analyzed the output of the model and identified the gaps in coverage for each county in terms of "on-street" coverage for in-vehicle mobile radios and hand-held portable radios. The coverage gaps are areas where there is inadequate service for first responders to make and receive transmissions from the respective public safety radio networks. The proposed facilities in this Comprehensive Plan are to fill in the coverage gaps so that the public safety radio networks provide "adequate service" first responders. The term "adequate service" is used in N.J.A.C. 7:50-5.4(c) three times. Specifically at N.J.A.C. 7:50-5.4(c)1, adequate service is described as that which "serves the local communication needs of the Pinelands, including those related to public health and safety." It was recognized at the outset that this distinction could play an important role in determining both the number and location of wireless facilities in the Pinelands Area because the height and proximity of the antennas exert a tremendous influence on the quality of service. To judge, as is required by this CMP standard, whether every facility proposed in the Pinelands is needed, an objective definition of adequate service is when there is sufficient, interference free, radio signal for first responders to make and receive transmissions from their respective public safety radio networks.

This Comprehensive Plan indicates that 49 out of the 50 proposed facilities are necessary for coverage. Of the 49 proposed coverage facilities, there are two proposed locations where the existing approved facilities cannot support the respective planned antenna load for a new 700 MHz two-way voice communication system and the county has identified a new location to provide service in that part of the Pinelands. The two locations are in Burlington County; the Medford 1 site and "Section 5 Maint" site in Bass River, NJ.

There is one proposed facility that is not needed specifically based on coverage; it is the new Mays Landing Site in Atlantic County. That tower will be co-located at Atlantic County's newly proposed 911 Dispatch Center and the tower will be used for wireless backhaul to the other county radio towers located throughout the county. The use of wireless backhaul or microwave provides improved reliability and long term cost savings over the use of leased telephone facilities. Most public safety agencies in New Jersey have, or are in, the process of migrating to wireless backhaul, as the reliability of analog leased facilities has declined significantly over the past decade, and specifically in remote and rural areas like the Pineland's region.

There are two proposed locations in Phases 1 and 2 where the existing approved facilities cannot support the planned antenna load for the new 700 MHz two-way voice communication system and the county has identified a new facility location to provide service in that part of the Pinelands. The two locations are in Burlington County, Medford 1 site and “Section 5 Maint” site in New Gretna, NJ.

6. The plan must demonstrate that the facilities to be located in the Preservation Area District, the Forest Area, the Special Agricultural Production Area and 17 specific Pinelands Villages are the least number necessary to provide adequate service, taking into consideration the location of facilities outside the Pinelands. N.J.A.C. 7:50-5.4(c)6.

The various public safety agencies have taken advantage of the existing facilities both within and outside of the Pinelands Preservation Area to provide the necessary coverage to support first responders. The purpose of this Comprehensive Plan is to identify locations to fill in coverage gaps where there is unreliable service for first responders. The plan incorporated the needs and direction from eight public safety agencies as well as the NJDOT and NJ Transit. The Plan assumes that multiple agencies will be able to take advantage of each proposed facility. Specifically, NJ State Police and NJ Transit both stated that they will “piggy-back” on the counties’ system designs and co-locate on the facilities that support their coverage requirements. NJ Transit is specifically interested in the proposed Jackson site in Ocean County and the Cumberland Volunteer Fire site in Cumberland County to fill coverage holes in their radio network servicing the NJ Transit bus lines in the Pinelands area. In the end, the proposed network of 50 new facilities within the Pinelands includes 17 in the most conservation oriented land management areas.

The design for Phase 3 of this plan, which identifies the facilities needed to support public safety’s long term requirements for broadband data as part of the National Public Safety Broadband Data network, incorporates locations that are already approved by the Pinelands Commission as part of the Cellular and PCS Plan submissions and subsequent amendments. These specific locations will satisfy the coverage requirements of the counties. Should the approved location not have a tower, then the individual county will petition the Pinelands Commission to take over that particular location’s approval and erect the tower. However, if there is an existing tower at the approved location, that tower will require evaluation as to whether the facility is suitable for co-location from both a structural and financial basis.

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These specific locations will satisfy the coverage requirements of the counties. Should the approved location not have a tower, then the individual county will petition the Pinelands Commission to take over that particular location's approval and erect the tower. However, if there is an existing tower at the approved location, that tower will need to be evaluated as to whether the facility is suitable for co-location from both a structural and financial basis.

7. The plan must demonstrate that the antenna utilizes an existing communications or other structure, to the extent practicable. N.J.A.C. 7:50-5.4(c)3.

The design for Phases 1 and Phase 2 of the plan, which identifies the facilities needed to support narrowband two-way voice communications, are located in areas of the Pinelands where there are few existing tower locations. The public safety agencies have taken advantage of the previously approved facilities within the Pinelands and existing and new structures outside of the Pinelands Area to provide service in the Pinelands Areas. For the majority of the locations in Phases 1 and 2, new structures will be required as there are no existing approved facilities upon which to co-locate. In certain cases, there may be a previously approved location in close proximity. Should the approved location not have a tower, then the individual county will petition the Pinelands Commission to take over that particular location's approval and erect the tower. However, if there is an existing tower at the approved location, that tower will require evaluation as to whether the facility is suitable for co-location from both a structural and financial basis.

There are two proposed locations in Phases 1 and 2 where the existing approved facilities cannot support the planned antenna load for the new 700 MHz two-way voice communication system and the county has identified a new facility location to provide service in that part of the Pinelands. The two locations are in Burlington County, Medford 1site and "Section 5 Maint" site in New Gretna, NJ.

The design for Phase 3 of this plan, which identifies the facilities needed to support public safety's long term requirements for broadband data as part of the National Public Safety Broadband Data network, incorporates locations that are already approved by the Pinelands Commission as part of the Cellular and PCS Plan submissions and subsequent amendments. These specific locations will satisfy the coverage requirements of the counties. Should the approved location not have a tower, then the individual county will petition the Pinelands Commission to take over that particular location's approval and erect the tower. However, if there is an existing tower at the approved location, that tower will need to be evaluated as to whether the facility is suitable for co-location from both a structural and financial basis.

8. The plan must demonstrate or note the need to demonstrate when the actual siting of facilities is proposed that, if a new supporting structure (tower) with antennae is to be constructed, it can probably be sited according to the six criteria in N.J.A.C. 7:50-5.4(c)4. These criteria deal with satisfying technical operating requirements; minimizing visual impacts from public areas, wild and scenic rivers and special scenic corridors, the Pine Plains, the Forked River Mountains and residential areas; and, if proposed in the Preservation Area District, Forest Area, Special Agricultural Area, or Rural Development Area, locating the facility in non-residential zones, nonconservation public lands, mines, first aid or fire stations, and landfills.

While it is acceptable for a plan to note the need to demonstrate adherence to these siting criteria when individual facilities are proposed, there must also be a reasonable expectation when this Comprehensive Plan is approved that the proposed facilities can, in fact, be sited. Without this expectation, the Comprehensive Plan is meaningless because there can be no confidence that the proposed facility network is realistic. This does not require the same type of comprehensive analysis required at the time a specific development application is filed; rather, it is a planning review to ensure that there is a reasonable probability that qualifying sites exist.

9. The plan must demonstrate or note the need to demonstrate when the actual siting of facilities is proposed that supporting structures (towers) are designed to accommodate the needs of any other local communications provider which has identified a need to locate a facility within an overlapping service area. N.J.A.C. 7:50-5.4(c)2. A closely related CMP standard also requires that the plan must demonstrate or note the need to demonstrate when the actual siting of facilities is proposed that the supporting structure, if initially constructed at a height less than 200 feet, can be increased to 200 feet to accommodate other local communications facilities in the future. N.J.A.C. 7:50-5.4(c)5. Another closely related standard in N.J.A.C. 7:50-5.4(c)6. requires that the plan must provide for joint construction and use of the supporting structures (towers).

This requirement is intended to ensure that the greatest possible degree of coordinated planning occurs to minimize the number of new structures in the Pinelands Area. V-COMM, with the support of the State of New Jersey OIT, has reached out to the major first responder agencies with the Pinelands jurisdiction, including the County Communications officials from Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester and Ocean Counties, New Jersey State Police, New Jersey Department of Environmental Protection and New Jersey Transit. This Comprehensive Public Safety Tower Plan will incorporate the needs and/or input from all of the above agencies.

The public safety agencies involved in this Comprehensive Plan commit to design and construct all new structures such that they can be increased in height to 200 feet if necessary to accommodate other public safety agencies' communications requirements. With respect to other communications providers, a determination will need to be made whether their operations would be compatible with public safety's use of the tower and that it would not cause any interference to the use or inhibit future public safety uses at that location.

10. If it reduces the number of facilities to be developed, shared service shall be part of the plan unless precluded by federal law. N.J.A.C. 7:50-5.4(c)6.

The public safety agencies have agreed to co-locate on each other's facilities and jointly develop sites where there are overlapping coverage requirements. With respect to utilizing Commercial Wireless developed facilities (CWDF), the public safety agencies, in principal, have no objection to co-location to reduce the overall number of facilities within the Pinelands. This assumes that there is sufficient structural capacity in the tower to support the proposed antenna system load and that the site will meet the respective agency's coverage requirements and that the public safety agency will have unfettered 24 hour, 365 day access to the site and tower. However in most cases, the CWDFs are designed to support the equipment requirements of Commercial Wireless Carriers (CWC), including antenna separation to support their needs and utilizing the highest available antenna locations, thereby public safety relegating, public safety agencies to the lower antenna locations. Should the CWDFs be able to support an expansion of the height of the tower to meet the coverage objective of the public safety agencies, then these existing CWDFs may be of use to the public safety agencies. The other deterrent to co-location on the CWDFs is the high monthly rent normally charged for co-locations. In some cases, the CWCs have waived these fees if the CWDF is owned by the CWCs themselves, however in many cases the CWCs have sold the towers to a third party, for profit, companies that do not make such allowances.

Current and Future Site Plan

V-COMM initiated its comprehensive analysis by reaching out the various county public safety communications organizations to obtain their existing site locations and radio network parameters as well as their planned future locations. Upon receipt of this information, we reviewed the current and future locations, understanding the system operations and set forth the required coverage plans to better serve each of the seven counties in the Pinelands jurisdiction.

For its analysis, V-COMM considered all the existing sites in and immediately around the Pinelands area, provided by each of the counties. The coverage analysis was done to encompass narrowband voice and broadband LTE data to account for current and future coverage requirements.

In order to identify viable and approvable sites needed for emergency communications, V-COMM requested each county to provide their existing and future planned sites to identify the dead spots and the coverage gaps at 700 MHz, the FCC's preferred band for public safety. V-COMM then validated the need for the future sites and their requirements. V-COMM's study shows that the counties have dead spots and service gaps in areas that fall within the Pinelands. The New Jersey Pinelands Commission has jurisdiction over one million (1,000,000) acres of property. Currently, much of this area is not adequately served and some areas are totally unserved thereby compromising the safety and security of those in or traveling through the Pinelands area. Even though the Pinelands management area has restrictions, these areas are in need of adequate coverage to better serve the population in the Pinelands area.

V-COMM's site review and analysis shows that not all sites are required for coverage. Some of the future sites are specifically required to fill the coverage gaps while some sites are needed for communications centers/ Public Safety Answering Points (PSAP) and others are required as replacements to existing sites. Below is the list of future sites with their detailed information.

Table 1 – List of Future Sites in Pinelands

Site No.	Agency	Site Name	Latitude (N)	Longitude (W)	Structure Height (Feet)	Pinelands Area
1	Atlantic	Mays Landing (ML)	39.453051	74.723487	170	Regional Growth
2	Atlantic	Atlantic 1	39.492913	74.837446	170	Pinelands Village
3	Atlantic	Atlantic 2	39.627858	74.792691	170	Pinelands Town
4	Atlantic	Atlantic 3	39.5653	74.818299	170	Rural Develop
5	Atlantic	Atlantic 4	39.479931	74.575639	170	Regional Growth
6	Atlantic	Atlantic 5	39.397104	74.616591	170	Regional Growth
7	Atlantic	Atlantic 6	39.57604	74.714757	150	Pinelands Village
8	Atlantic	Estelle Manor	39.393413	74.823776	170	Pinelands Village
9	Atlantic	Atlantic 7	39.680507	74.7671678	150	Agricultural Prod
10	Atlantic	Atlantic 8	39.6042	74.8818995	150	Rural Develop
11	Atlantic	Atlantic 9	39.563056	74.7838884	150	Agricultural Prod
12	Atlantic	Atlantic 10	39.523167	74.7116694	150	Forest Area
13	Atlantic	Atlantic 11	39.47889	74.6369471	150	Rural Develop
14	Atlantic	Atlantic 12	39.451943	74.5697245	150	Federal Install
15	Atlantic	Atlantic 13	39.535556	74.5141661	150	Rural Develop
16	Atlantic	Atlantic 14	39.439561	74.8565534	150	Rural Develop
17	Atlantic	Atlantic 15	39.442501	74.7823023	150	Forest Area
18	Atlantic	Atlantic 16	39.3744	74.7618995	150	Forest Area
19	Burlington	Burlington 1	39.722042	74.653831	170	Preservation Area
20	Burlington	Medford 1	39.8450556	74.82922	180	Rural Develop
21	Burlington	Section 5 Maintenance	39.59194	74.4711	250	Pinelands Village
22	Burlington	Shamong Township	39.79056	74.7561	150	Pinelands Village
23	Burlington	Southampton Township	39.9325	74.7386	150	Pinelands Village
24	Burlington	Upton Station	39.9375	74.5217	150	Rural Develop
25	Burlington	Medford 2	39.9025	74.8067	150	Regional Growth
26	Burlington	Burlington 2	39.87817145	-74.63904286	150	Preservation Area
		Phase 1 Sites				
		Phase 2 Sites				
		Phase 3 Sites				

Table 1 Continued – List of Future Sites in Pinelands

Site No.	Agency	Site Name	Latitude (N)	Longitude (W)	Structure Height (Feet)	Pinelands Area
27	Burlington	Burlington 3	39.8365	-74.46758278	150	Preservation Area
28	Burlington	Burlington 4	39.79678313	-74.58015667	150	Preservation Area
29	Burlington	Burlington 5	39.79706244	-74.40292711	150	Preservation Area
30	Burlington	Burlington 6	39.89720012	-74.59329943	150	Preservation Area
31	Camden	Atco	39.766333	74.827556	170	Rural Develop
32	Camden	Winslow	39.658056	74.861056	170	Pinelands Village
33	Cape May	NJ DEP	39.287222	74.845	170	Preservation Area
34	Cape May	Cape May 1	39.28678	74.7543	150	Pinelands Village
35	Cumberland	Cumberland Vol. Fire Co.	39.367014	74.935639	170	Pinelands Village
36	Cumberland	Maurice River	39.28622	74.96628	170	Pinelands Village
37	Cumberland	Cumberland 1	39.2415	74.9676	150	Rural Develop
38	Cumberland	Cumberland 2	39.32484	74.8657	150	Preservation Area
39	Cumberland	Cumberland 3	39.42063	74.8901	150	Pinelands Village
40	Gloucester	Gloucester 1	39.587236	74.903219	170	Rural Develop
41	Ocean	Ocean 1	39.883116	74.288866	170	Preservation Area
42	Ocean	Jackson Patriot Park	40.076417	74.336056	170	Rural Develop
43	Ocean	Manchester	40.032306	74.294833	170	Regional Growth
44	Ocean	Ocean 2	39.951428	74.370188	170	Pinelands Town
45	Ocean	Ocean 3	40.001165	74.3745923	150	Pinelands Village
46	Ocean	Ocean 4	39.958611	74.4226939	150	Preservation Area
47	Ocean	Ocean 5	39.937222	74.2888865	150	Preservation Area
48	Ocean	Ocean 6	39.907501	74.2358316	150	Preservation Area
49	Ocean	Ocean 7	39.755121	74.3126445	150	Forest Area
50	Ocean	Ocean 8	39.651667	74.3499938	150	Preservation Area
		Phase 1 Sites				
		Phase 2 Sites				
		Phase 3 Sites				

Figure 1 - Map of Future Sites for the Seven Counties in Pinelands

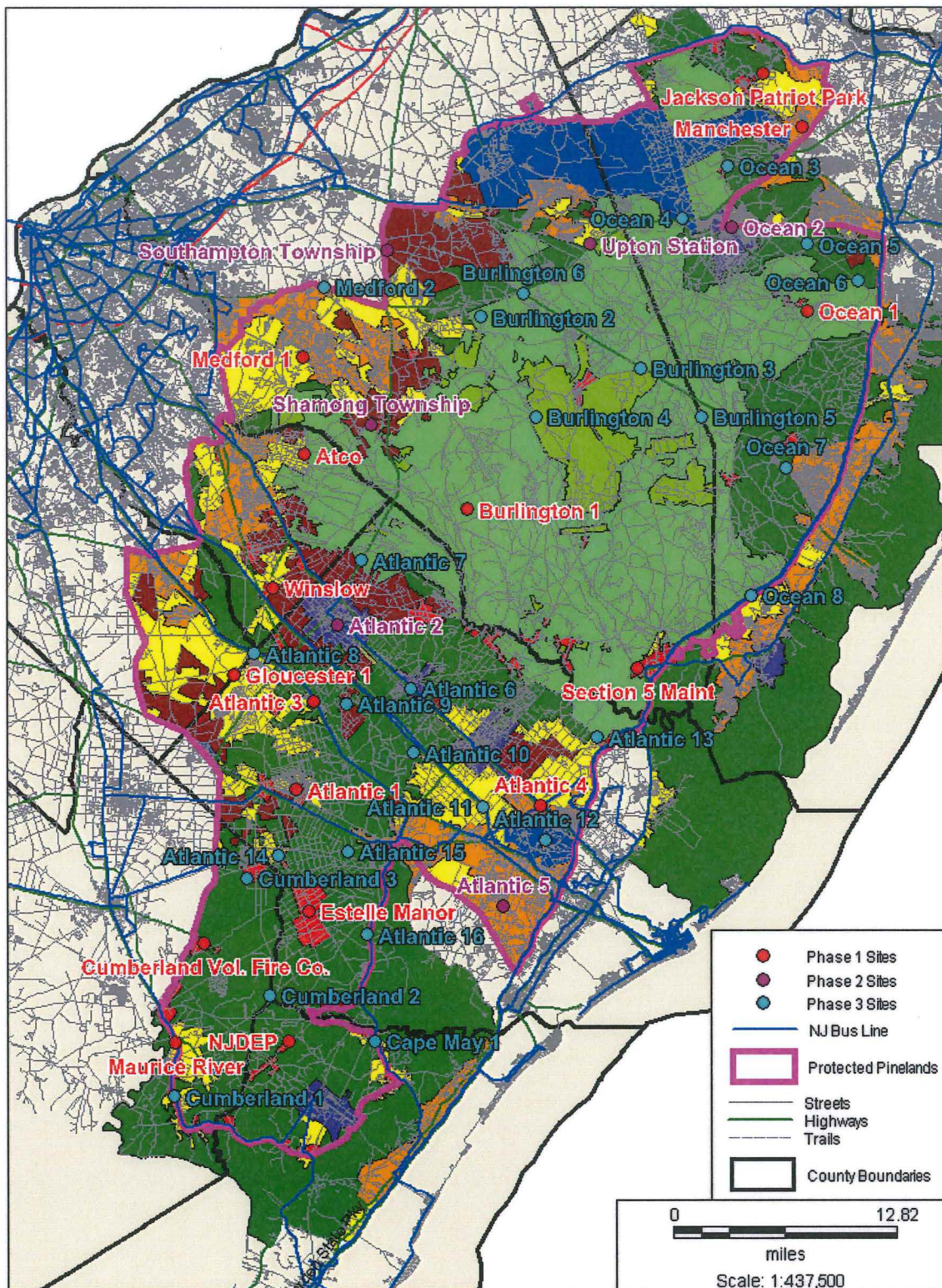


Table 2 – List of Existing Sites in and adjacent to the Pinelands

Site No.	Agency	Site Name	Latitude (N)	Longitude (W)	Structure Height (Feet)
1	Atlantic	Mays Landing	39.44261	74.694306	200
2	Atlantic	Egg Harbor City	39.54703	74.638194	500
3	Atlantic	Hammonton	39.60167	74.748889	200
4	Atlantic	Buena	39.52033	74.945333	156
5	Atlantic	Brigantine	39.40344	74.373194	164
6	Atlantic	Atlantic City	39.38361	74.448333	356
7	Atlantic	Egg Harbor Township	39.36136	74.583194	250
8	Atlantic	Galloway	39.45511	74.486528	200
9	Atlantic	Stillwater	39.37678	74.538472	125
10	Atlantic	Criminal Court	39.45206	74.725972	100
11	Atlantic	AC Criminal	39.36428	74.426806	100
12	Burlington	Chatsworth	39.84289	74.54514	272
13	Burlington	Pemberton	39.97061	74.64194	150
14	Burlington	Bass River	39.60478	74.43394	240
15	Burlington	Browns Mills	39.97089	74.58225	163
16	Burlington	Medford	39.84506	74.82922	180
17	Burlington	Tabernacle	39.84764	74.70292	300
18	Burlington	Warren Grove	39.75289	74.38847	274
19	Burlington	Sweet Water	39.62219	74.64625	274
20	Burlington	Jenkins Tower	39.70791	74.53068	185
21	Camden	Lindenwold	39.816	74.96333	320
22	Camden	Pennsauken PD	39.96561111	75.04747	260
23	Camden	NJDOT	39.90416667	74.98448	150
24	Camden	WUVP	39.73472222	74.84111	868
25	Camden	Winslow Municipal Bldg.	39.7	74.89758	300
26	Camden	Camden County College	39.78386111	75.04408	320
27	Camden	Irish Hill	39.85711111	75.06861	180
28	Camden	Winslow Water Tank	39.74302778	74.99347222	166
29	Camden	Waterford Water Tank	39.77813889	74.90013889	119
30	Cape May	RRC	39.2006944	74.7554167	170
31	Cape May	Traffic	39.1015	74.79625	200
32	Cape May	Airport	39.000778	74.91588900	135

Table 2 Continued - List of Existing Sites in and adjacent to the Pinelands

Site No.	Agency	Site Name	Latitude (N)	Longitude (W)	Structure Height (Feet)
33	Cape May	Library-EOC	39.0833611	74.8248056	140
34	Cumberland	Bridgeton	39.46027778	75.2077778	170
35	Cumberland	Millville	39.3952777	75.0380555	121
36	Cumberland	Rosenhayne	39.45983	75.15742	213
37	Cumberland	Vineland	39.48622	75.02183	98
38	Gloucester	Corkery Lane	39.6686111	74.9755556	150
39	Gloucester	Malaga	39.5872222	75.04694	305
40	Gloucester	Monroe Ind. Park	39.6477778	74.93972	199
41	Ocean	Toms River	39.97361	74.195	200
42	Ocean	Barnegat	39.75567	74.23125	150
43	Ocean	Tuckerton	39.602	74.3448	150
44	Ocean	New Egypt	40.08288	74.48291	151
45	Ocean	Lakewood	40.10219	74.16075	260
46	Ocean	Pasadena	39.90179	74.406114	240
47	State of NJ	Bordentown	40.1335833	74.71747222	270
48	State of NJ	Millstone	40.2000555	74.4247222	280
49	State of NJ	Toms River	39.9694444	74.235	190
50	State of NJ	Warren Grove	39.7491667	74.3908333	270
51	State of NJ	Berlin	39.8038889	74.9327778	280
52	State of NJ	Bridgeton	39.4602777	75.2077778	166
53	State of NJ	Atlantic City	39.3483333	74.4555556	298
54	State of NJ	Woodbine	39.2352777	74.8111111	200
55	State of NJ	Hammononton	39.6016667	74.7491667	180
56	State of NJ	Manasquan	40.13	74.1247222	150
57	State of NJ	Wildwood	38.99008333	74.81725	140
58	NJ Transit	Mays Landing	39.461111	74.685	268
59	NJ Transit	Barnegat	39.75777778	74.24972222	245
60	NJ Transit	Woodbine	39.23527778	74.81083333	210
61	NJ Transit	Port Republic	39.50725	74.51738889	192
62	NJ Transit	Toms River	39.96955556	74.23458333	150
63	NJ Transit	Waterford	39.72805556	74.84388889	822

Figure 2 - Map of Existing Sites in and adjacent to the Pinelands

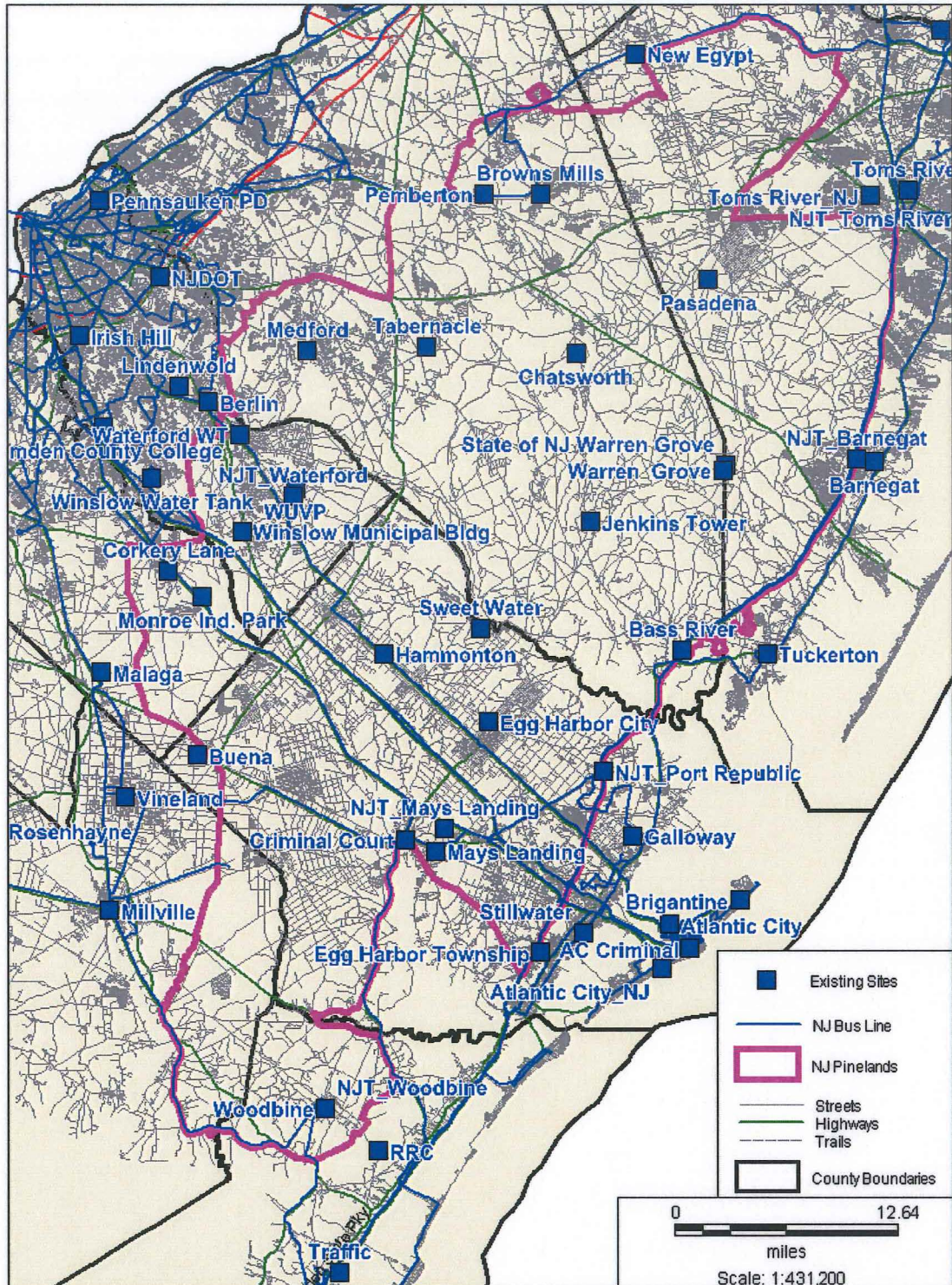


Figure 3 – Existing and Proposed Sites with Pinelands Area

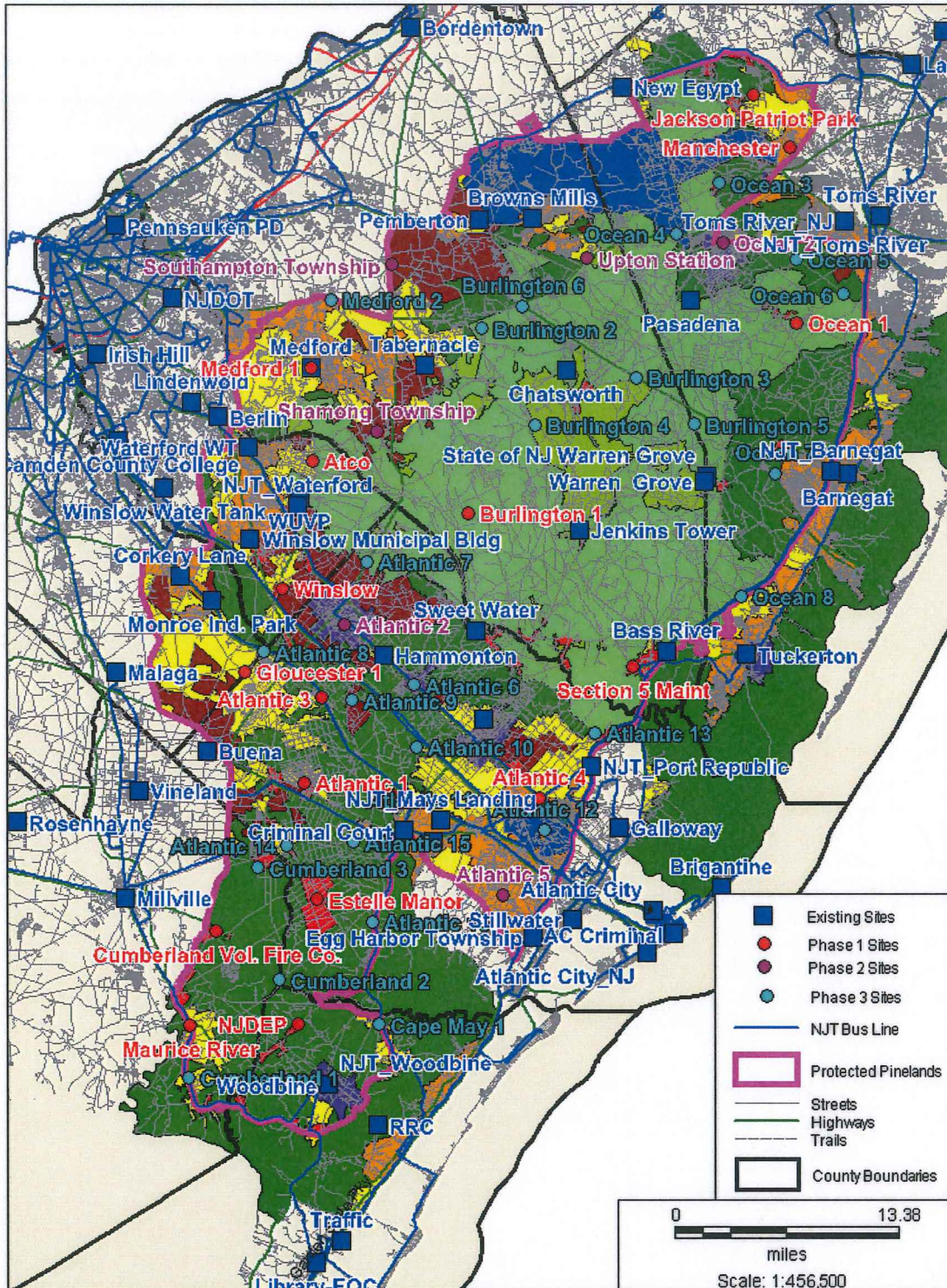
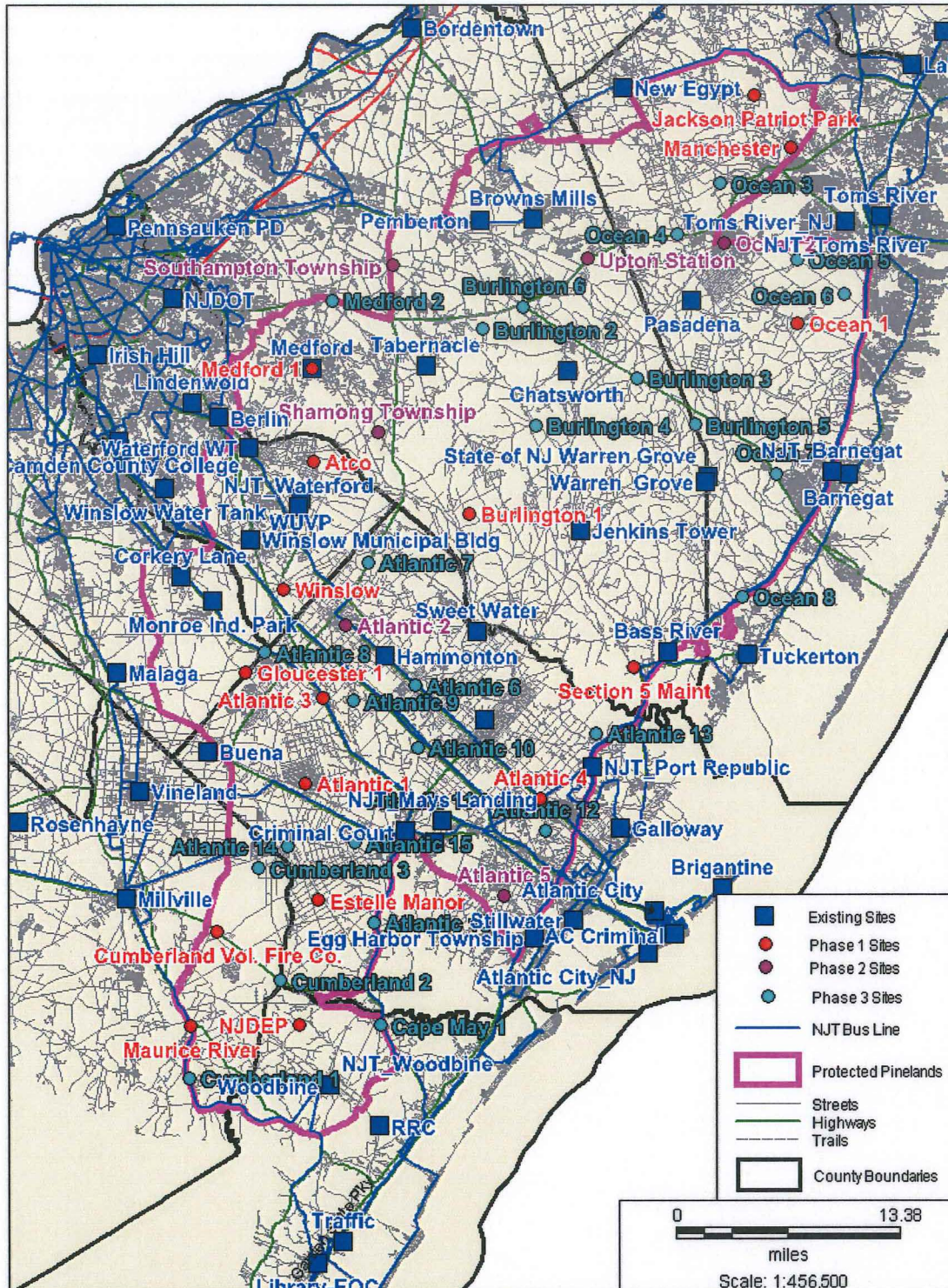


Figure 4 – Existing and Proposed Sites without Pinelands Area



Narrowband and Broadband Technologies

Narrowband

In order to help alleviate wireless radio congestion, the Federal Communication Commission (FCC) released 60 MHz of television broadcast spectrum – channels 60-69 (746-805 MHz) for use by land mobile radios. In addition to alleviating the congestion for wireless radio systems, the FCC also hoped to provide public safety access to new technologies that may require additional use of bandwidth, and promote interoperability. To accomplish these goals, the FCC originally allocated 24 MHz of this spectrum with 12 MHz for narrowband voice and data applications and 12 MHz for broadband data applications. Subsequently, the FCC reallocated the 12 MHz of broadband spectrum to a single nationwide licensee to develop a nationwide broadband system on behalf of public safety. The remaining 12 MHz of narrowband voice and data paired spectrum is divided as follows:

Within the 12 MHz of paired spectrum (6 MHz of operational channels) for public safety, the following is a breakdown of how channels can be used:

- 475 kHz for interoperability
- 4 MHz for general use
- 1.2 MHz for state use
- 325 kHz reserved for future FCC allocation

The FCC has allocated the 769-775/799-805 MHz segment for narrowband operations. In the narrowband segment, the rules allow the licensing of the 700 MHz General Use Narrowband Channels and Narrowband Low Power Channels for assignment to public safety eligible agencies, subject to Commission approved regional planning committee (RPC) regional plans. The Narrowband Low Power Itinerant Channels are licensed for nationwide itinerant operation and are not subject to regional planning or frequency coordination.

The two narrowband segments are 769-775 MHz (Channels 1 – 960) for base operations and 799-805 MHz (Channels 961-1920) for mobile operations. Each narrowband segment is divided into 960 channels, with each channel having a size of 6.25 kHz.

For this analysis, V-COMM used the 700 MHz band to evaluate the coverage for each of the counties' radio networks. A number of the counties are currently utilizing the UHF-T Band frequencies, which are actually co-channel with several DTV stations in Massachusetts, Connecticut, Virginia and North Carolina. Unfortunately, many of the counties have experienced interference on those channels from the DTV stations. The FCC has strongly recommended that these public safety agencies migrate to the 700 MHz band. Those agencies include Camden County, Gloucester County and Ocean County, who have already made applications to the FCC for 700 MHz channels and Burlington County is in the process of preparing its application for 700 MHz channels. Atlantic County utilizes 800 MHz which has very similar propagation characteristics to 700 MHz. At the same time, the State of New Jersey is implementing a state-wide 700 MHz Public Safety radio system that will provide mobile coverage to most parts of the

State. The State's goal is provide an interoperable system that will allow other 700 MHz networks to interconnect and provide true state-wide interoperability. Therefore, it is clear that the future of public safety voice communications in New Jersey is in the 700 MHz band.

Broadband LTE

In July 2007, the Federal Communications Commission (FCC) revised the 700 MHz band plan and service rules to promote the creation of a nationwide interoperable broadband network for public safety and to facilitate the availability of new and innovative wireless broadband services for consumers. The Commission designated the lower half of the 700 MHz Public Safety Band (763-768/793-798 MHz) for broadband communications. The Commission also consolidated existing narrowband allocations to the upper half of the 700 MHz Public Safety block (769-775/799-805 MHz). Further, in order to minimize interference between broadband and narrowband operations, the Commission adopted a one megahertz guard band (768-769/798-799 MHz) between the public safety broadband and narrowband segments. Finally, the Commission established a single nationwide license – the Public Safety Broadband License – for the 700 MHz public safety broadband spectrum.

The ever changing world of mobile broadband is now beginning to put serious strain on the networks of mobile broadband providers as smart phones and mobile broadband devices quickly became increasingly hungry for larger amounts of data. This is forcing wireless network providers to look for new ways to improve the quality of the service they offer and one of the ways many are in the process of upgrading their current 3G networks to a fourth generation or a 4G networks utilizing the Long Term Evolution (LTE) technology. In a similar way to when 3G technology was implemented, the building of a 4G mobile broadband network using LTE technology will bring about a number of significant changes to the way in which mobile broadband will be used and will allow users to get far more from their mobile broadband service. The increased capacity that this technology offers will provide users with the extra bandwidth they need to make the most of their new mobile broadband devices and will offer them a far more stable connection no matter how many users are accessing the mobile network. The faster connection speeds will also allow them to perform tasks like streaming video and downloading large data files and much more. Initially the broadband service will be utilized by first responders with in-vehicle Mobile Data Terminals (MTD's) requiring on-street coverage. Long term, once the device manufacturers introduce devices that will operate in the public safety designated frequency band, there will be a migration to smaller, tablet like devices, necessitating more in-building coverage as first responders take these devices out of their vehicles.

In order to take advantage of the advances in broadband technology and the wide scale availability of compatible devices, public safety, with the support of the federal government, will be utilizing LTE technology. To that end, the State of New Jersey recently released a Request for Bid for a 700 MHz LTE based system in Northern New Jersey UASI's region with the long term goal of a Statewide coverage. Therefore V-COMM prepared a coverage analysis of the counties' base station locations and what coverage they would provide. V-COMM then identified the additional locations required to provide full 700 MHz LTE coverage to the Pinelands region.

Detailed Coverage Analyses

V-COMM analyzed the coverage for each of the counties separately. In predicting the coverage of two-way communications systems, it is important to understand the differences between the portable (hand held) unit vs. mobile (car mounted) unit. Although both share the same infrastructure, their ability to talk into the system is quite different. What creates differences in propagation is the power output, antenna systems and the environment in which these systems operate. In most cases, there is an imbalance between the “talk-out” path (base station to mobile/portable units) and the “talk-back” or “talk-in” path (mobile/portable units to the base station), since the base station has more power and better height than either the mobile or portable. In addition, since a mobile unit has more power and an external vehicular mounted antenna system, the mobile talk-in capability is significantly better than that of portable or handheld radio equipment. This means that in a two-way system, the portable talk-back path will be the most challenging of the coverage scenarios and was, therefore, adopted as the standard for this coverage analysis.

The in-building coverage in Pinelands focuses on the Pinelands village, Pinelands town and regional growth areas where there are pockets of large population density. Each scenario has different coverage thresholds that have been derived by V-COMM using industry standardized methods such as link budget and building loss calculation techniques published by the Telecommunications Industry Association (TIA) in TSB-88-B. The tool used for the propagation analysis was an industry standard propagation modeling tool known as EDX SignalPro with 1 arc second terrain data. The analysis was done with the Anderson 2D propagation model.

Specifically, V-COMM analyzed the coverage holes and dead spots based on the 700 MHz model for narrowband voice and broadband LTE.

1. **Narrowband Voice** – The narrowband voice coverage was analyzed for two different scenarios.
 - a. On-street portable talk back (also known as – uplink, reverse link or talk in)
 - b. In-building portable talk back
2. **Broadband LTE** - The broadband data coverage was analyzed for on street portable devices. The model assumed enough signal strength to allow for a 2 megabit per second data transmission. In a wireless broadband data system, as the signal strength decreases, the data transmission speed decreases as the additional bits are used for error correction and retransmissions.
 - a. On-street portable talk back, which will cover most areas with in-building service

Design Methodology

V-COMM performed the 700 MHz coverage analysis for the sites provided by the seven counties that fall within the Pinelands jurisdiction (we have previously discussed why 700 MHz was selected). These coverage analyses were done for on-street portable talk-back and in-building portable talk back for narrowband and broadband frequencies for the existing and future sites. The future sites have been divided into three phases:

- Phase 1 Sites (shown as red dots): To provide coverage for narrowband voice on-street.
- Phase 2 Sites (shown as purple dots): To provide coverage for narrowband voice in-building.
- Phase 3 Sites (shown as blue dots): To provide coverage for broadband data on-street and a majority of in-building areas.

Provided below are the thresholds used in the coverage analysis.

Narrowband On-Street: -95 dBm, represented by blue for maps which don't show the Pinelands management area and represented by gray for maps which show the Pinelands management area.

Narrowband In-Building: -81 dBm represented by green for maps which don't show the Pinelands management area and represented by gray for maps which show the Pinelands management area.

Broadband On-Street: -80 dBm represented by blue for maps which don't show the Pinelands management area and represented by gray for maps which show the Pinelands management area.

Broadband In-Building: -66 dBm represented by green for maps which don't show the Pinelands management area and represented by gray for maps which show the Pinelands management area.

PHASE 1 DESIGN

The initial coverage analysis was done utilizing the existing county provided sites to determine the baseline coverage for on-street and in-building for narrowband voice. This is the first coverage plot in each individual county section showing the blue on-street and green in-building coverage.

The 2nd analysis was done utilizing the existing sites to highlight the gaps in on-street coverage in the Pinelands management area for narrowband voice, with the Pinelands management area map as the underlay. This map clearly defines the areas that are currently served in the Pinelands with the existing sites and which sections of the county that falls within the Pinelands area are unserved. These areas are where we located the Phase 1 sites.

The 3rd analysis was done to see how the combined coverage of the existing and Phase 1 sites fill the gaps in coverage in the Pinelands management area at the on-street level for narrowband voice with the Pinelands management area map as an underlay. The phase 1 sites fill in the on-street coverage gaps that were there with the existing sites alone.

The 4th analysis was done utilizing the combined coverage of the existing and Phase 1 sites showing the coverage for on-street and in-building for narrowband voice. This is typically the fourth coverage plot in each individual county section showing the blue on-street and green in-building coverage.

PHASE 2 DESIGN

The 5th analysis was done utilizing the combined coverage of the existing and Phase 1 sites to highlight the in-building coverage gaps in narrowband voice with the Pinelands area map as an underlay. This map clearly defines the areas within the Pinelands that are unserved with in-building coverage utilizing the existing and Phase 1 proposed sites. It is a fair questions to ask why the need for in-building coverage in the Pinelands. There are many areas that require in-building coverage for Public Safety including the Growth Areas, Pinelands Towns and Pineland Villages, where a first responder requires service if he leaves his vehicle and goes indoors. Where we identified unserved areas in 4th analysis that included the above mentioned Pinelands designations, we focused our Phase 2 sites.

The 6th analysis was done to see how the combined coverage of the existing, Phase 1, and Phase 2 sites fill the gaps in coverage in the Pinelands management area at the in-building level for narrowband voice with the Pinelands management area map as an underlay. The phase 2 sites fill in the in-building coverage gaps that were there with the existing and Phase 1 sites alone.

The 7th analysis was done utilizing the combined coverage of the existing, Phase 1, and Phase 2 sites showing the coverage for on-street and in-building for narrowband voice. This is typically the seventh coverage plot in each individual county section showing the blue on-street and green in-building coverage.

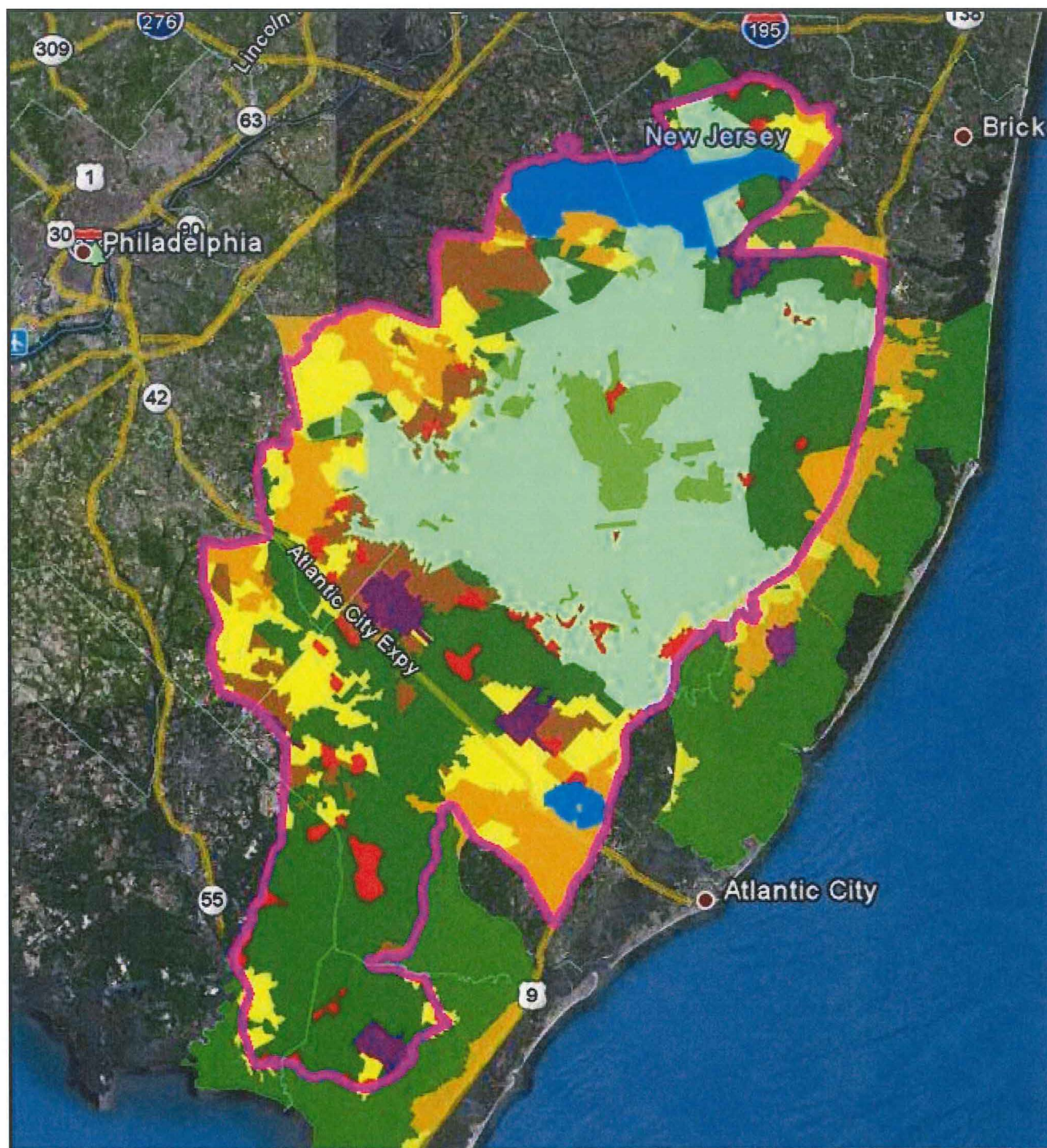
PHASE 3 DESIGN

The 8th analysis was done utilizing the combined coverage of the existing, Phase 1 and Phase 2 sites and modifying the coverage model for on-street coverage for broadband data, with the Pinelands area map as an underlay. This analysis highlights the gaps in broadband service in areas within in Pineland areas both populated and unpopulated. These are the areas that we focused the Phase 3 site locations.

The 9th and final analysis was done utilizing the combined coverage of the existing, Phase 1, Phase 2 and Phase 3 sites and modifying the coverage model for on-street coverage for broadband data, with the Pinelands area map as an underlay. The Phase 3 sites fill in many of the gaps in broadband data coverage that were there with the existing, Phase 1 and Phase 2 sites alone.

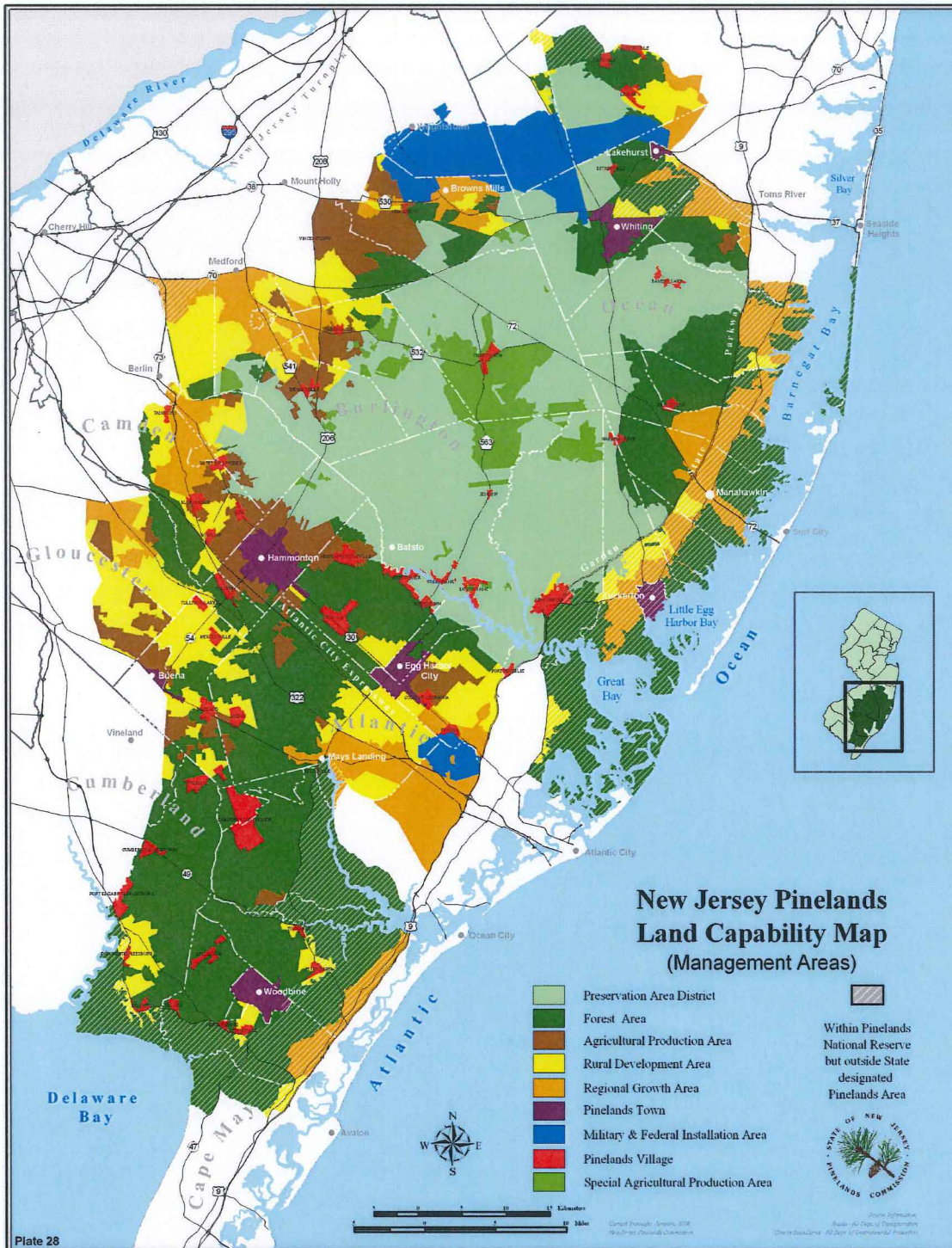
It should be noted that in analysis, we found that not all Counties required sites in all three Phase to fill in the gaps in coverage.

Figure 5 - Google Earth Map Showing Pinelands Area



In the map above the area outlined in pink shows the jurisdictional region of study within the Pinelands.

Figure 6 - New Jersey Pinelands Land Capability Map



Atlantic County Overview

For the Atlantic County comprehensive plan, V-COMM contacted Mr. John Miller requesting the current list of existing radio towers utilized for the county's operations in and near the Pinelands Region, the towers the county is leasing space on for its operations, additional sites needed by the county to provide full coverage in the Pinelands, frequency information and information on any locations the county might have already discussed with the Pinelands Commission. Atlantic County has provided V-COMM all the requested information and V-COMM has utilized this information to analyze the County's current and future coverage requirements.

System Design

Atlantic County has eleven (11) 700 MHz sites that provide the necessary coverage within the county's jurisdictional area. Listed in table 3 below are the details of the existing sites.

Table 3 - Atlantic County 700 MHz Sites Information

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet)/ Type
1	Mays Landing	39.44261	74.694306	5060 Atlantic Avenue, Mays Landing, NJ	200 Guyed Tower
2	Egg Harbor City	39.54703	74.638194	Hamburg Ave and Moss Mill Road, Egg Harbor City, NJ	500 Guyed Tower
3	Hammonton	39.60167	74.748889	3434 White Horse Pike, Hammonton	200 Self Support Tower
4	Buena	39.52033	74.945333	Atlantic and Cass Avenues, Buena, NJ	156 Water Tower
5	Brigantine	39.40344	74.373194	14 Street and Beach Avenue, Brigantine, NJ	164 Water Tower
6	Atlantic City	39.38361	74.448333	3100 Boardwalk, Atlantic City, NJ 08401	356 Building mounted
7	Egg Harbor Township	39.36136	74.583194	3515 Bargaintown Road, Egg Harbor Township, NJ	250 Self Support Tower
8	Galloway	39.45511	74.486528	300 E. Jimmie Leeds Road, Galloway, NJ	200 Self Support Tower
9	Stillwater	39.37678	74.538472	201 Shore Road, Northfield, NJ	125 Self Support Tower
10	Criminal Court	39.45206	74.725972	Main Street and Rt. 50, Mays Landing, NJ	100 Self Support Tower
11	AC Criminal	39.36428	74.426806	1201 Bacharach Blvd, Atlantic City, NJ	100 Building mounted

Future Sites

Atlantic County has provided V-COMM one future planned site that falls within the Pinelands Jurisdiction. This site, called Mays Landing, is proposed by the county to be used as a consolidated dispatch center. In addition to the County proposed site, V-COMM's coverage analysis shows that the county requires seventeen (17) new sites to provide the necessary on-street and in-building coverage for narrowband and broadband. These seventeen (17) V-COMM proposed sites have been divided into 3 phases.

Phase 1 Sites: To provide coverage for narrowband on-street.

Phase 2 Sites: To provide coverage for narrowband in-building.

Phase 3 Sites: To provide coverage for broadband on-street and a majority of in-building service.

Provided in Table 4 is the general area of the list of sites required by Atlantic County.

Table 4 – Atlantic County Future Sites

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type	Proposed By	Phase
1	Mays Landing (ML)	39.453051	74.723487	Farragut Avenue and 3rd Street Mays Landing	170 Proposed Tower	Atlantic County	1
2	Atlantic 1	39.492913	74.837446	Fulton Avenue and Shreveport Avenue Hamilton	170 Proposed Tower	V-COMM	1
3	Atlantic 2	39.627858	74.792691	South Egg Harbor Road Hammonton	170 Proposed Tower	V-COMM	2
4	Atlantic 3	39.5653	74.818299	Route 322 and 7 th Street Hamilton	170 Proposed Tower	V-COMM	1
5	Atlantic 4	39.479931	74.575639	285 West White Horse Pike Galloway	170 Proposed Tower	V-COMM	1
6	Atlantic 5	39.397104	74.616591	Tremont Avenue and High School Drive Egg Harbor Township	170 Proposed Tower	V-COMM	2
7	Atlantic 6	39.57604	74.714757	4612 White Horse Pike Mullica	150 Proposed Tower	V-COMM	3
8	Estelle Manor	39.393413	74.823776	10 th Avenue and Tuckahoe Road Weymouth	170 Proposed Tower	V-COMM	1

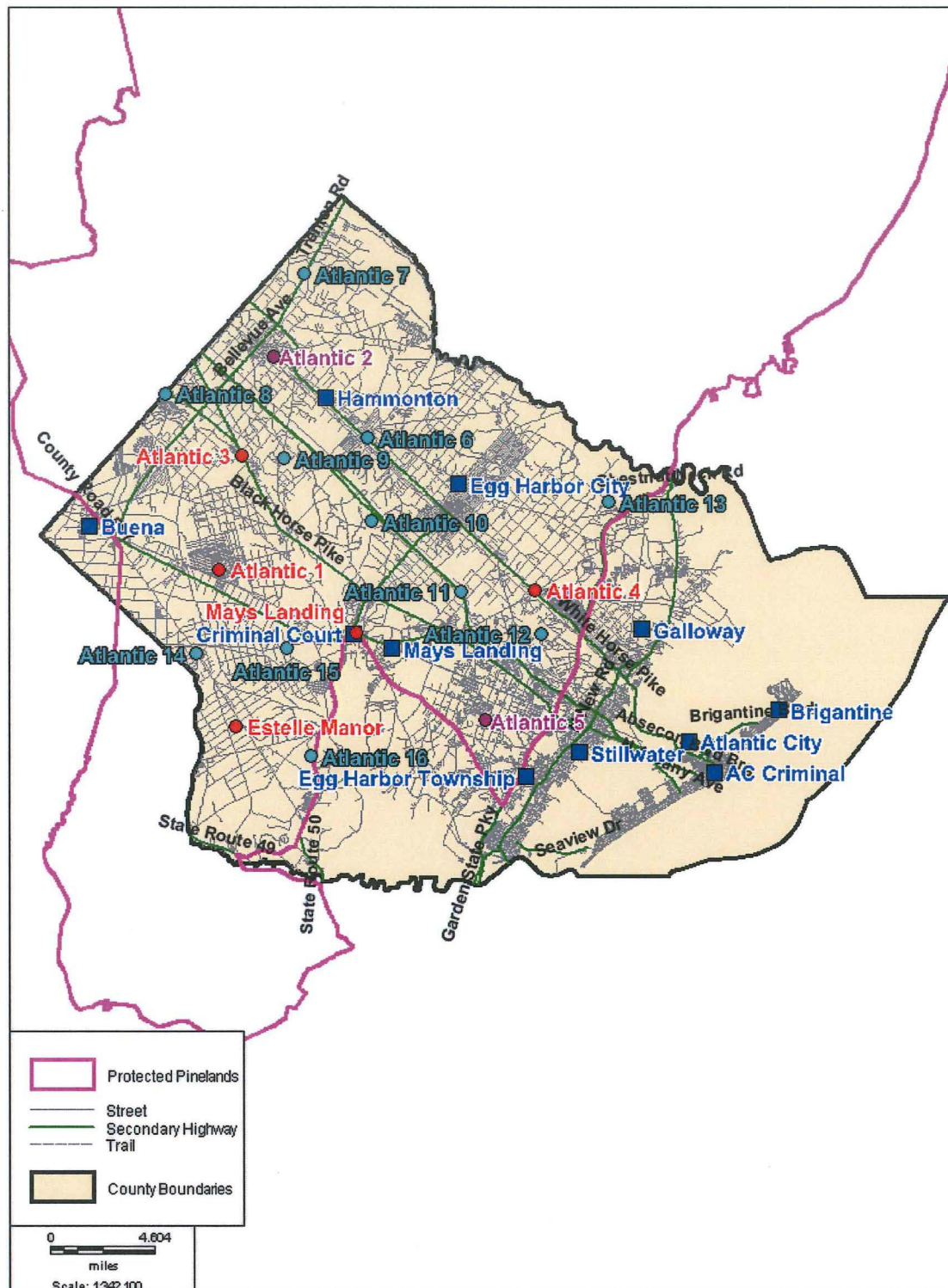
Table 4 Continued – Atlantic County Future Sites

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type	Proposed By	Phase
9	Atlantic 7	39.680507	74.7671678	Route 206 / Trenton Road Hammonton	150 Proposed Tower	V-COMM	3
10	Atlantic 8	39.6042	74.8818995	Route 322 /South Black Horse Pike and Cains Mill Road Folsom	150 Proposed Tower	V-COMM	3
11	Atlantic 9	39.563056	74.7838884	Dacosta Road Hamilton	150 Proposed Tower	V-COMM	3
12	Atlantic 10	39.523167	74.7116694	Atlantic City Expressway Hamilton	150 Proposed Tower	V-COMM	3
13	Atlantic 11	39.47889	74.6369471	South Cologne Avenue and Atlantic City Expressway Hamilton	150 Proposed Tower	V-COMM	3
14	Atlantic 12	39.451943	74.5697245	Atlantic City Intl Airport Egg Harbor Township	150 Proposed Tower	V-COMM	3
15	Atlantic 13	39.535556	74.5141661	County Highway 624 and N Genoa Avenue Galloway	150 Proposed Tower	V-COMM	3
16	Atlantic 14	39.439561	74.8565534	Tuckahoe Road and Atlantic County Route 552 Buena Vista	150 Proposed Tower	V-COMM	3
17	Atlantic 15	39.442501	74.7823023	Scranton Avenue and Millville Road Hamilton	150 Proposed Tower	V-COMM	3
18	Atlantic 16	39.3744	74.7618995	Old Mays Landing Road and State Route 50 Estell Manor	150 Proposed Tower	V-COMM	3

In the Map “Atlantic County Map of Existing and Future Sites” below, the existing and future sites have been shown as described:

- Phase 1 Sites – Denoted by red circles
- Phase 2 Sites – Denoted by purple circles
- Phase 3 Sites – Denoted by blue circles
- Existing Sites – Denoted by blue squares

Figure 7 - Atlantic County Map of Existing and Future Sites



1. **Mays Landing (ML) :**

This site is located near Farragut Street and 3rd Street in Mays Landing. Atlantic County will utilize the Mays Landing site for the county's *Public Safety Answering Point (PSAP)* to control the radio system by deploying wireless backhaul to the radio base stations throughout the county. This site will only be used for the countywide consolidated dispatch center and will not be used for coverage or replacement to any of the nearby sites. This site has been considered as a phase 1 site by V-COMM.

2. **Atlantic 1:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located on Fulton Avenue to the north of Shreveport Avenue in Hamilton. This site will provide coverage to the western section of Hamilton and eastern section of Buena Vista in the areas around Fulton Avenue, US Highway 40, Paris Avenue, Mizpah Road and other streets in the vicinity.

3. **Atlantic 2:**

This site is recommended by V-COMM for phase 2, narrowband in-building coverage. This site is located on South Egg Harbor Road in Hammonton. This site will provide coverage to the southern section of Hammonton Township in the areas around South Egg Harbor Road, State Route 54, US Highway 30, S Chew Road, Pleasant Mills Road, US Highway 30 and other areas in the vicinity.

4. **Atlantic 3:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located on Route 322 to the south of 7th Street in Hamilton. This site will provide coverage to the northwest section of Hamilton Township and eastern section of Folsom in the areas around US Highway 322, Mays Landing Road, 5th Street, 6th Street, 8th Street and other areas in the vicinity.

5. **Atlantic 4:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located on 285 West White Horse Pike, Pomona in Galloway Township. This site will provide coverage to the southern section of Galloway Township, Hamilton and Egg Harbor Township in the areas around US highway 30, County Road 575, S Odessa Avenue, County Road 563 and other areas in the vicinity.

6. **Atlantic 5:**

This site is recommended by V-COMM for phase 2, narrowband in-building coverage. This site is located on Tremont Avenue to the north of High School Drive in Egg Harbor Township. This site will provide coverage to the central section of Egg Harbor Township in the areas around Tremont Avenue, English Creek Avenue, Red Avenue, Mill Road and other areas in the vicinity.

7. **Atlantic 6:**

This site is recommended by V-COMM for Phase 3, broadband on-street coverage and a majority of in-building service. This site is located in the Gary's Used Car property at 4612 White Horse Pike in Elmwood-Mongolia in Mullica. This site will provide coverage to the southwest section of Mullica Township and sections of Hamilton Township in the areas around US Highway 30, Sailor Boy Road, Weymouth Elmwood Road, Columbia Road, Richard Avenue and other areas in the vicinity.

8. **Estelle Manor:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located near Cape May Avenue and Tuckahoe Road to the south of 10th Avenue in Weymouth. This site will provide coverage to the southwest section of Weymouth and northwest section of Estelle Manor in the areas around 10th Avenue, Cumberland Avenue

9. **Atlantic 7:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located on Route 206 in Hammonton. This site will provide coverage to the central section of Hammonton Township in the areas around US Highway 206, Laurel Avenue, Chew Road and other areas in the vicinity.

10. **Atlantic 8:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located near Route 322 and Cains Mill Road in Folsom. This site will provide coverage to the western section of Folsom in the areas around Black Horse Pike, Mays Landing Road, Cains Mill Road, State Route 54 and other areas in the vicinity.

11. **Atlantic 9:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located on Dacosta Road in Hamilton. This site will provide coverage to the northwest section of Hamilton in the areas around Dacosta Road, Atlantic City Expressway, Creek Road and other areas in the vicinity.

12. **Atlantic 10:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located on Atlantic City Expressway in Hamilton. This site will provide coverage in the areas around Atlantic City Expressway, Columbia Road, Egg Harbor-Greenbank Road and other areas in the vicinity.

13. **Atlantic 11:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located close to South Cologne Avenue and Atlantic City Expressway in Hamilton. This site will provide coverage to the southeast section of Hamilton in the areas around Atlantic City Expressway, South Cologne Avenue, Wrangleboro Road, US Highway 322 and other areas in the vicinity.

14. **Atlantic 12:**

This site is recommended by V-COMM for Phase 3, broadband on-street coverage and a majority of in-building service. This site is located at Atlantic City International Airport in Egg Harbor Township. This site will provide coverage to the northern section of Egg Harbor Township in the Atlantic City Airport area and other areas in the vicinity.

15. **Atlantic 13:**

This site is recommended by V-COMM for Phase 3, broadband on-street coverage and a majority of in-building service. This site is located close to County Highway 624 and N Genoa Avenue in Galloway Township. This site will provide coverage to the western section of Galloway Township and eastern section of Port Republic in the areas around County Highway 624, North Genoa Avenue, Cologne Port-Republic Road, Garden State Parkway and other areas in the vicinity.

16. **Atlantic 14:**

This site is recommended by V-COMM for Phase 3, broadband on-street coverage and a majority of in-building service. This site is located close to Tuckahoe Road and Atlantic County Route 552 in Buena Vista. This site will provide coverage to the southern section of Buena Vista and southwest of Hamilton Township in the areas around Tuckahoe Road, Broad Street, Millville Avenue, Estelle Avenue, 19th Avenue and other areas in the vicinity.

17. **Atlantic 15:**

This site is recommended by V-COMM for Phase 3, broadband on-street coverage and a majority of in-building service. This site is located close to Scranton Avenue and Millville Road in Hamilton. This site will provide coverage to the southern section of Hamilton and central section of Weymouth in the areas around Millville Road, Pittsburg Avenue, Forty Wire Road, Hudson Avenue and other areas in the vicinity.

18. **Atlantic 16:**

This site is recommended by V-COMM for Phase 3, broadband on-street coverage and a majority of in-building service. This site is located close to Old Mays Landing Road and State Route 50 in Estelle Manor. This site will provide coverage to the central section of Estelle Manor in the areas around State Route 50, Honest John Road, Cumberland Avenue, First Avenue and other areas in the vicinity.

System Coverage

V-COMM performed the 700 MHz coverage analysis for the sites provided by Atlantic County using EDX SignalPro with 1 arc second terrain data. The tool was setup to use the Anderson propagation model. This coverage analysis was done for on-street portable talk-back and in-building portable talk back for narrowband and broadband frequencies for the existing sites and for the existing and future sites. Provided in the maps below are the coverage plots along with the threshold levels for each analysis.

The Map 1 labeled “Existing Sites Coverage On-Street and In-Building – Narrowband” shows Atlantic County coverage with the existing sites at -81 dBm (in-building) and -95 dBm (on-street). As can be seen in Map 1, with the existing sites, there are many coverage gaps in different sections of the county.

The Map 2 labeled “Existing Sites On-Street Coverage – Narrowband” shows the existing sites coverage at -95 dBm with the Pinelands management area map as the underlay.

The Map 3 labeled “Existing and Phase 1 Sites On-Street Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -95 dBm with the Pinelands management area map as an underlay. The Phase 1 sites were designed to provide the necessary on-street coverage by filling in the gaps that were there with the existing sites.

The Map 4 labeled “Existing and Phase 1 Sites On-Street and In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -81 dBm and -95 dBm.

The Map 5 labeled “Existing and Phase 1 Sites In-Building Coverage – Narrowband” shows the existing sites coverage at -81 dBm with the Pinelands management area map as the underlay.

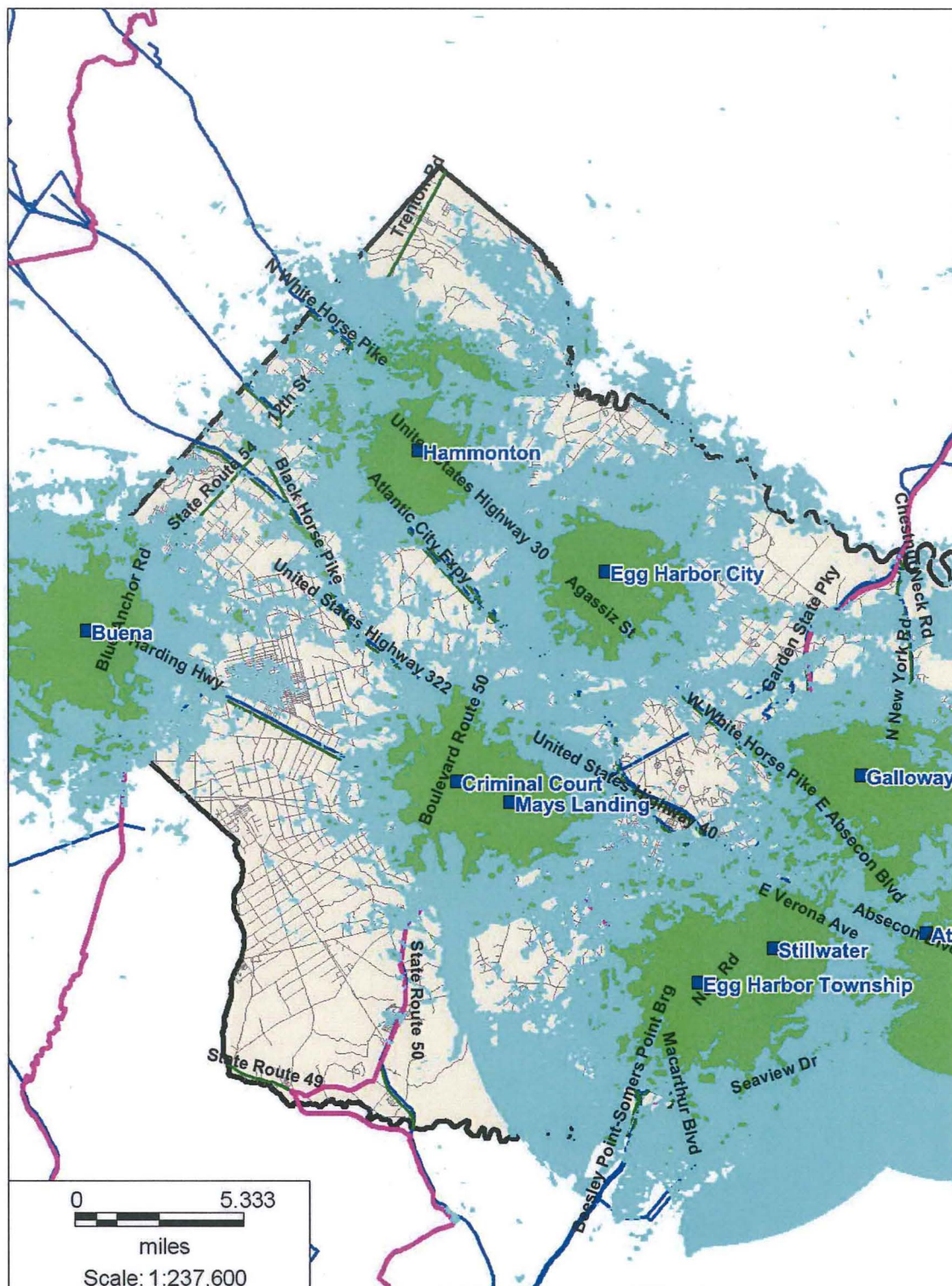
The Map 6 labeled “Existing and Phase 1 and 2 Sites In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 and Phase 2 sites at -81 dBm with the Pinelands area map as an underlay. The Phase 2 sites were designed to provide the necessary in-building coverage.

The Map 7 labeled “Existing and Phase 1 and 2 Sites On-Street and In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 and 2 sites at -81 dBm and -95 dBm.

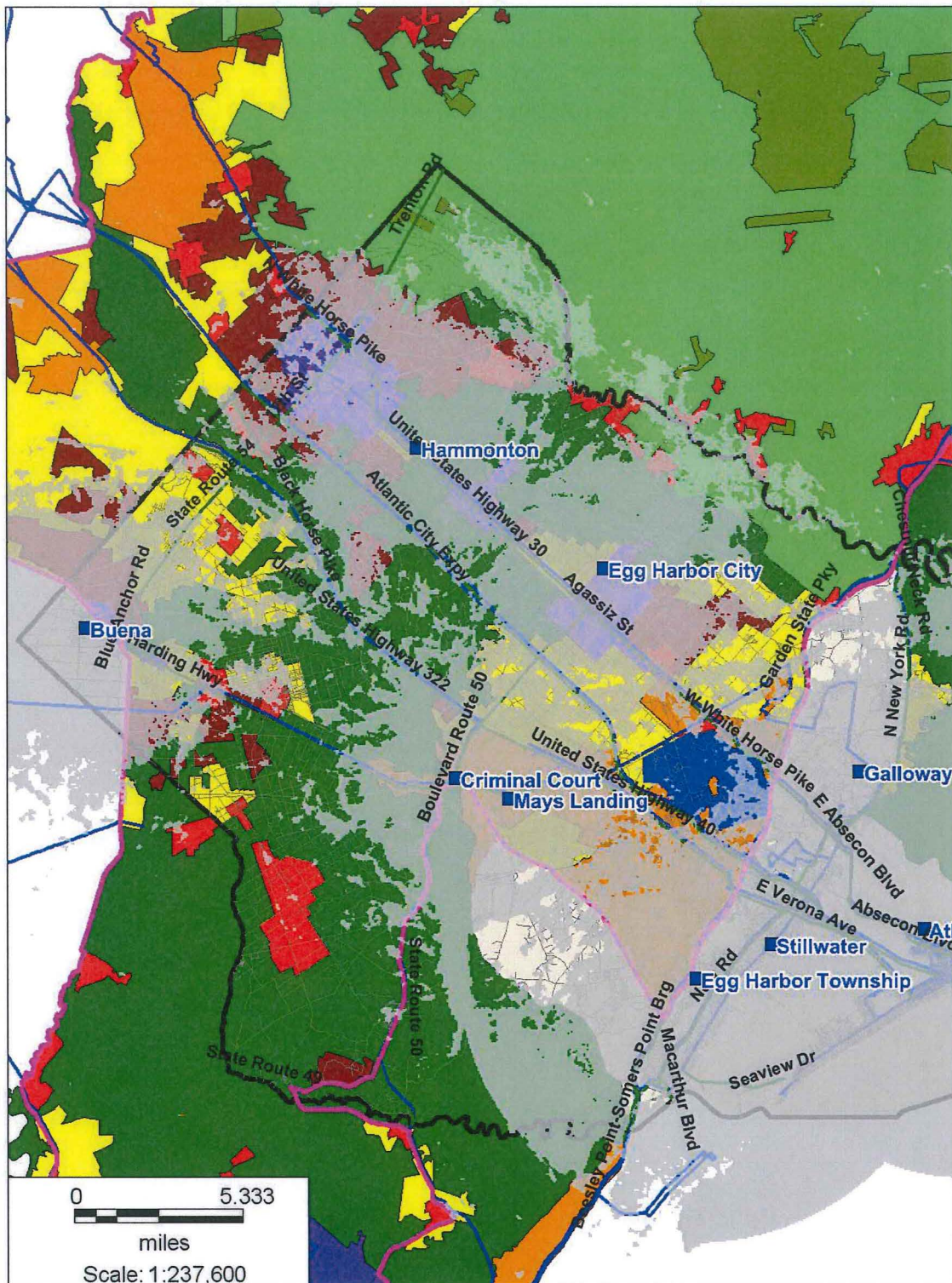
The Map 8 labeled “Existing and Phase 1 and 2 On-Street Coverage – Broadband” shows the existing sites coverage with Phase 1 and 2 at -80 dBm with the Pinelands area map as an underlay.

The Map 9 labeled “Existing and Phase 1, 2 and 3 Sites Coverage – Broadband” shows the existing sites coverage with phase 1, 2 and 3 sites at -80 dBm with the Pinelands area map as an underlay. The Phase 3 sites provide on-street and a majority of in-Building coverage in the Pinelands.

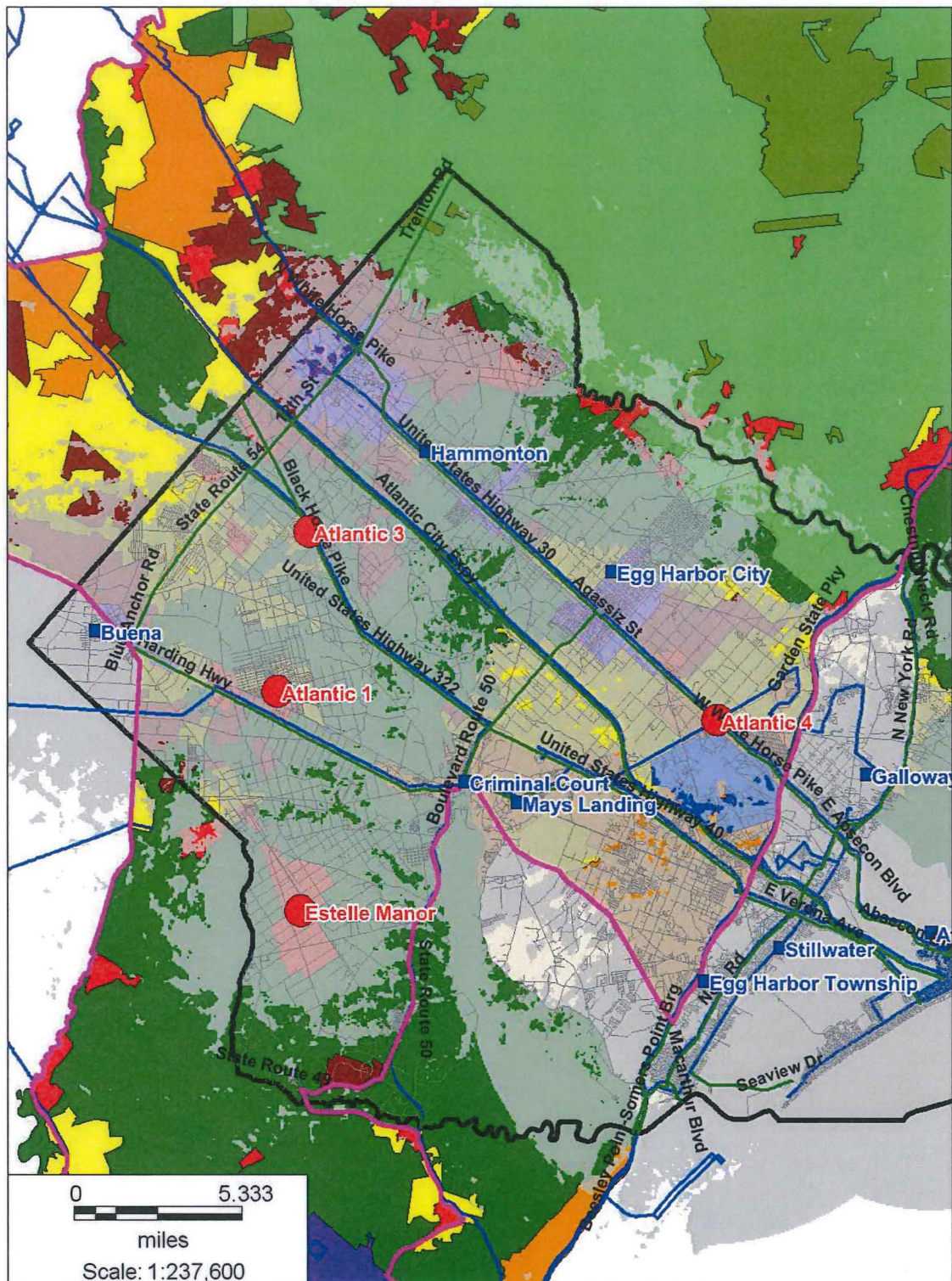
Map 1 - Existing Sites Coverage On-Street and In-Building – Narrowband



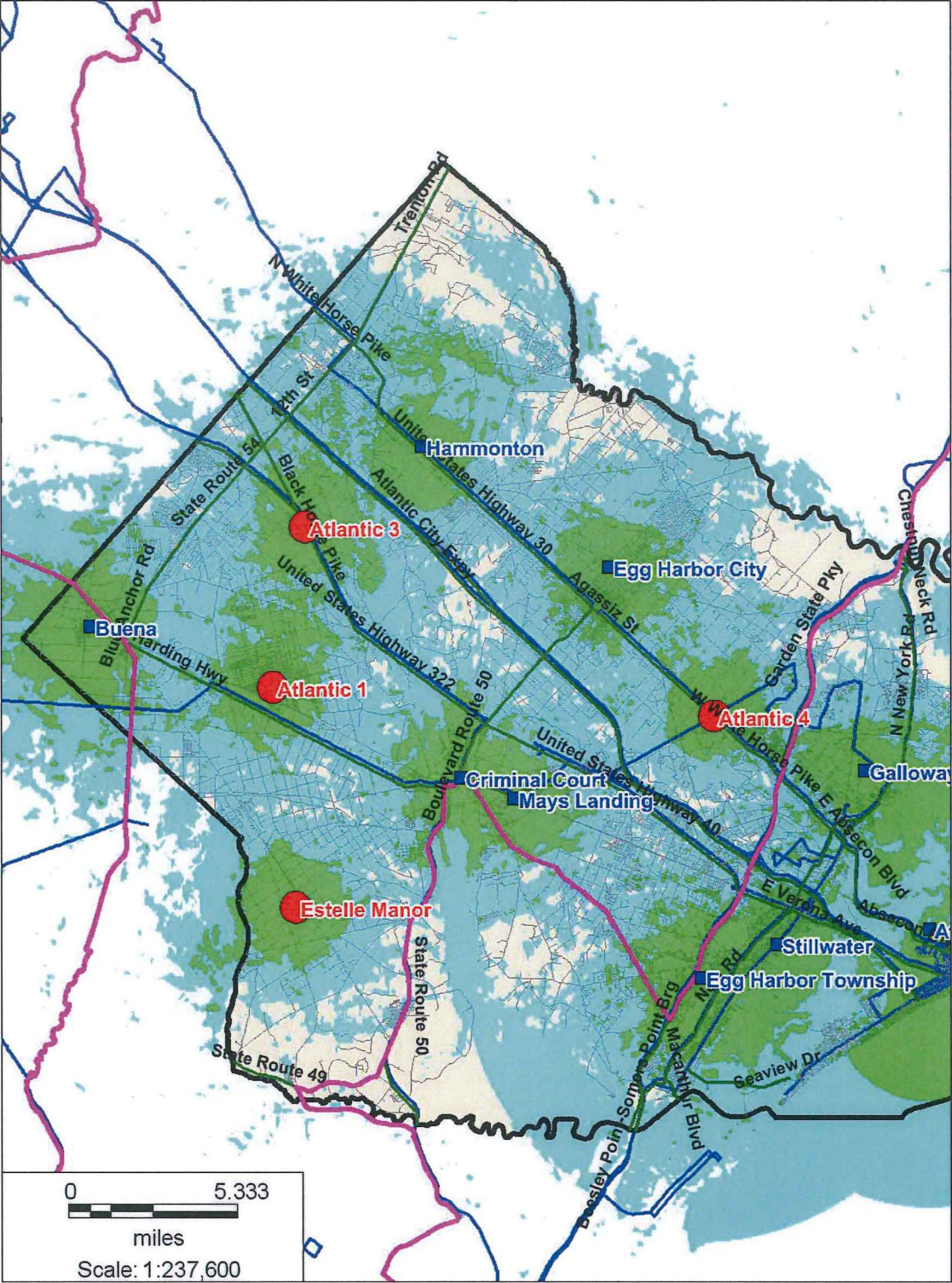
Map 2 - Existing Sites On-Street Coverage – Narrowband



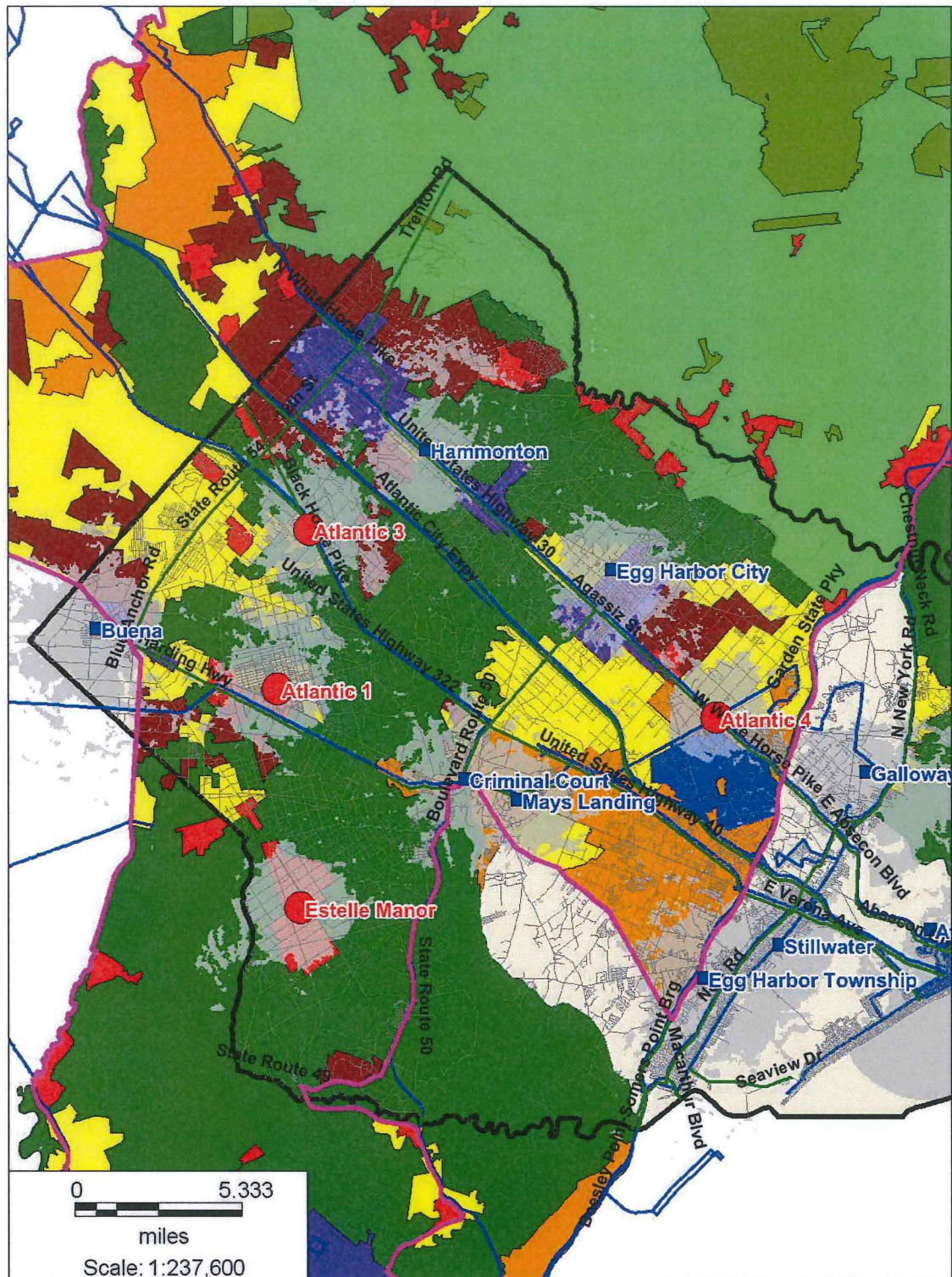
Map 3 - Existing and Phase 1 Sites On-Street Coverage – Narrowband



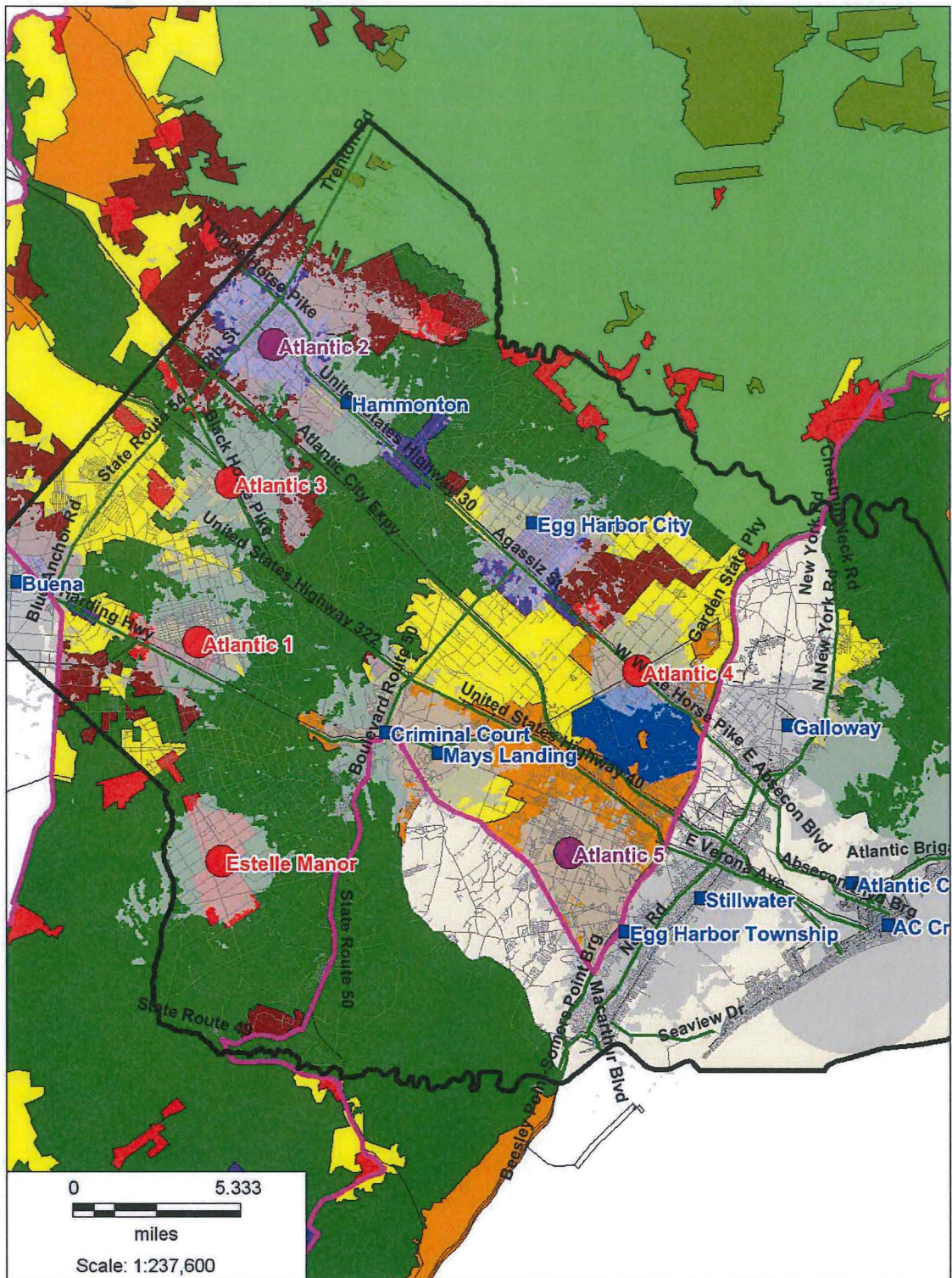
**Map 4 - Existing and Phase 1 Sites On-Street and In-Building Coverage –
Narrowband**



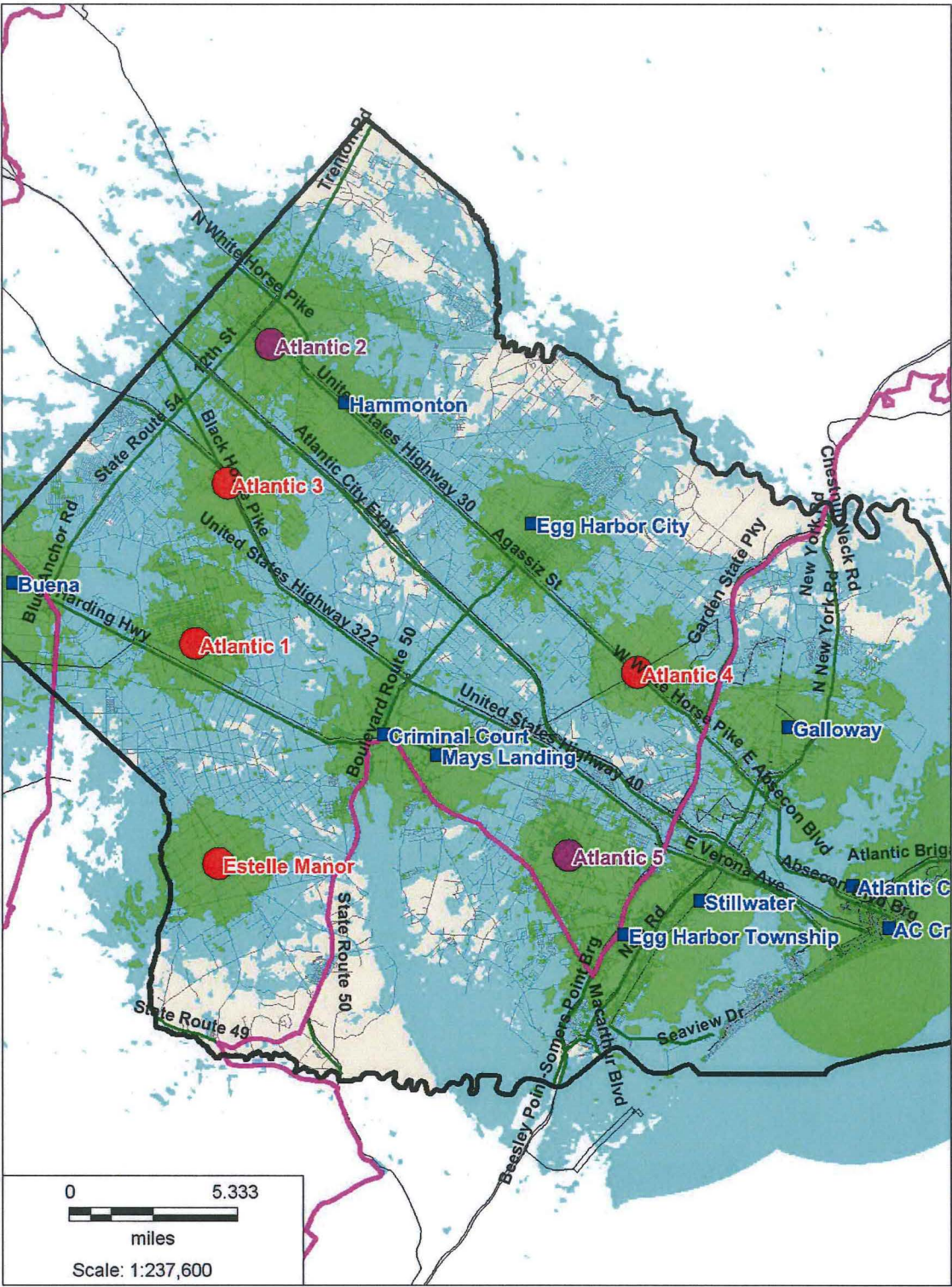
Map 5 - Existing and Phase 1 Sites In-Building Coverage – Narrowband



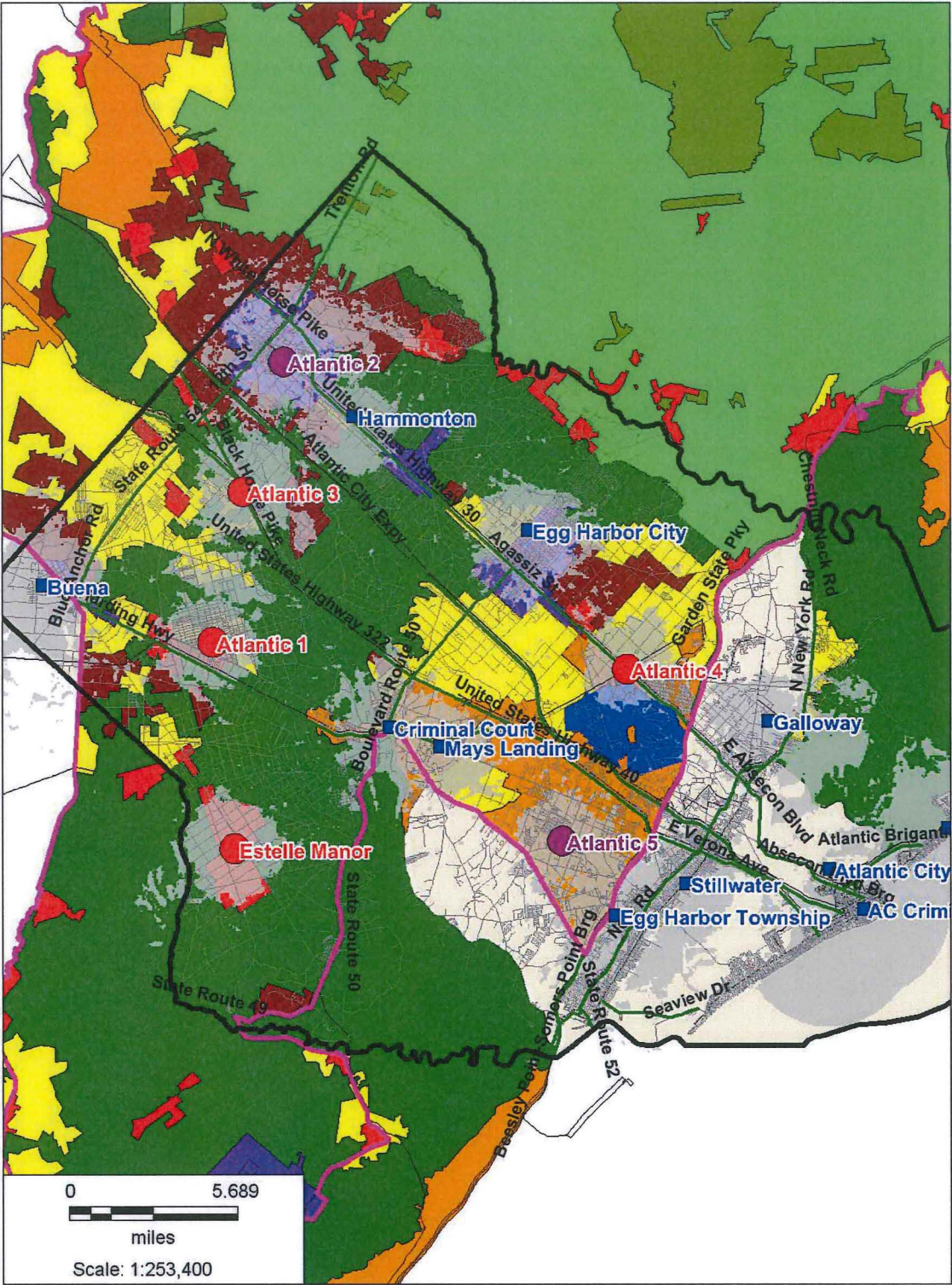
**Map 6 - Existing and Phase 1 and 2 Sites In-Building Coverage –
Narrowband**



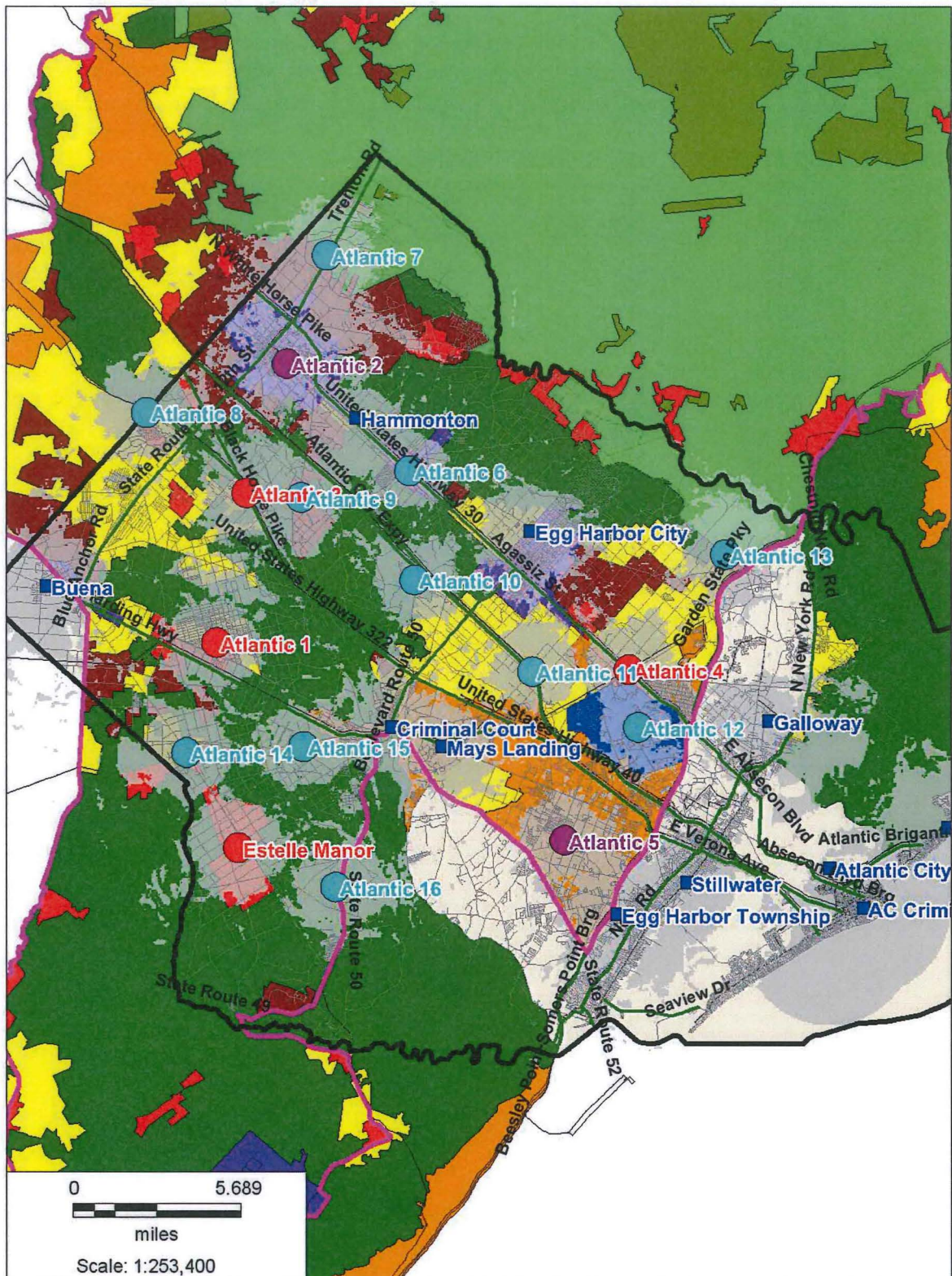
**Map 7 - Existing and Phase 1 and 2 Sites On-Street and In-Building Coverage
– Narrowband**



Map 8 - Existing and Phase 1 and 2 On-Street Coverage – Broadband



Map 9 - Existing and Phase 1, 2 and 3 Sites Coverage – Broadband



Burlington County Overview

For the Burlington County comprehensive plan, V-COMM contacted Mr. Mark Van Ness requesting the current list of existing radio towers utilized for the county's operations in and near the Pinelands Region, the towers the county is leasing space on for its operations, additional sites needed by the county to provide full coverage in the Pinelands, frequency information and information on any locations the county might have already discussed with the Pinelands Commission. Burlington County has provided V-COMM all the requested information and V-COMM has utilized this information to analyze the county's current and future coverage requirements.

System Design

Burlington County has provided V-COMM nine (9) 700 MHz sites that provide the necessary coverage within the county's jurisdictional area. In addition, included in the list of existing sites is the Bordentown State of NJ tower owned by the State Police. Listed in table 5 below are the details of the existing sites.

Table 5 - Burlington County 700 MHz Sites Information

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet)/ Type
1	Chatsworth	39.84289	74.54514	Canal Street Chatsworth	272 Tower
2	Pemberton	39.97061	74.64194	628 CR Rt. 530 Pemberton	150 Tower
3	Bass River	39.60478	74.43394	SP Barracks E Gardenstate Parkway New Gretna	240 Tower
4	Browns Mills	39.97089	74.58225	15 Trenton Road Browns Mills	163 Pole
5	Medford	39.84506	74.82922	282 Jackson Road Medford	180 Tower
6	Tabernacle	39.84764	74.70292	590 CR532 Tabernacle	300 Tower
7	Warren Grove	39.75289	74.38847	FAA Site Beaver Dam Road Warren Grove	274 Tower
8	Sweet Water	39.62219	74.64625	CR 643 Mullica Township	274 Tower
9	Jenkins Tower	39.70791	74.53068	ATC Tower Chatsworth Road Vincetown	185 Tower
10	Bordentown	40.1335833	74.7174722	US Highway 130 and I-295 (NJ Police Public Safety Tower) Bordentown	270 Tower

Future Sites

Currently, Burlington County has seven (7) future planned sites within the Pinelands Jurisdiction. In addition to the county proposed sites, V-COMM's coverage analysis shows that the county requires five (5) new sites to provide the necessary on-street and in-building coverage for narrowband and broadband. For Burlington County, the future sites have been divided into 3 phases.

Phase 1 Sites: To provide coverage for narrowband on-street.

Phase 2 Sites: To provide coverage for narrowband in-building.

Phase 3 Sites: To provide coverage for broadband on-street and a majority of in-building service.

Provided in Table 6 below is the general area of the list of sites required by Burlington County.

Table 6 – Burlington County Future Sites

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type	Proposed By	Phase
1	Burlington 1	39.722042	74.653831	Mannis Pond Road Washington	170 Proposed Tower	Burlington County	1
2	Medford 1	39.8450556	74.82922	282 Jackson Road Medford	180 Proposed Tower	Burlington County	1
3	Section 5 Maintenance	39.59194	74.4711	County Road 542 Bass River	250 Proposed Tower	Burlington County	1
4	Shamong Township	39.79056	74.7561	105 Willow Grove Road Shamong	150 Proposed Tower	Burlington County	2
5	Southampton Township	39.9325	74.7386	US Highway 206 and Buddtown Road Southampton	150 Proposed Tower	Burlington County	2
6	Upton Station	39.9375	74.5217	Upton Station Road Pemberton	150 Proposed Tower	Burlington County	2
7	Medford 2	39.9025	74.8067	NJ Route 70/ Marlton Pike Medford	150 Proposed Tower	Burlington County	3
8	Burlington 2	39.878171	74.6390429	Burrs Mill Road Woodland	150 Proposed Tower	V-COMM	3
9	Burlington 3	39.8365	74.4675828	Route 72 and County Road 532 / Chatsworth Barnegat Road Woodland	150 Proposed Tower	V-COMM	3

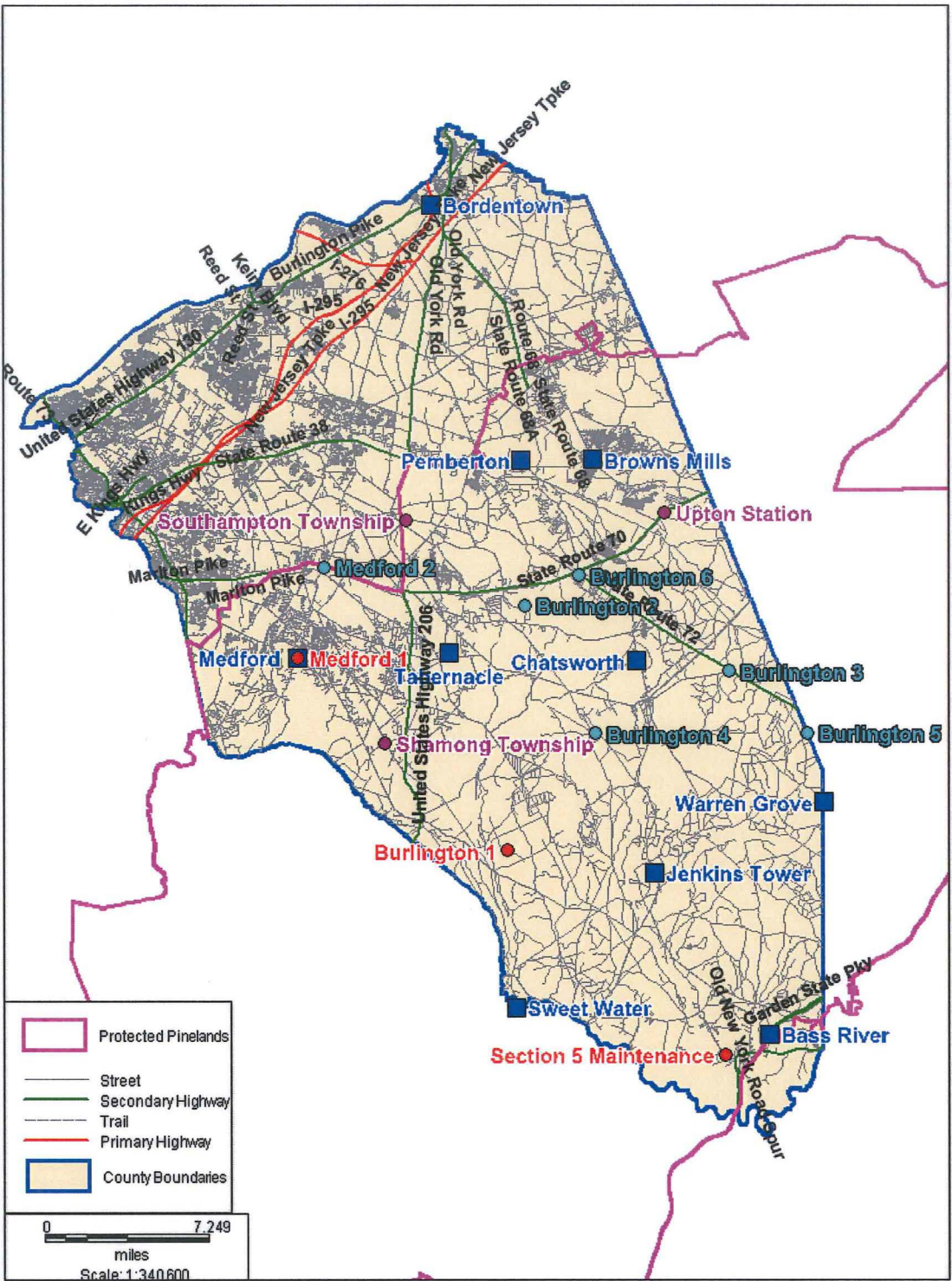
Table 6 Continued – Burlington County Future Sites

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type	Proposed By	Phase
10	Burlington 4	39.796783	74.5801567	Speedwell Road Tabernacle	150 Proposed Tower	V-COMM	3
11	Burlington 5	39.797062	74.4029271	Stephenson Road and Route 72 Woodland/ Barnegat	150 Proposed Tower	V-COMM	3
12	Burlington 6	39.8972	74.5932994	14 Route 72 Woodland	150 Proposed Tower	V-COMM	3

In the Map “Burlington County Map of Existing and Future Sites” below, the existing and future sites have been shown as described:

- Phase 1 Sites – Denoted by red circles
- Phase 2 Sites – Denoted by purple circles
- Phase 3 Sites – Denoted by blue circles
- Existing Sites – Denoted by blue squares

Figure 8 - Burlington County Map of Existing and Future Sites



1. **Burlington 1:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located along Mannis Pond Road in Washington Township. This site will provide coverage to the western section of Washington Township in the areas around Mannis Pond Road, Washington Quaker Bridge Road, Hay Road and other streets in the vicinity.

2. **Medford 1:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located on 282 Jackson Road in Medford. This site will be a 2nd tower next to the existing Medford tower, as there is insufficient capacity to support the anticipated antenna load for the new 700 MHz two-voice system. This site will provide coverage to the southern section of Medford Township in the areas along Jackson Road, Atsion Road, Tuckerton Road and other streets in the vicinity.

3. **Section 5 Maintenance:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located on County Road 542 in Bass River Township. This site will provide coverage to the southern section of Bass River Township in the areas around the Garden State Parkway, Hammonton Road, State Highway 167 and other streets in the vicinity. This site will replace Burlington County's facility on the Bass River Tower, located at Exit 52 of the Garden State Parkway as this tower has insufficient capacity to support the anticipated antenna load from the new 700 MHz two-voice system.

4. **Shamong Township:**

This site is recommended by V-COMM for phase 2, narrowband in-building coverage. This site is located on Buddtown Road in Shamong. This site will provide coverage to the western section of Shamong Township in the areas around US Highway 206, Willow Grove Road, Stokes Road, Atsion Road and other areas in the vicinity.

5. **Southampton Township:**

This site is recommended by V-COMM for phase 2, narrowband in-building coverage. This site is located near US Highway 206 and Buddtown Road in Southampton. This site will provide coverage to the northern section of Southampton Township in the areas around US Highway 206, Buddtown Road, Retreat Road, Pemberton Road, Eayrestown Road, Church Road and other areas in the vicinity.

6. **Upton Station:**

This site is recommended by V-COMM for phase 2, narrowband in-building coverage. This site is located on Upton Station Road in Pemberton. This site will provide coverage to the south eastern section of Pemberton Township in the areas around State Route 70, Lakehurst Road, Mount Misery Road and other areas in the vicinity.

7. **Medford 2:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located on NJ Route 70/ Marlton Pike in Medford. This site will provide coverage to the northern section of Medford Township in the areas around State Route 70, Eayrestown Road, County Road 541 and Chairville Road and other areas in the vicinity.

8. **Burlington 2:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located on Burrs Mills Road in Woodland. This site will provide coverage to the northwest section of Woodland Township in the areas around State Route 70, Sooy Place Road, Burrs Mills Road, South Park Road and other areas in the vicinity.

9. **Burlington 3:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located near Route 72 and Chatsworth Barnegat Road in Woodland. This site will provide coverage to the Southeast section of Woodland Township in the areas around Route 72, County Road 532, Savoy Boulevard, Sooy Road and other areas in the vicinity.

10. **Burlington 4:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located on Speedwell Road in Tabernacle. This site will provide coverage to the southeast section of Tabernacle in the areas around Speedwell Road, County Road 532 and other areas in the vicinity.

11. **Burlington 5:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located on Stephenson Road and Route 72 in Woodland/Barnegat. This site will provide coverage to the southern section of Woodland Township and western section of Barnegat Township in the areas around Stephenson Road, State Route 72, Old Halfway Road, Sooy Road and other areas in the vicinity.

12. **Burlington 6:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located at 14 Route 72 in Woodland. This site will provide coverage to the northern section of Woodland and parts of Southampton and Pemberton Township in the areas around State Route 70, Mangolia Road, Four Mile Road, Branson Road, Shinns Road, Deep Hollow Road and other areas in the vicinity.

System Coverage

V-COMM performed the 700 MHz coverage analysis for Burlington County using EDX SignalPro with 1 arc second terrain data. The tool was set up to use the Anderson propagation model. This coverage analysis was done for on-street portable talk-back and in-building portable talk back for narrowband and broadband frequencies for the existing sites and the existing and future sites. Provided in the maps below are the coverage plots along with the threshold levels for each analysis.

The Map 10 labeled “Existing Sites Coverage On-Street and In-Building – Narrowband” shows Burlington County coverage with the existing sites at -81 dBm (in-building) and -95 dBm (on-street). As can be seen in Map 10, with the existing sites, there are many coverage gaps in different sections of the county.

The Map 11 labeled “Existing Sites On-Street Coverage – Narrowband” shows the existing sites coverage at -95 dBm with the Pinelands management area map as the underlay.

The Map 12 labeled “Existing and Phase 1 Sites On-Street Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -95 dBm with the Pinelands management area map as an underlay. The Phase 1 sites were designed to provide the necessary on-street coverage by filling in the gaps that were there with the existing sites.

The Map 13 labeled “Existing and Phase 1 Sites On-Street and In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -81 dBm and -95 dBm.

The Map 14 labeled “Existing and Phase 1 Sites In-Building Coverage – Narrowband” shows the existing sites coverage at -81 dBm with the Pinelands management area map as the underlay.

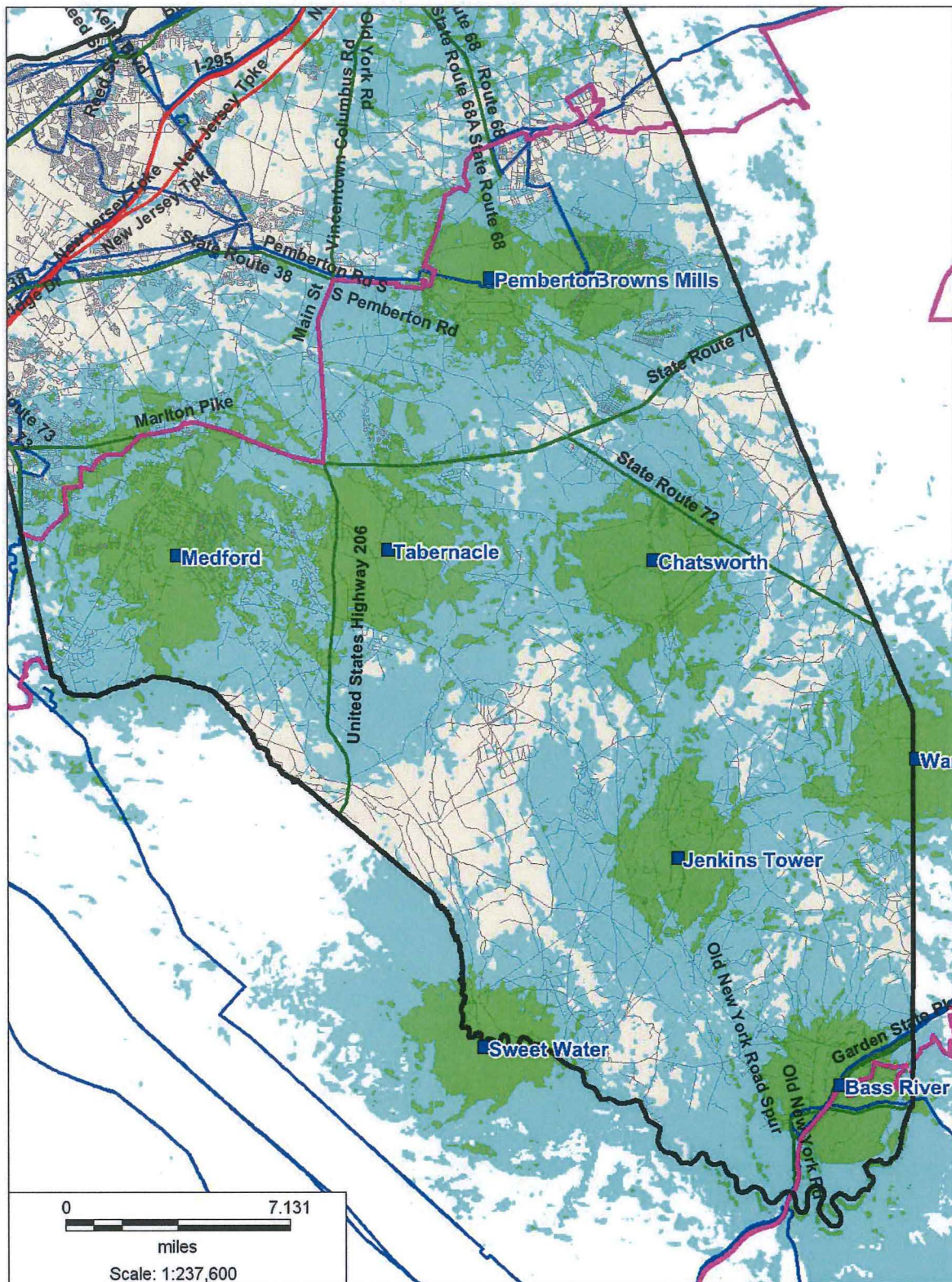
The Map 15 labeled “Existing and Phase 1 and 2 Sites In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 and Phase 2 sites at -81 dBm with the Pinelands area map as an underlay. The Phase 2 sites were designed to provide the necessary in-building coverage.

The Map 16 labeled “Existing and Phase 1 and 2 Sites On-Street and In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 and 2 sites at -81 dBm and -95 dBm.

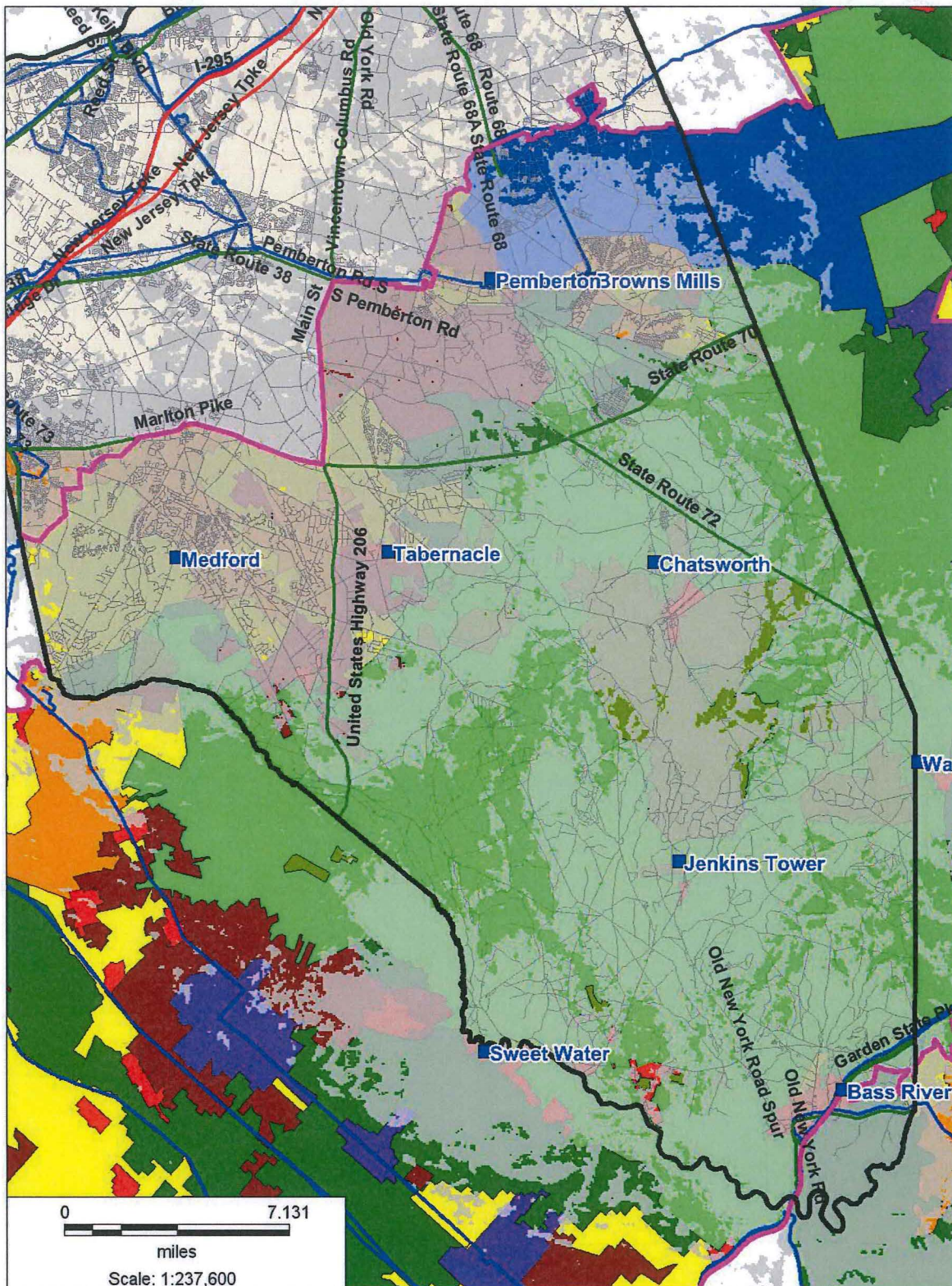
The Map 17 labeled “Existing and Phase 1 and 2 On-Street Coverage – Broadband” shows the existing sites coverage with Phase 1 and 2 at -80 dBm with the Pinelands area map as an underlay.

The Map 18 labeled “Existing and Phase 1, 2 and 3 Sites Coverage – Broadband” shows the existing sites coverage with Phase 1, 2 and 3 sites at -80 dBm with the Pinelands area map as an underlay. The Phase 3 sites provide on-street and a majority of in-Building coverage in the Pinelands.

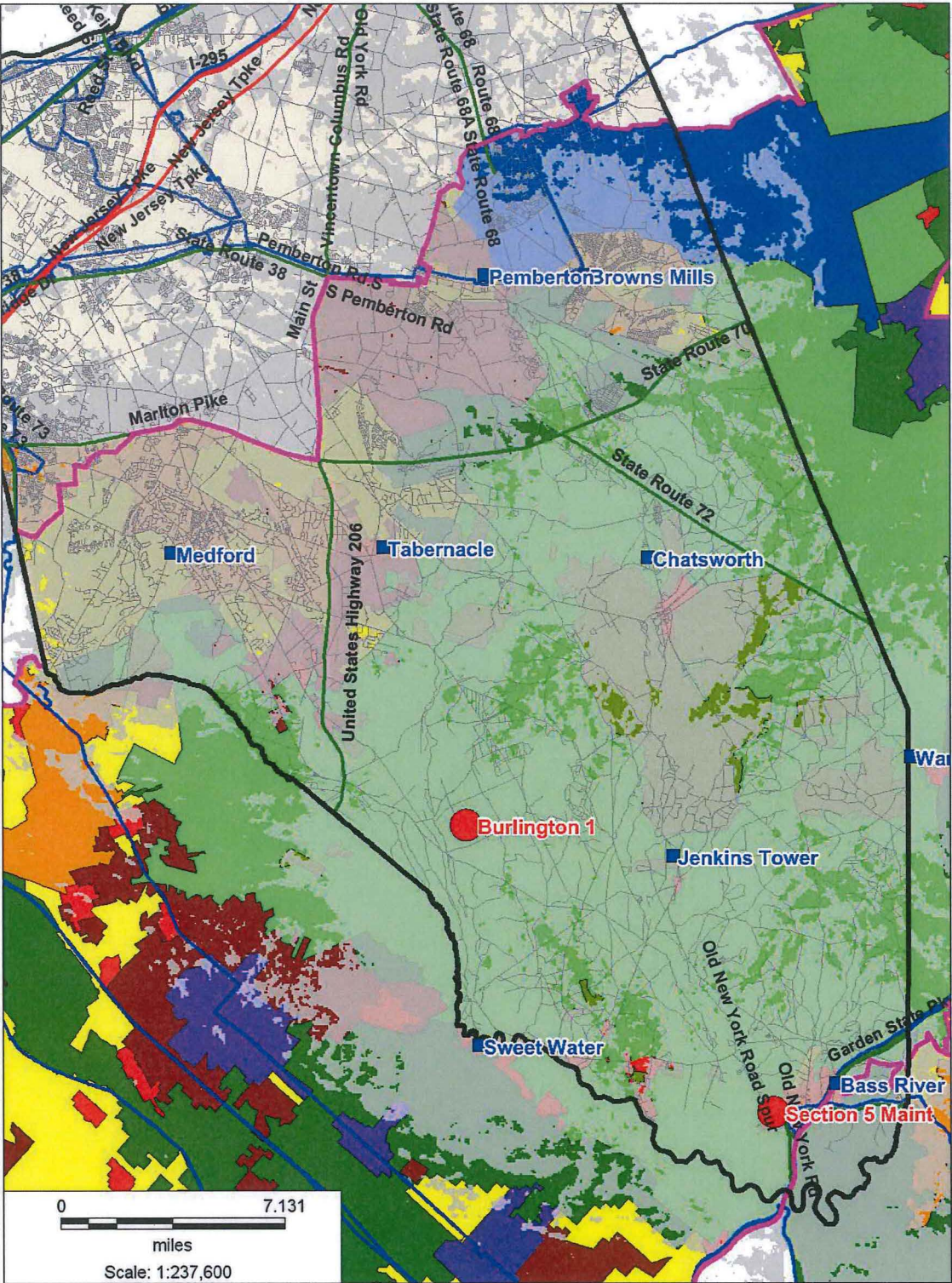
Map 10 - Existing Sites Coverage On-Street and In-Building – Narrowband



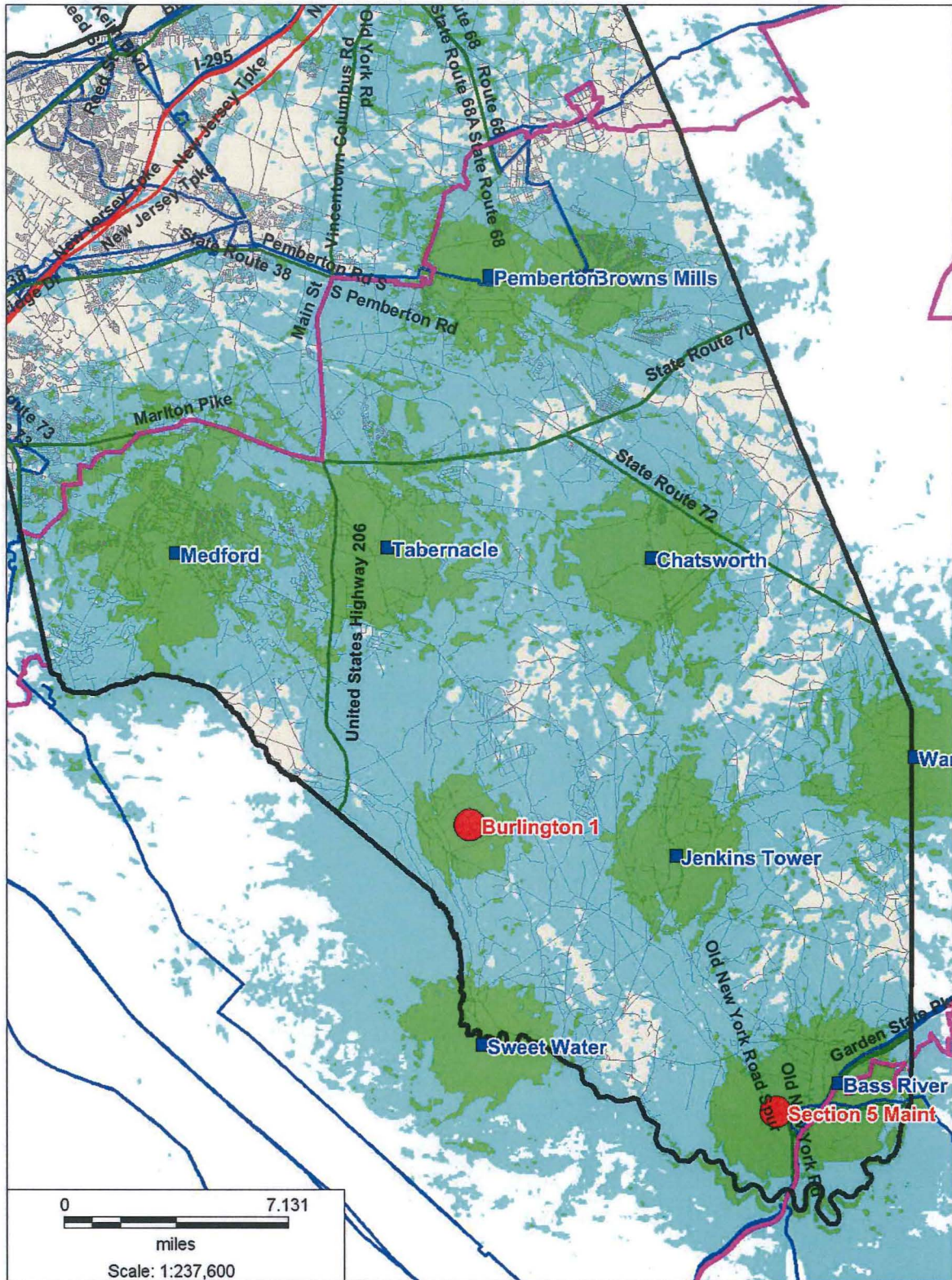
Map 11 - Existing Sites On-Street Coverage – Narrowband



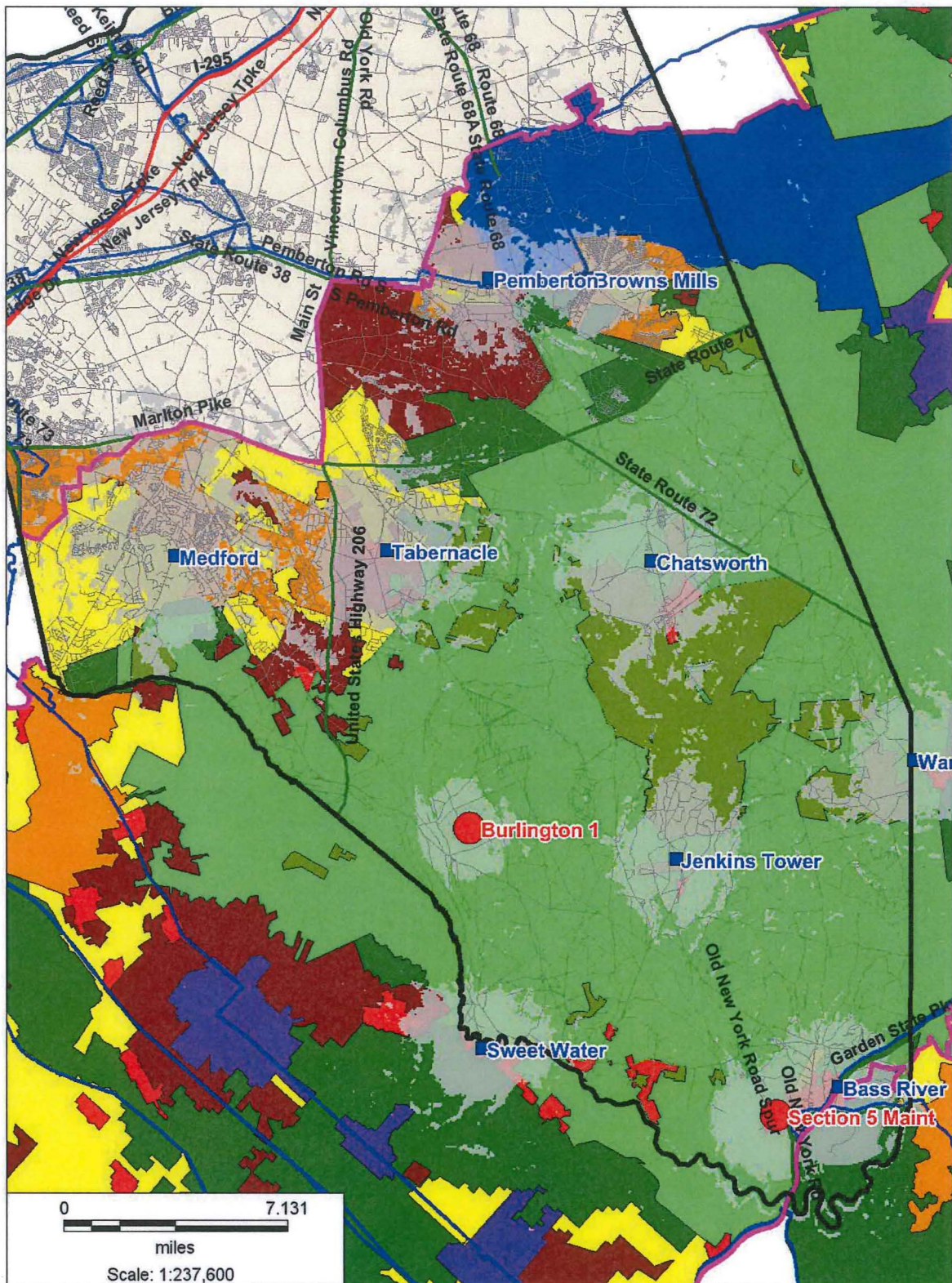
Map 12 - Existing and Phase 1 Sites On-Street Coverage – Narrowband



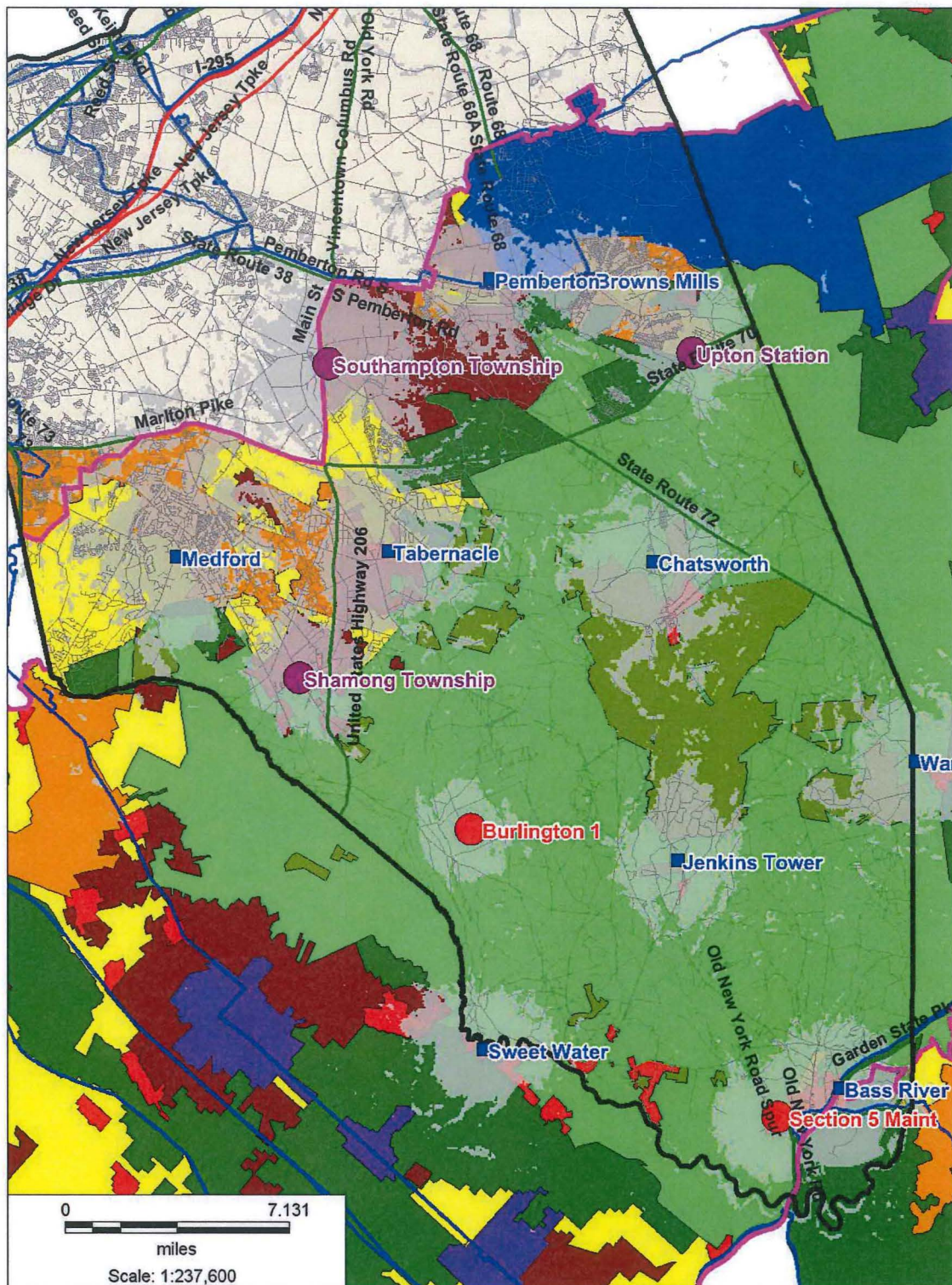
**Map 13 - Existing and Phase 1 Sites On-Street and In-Building Coverage –
Narrowband**



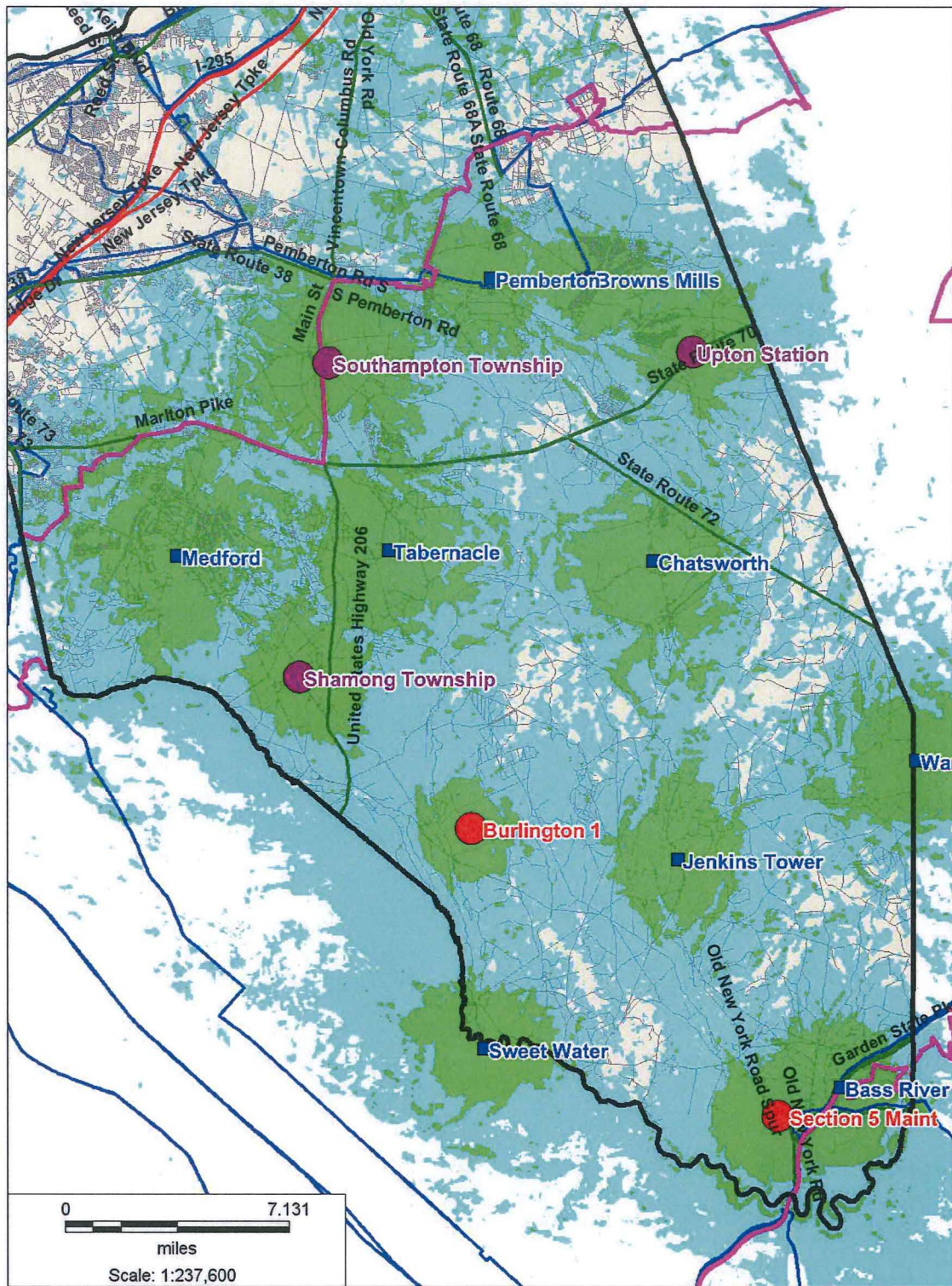
Map 14 - Existing and Phase 1 Sites In-Building Coverage – Narrowband



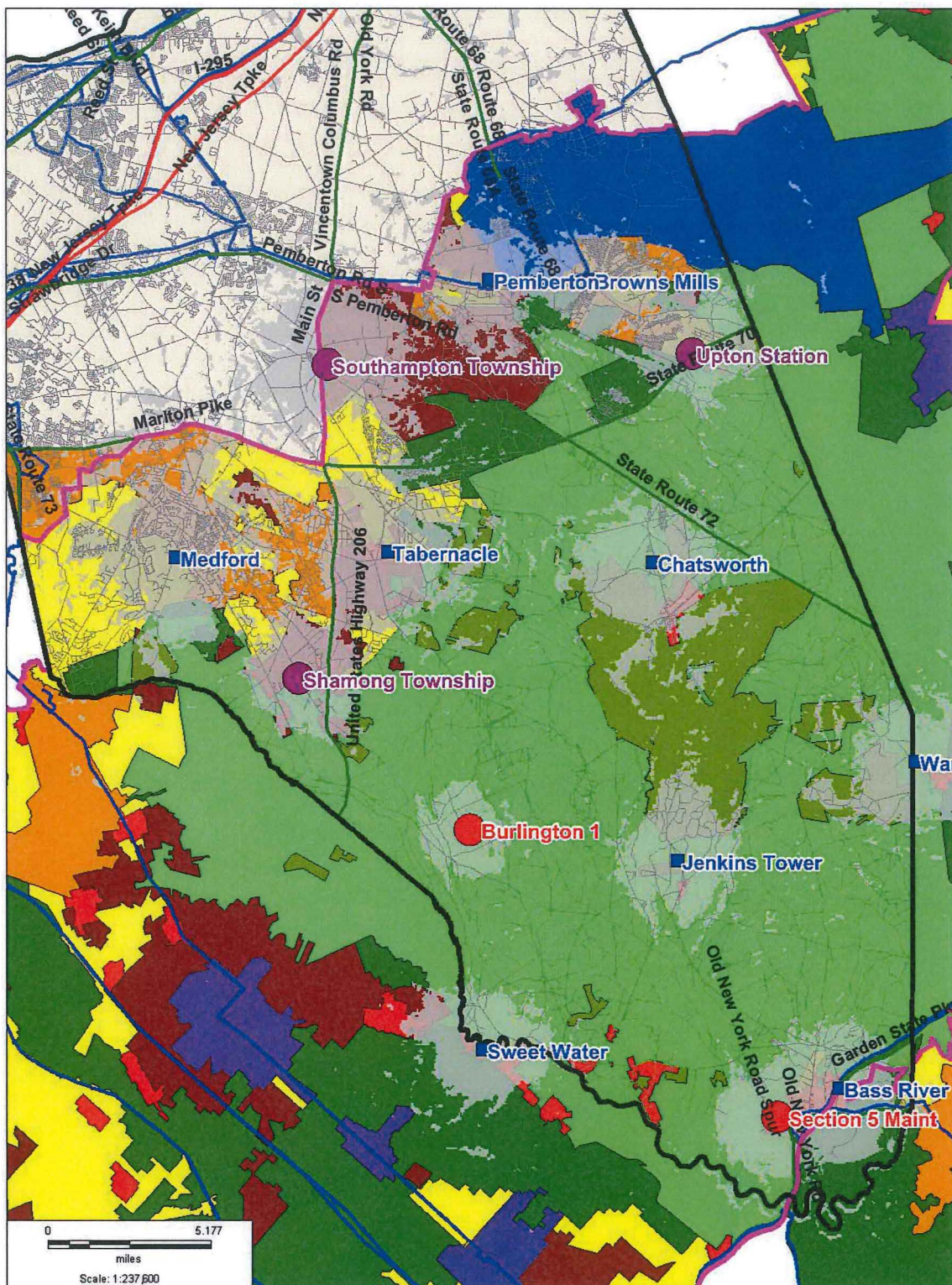
**Map 15 - Existing and Phase 1 and 2 Sites In-Building Coverage –
Narrowband**



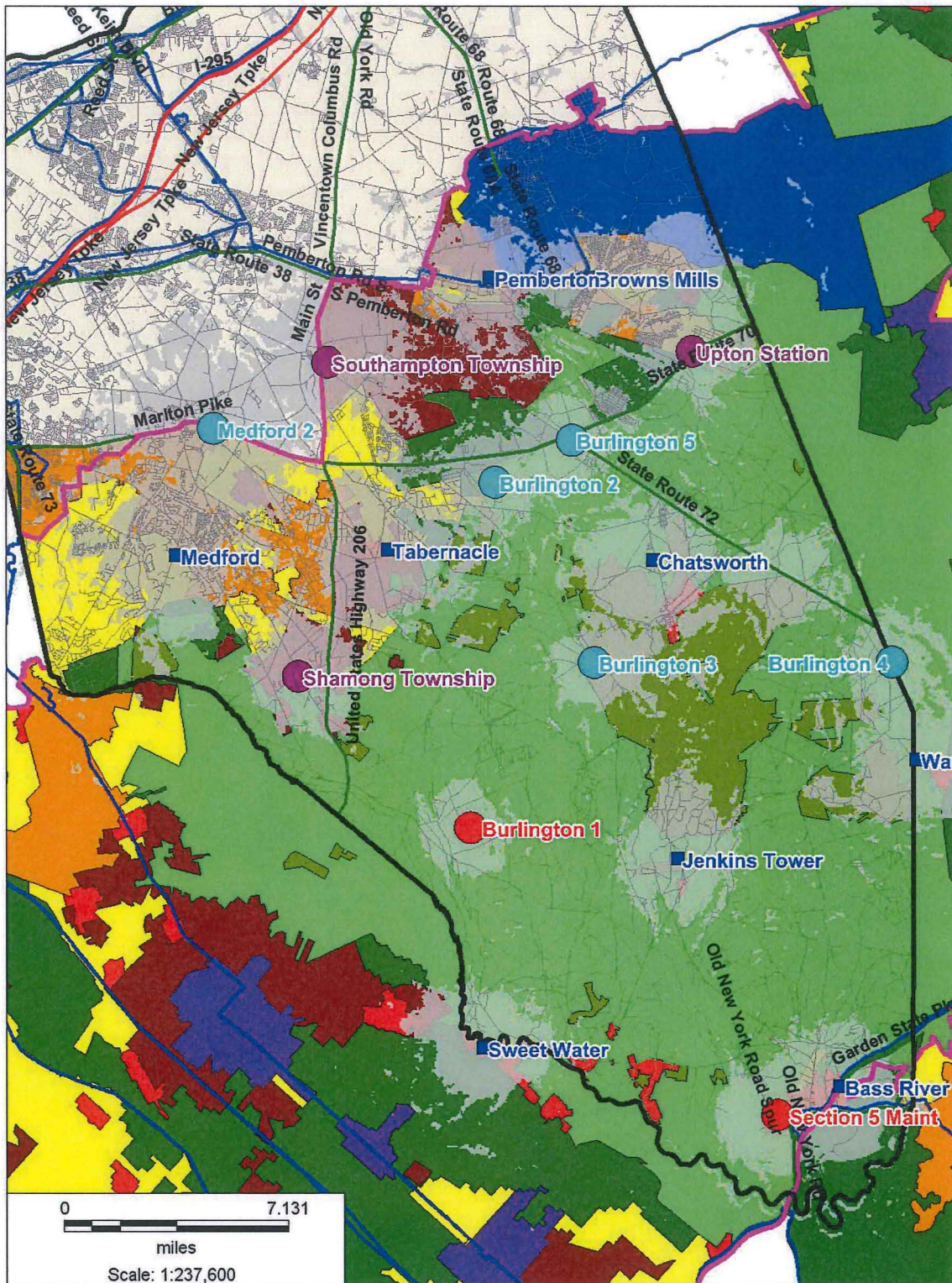
**Map 16 - Existing and Phase 1 and 2 Sites On-Street and In-Building
Coverage – Narrowband**



Map 17 - Existing and Phase 1 and 2 On-Street Coverage – Broadband



Map 18 - Existing and Phase 1, 2 and 3 Sites Coverage – Broadband



Camden County Overview

For the comprehensive plan for Camden County, V-COMM had all the necessary site information for the 700 MHz analysis from the “Camden County 700 MHz build Plan” done by V-COMM previously. V-COMM has utilized this information to analyze the County’s current and future coverage requirements.

System Design

Camden County's system design consists of seven (7) 700 MHz sites to provide the necessary coverage within the County's jurisdictional area. The detailed site information is included in table 7 below.

Table 7 – Camden County 700 MHz Sites Information

Site No.	Site Name	Latitude (N)	Longitude (W)	Structure	Structure Height AGL (ft)	Tx Ant Tip (ft)
1	Lindenwold	39.816000	74.96333	Lattice Tower	320	332
2	Pennsauken PD	39.96561111	75.04747	Lattice Tower	260	272
3	NJDOT	39.90416667	74.98448	Lattice Tower	150	162
4	WUVP	39.73472222	74.84111	Guyed Tower	868	262
5	Winslow Municipal Bldg	39.7000000	74.89758	Lattice Tower	300	312
6	Camden County College	39.78386111	75.04408	Lattice Tower	320	332
7	Irish Hill	39.85711111	75.06861	Lattice Tower	180	192

Future Sites

Currently, Camden County has two future sites within the Pinelands Jurisdiction. Based on the coverage analysis, V-COMM has categorized the coverage from the future sites into 2 phases.

Phase 1 Sites: To provide coverage for narrowband on-street.

Phase 2 Sites: To provide coverage for narrowband in-building.

With the current design, Camden County doesn't require additional sites to provide coverage for broadband on-street and a majority of in-building service.

Provided in Table 8 below is the list of sites required by Burlington County.

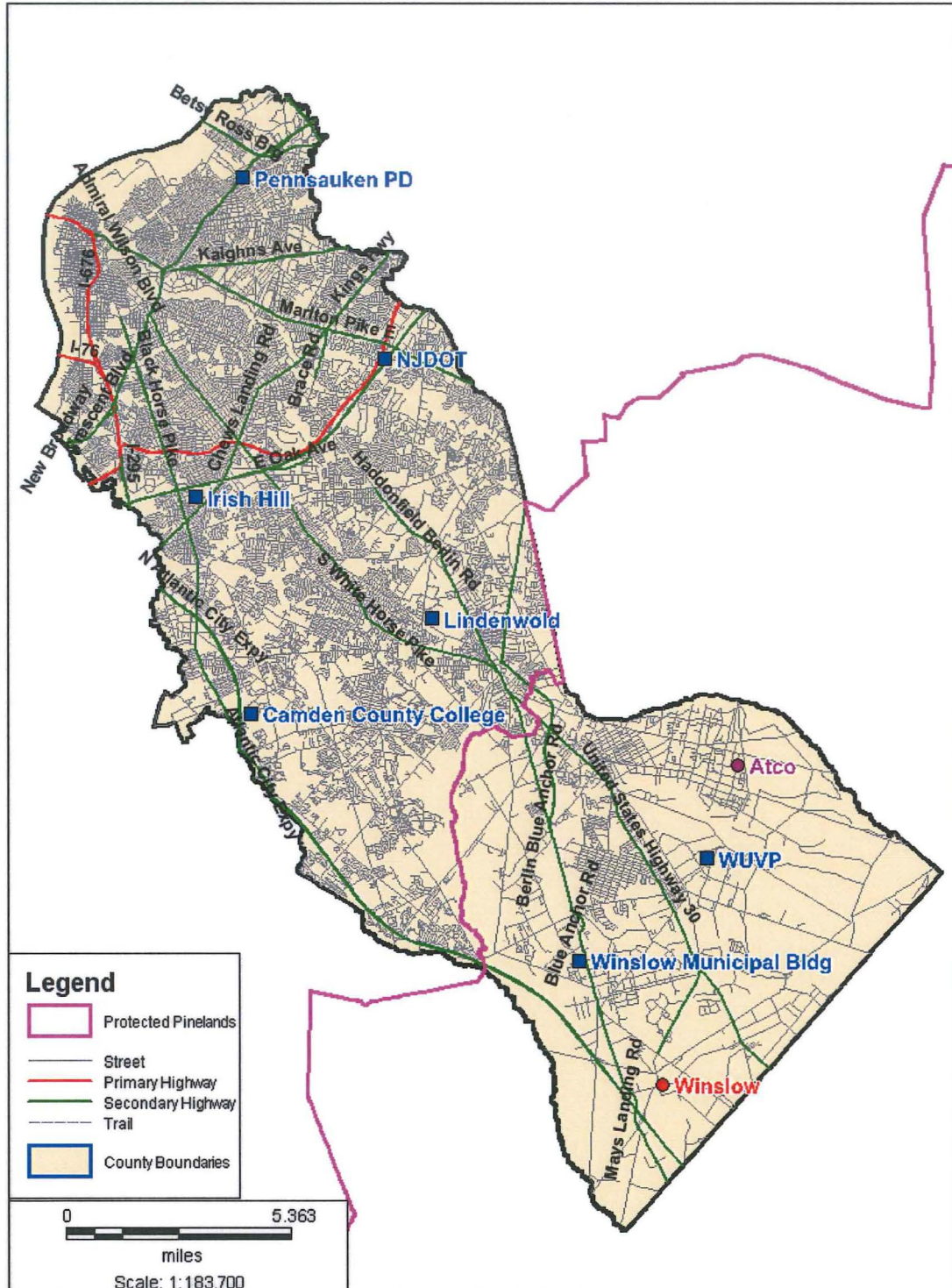
Table 8 – Camden County Future Sites

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type	Proposed By	Phase
1	Atco	39.766333	74.827556	Columbia Avenue Waterford	170 Proposed Tower	Camden County	1
2	Winslow	39.658056	74.861056	Hay Street and Hall Street Winslow	170 Proposed Tower	Camden County	1

In the Map “Camden County Map of Existing and Future Sites” below, the existing and future sites have been shown as described:

- Phase 1 Sites – Denoted by red circles
- Phase 2 Sites – Denoted by purple circles
- Existing Sites – Denoted by blue squares

Figure 9 - Camden County Map of Existing and Future Sites



1. Atco:

This site is recommended by V-COMM for phase 2, narrowband in-building coverage. There are two candidates for this location. The primary candidate is the Atco concrete plant site located on Columbia Avenue in Waterford. The alternate candidate called Atco Raceway is located on Trenton Avenue and North of Jackson Road which is located within 0.5 miles of the Columbia Avenue location. The Atco site will provide coverage to the northern section of Waterford Township in and around Columbia Avenue, Jackson Road and Maple Island Road and other areas in the vicinity.

2. Winslow:

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located east of the intersection of Hay Street and Hall Street / Hammonton Road in Winslow. This site will provide coverage to the southern section of Winslow in the areas around Spring Garden Road, Mays Landing Road, Atlantic City Expressway, Fleming Pike and other streets in the vicinity.

System Coverage

V-COMM performed the 700 MHz coverage analysis for Camden County using EDX SignalPro with 1 arc second terrain data. The tool was set up to use the Anderson propagation model. This coverage analysis was done for on-street portable talk-back and in-building portable talk back for narrowband and broadband frequencies for existing sites and for the existing and future sites. Provided in the maps below are the coverage plots along with the threshold levels for each analysis.

The Map 19 labeled “Existing Sites Coverage On-Street and In-Building – Narrowband” shows Camden County coverage with the existing sites at -81 dBm (in-building) and -95 dBm (on-street). As can be seen in Map 19 with the existing sites, there are many coverage gaps in different sections of the county.

The Map 20 labeled “Existing Sites On-Street Coverage – Narrowband” shows the existing sites coverage at -95 dBm with the Pinelands management area map as the underlay.

The Map 21 labeled “Existing and Phase 1 Sites On-Street Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -95 dBm with the Pinelands management area map as an underlay. The Phase 1 sites were designed to provide the necessary on-street coverage by filling in the gaps that were there with the existing sites.

The Map 22 labeled “Existing and Phase 1 Sites On-Street and In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -81 dBm and -95 dBm.

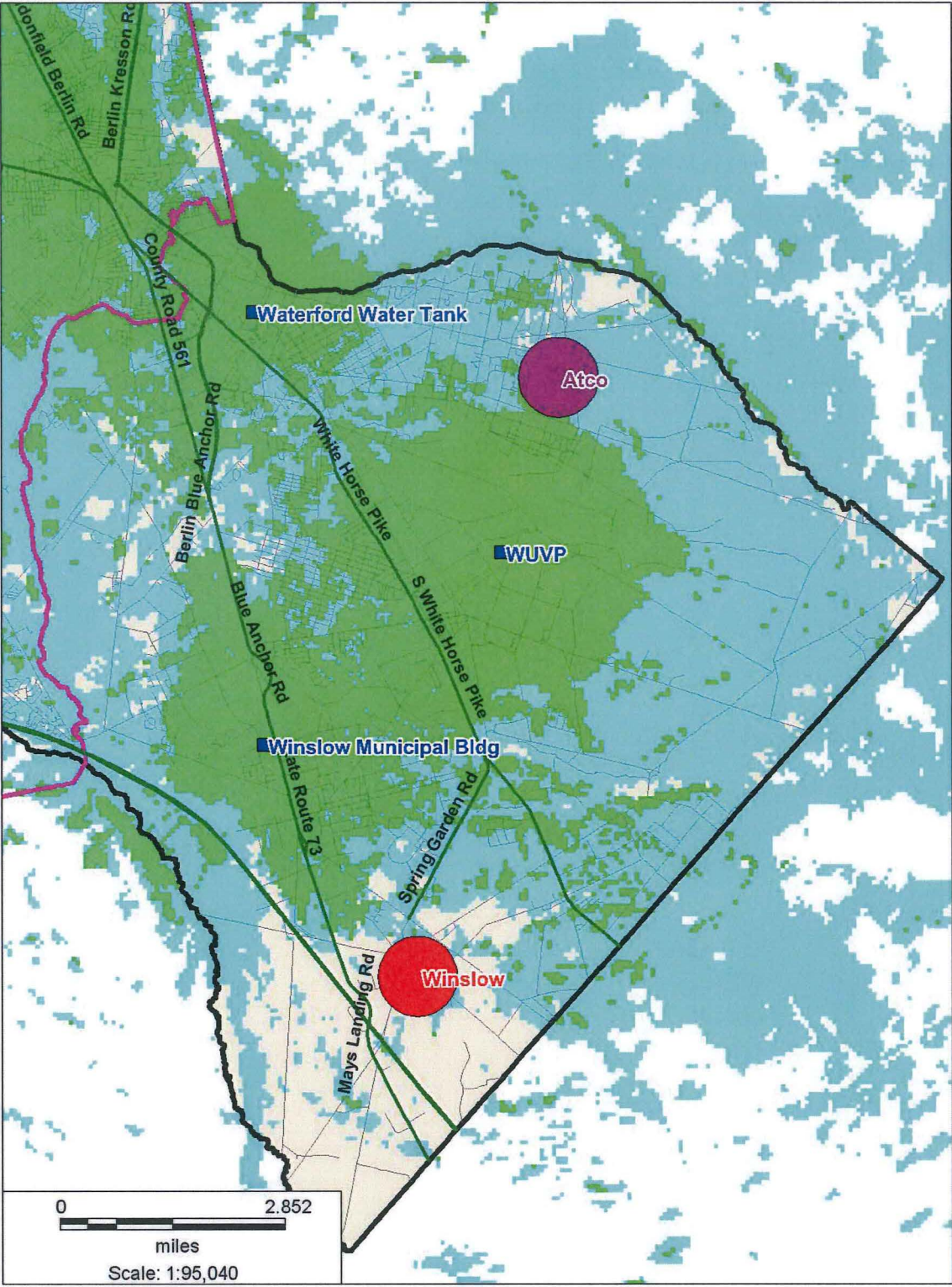
The Map 23 labeled “Existing and Phase 1 Sites In-Building Coverage – Narrowband” shows the existing sites coverage at -81 dBm with the Pinelands management area map as the underlay.

The Map 24 labeled “Existing and Phase 1 and 2 Sites In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 and Phase 2 sites at -81 dBm with the Pinelands area map as an underlay. The Phase 2 sites were designed to provide the necessary in-building coverage.

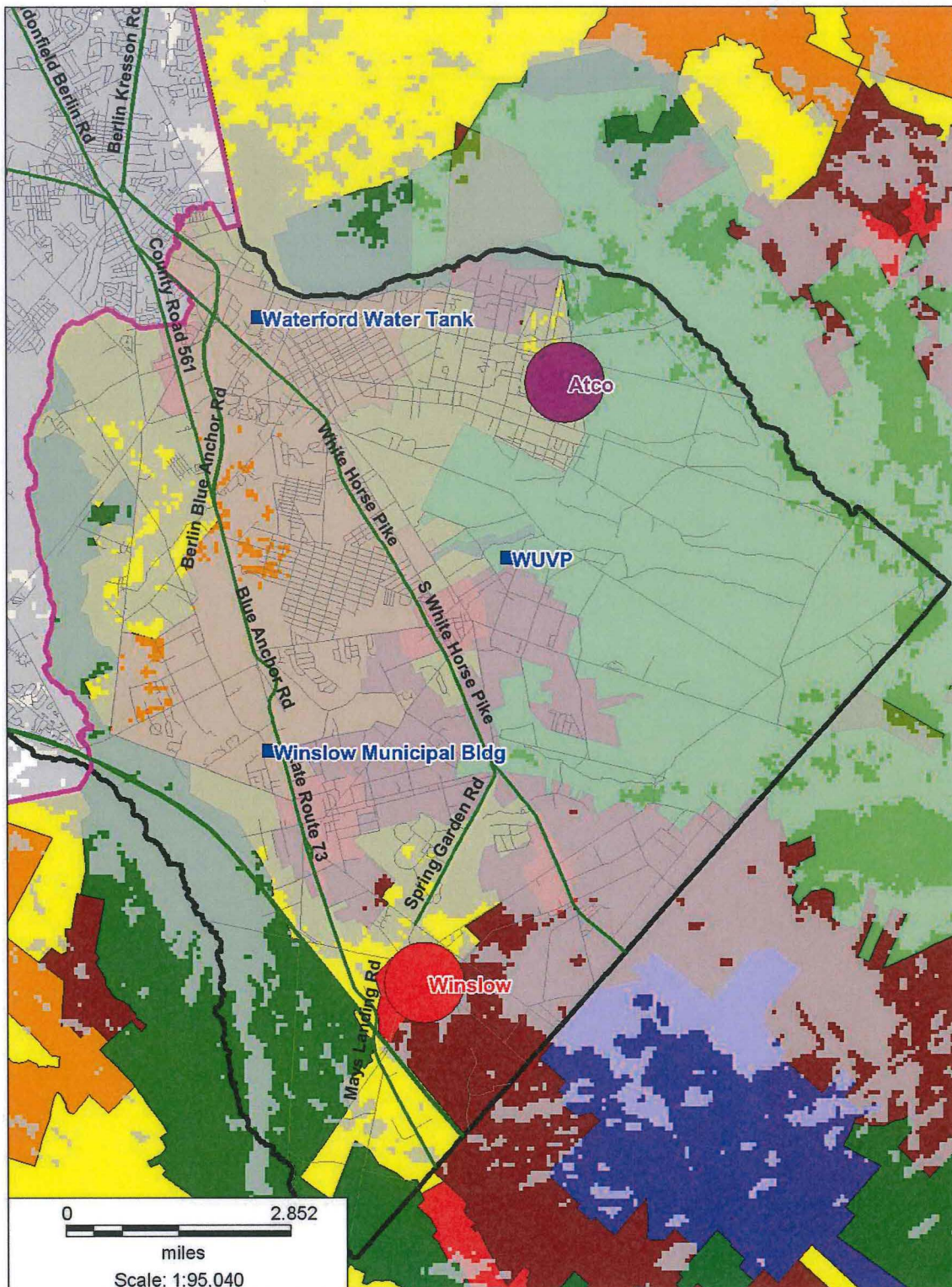
The Map 25 labeled “Existing and Phase 1 and 2 Sites On-Street and In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -81 dBm and -95 dBm.

The Map 26 labeled “Existing and Phase 1 and 2 Sites On-Street Coverage – Broadband” shows the existing sites coverage at -80 dBm with the Pinelands management area map as the underlay.

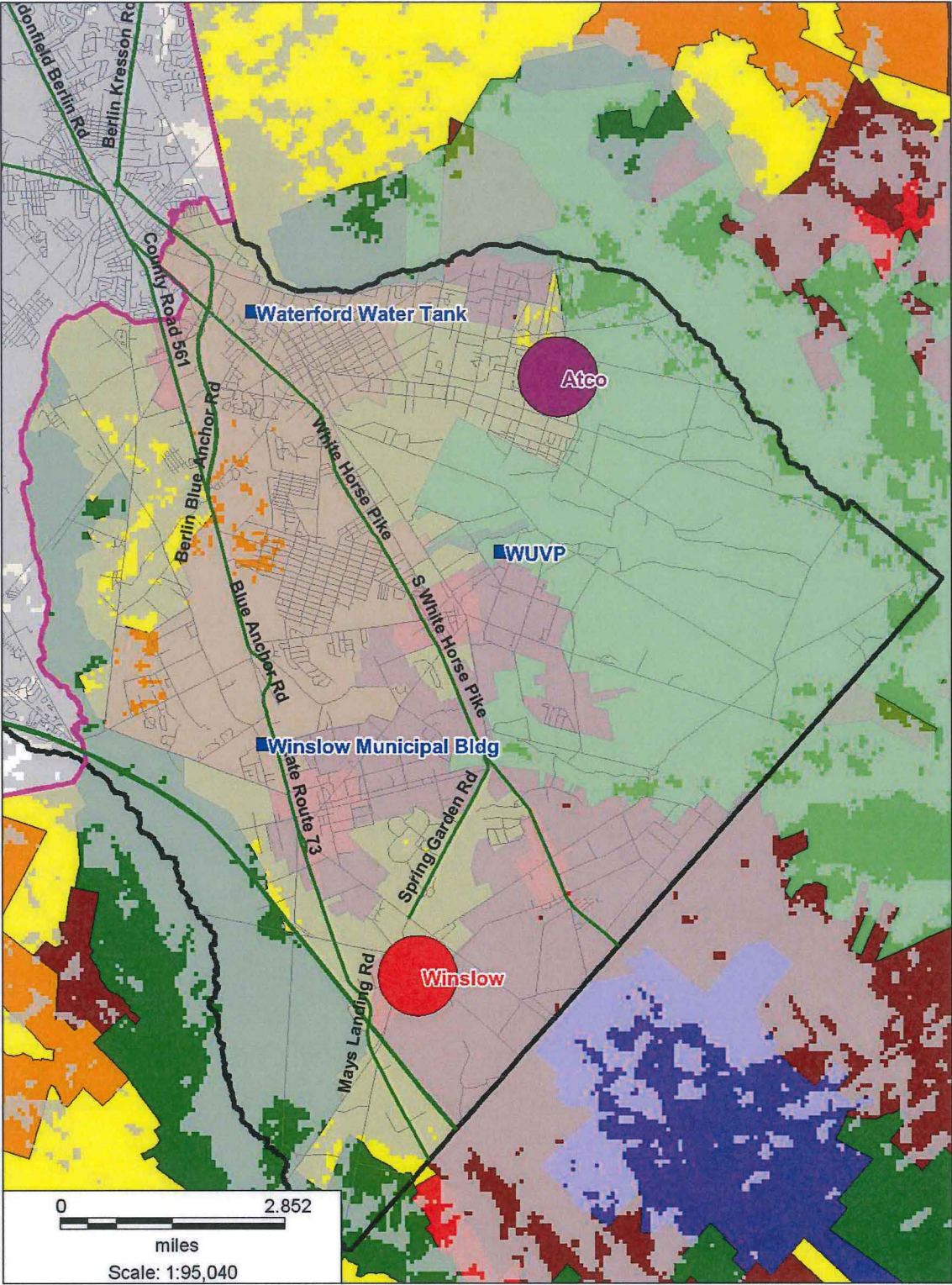
Map 19 - Existing Sites Coverage On-Street and In-Building – Narrowband



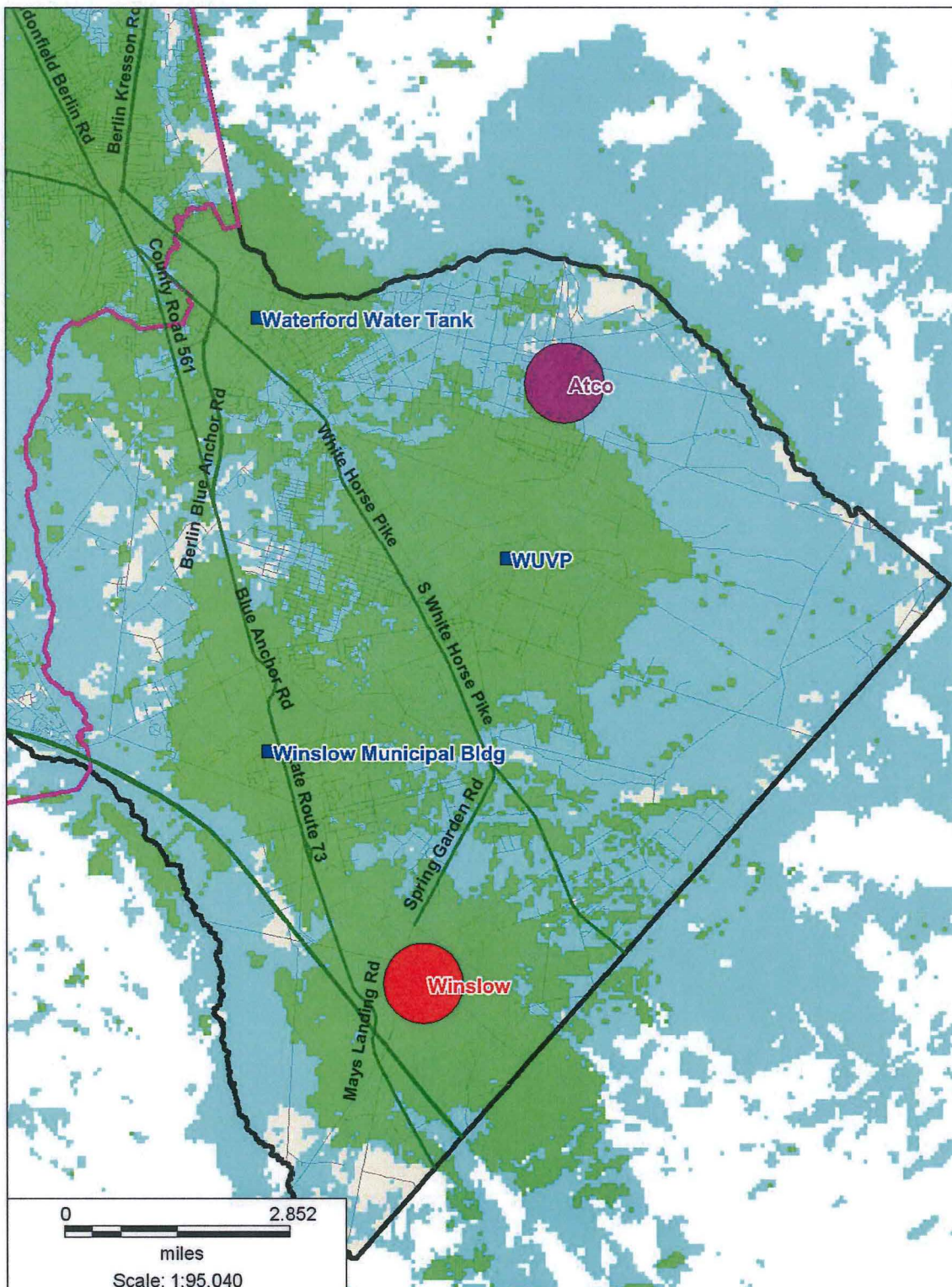
Map 20 - Existing Sites On-Street Coverage – Narrowband



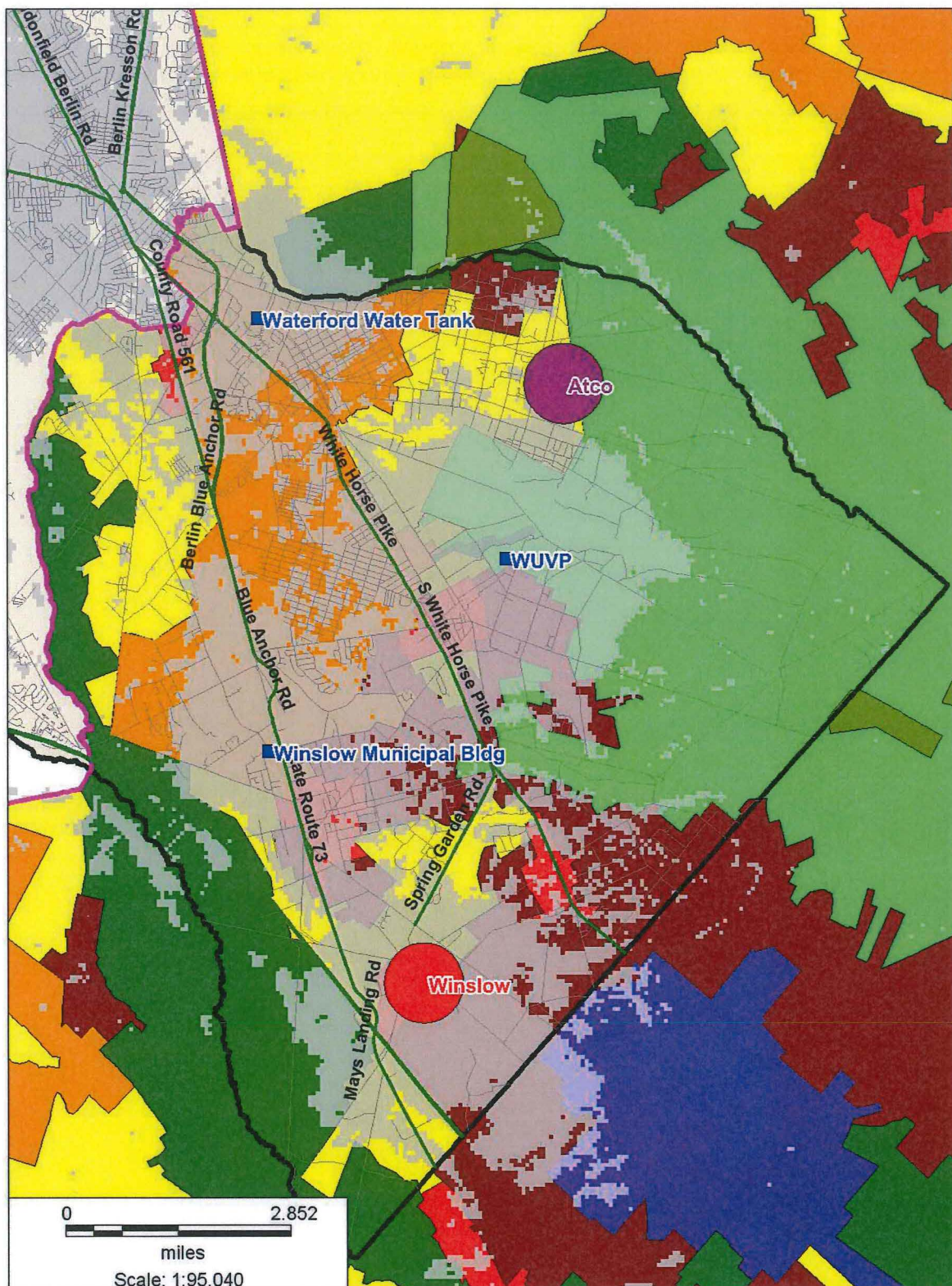
Map 21 - Existing and Phase 1 Sites On-Street Coverage – Narrowband



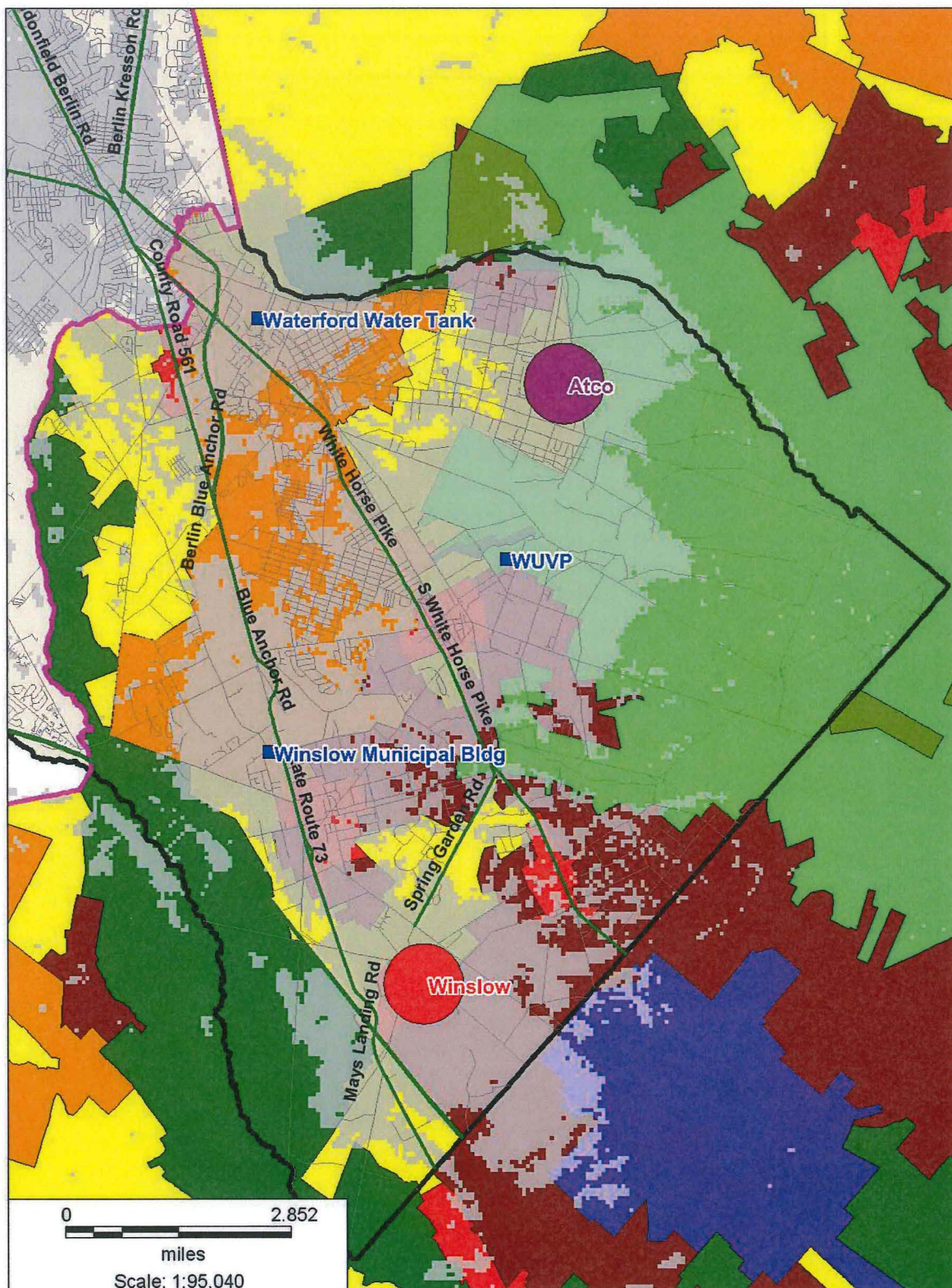
**Map 22 - Existing and Phase 1 Sites On-Street and In-Building Coverage –
Narrowband**



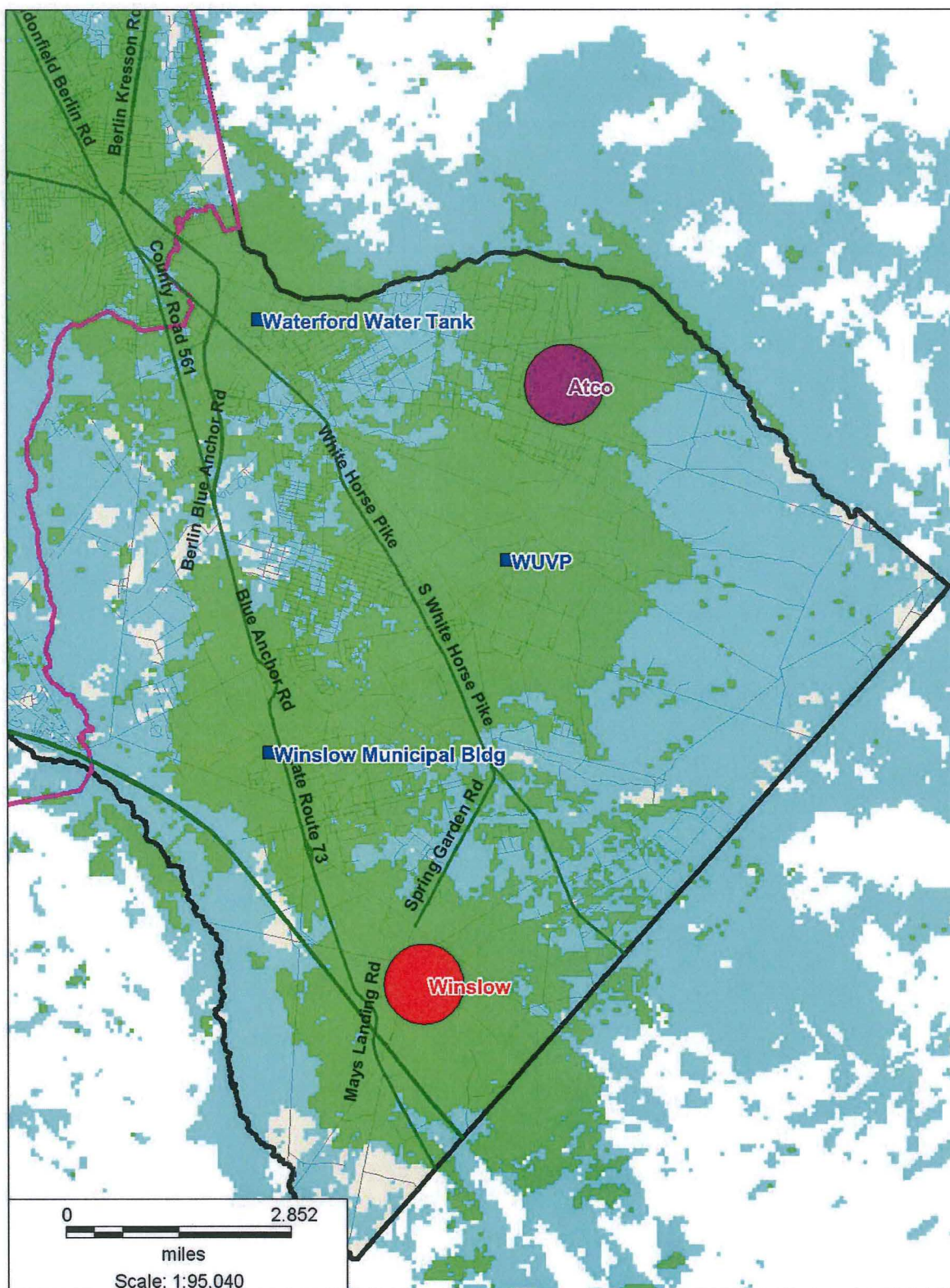
Map 23 - Existing and Phase 1 Sites In-Building Coverage – Narrowband



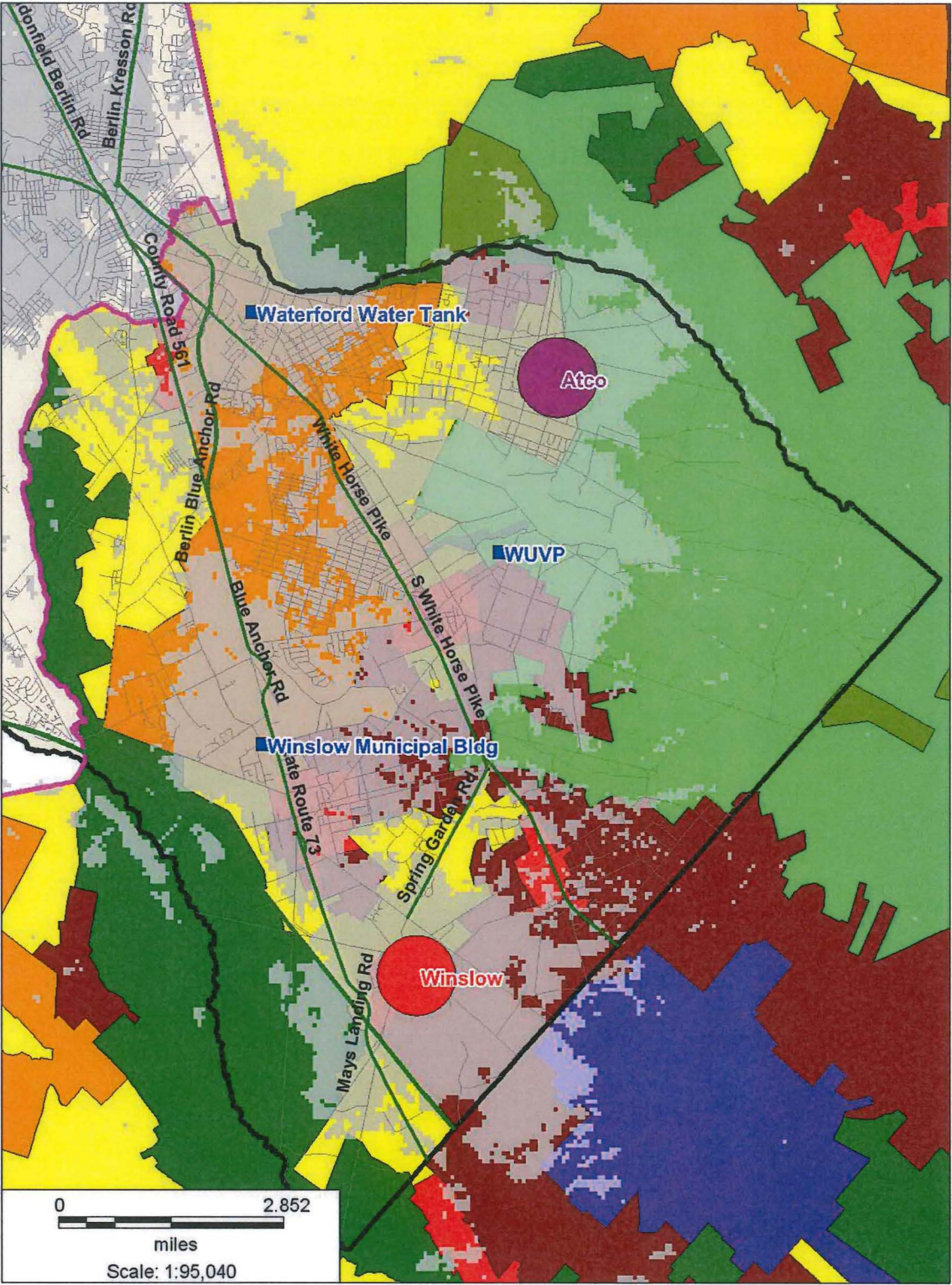
**Map 24 - Existing and Phase 1 and 2 Sites In-Building Coverage –
Narrowband**



**Map 25 - Existing and Phase 1 and 2 Sites On-Street and In-Building
Coverage – Narrowband”**



Map 26 - Existing and Phase 1 and 2 Sites On-Street Coverage – Broadband



Cape May County Overview

For the Cape May County comprehensive plan, V-COMM contacted Mr. Francis J. McCall requesting the current list of existing radio towers utilized for the county's operations in and near the Pinelands Region, the towers the county is leasing space on for its operations, additional sites needed by the county to provide full coverage in the Pinelands, frequency information and information on any locations the county might have already discussed with the Pinelands Commission. Cape May County has provided V-COMM all the requested information and V-COMM has utilized this information to analyze the county's current and future coverage requirements.

System Design

Cape May County has provided V-COMM with four (4) 700 MHz sites that provide the necessary coverage within the county's jurisdictional area. Two other existing sites which are the New Jersey State Police public safety towers have been included in the list of existing sites. The detailed site information is included in table 9 below.

Table 9 – Cape May County 700 MHz sites Information

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type
1	RRC	39.2006944	74.75541670	521 Woodbine Road Dennis	170 Tower
2	Traffic	39.1015	74.79625000	153 Crest Haven Road Cape May Court House	200 Tower
3	Airport	39.000778	74.91588900	356 Breakwater Road Lower Township	135 Water Tank
4	Library-EOC	39.0833611	74.82480560	30 West Mechanic Street Cape May Court House	140 Tower
5	Wildwood	38.99008333	74.81725	3700 New Jersey Ave # 100 Wildwood (NJ State Police Tower)	140 Tower
6	Woodbine	39.23527778	74.81111111	Heilprin Avenue and Webster Street Woodbine (NJ State Police Tower)	200 Tower

Future Sites

Currently, Cape May County has one site that falls within the Pinelands Jurisdiction. In addition to the County proposed site, V-COMM's coverage analysis shows that the county requires one more site to provide the necessary on-street and in-building coverage for narrowband and broadband. Based on the coverage analysis, V-COMM has categorized the coverage from the future sites into 2 phases.

Phase 1 Sites: To provide coverage for narrowband on-street.

Phase 3 Sites: To provide coverage for broadband on-street and a majority of in-building service.

Provided in Table 10 below is the list of sites required by Cape May County.

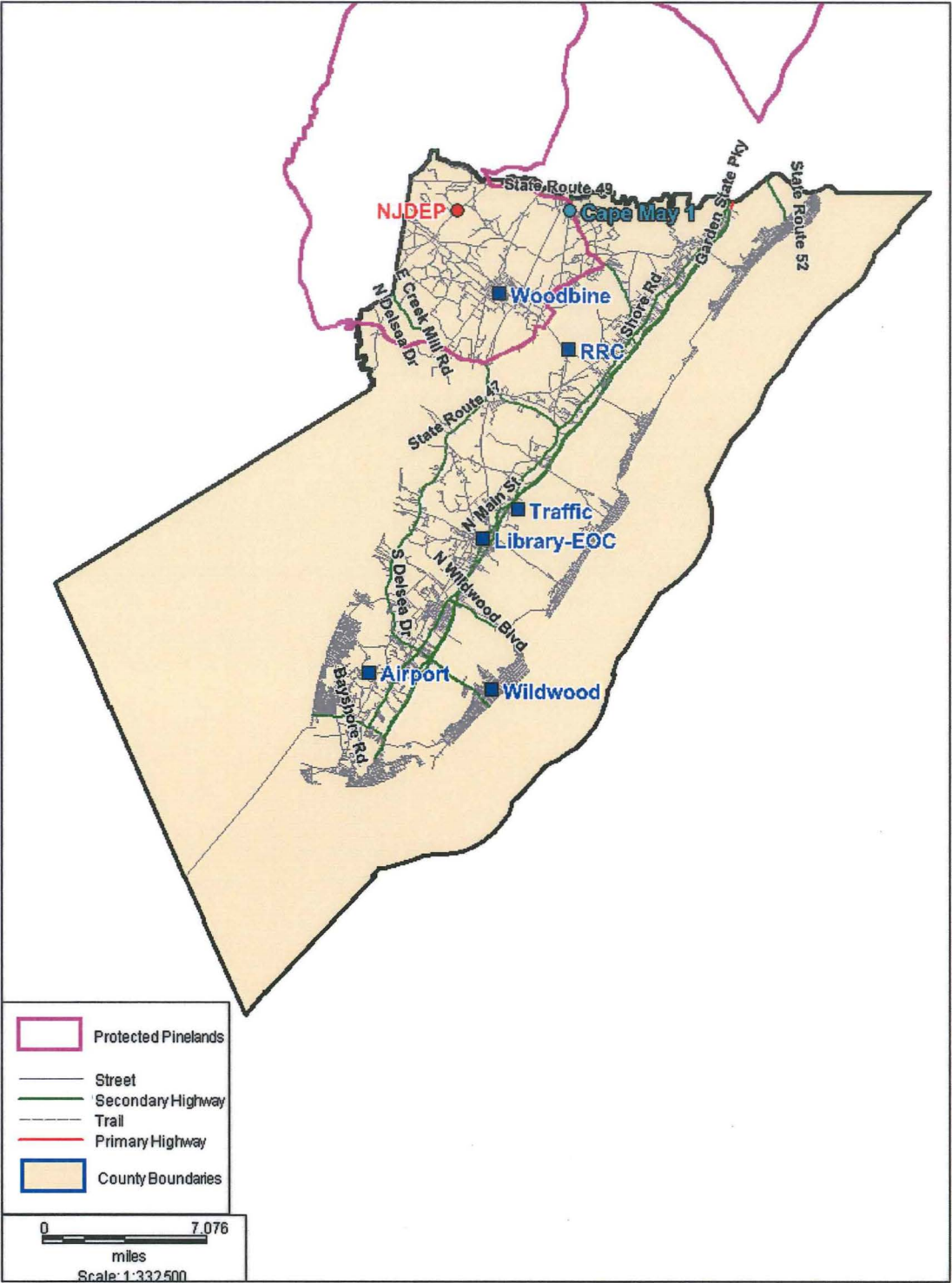
Table 10 – Cape May County Future Sites

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type	Proposed By	Phase
1	NJ DEP	39.287222	74.845	Atlantic Boulevard & County Highway 605 Upper Township	170 Proposed Tower	Cape May County	1
2	Cape May 1	39.28678	74.7543	County Highway 664 Upper Township	150 Proposed Tower	V-COMM	3

In the Map "Cape May County Map of Existing and Future Sites" below, the existing and future sites have been shown as described:

- Phase 1 Sites – Denoted by red circles
- Phase 3 Sites – Denoted by blue circles
- Existing Sites – Denoted by Blue Squares

Figure 10 - Cape May County Map of Existing and Future Sites



1. NJDEP:

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located west of the intersection of Atlantic Boulevard and County Highway 605 in Upper Township. This site will provide coverage to the western section of Upper Township in the areas around Atlantic Boulevard, Head of River Road, Narrow Road, Steelmantown Bog Road and other areas in the vicinity.

2. Cape May 1:

This site is recommended by V-COMM for phase 3, broadband on-street coverage. This site is located on County Highway 664 in Upper Township. This site will provide coverage in the areas around County Highway 664, State Route 50, Mosquito Landing Road, Mill Road and other areas in the vicinity.

System Coverage

V-COMM performed the 700 MHz coverage analysis for Cape May County using EDX SignalPro with 1 arc second terrain data. The tool was setup to use the Anderson propagation model. This coverage analysis was done for on-street portable talk-back and in-building portable talk back for narrowband and broadband frequencies for existing sites and for the existing and future sites. Provided in the maps below are the coverage plots along with the threshold levels for each analysis.

The Map 27 labeled “Existing Sites Coverage On-Street and In-Building – Narrowband” shows Cape May County coverage with the existing sites at -81 dBm (in-building) and -95 dBm (on-street). As can be seen in Map 27, with the existing sites there are many coverage gaps in different sections of the County.

The Map 28 labeled “Existing Sites On-Street Coverage – Narrowband” shows the existing sites coverage at -95 dBm with the Pinelands management area map as the underlay.

The Map 29 labeled “Existing and Phase 1 Sites On-Street Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -95 dBm with the Pinelands management area map as an underlay. The Phase 1 sites were designed to provide the necessary on-street coverage by filling in the gaps that were there with the existing sites.

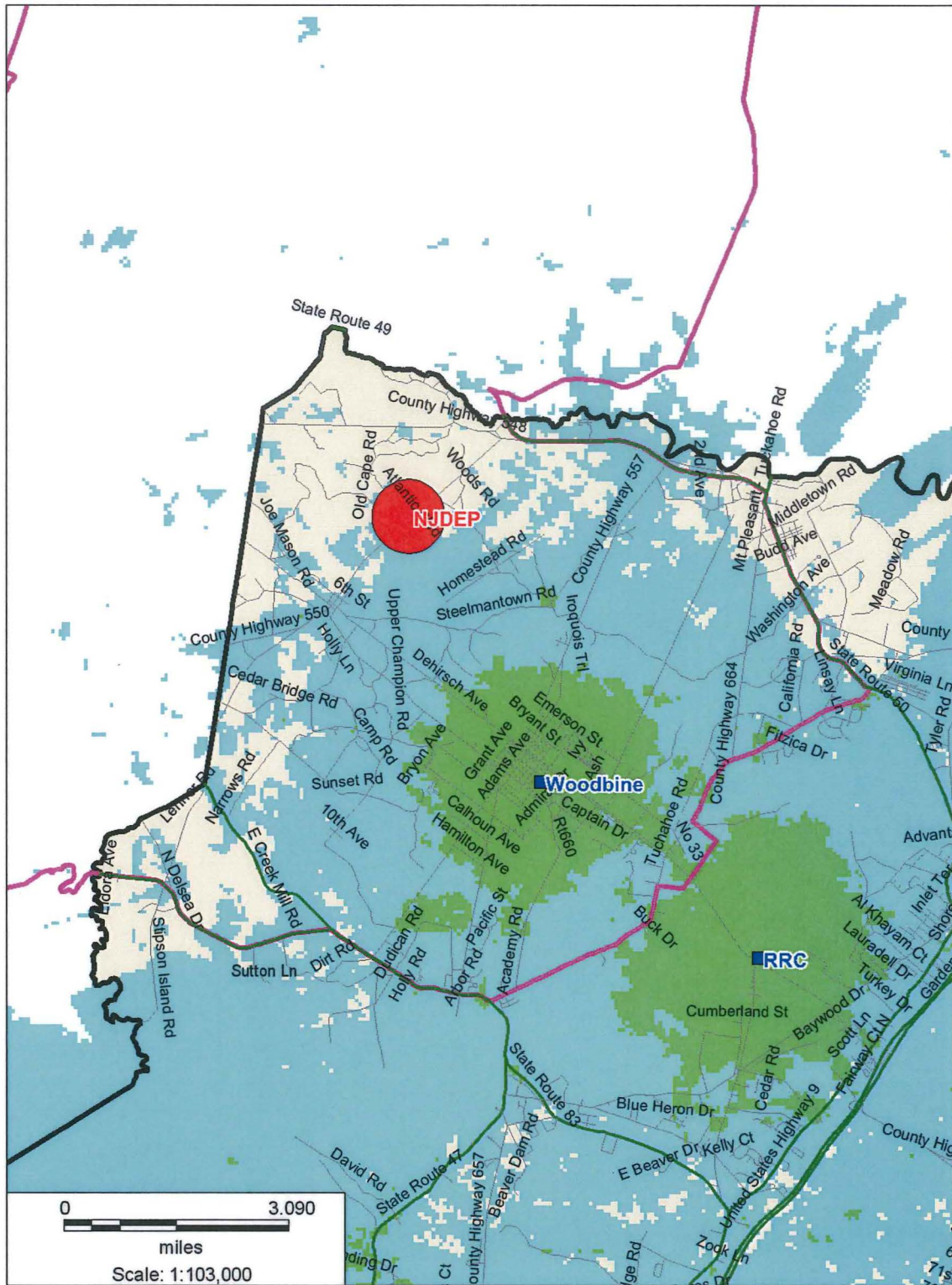
The Map 30 labeled “Existing and Phase 1 Sites On-Street and In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -81 dBm and -95 dBm.

The Map 31 labeled “Existing and Phase 1 Sites In-Building Coverage – Narrowband” shows the existing sites coverage at -81 dBm with the Pinelands management area map as the underlay.

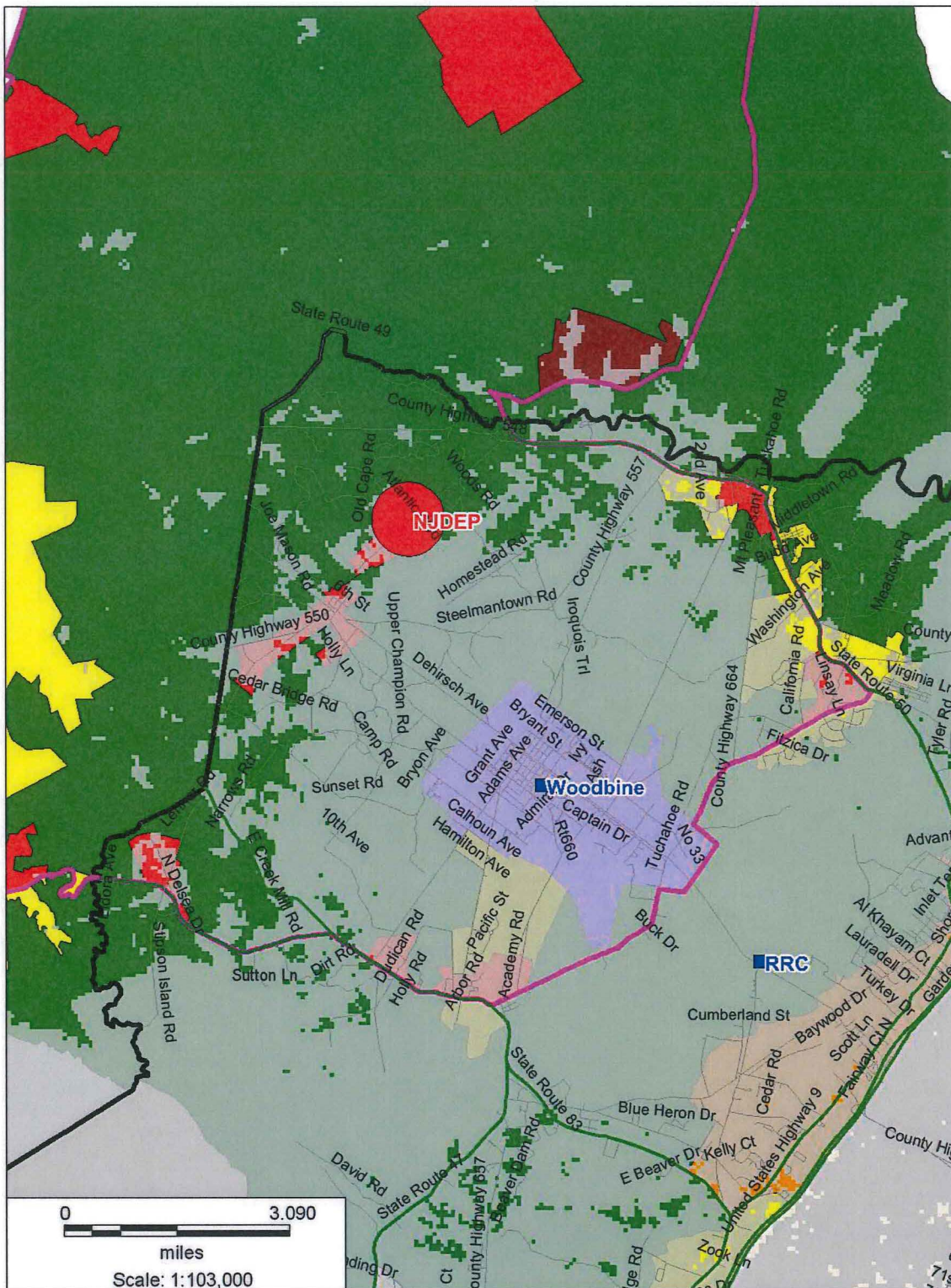
The Map 32 labeled “Existing and Phase 1 Sites On-Street Coverage – Broadband” shows the existing sites coverage at -80 dBm with the Pinelands management area map as the underlay.

The Map 33 labeled “Existing and Phase 1 and 3 Sites On-Street and most of In-Building Coverage – Broadband” shows the existing sites coverage with the Phase 1 and Phase 3 sites at -80 dBm with the Pinelands area map as an underlay. The Phase 3 sites provide on-street and a majority of in-Building coverage in the Pinelands.

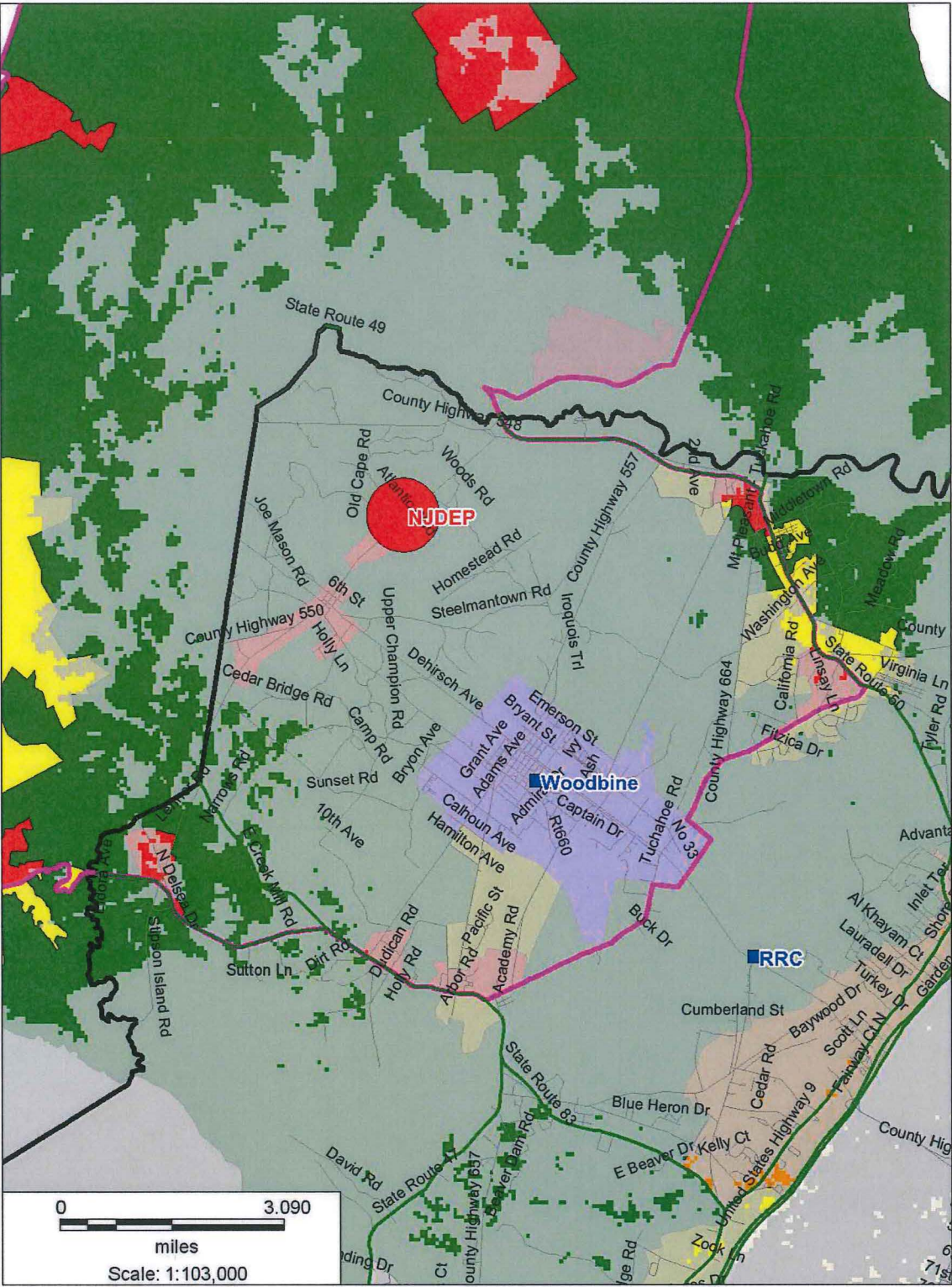
Map 27 - Existing Sites Coverage On-Street and In-Building – Narrowband



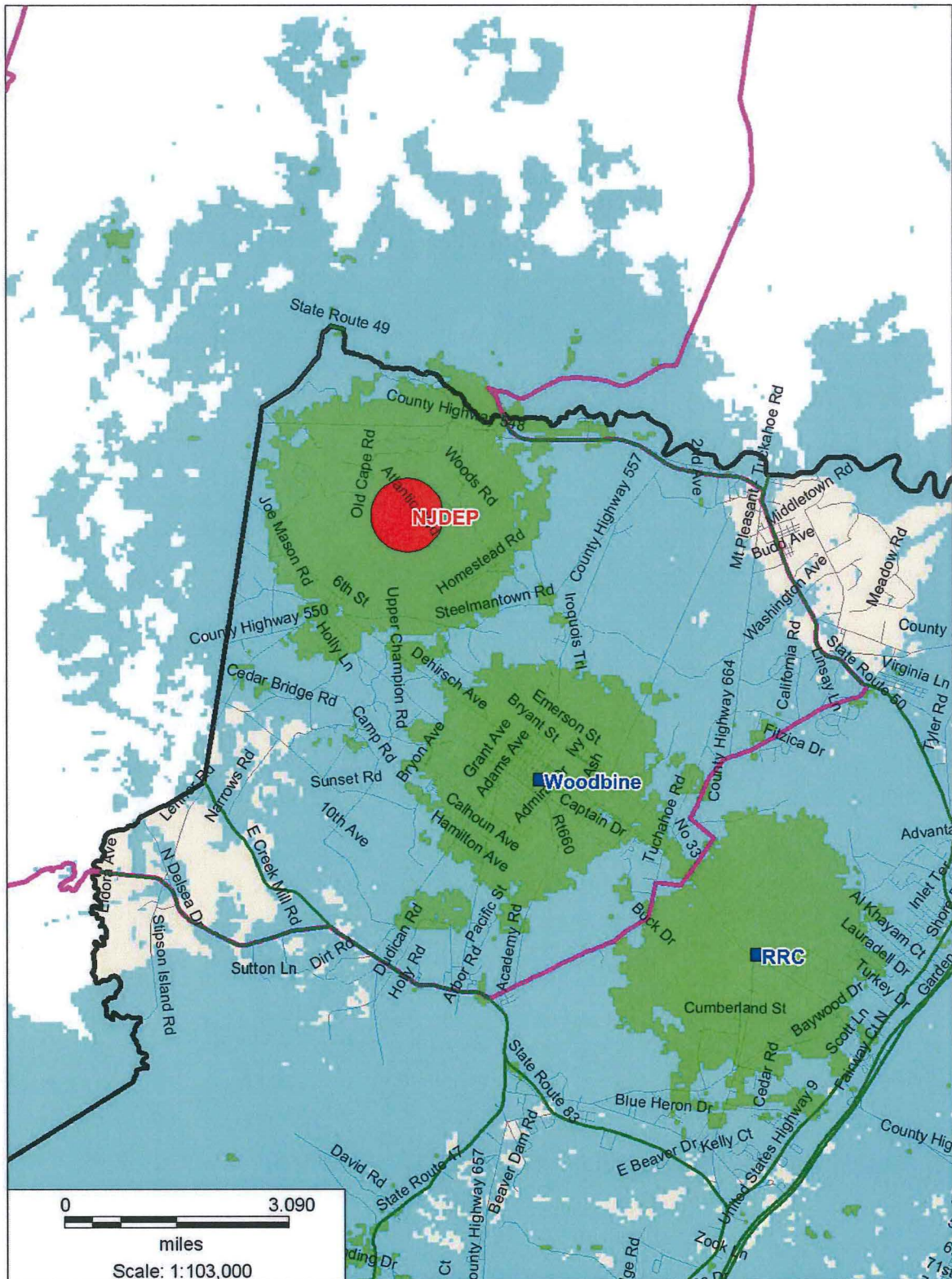
Map 28 - Existing Sites On-Street Coverage – Narrowband



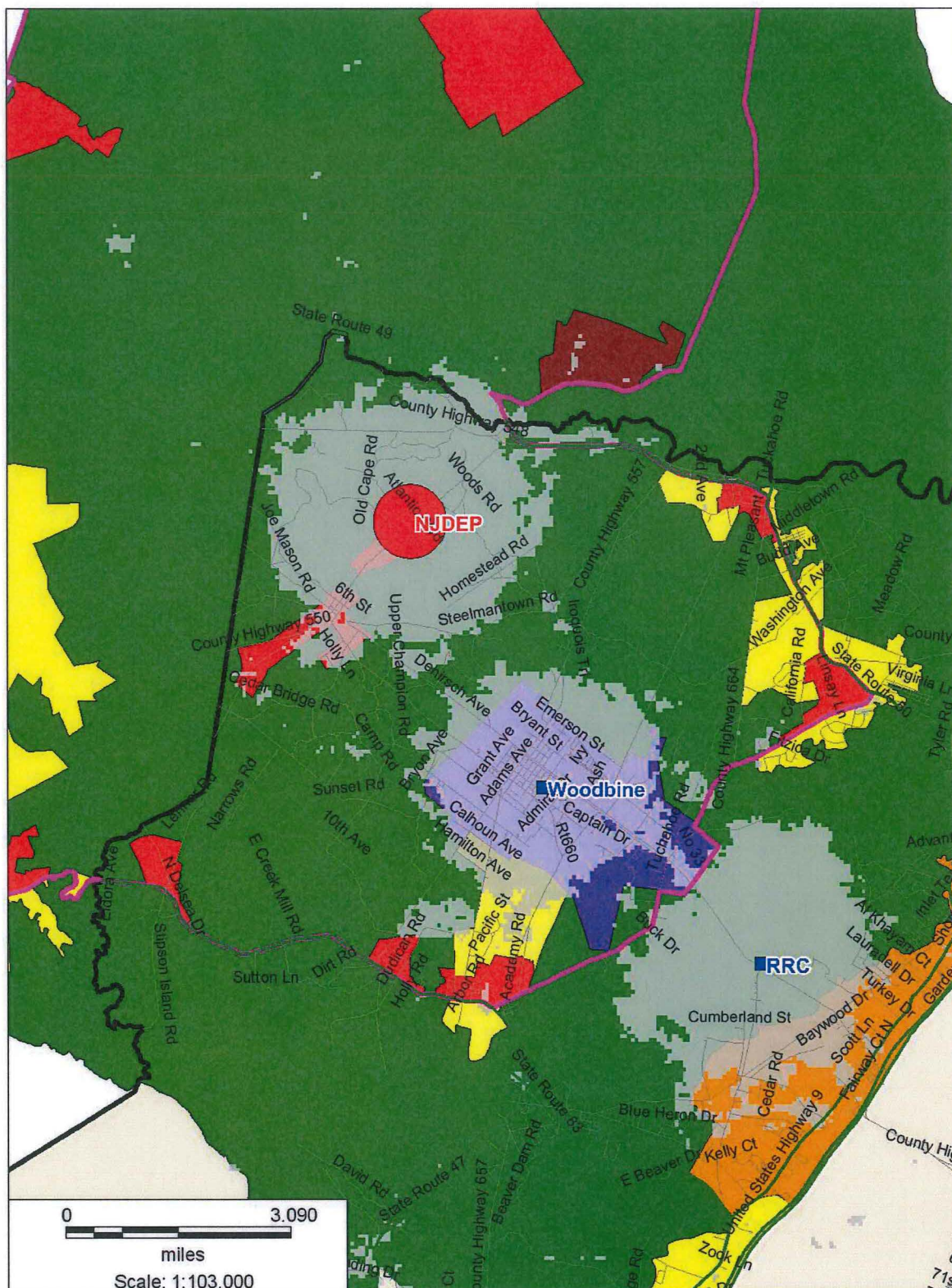
Map 29 - Existing and Phase 1 Sites On-Street Coverage – Narrowband



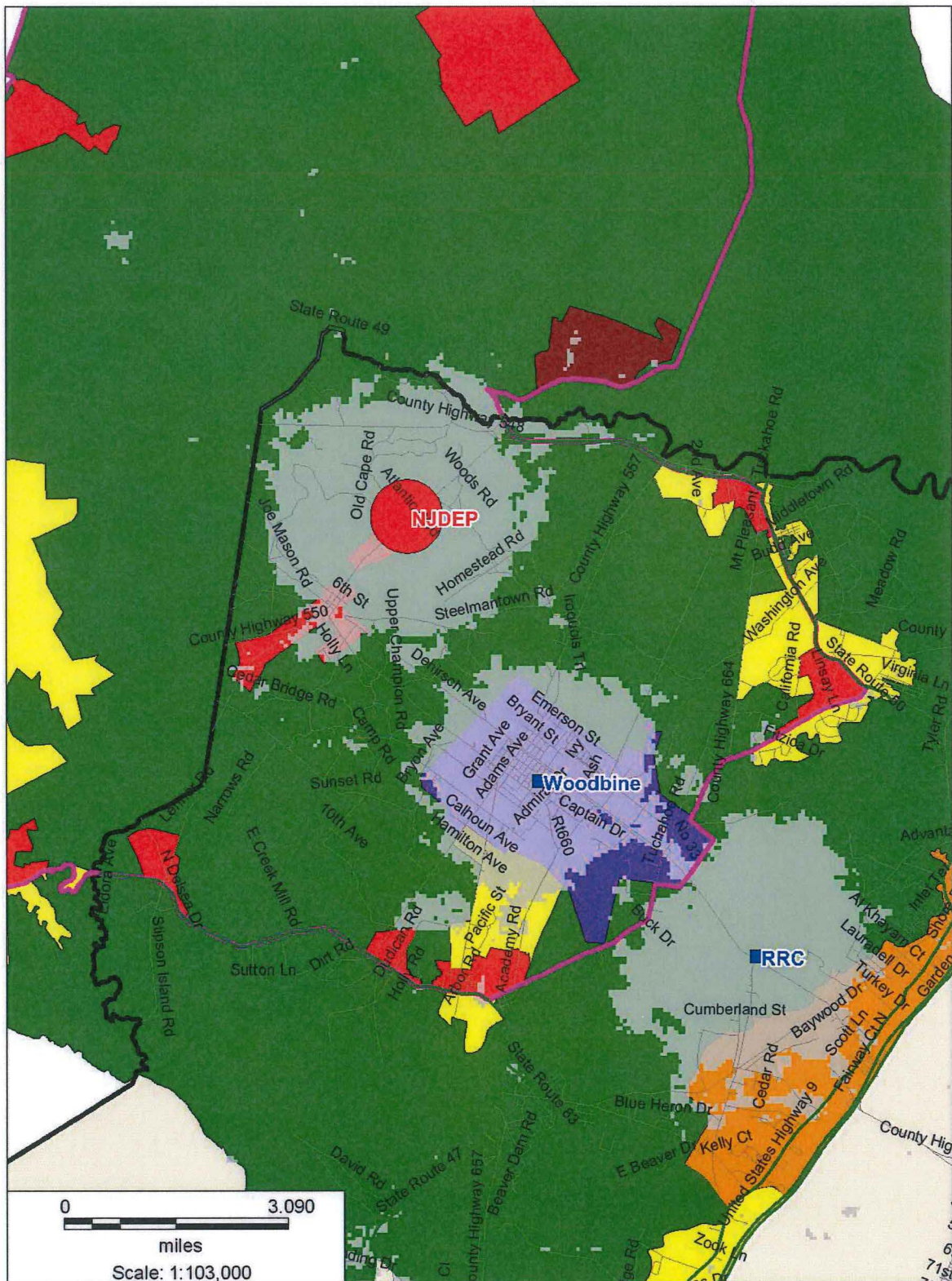
**Map 30 - Existing and Phase 1 Sites On-Street and In-Building Coverage –
Narrowband**



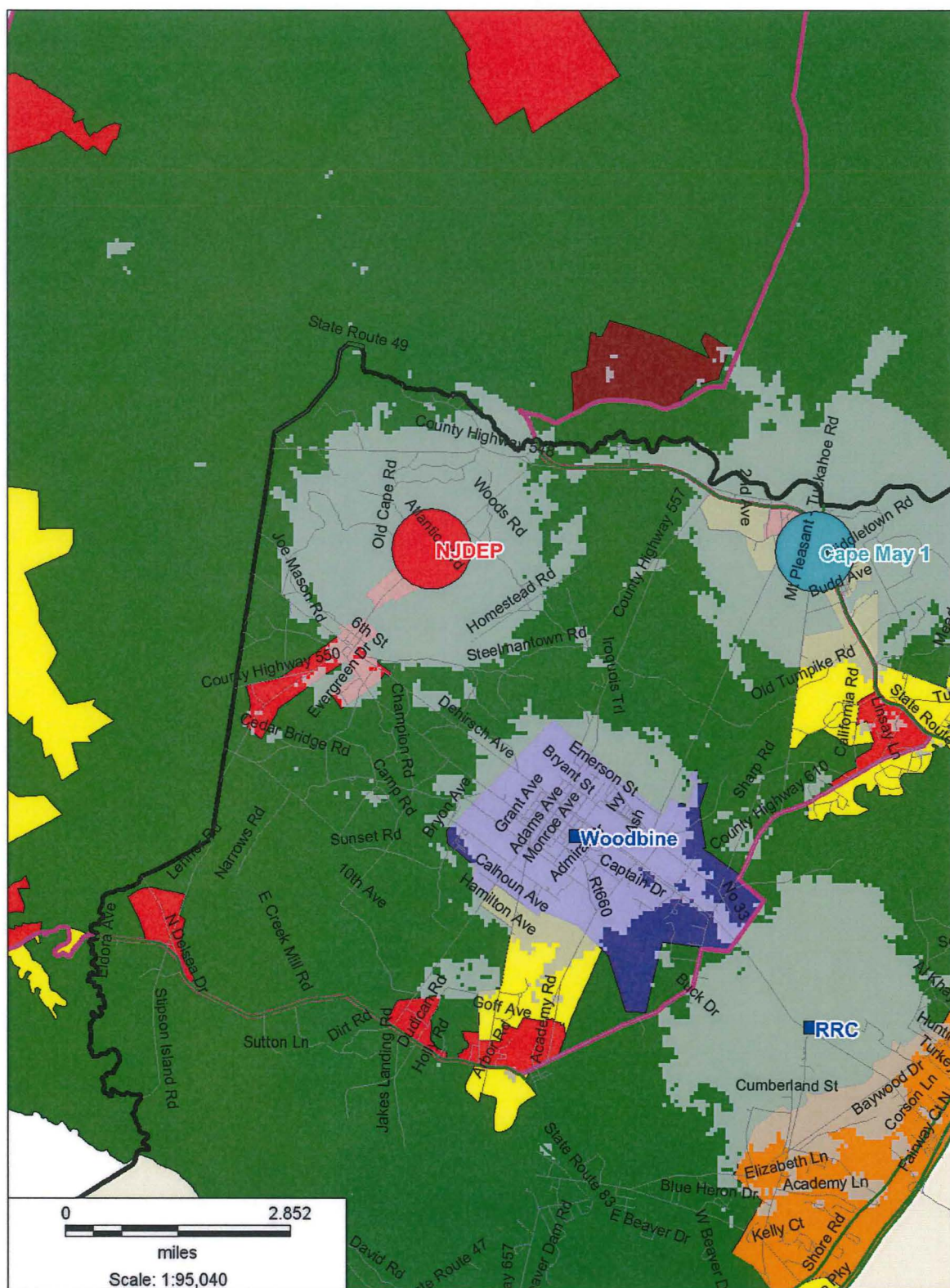
Map 31 - Existing and Phase 1 Sites In-Building Coverage – Narrowband



Map 32 - Existing and Phase 1 Sites On-Street Coverage – Broadband



Map 33 - Existing and Phase 1 and 3 Sites On-Street and most of In-Building Coverage – Broadband



Cumberland County Overview

For the comprehensive plan for Cumberland County, V-COMM contacted Joseph Server, Cumberland County OEM Coordinator. V-COMM verified that the county currently has no towers located in the Pinelands Region. Mr. Server provided the locations of the additional site required by the county to provide full coverage in the Pinelands along with location data for their existing sites. V-COMM has utilized this information to analyze the county's current and future coverage requirements.

System Design

Cumberland County has four (4) 700 MHz sites to provide the necessary coverage within the county's jurisdictional area. Included in the list of the existing sites is the State Police tower located in Bridgeton. Table 11 below provided the detailed site information.

Table 11 - Cumberland County 700 MHz sites Information

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type
1	Bridgeton	39.46027778	75.2077778	Near 864 Pearl Street North (State Police Public Safety Tower) Bridgeton	170 Tower
2	Millville	39.3952777	75.0380555	High Street and Main Street Millville	121 Tower
3	Rosenhayne	39.45983	75.15742	637 County Road 666 Bridgeton	213 Tower
4	Vineland	39.48622	75.02183	640 Wood Street Vineland	98 Building

Future Sites

Currently, Cumberland County has provided two (2) future sites that fall within the Pinelands Jurisdiction. In addition, based on the coverage analysis, V-COMM has proposed three (3) additional future sites. The future sites have been divided into 2 phases.

Phase 1 Sites: To provide coverage for narrowband on-street.

Phase 3 Sites: To provide coverage for broadband on-street and a majority of in-building service.

Provided in Table 12 below is the list of sites required by Cumberland County.

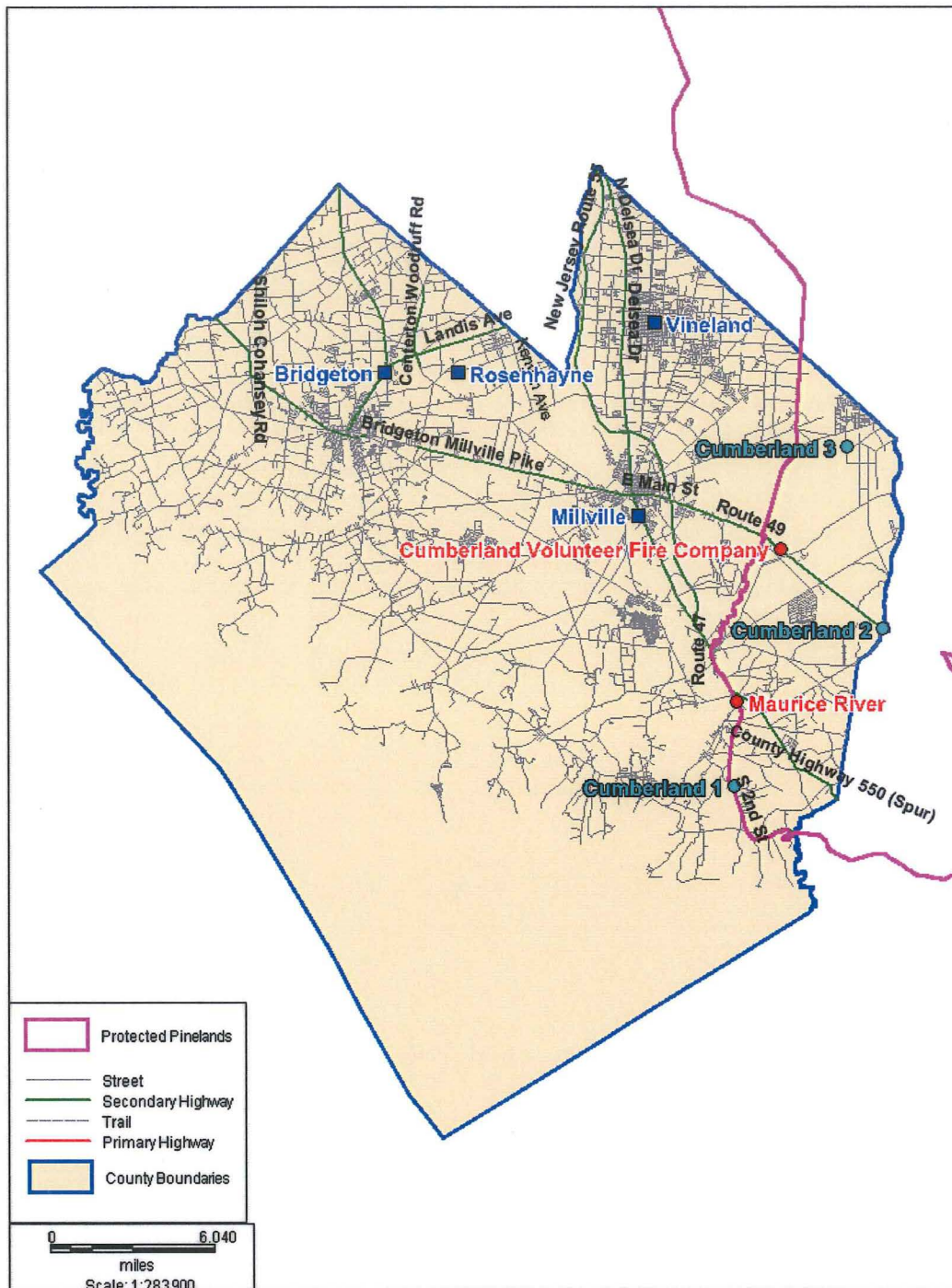
Table 12 – Cumberland County Future Sites

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type	Proposed By	Phase
1	Cumberland Volunteer Fire Company	39.367014	74.935639	Route 49 / East Main Street Maurice River	170 Proposed Tower	Cumberland	1
2	Maurice River	39.28622	74.96628	Route 47 and Main Street Maurice River	170 Proposed Tower	Cumberland	1
3	Cumberland 1	39.2415	74.9676	4295 Route 47 Maurice River	150 Proposed Tower	V-COMM	3
4	Cumberland 2	39.32484	74.8657	East Main Street/ Route 49 and 1st Avenue Maurice River	150 Proposed Tower	V-COMM	3
5	Cumberland 3	39.42063	74.8901	Cannon Range Road and Mc Donald Avenue Maurice River	150 Proposed Tower	V-COMM	3

In the Map “Cumberland County Map of Existing and Future Sites” below, the existing and future sites have been shown as described:

- Phase 1 Sites – Denoted by red circles
- Phase 3 Sites – Denoted by blue circles
- Existing Sites – Denoted by Blue Squares

Figure 11 - Cumberland County Map of Existing and Future Sites



1. **Cumberland Volunteer Fire Company:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located on Route 49 between Port Elizabeth Cumberland Road and Hesstown Road in Maurice River Township. This site will provide coverage to the northwest section of Maurice River Township in the areas around Route 49, County Highway 646, Hesstown Road and other streets in the vicinity.

2. **Maurice River:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located on Route 47 to the north of Main Street / County Highway 616 in Maurice River Township. This site will provide coverage to the South west section of the Township in the areas around Route 47, Mauricetown Crossway Road, County Road 347, Hunters Mill Road and other streets in the vicinity.

3. **Cumberland 1:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located close to the property at 4295 Route 47 in Maurice River Township. This site will provide coverage to the southern section of Maurice River in the areas around Route 47, Peterson Road, Main Street, Glade Road, County Highway 550 and other areas in the vicinity.

4. **Cumberland 2:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located close to East Main Street and 1st Avenue close to Estelle Manor in Maurice River Township. This site will provide to the eastern section of the Township in the areas around East Main Street, Estelle Manor Road, Hunters Mill Road and other areas in the vicinity.

5. **Cumberland 3:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located close to the Cannon Range Road and McDonald Avenue in Maurice River Township. This site will provide coverage to the northern section of the Township along Cannon Range Road, Millville Lays Landing Road, Main Avenue and other areas in the vicinity.

System Coverage

V-COMM performed the 700 MHz coverage analysis for Cumberland County using EDX SignalPro with 1 arc second terrain data. The tool was set up to use the Anderson propagation model. This coverage analysis was done for on-street portable talk-back and in-building portable talk back for narrowband and broadband frequencies for existing sites and with the existing and future sites. Provided in the maps below are the coverage plots along with the threshold levels for each analysis.

The Map 34 labeled “Existing Sites Coverage On-Street and In-Building – Narrowband” shows Cumberland County coverage with the existing sites at -81 dBm (in-building) and -95 dBm (on-street). As can be seen in Map 34, with the existing sites there are many coverage gaps in different sections of the County.

The Map 35 labeled “Existing Sites On-Street Coverage – Narrowband” shows the existing sites coverage at -95 dBm with the Pinelands management area map as the underlay.

The Map 36 labeled “Existing and Phase 1 Sites On-Street Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -95 dBm with the Pinelands management area map as an underlay. The Phase 1 sites were designed to provide the necessary on-street coverage by filling in the gaps that were there with the existing sites.

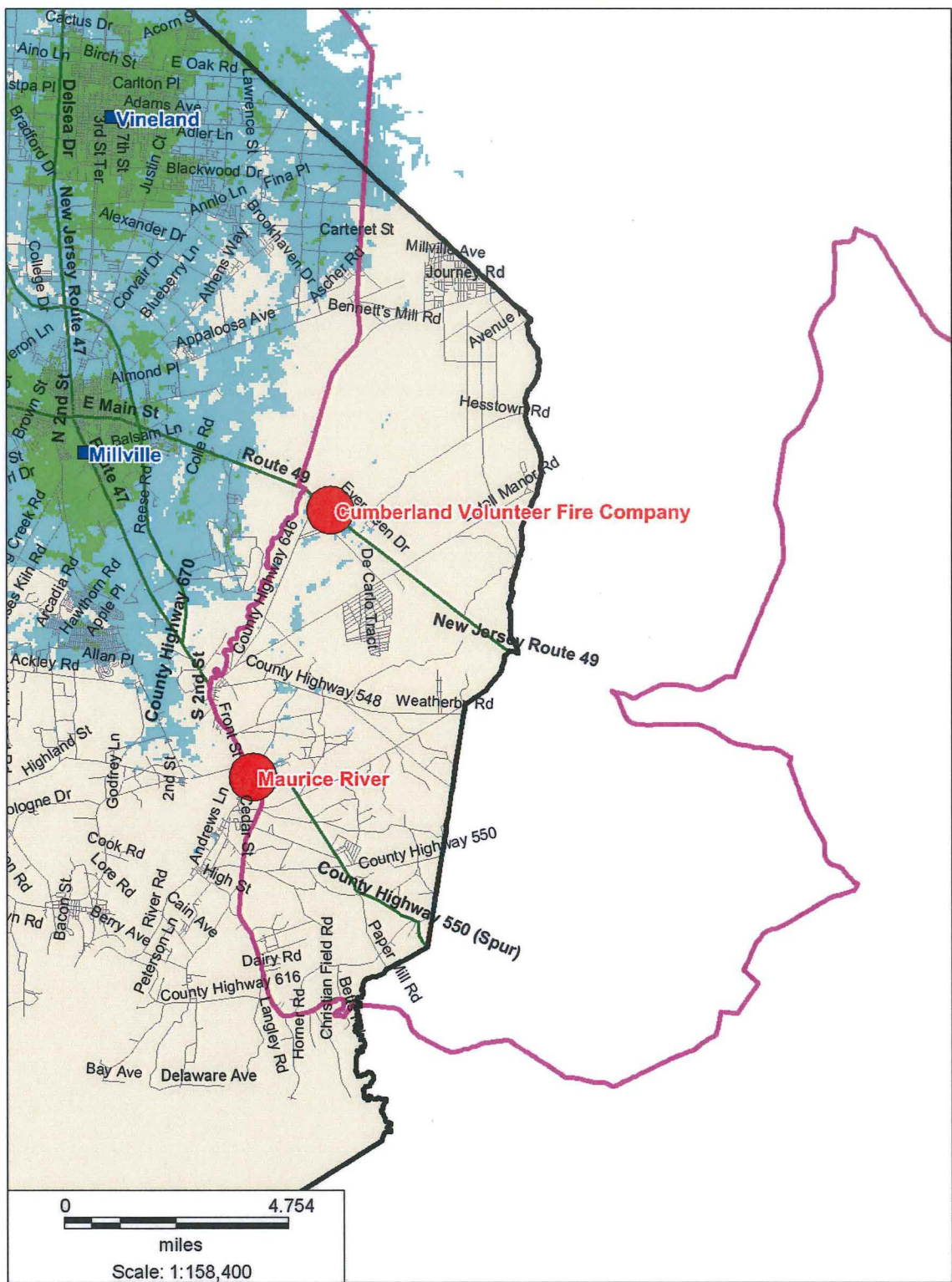
The Map 37 labeled “Existing and Phase 1 Sites On-Street and In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -81 dBm and -95 dBm.

The Map 38 labeled “Existing and Phase 1 Sites In-Building Coverage – Narrowband” shows the existing sites coverage at -81 dBm with the Pinelands management area map as the underlay.

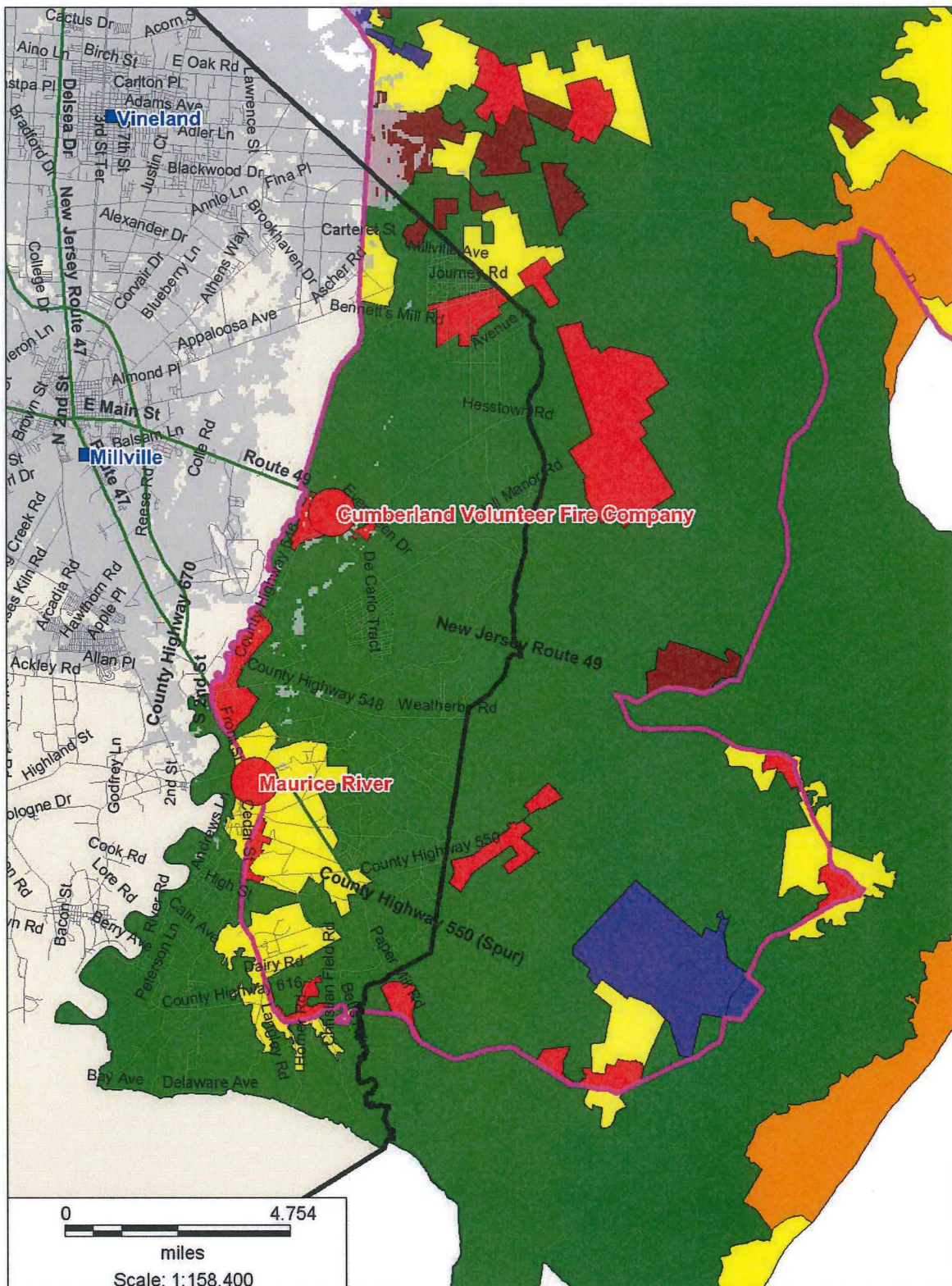
The Map 39 labeled “Existing and Phase 1 Sites On-Street Coverage – Broadband” shows the existing sites coverage at -80 dBm with the Pinelands management area map as the underlay.

The Map 40 labeled “Existing and Phase 1 and 3 Sites On-Street and most of In-Building Coverage – Broadband” shows the existing sites coverage with the Phase 1 and Phase 3 sites at -80 dBm with the Pinelands area map as an underlay. The Phase 3 sites provide on-street and a majority of in-Building coverage in the Pinelands.

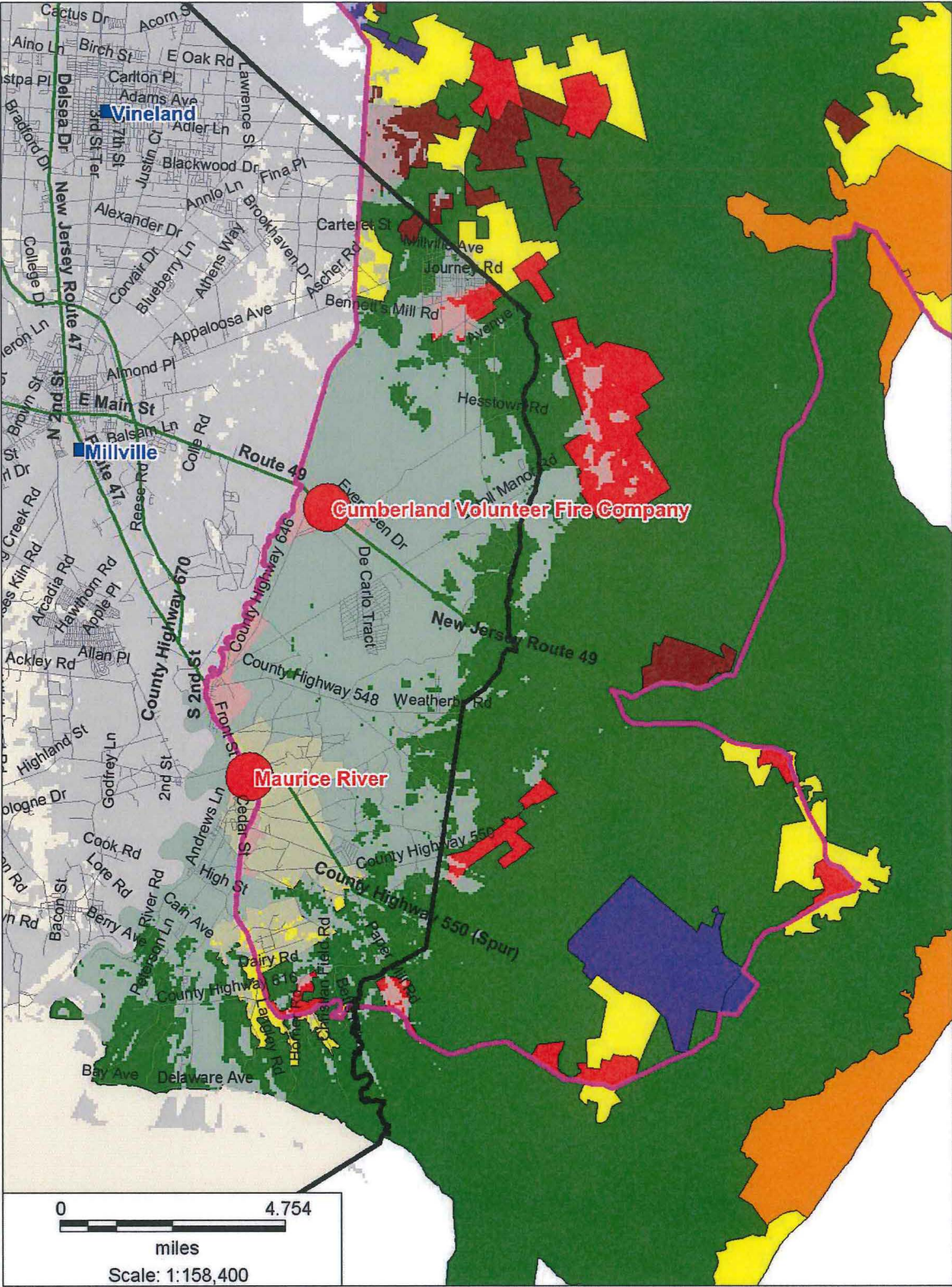
Map 34 - Existing Sites Coverage On-Street and In-Building – Narrowband



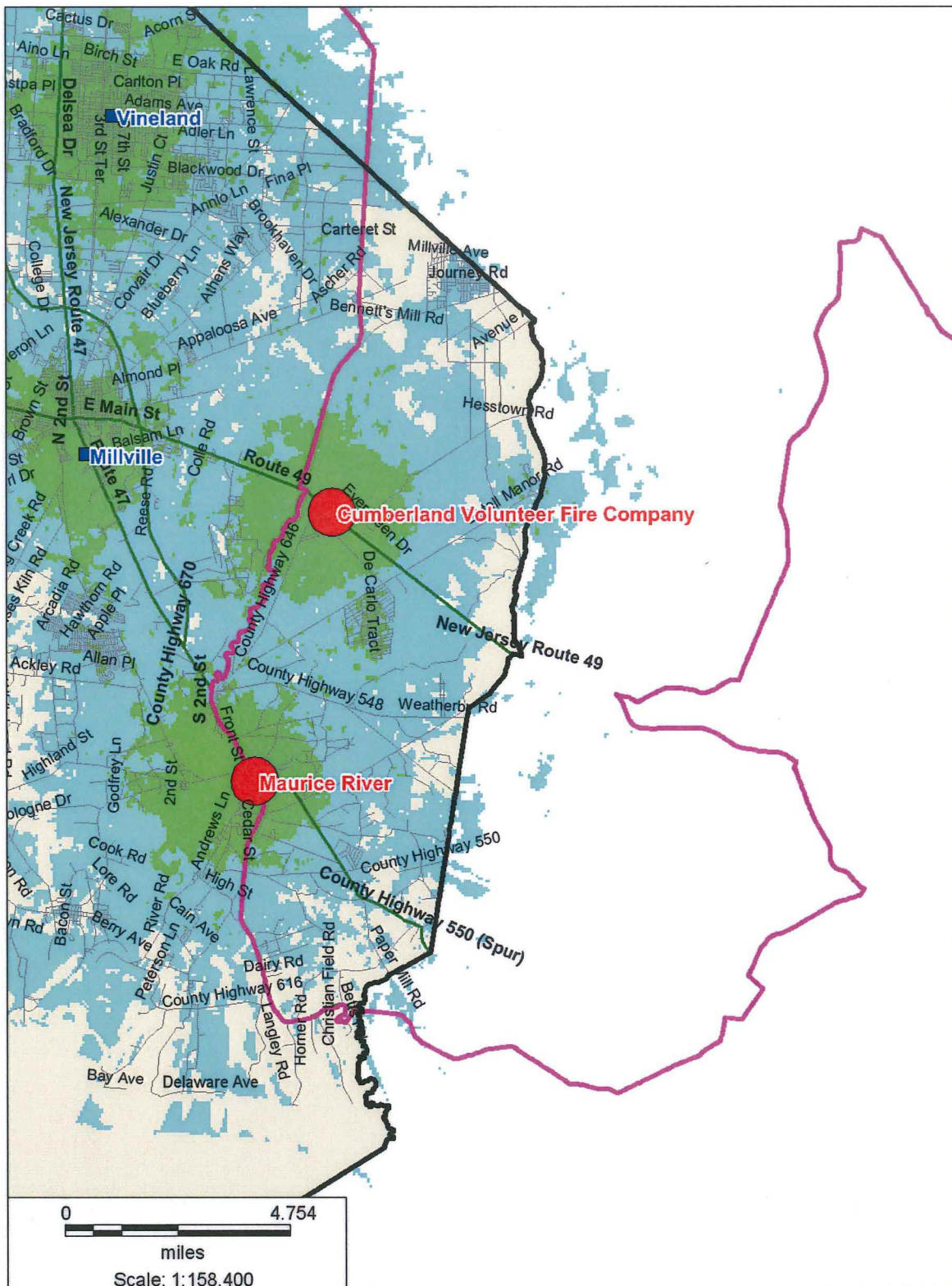
Map 35 - Existing Sites On-Street Coverage – Narrowband



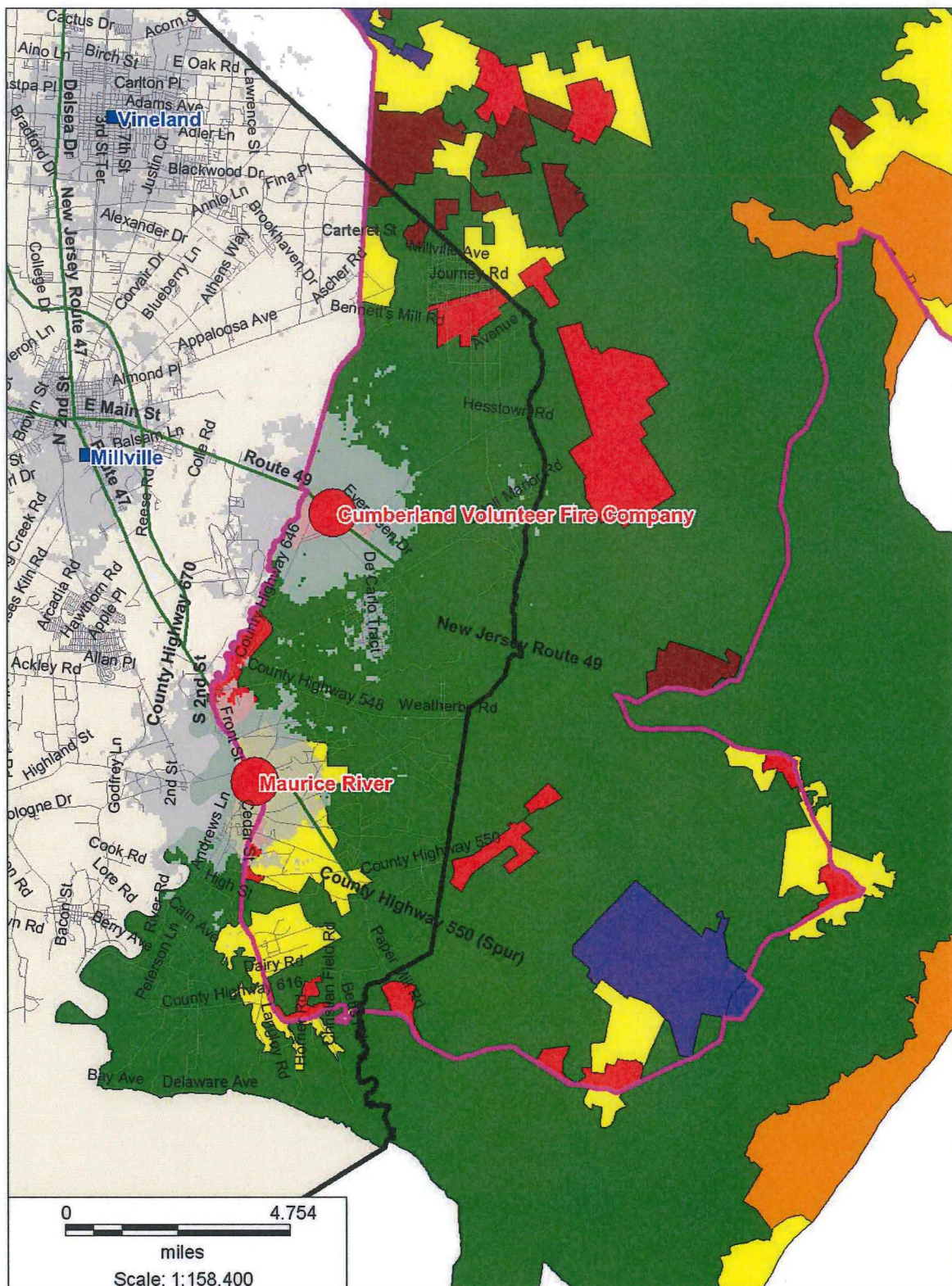
Map 36 - Existing and Phase 1 Sites On-Street Coverage – Narrowband



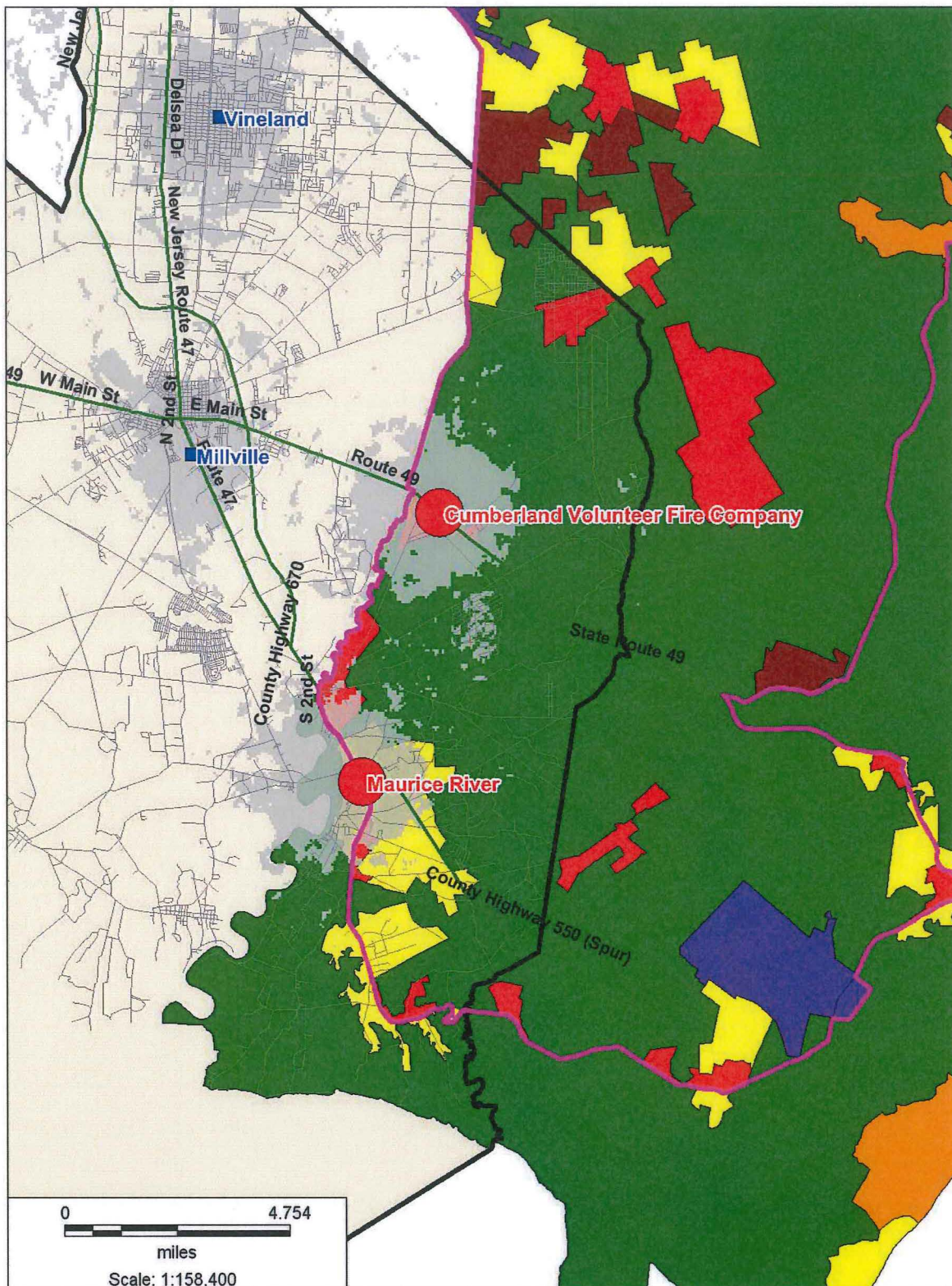
**Map 37 - Existing and Phase 1 Sites On-Street and In-Building Coverage –
Narrowband**



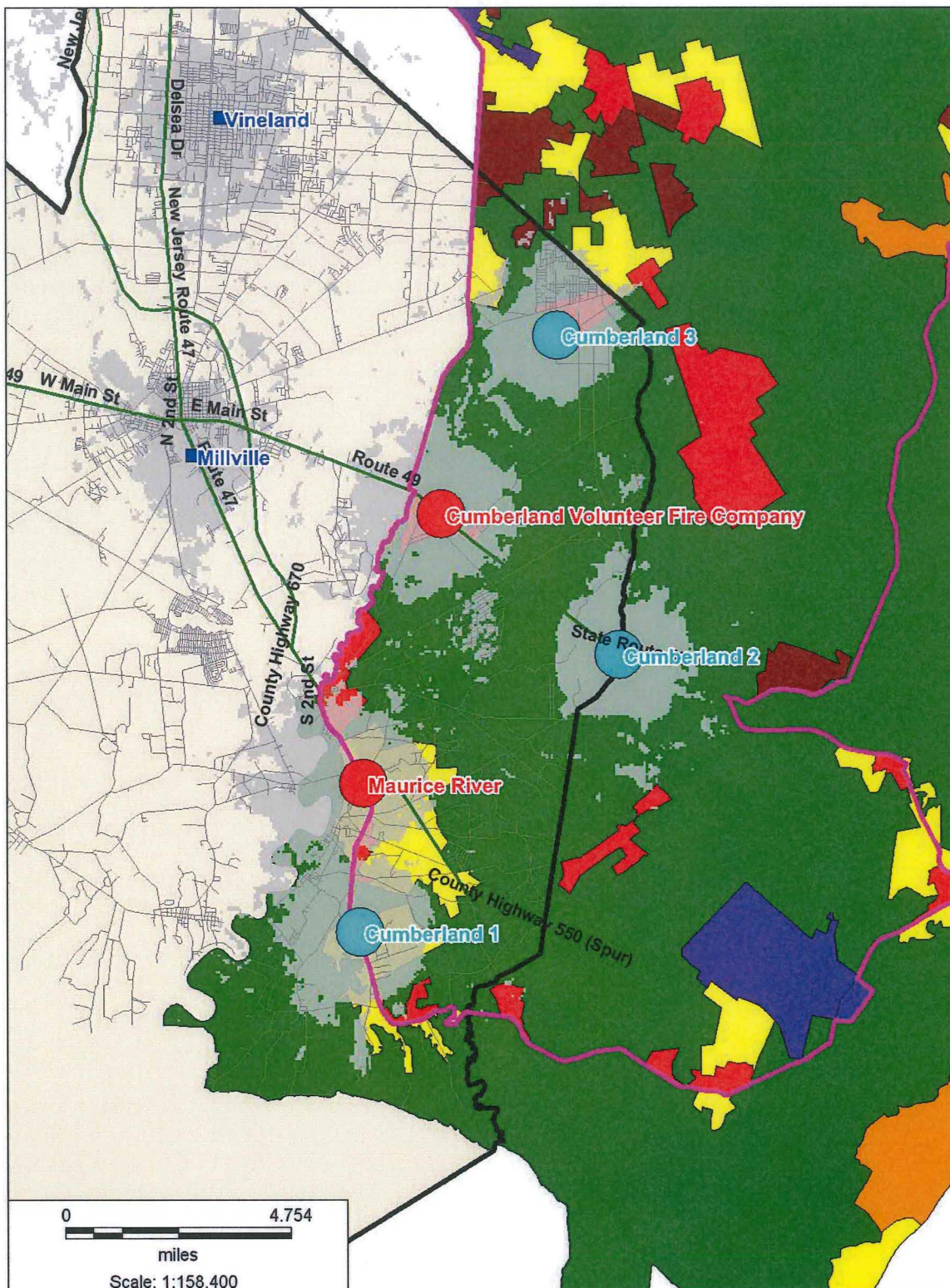
Map 38 - Existing and Phase 1 Sites In-Building Coverage – Narrowband



Map 39 - Existing and Phase 1 Sites On-Street Coverage – Broadband



**Map 40 - Existing and Phase 1 and 3 Sites On-Street and most of In-Building
Coverage – Broadband**



Gloucester County Overview

For the Gloucester County comprehensive plan, V-COMM contacted Mr. Thomas Butts requesting the current list of existing radio towers utilized for the county's operations in and near the Pinelands Region, the towers the county is leasing space on for its operations, additional sites needed by the county to provide full coverage in the Pinelands, frequency information and information on any locations the county might have already discussed with the Pinelands Commission. Gloucester County has provided V-COMM all the requested information and V-COMM has utilized this information to analyze the county's current and future coverage requirements.

System Design

Gloucester County has provided V-COMM with three (3) 700 MHz sites that provide the necessary coverage within the county's jurisdictional area. Listed in table 13 below is the detailed site information.

Table 13 – Gloucester County 700 MHz sites Information

Site No.	Site	Latitude	Longitude	Address	Structure Height (feet)/ Type
1	Corkery Lane	39.6686111	74.97555560	1401 S.Black Horse Pike Williamstown	150 Water Tank
2	Malaga	39.5872222	75.04694	Nelson Avenue & Franklin Street Franklinville	305 Guyed Wire Tower
3	Monroe Ind. Park	39.6477778	74.93972	Monroe Industrial Park Williamstown	199 Tower

Future Sites

Currently, Gloucester County has one future site that falls within the Pinelands Jurisdiction. For Gloucester County, based on the coverage analysis, V-COMM has categorized the future site to be used for phase 1 to provide narrowband on-street coverage.

With the current design, Gloucester County doesn't require any additional sites to provide coverage for narrowband in-building and broadband on-street coverage.

Provided in Table 14 below is the list of sites required by Cumberland County.

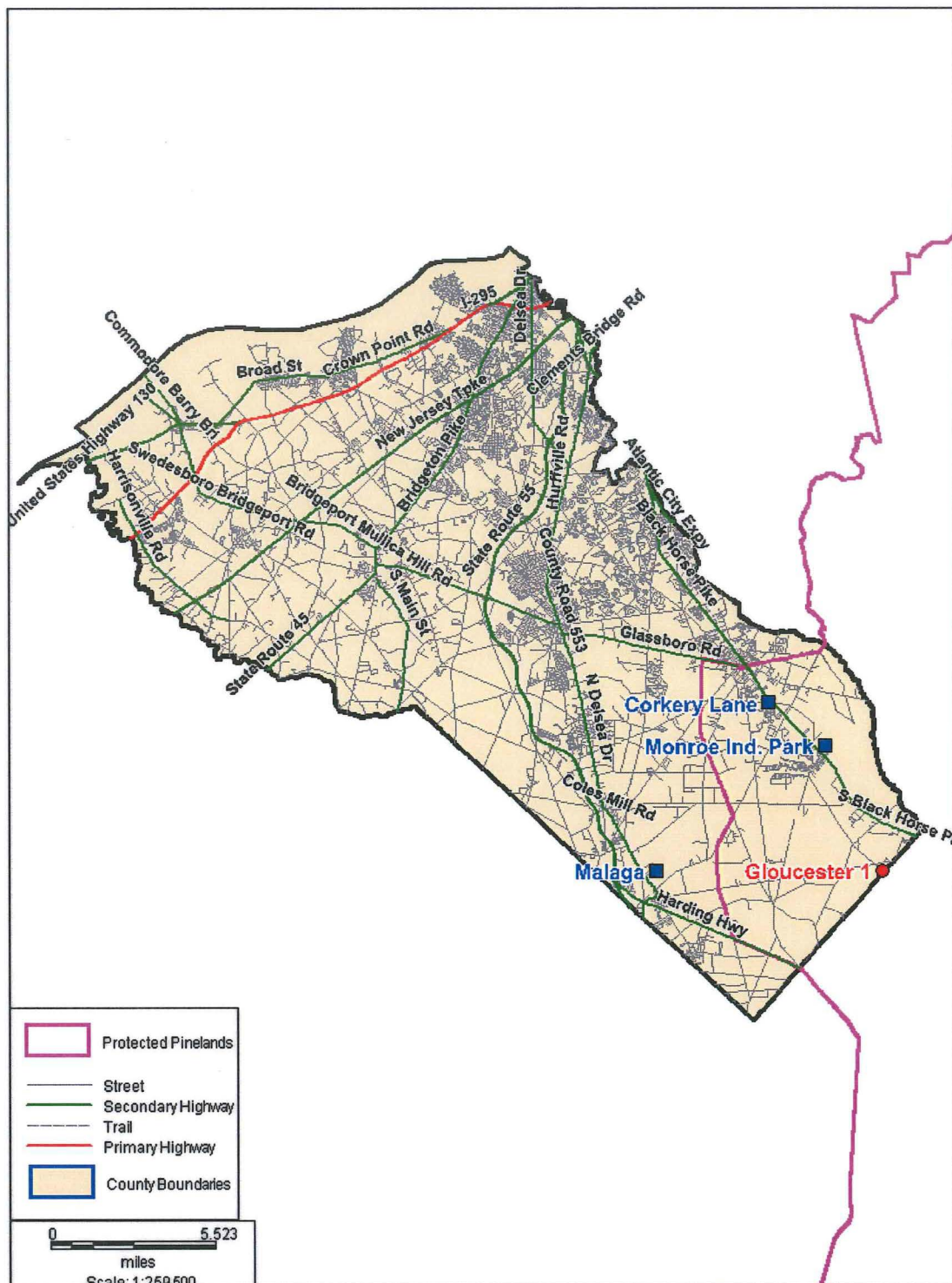
Table 14 – Gloucester County Future Sites

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type	Proposed By	Phase
1	Gloucester 1	39.587236	74.903219	Jackson Road and Malaga Road Monroe	170 Proposed Tower	Gloucester County	1

In the Map “Gloucester County Map of Existing and Future Sites” below, the existing and future sites have been shown as described:

- Phase 1 Sites – Denoted by red circles
- Existing Sites – Denoted by Blue Squares

Figure 12 - Gloucester County Map of Existing and Future Sites



1. **Gloucester 1:**

This site is recommended by V-COMM for phase 1. This site is located on Jackson Road near Malaga Road in Monroe. This site has an alternate which is located on Unexpected Road to the east of Piney Hollow Road. The Gloucester 1 site will provide coverage to the southern section of Monroe in the areas around Piney Hollow Winslow Road, Jackson Road, US Highway 322 and other areas in the vicinity.

System Coverage

V-COMM performed the 700 MHz coverage analysis for Gloucester County using EDX SignalPro with 1 arc second terrain data. The tool was set up to use the Anderson propagation model. This coverage analysis was done for on-street portable talk-back and in-building portable talk back for narrowband and broadband frequencies for existing sites and with the existing and future sites. Provided in the maps below are the coverage plots along with the threshold levels for each analysis.

The Map 41 labeled “Existing Sites Coverage On-Street and In-Building – Narrowband” shows Gloucester County coverage with the existing sites at -81 dBm (in-building) and -95 dBm (on-street). As can be seen in Map 41, with the existing sites, there are many coverage gaps in different sections of the county.

The Map 42 labeled “Existing Sites On-Street Coverage – Narrowband” shows the existing sites coverage at -95 dBm with the Pinelands management area map as the underlay.

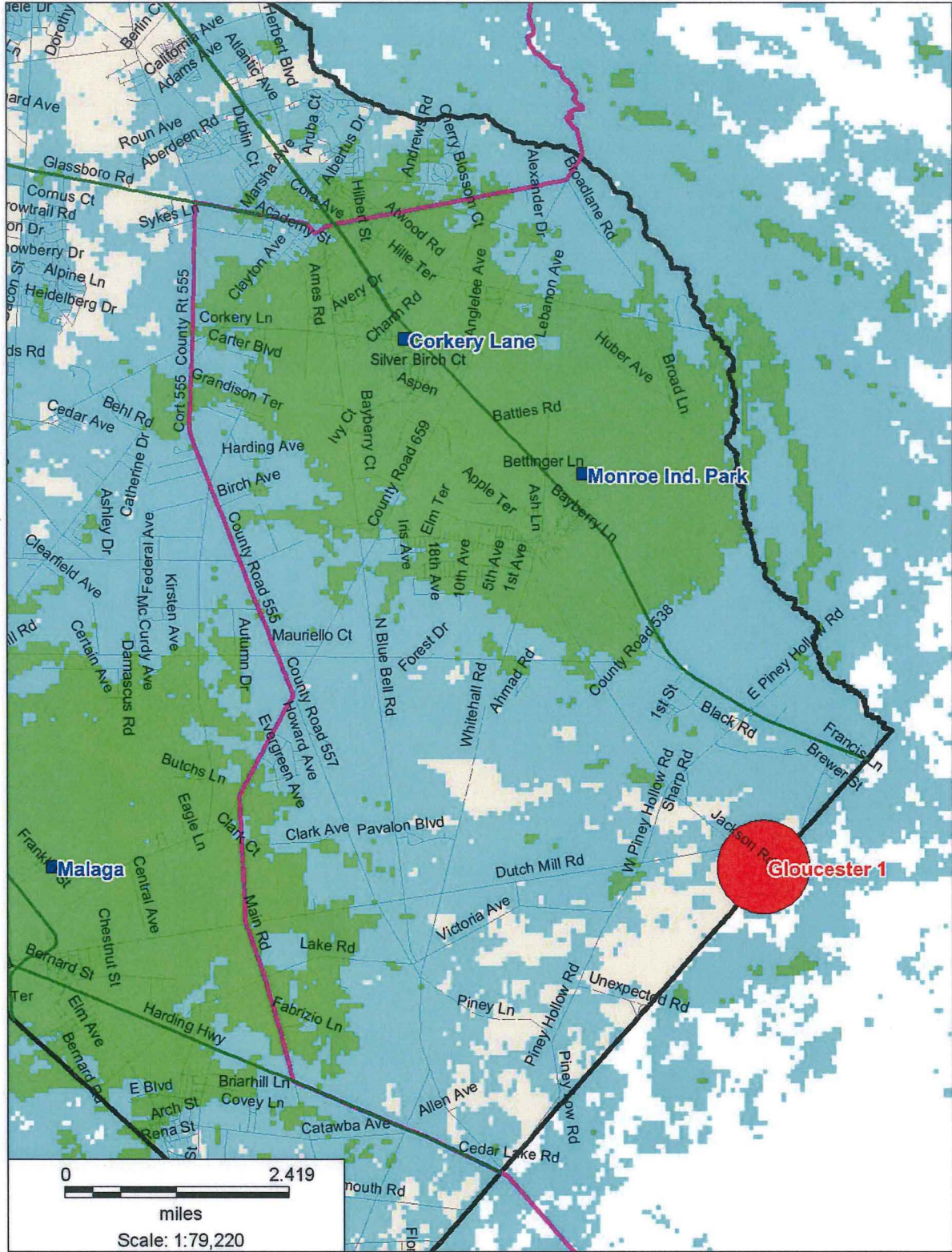
The Map 43 labeled “Existing and Phase 1 Sites On-Street Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -95 dBm with the Pinelands management area map as an underlay. The Phase 1 sites were designed to provide the necessary on-street coverage by filling in the gaps that were there with the existing sites.

The Map 44 labeled “Existing and Phase 1 Sites On-Street and In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -81 dBm and -95 dBm.

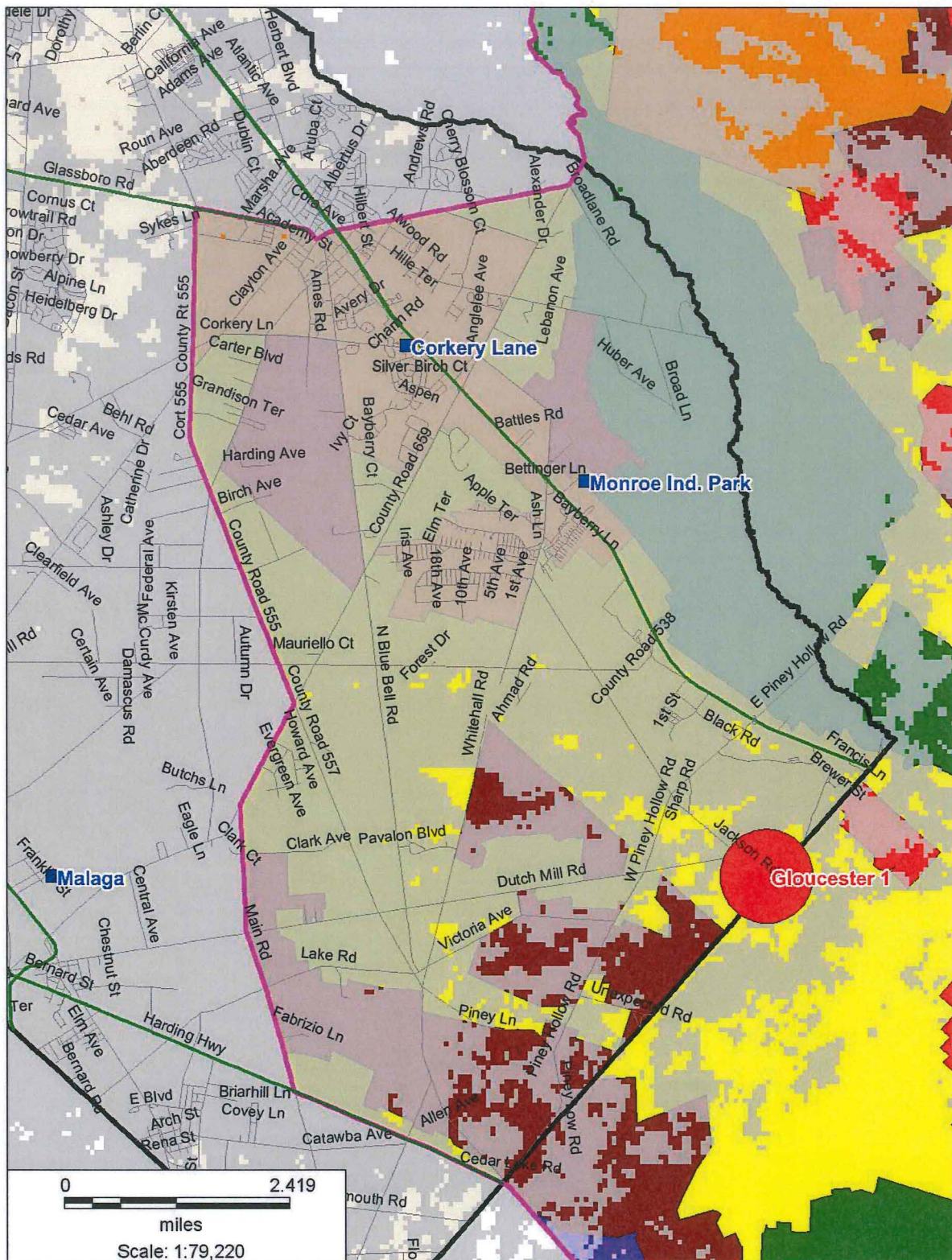
The Map 45 labeled “Existing and Phase 1 Sites In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -81 dBm with the Pinelands area map as an underlay. The Phase 2 sites were designed to provide the necessary in-building coverage.

The Map 46 labeled “Existing and Phase 1 Sites On-Street Coverage – Broadband” shows the existing sites coverage with the Phase 1 sites at -80 dBm with the Pinelands area map as an underlay.

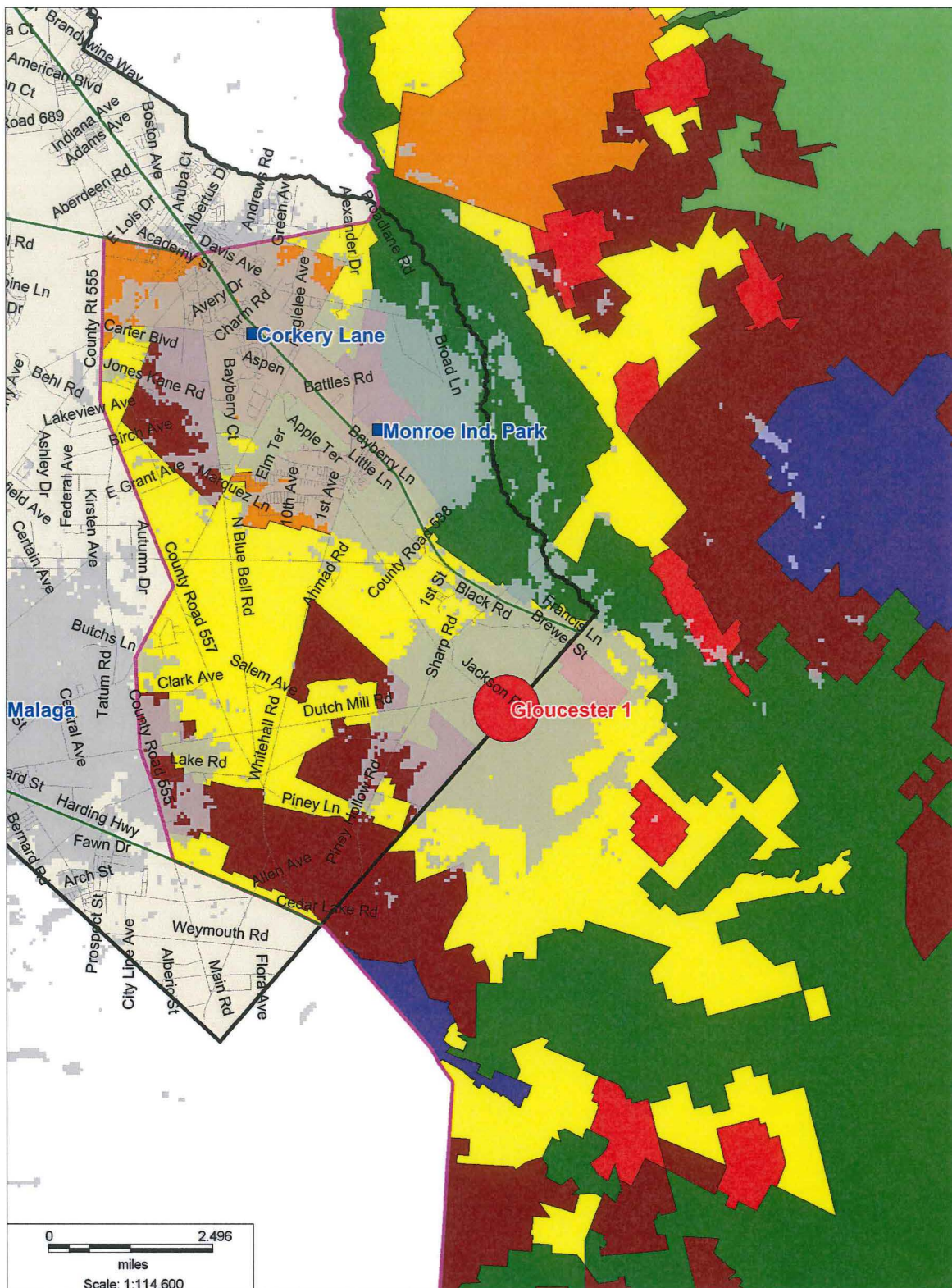
Map 41 - Existing Sites Coverage On-Street and In-Building – Narrowband



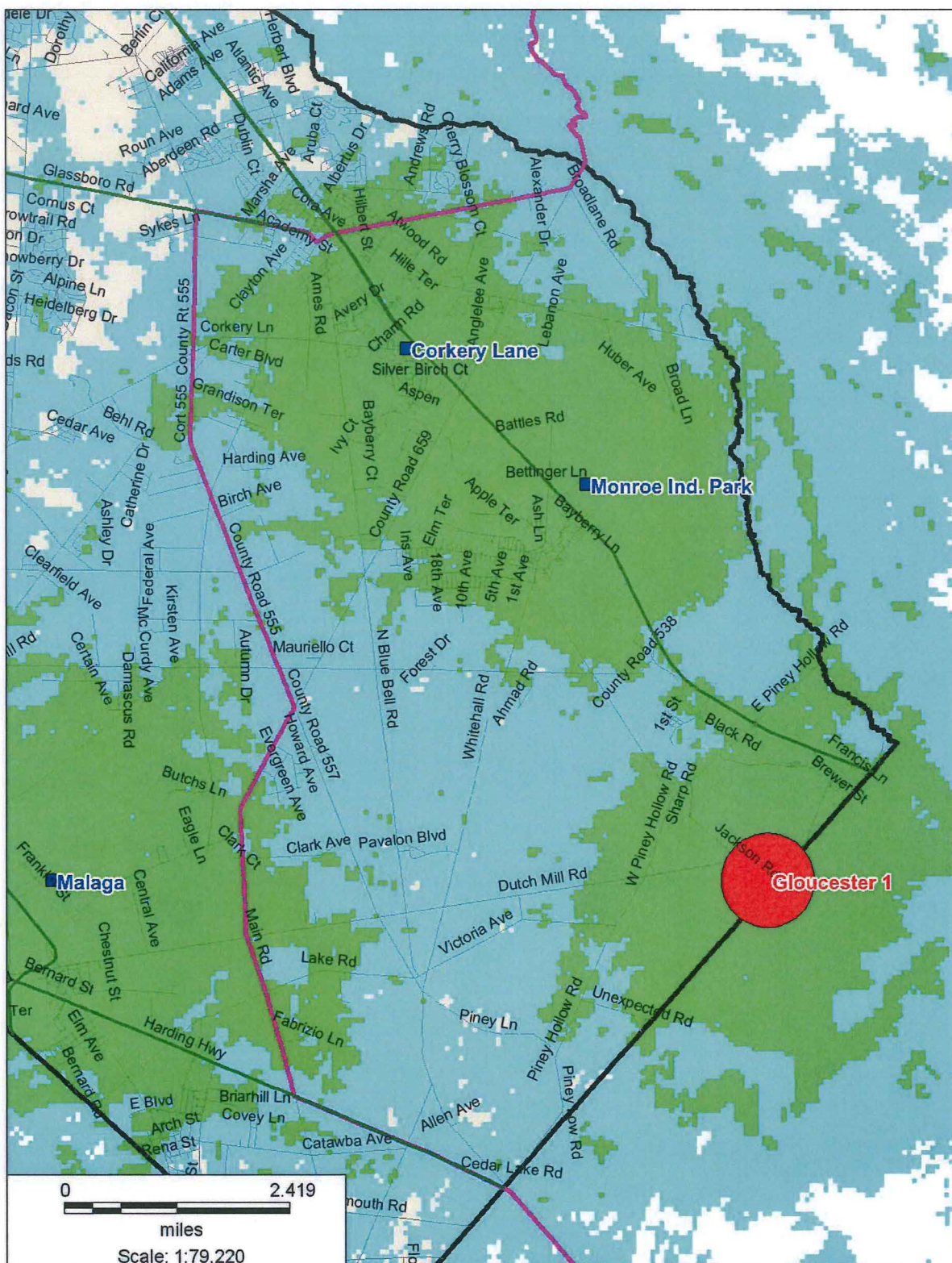
Map 42 - Existing Sites On-Street Coverage – Narrowband



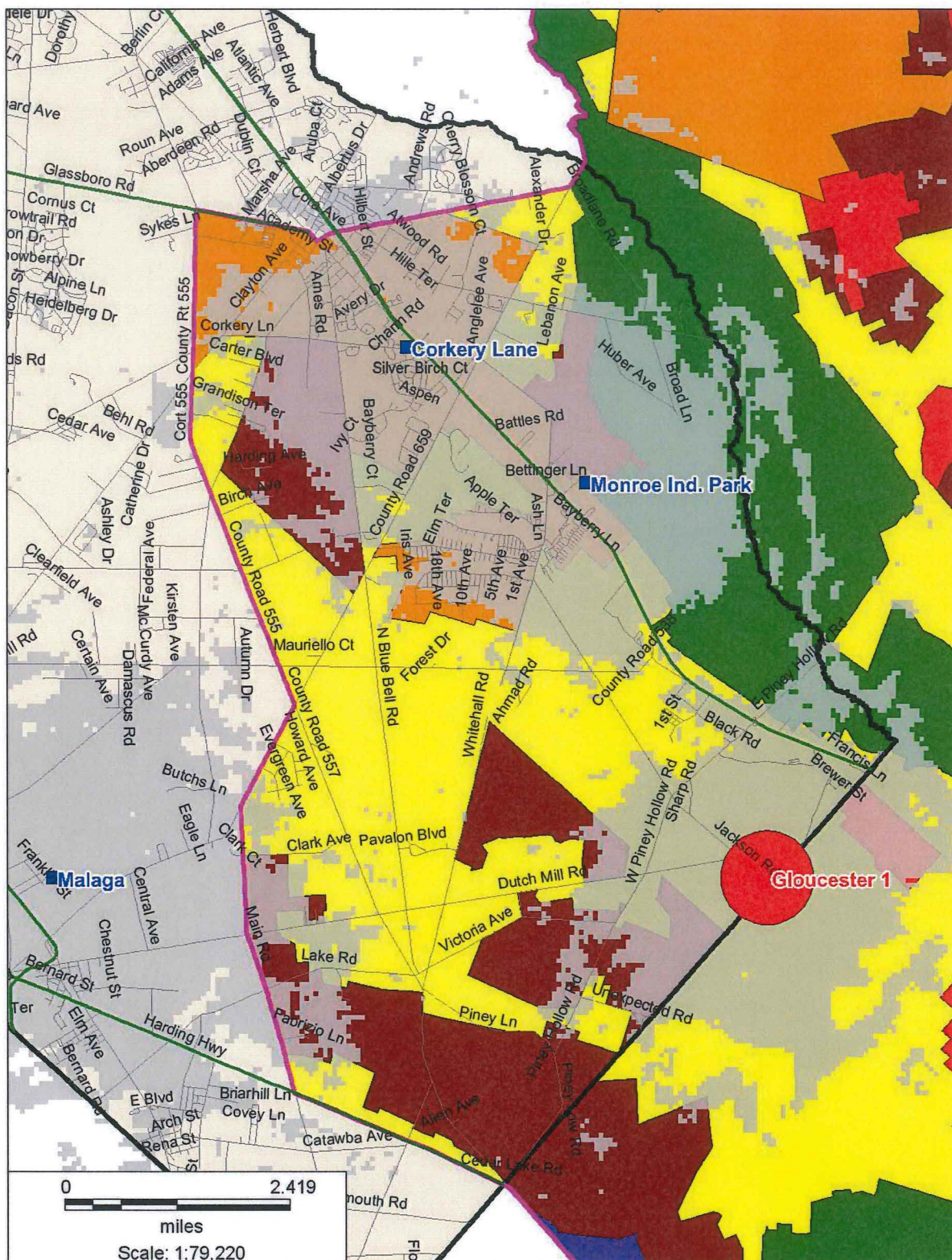
Map 43 - Existing and Phase 1 Sites On-Street Coverage – Narrowband



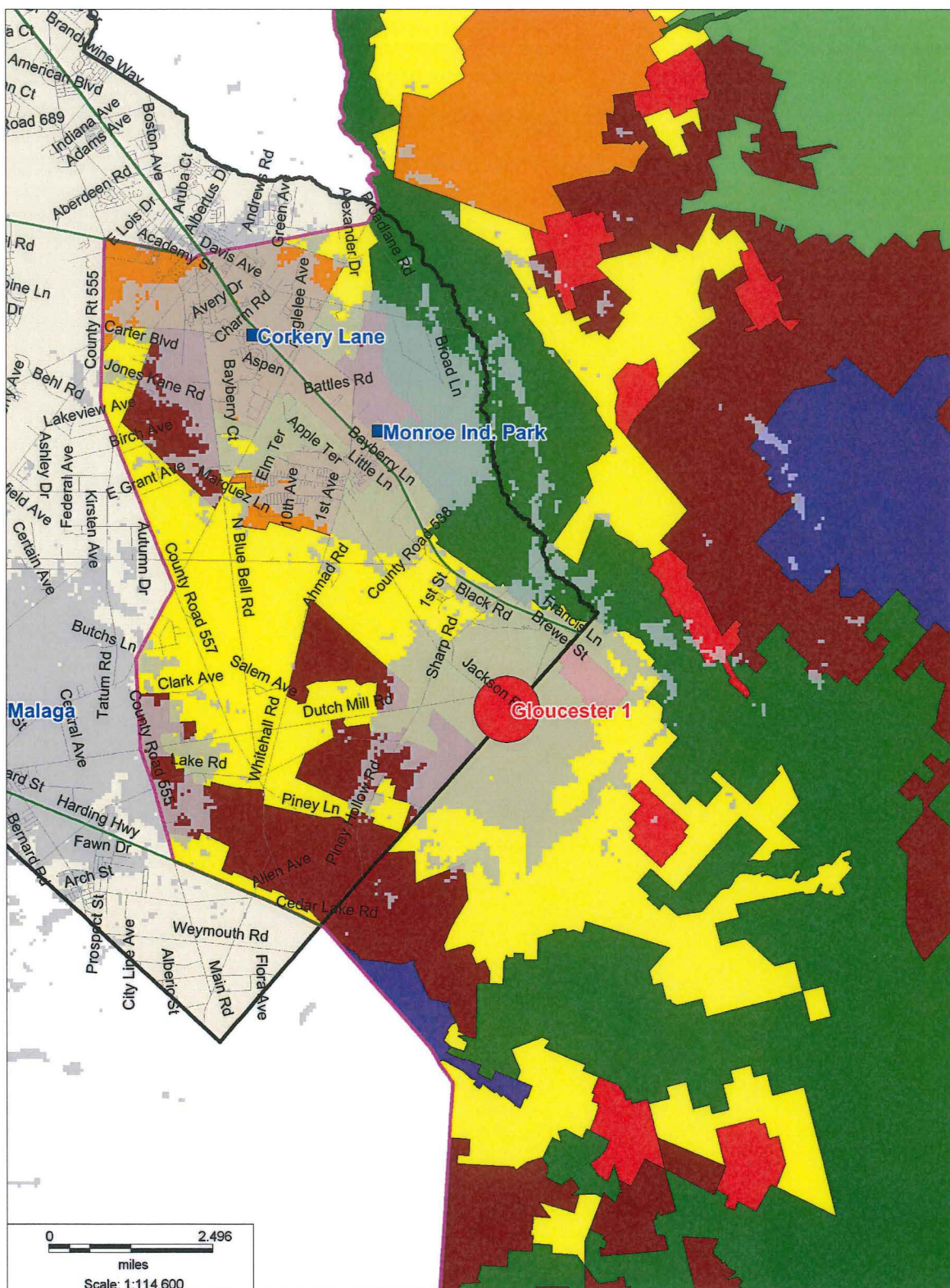
**Map 44 – Existing and Phase 1 Sites On-Street and In-Building Coverage –
Narrowband**



Map 45 - Existing and Phase 1 Sites In-Building Coverage – Narrowband



Map 46 - Existing and Phase 1 Sites On-Street Coverage – Broadband



Ocean County Overview

For the comprehensive plan for Ocean County, V-COMM had all the necessary site information from the 700 MHz analysis previously done for the county by V-COMM. V-COMM verified all information with Robert Bruno, Communications Division Director. V-COMM has utilized this information to analyze the county's current and future coverage requirements.

System Design

Ocean County currently has six (6) sites to provide the necessary coverage throughout the county's jurisdictional area. Listed in table 15 below are the details of the existing sites.

Table 15 – Ocean County 700 MHz Sites Information

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet)/ Type
1	Toms River	39.97361	74.195	146 Chestnut Street Toms River Ocean County, NJ	200 Tower
2	Barnegat	39.75567	74.23125	W Bay And Hillside Avenue Barnegat, Ocean County, NJ	150 Tower
3	Tuckerton	39.602	74.3448	Tip Seaman Park & Rt 9 Tuckerton, Ocean County, NJ	150 Tower
4	New Egypt	40.08288	74.48291	Rt 528 .25km W Of Rt 539 New Egypt Ocean County, NJ	151 Tower
5	Lakewood	40.10219	74.16075	1235 Hermosa Drive Lakewood Ocean County, NJ	260 Tower
6	Pasadena	39.90179	74.406114	Old Cedarbridge Road 3.5 Mi SSW, Whiting, Ocean County, NJ	240 Tower

Future Sites

Ocean County has two (2) future planned sites that fall within the Pinelands Jurisdiction. Based on the coverage analysis, V-COMM recommends eight (8) additional sites to fulfill the county's narrowband and broadband coverage needs. The future sites have been categorized into three (3) phases:

Phase 1 Sites: To provide coverage for narrowband on-street.

Phase 2 Sites: To provide coverage for narrowband in-building.

Phase 3 Sites: To provide coverage for broadband on-street and a majority of in-building service.

Provided in Table 16 below is the list of sites required by Cumberland County.

Table 16 – Ocean County Future Sites

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type	Proposed By	Phase
1	Ocean 1	39.883116	74.288866	Old Road and Lacey Road Lacey	170 Proposed Tower	V-COMM	1
2	Jackson Patriot Park	40.076417	74.336056	Bowman Road Jackson	170 Proposed Tower	Ocean County	1
3	Manchester	40.032306	74.294833	Ridgeway Boulevard Manchester	170 Proposed Tower	Ocean County	1
4	Ocean 2	39.951428	74.370188	Lacey Road / County Road 530 Manchester	170 Proposed Tower	V-COMM	2
5	Ocean 3	40.001165	74.3745923	Near 300 Horicon Road Manchester	150 Proposed Tower	V-COMM	3
6	Ocean 4	39.958611	74.4226939	County Road 530 and Pinehurst Road Manchester	150 Proposed Tower	V-COMM	3

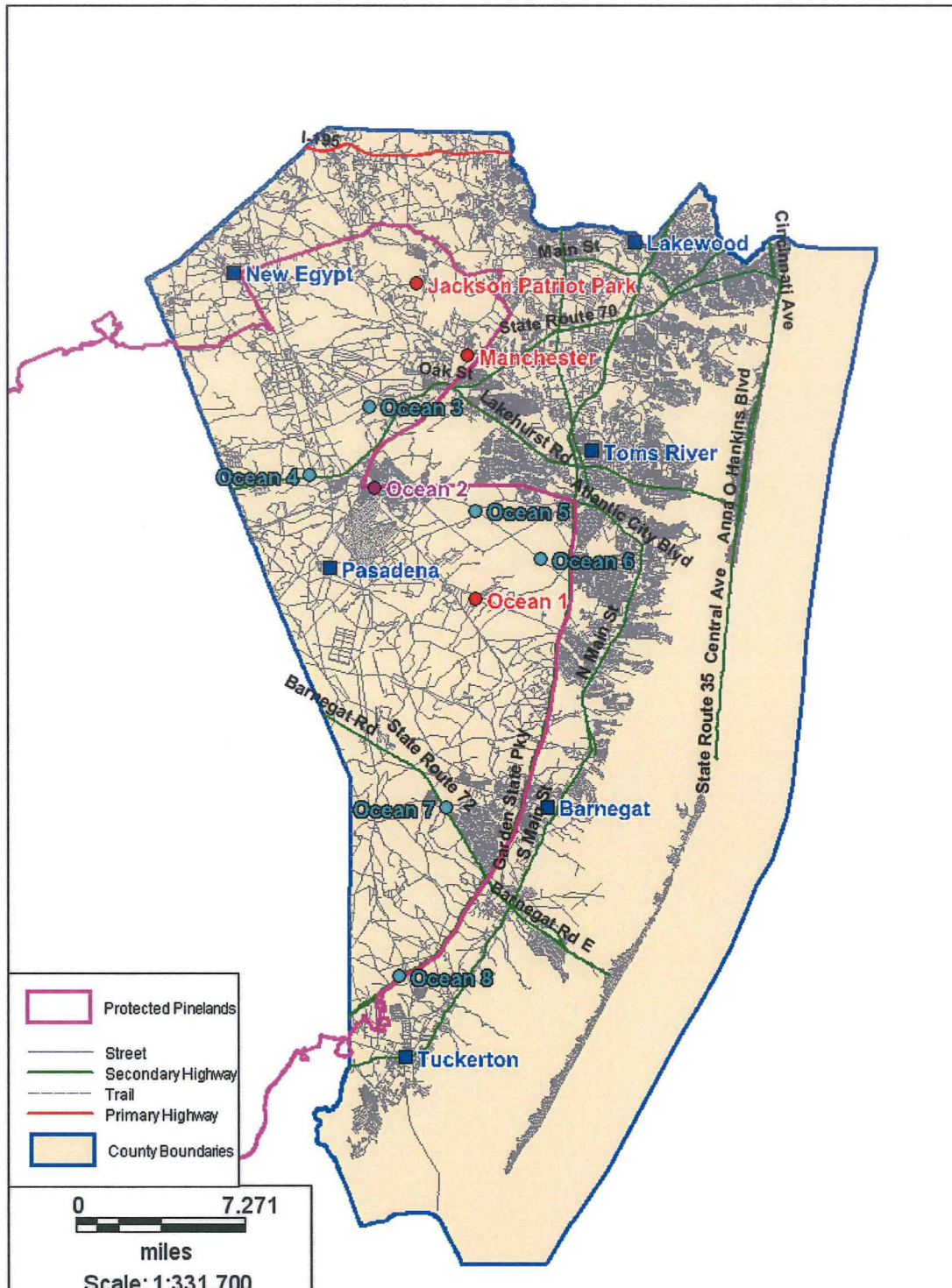
Table 16 Continued – Ocean County Future Sites

Site No.	Site Name	Latitude (N)	Longitude (W)	Address	Structure Height (feet) / Type	Proposed By	Phase
7	Ocean 5	39.937222	74.2888865	Route 530 and Mule Road Berkeley	150 Proposed Tower	V-COMM	3
8	Ocean 6	39.907501	74.2358316	Pinewald Keswick Road (Near Berkeley Township Police) Berkeley	150 Proposed Tower	V-COMM	3
9	Ocean 7	39.755121	74.3126445	Route 72/Barnegat Road and Dusty Mille Road Stafford	150 Proposed Tower	V-COMM	3
10	Ocean 8	39.651667	74.3499938	Garden State Parkway and Route 539 Little Egg Harbor	150 Proposed Tower	V-COMM	3

In the Map “Ocean County Map of Existing and Future Sites” below, the existing and future sites have been shown as described:

- Phase 1 Sites – Denoted by red circles
- Phase 2 Sites – Denoted by purple circles
- Phase 3 Sites – Denoted by blue circles
- Existing Sites – Denoted by blue squares

Figure 13 - Ocean County Map of Existing and Future Sites



1. **Jackson Patriot Park:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located on Bowman Road in Jackson. This site will provide coverage to the southern parts of Jackson Township in the areas around Bowman Road, Midway Avenue, County Road 571 and other streets in the vicinity.

2. **Manchester:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located on Ridgeway Boulevard in Manchester. This site will provide coverage to the north east section of Manchester Township in the areas around Ridgeway Boulevard, County Road 547, State Route 70 and other streets in the vicinity.

3. **Ocean 1:**

This site is recommended by V-COMM for phase 1, narrowband on-street coverage. This site is located close to Old Road and Lacey Road in Lacey. This site will provide coverage to the northwest section of Lacey Township in the areas around Lacey Road, Old Road, Stonehill Road and other streets in the vicinity.

4. **Ocean 2:**

This site is recommended by V-COMM for phase 2, narrowband in-building coverage. This site is located on Lacey Road / County Road 530 in Whiting. This site will provide to the dense areas to the mid southern section of the Manchester Township along John Davidson Rockefeller Highway, County Road 530, County Road 539, Schoolhouse Road and other smaller areas in the vicinity.

5. **Ocean 3:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located near 300 Horicon Road in Manchester. This site will provide coverage to the northern section of Manchester Township along Horicon Road, Union Road, Beckerville Road, John Davidson Rockefeller Highway and other areas in the vicinity.

6. **Ocean 4:**

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building service. This site is located on County Road 530 and Pinehurst Road in Manchester. This site will provide coverage to the western section of Manchester Township along Pinehurst Road, Lebanon State Forest Road, John Davidson Rockefeller Highway and other areas in the vicinity.

7. Ocean 5:

This site is recommended by V-COMM for phase 3, broadband on-street coverage. This site is located on Route 530 and Mule Road in Toms River. This site will provide coverage to the western section of Berkeley Township in the areas around Mule Road, County Road 530, Dover Road and other areas in the vicinity.

8. Ocean 6:

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building services. This site is located on Pinewald Keswick Road in Berkeley. This site will provide coverage to the mid southern section of Berkeley Township in the areas around Pinewald Keswick Road, Garden State Parkway, Double Trouble Road and other areas in the vicinity.

9. Ocean 7:

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building services. This site is located on Route 72/Barnegat Road and Dusty Mille Road in Stafford Township. This site will provide coverage to the Northwest section of Stafford Township in the areas around Route 72/Barnegat Road, Hay Road, West Bay Avenue, Pancoast Road and other areas in the vicinity.

10. Ocean 8:

This site is recommended by V-COMM for phase 3, broadband on-street coverage and a majority of in-building services. This site is located near Garden State Parkway and Route 539 in Little Egg Harbor Township. This site will provide coverage to the northern section of Little Egg Harbor Township in the areas around the Garden State Parkway, County Road 539, Oswego Road, Frog Pond Road, Forge Road and other areas in the vicinity.

System Coverage

V-COMM performed the 700 MHz coverage analysis for Ocean County using EDX SignalPro with 1 arc second terrain data. The tool was set up to use the Anderson propagation model. This coverage analysis was done for on-street portable talk-back and in-building portable talk back for narrowband and broadband frequencies for existing sites and with the existing and future sites. Provided in the maps below are the coverage plots along with the threshold levels for each analysis.

The Map 47 labeled “Existing Sites Coverage On-Street and In-Building – Narrowband” shows Ocean County coverage with the existing sites at -81 dBm (in-building) and -95 dBm (on-street). As can be seen in Map 47, with the existing sites, there are many coverage gaps in different sections of the county.

The Map 48 labeled “Existing Sites On-Street Coverage – Narrowband” shows the existing sites coverage at -95 dBm with the Pinelands management area map as the underlay.

The Map 49 labeled “Existing and Phase 1 Sites On-Street Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -95 dBm with the Pinelands management area map as an underlay. The Phase 1 sites were designed to provide the necessary on-street coverage by filling in the gaps that were there with the existing sites.

The Map 50 labeled “Existing and Phase 1 Sites On-Street and In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 sites at -81 dBm and -95 dBm.

The Map 51 labeled “Existing and Phase 1 Sites In-Building Coverage – Narrowband” shows the existing sites coverage at -81 dBm with the Pinelands management area map as the underlay.

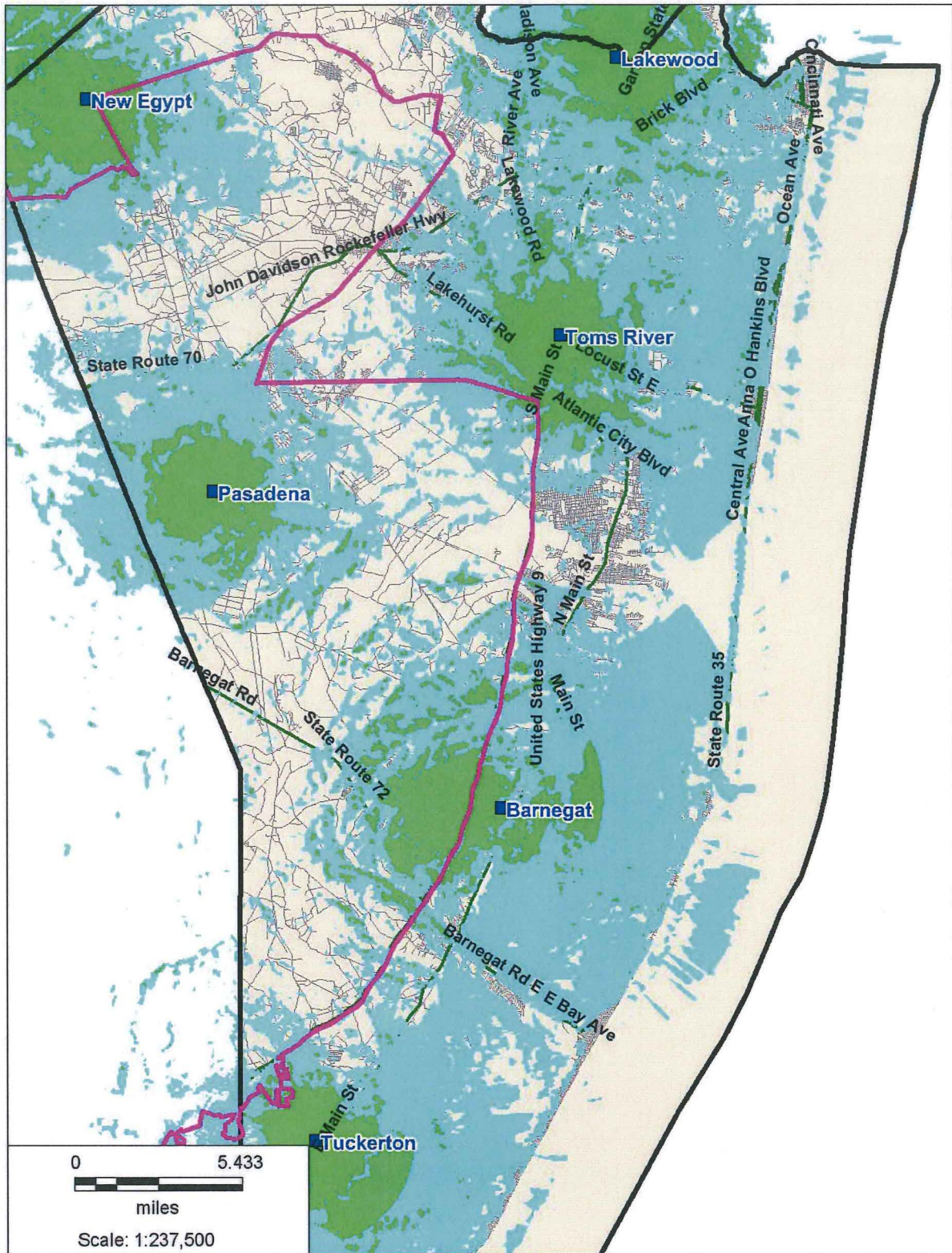
The Map 52 labeled “Existing and Phase 1 and 2 Sites In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 and Phase 2 sites at -81 dBm with the Pinelands area map as an underlay. The Phase 2 sites were designed to provide the necessary in-building coverage.

The Map 53 labeled “Existing and Phase 1 and 2 Sites On-Street and In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 and 2 sites at -81 dBm and -95 dBm.

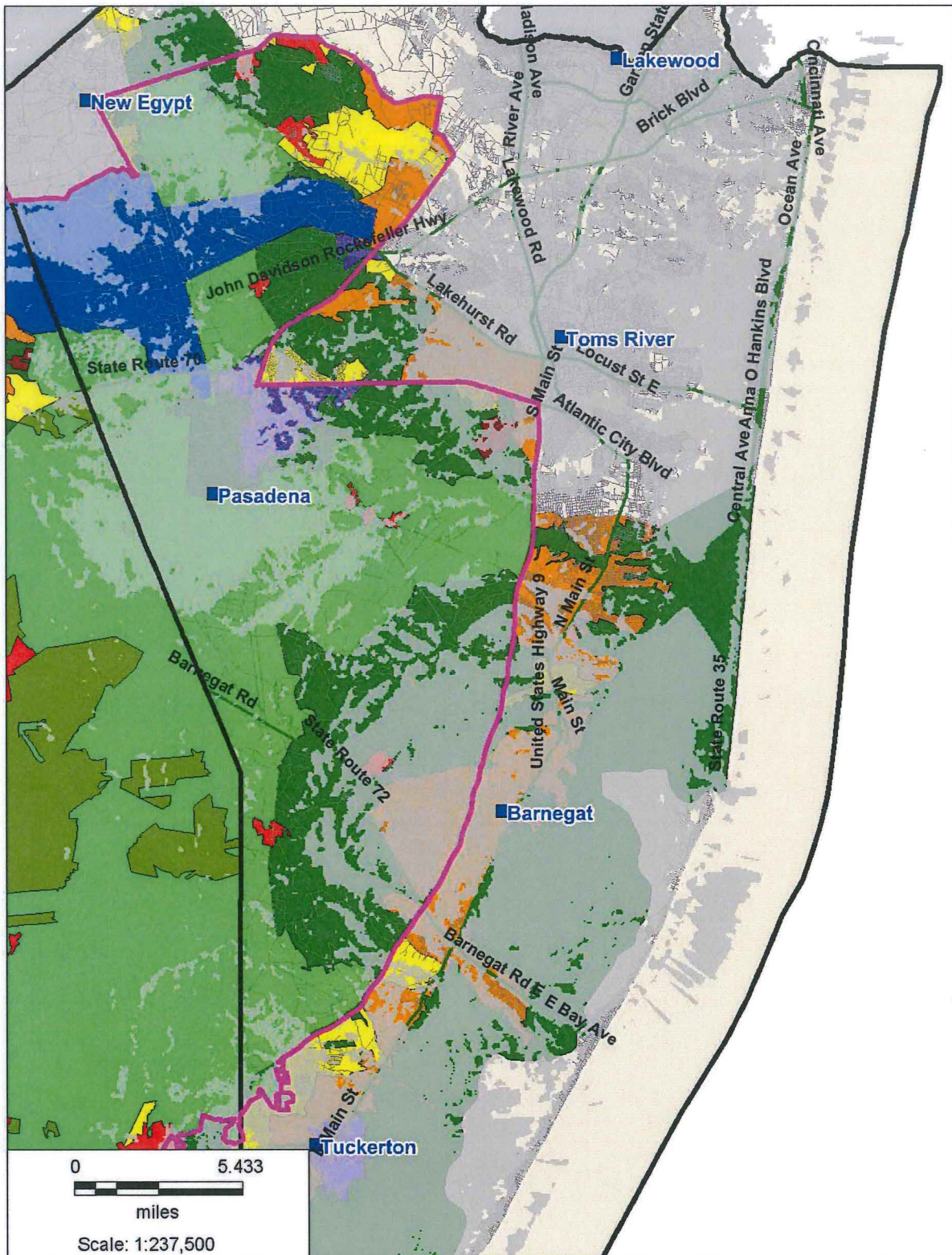
The Map 54 labeled “Existing and Phase 1 and 2 On-Street Coverage – Broadband” shows the existing sites coverage with Phase 1 and 2 at -80 dBm with the Pinelands area map as an underlay.

The Map 55 labeled “Existing and Phase 1, 2 and 3 Sites Coverage – Broadband” shows the existing sites coverage with Phase 1, 2 and 3 sites at -80 dBm with the Pinelands area map as an underlay. The Phase 3 sites provide on-street and a majority of in-Building coverage in the Pinelands.

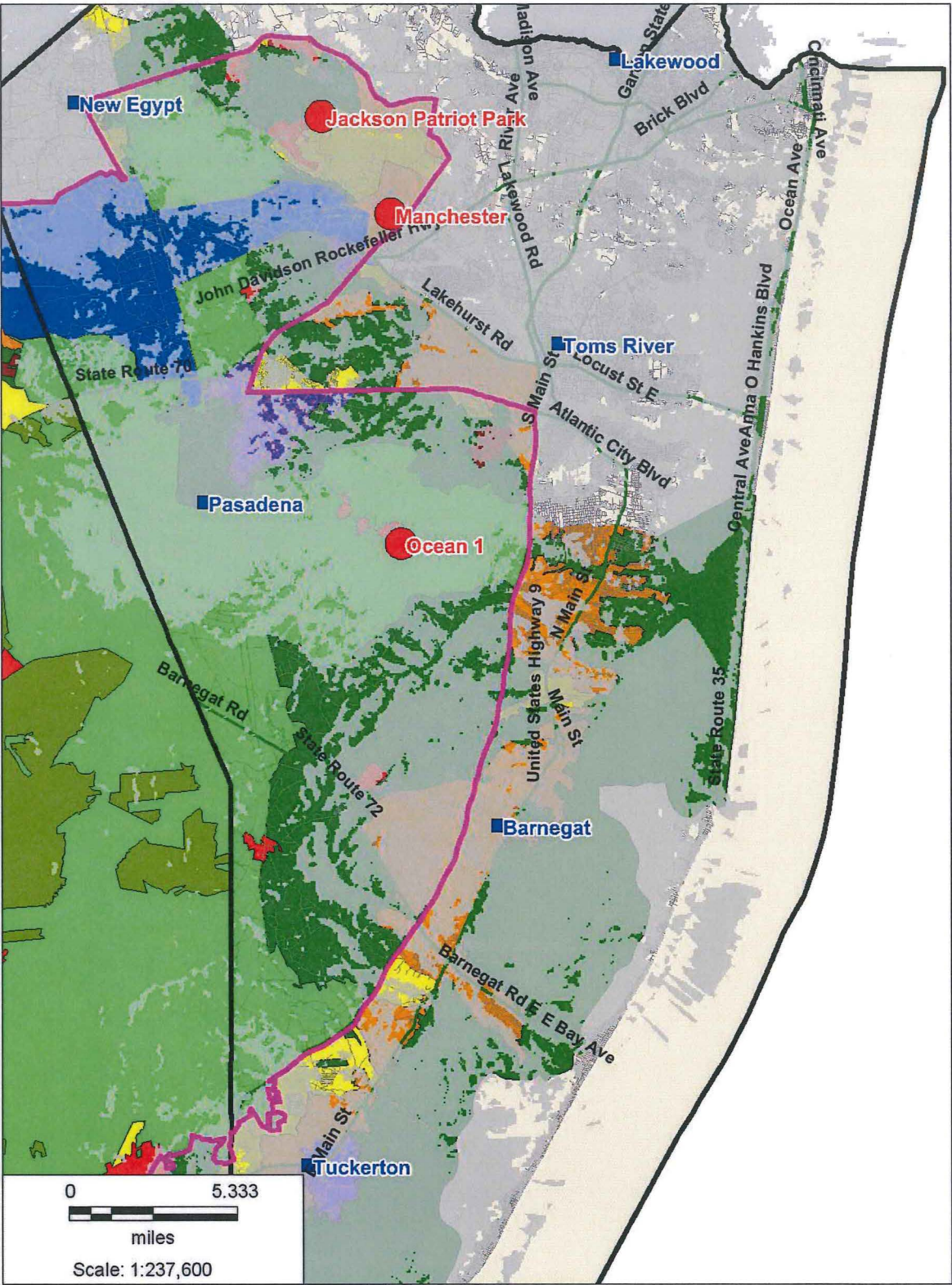
Map 47 - Existing Sites Coverage On-Street and In-Building – Narrowband



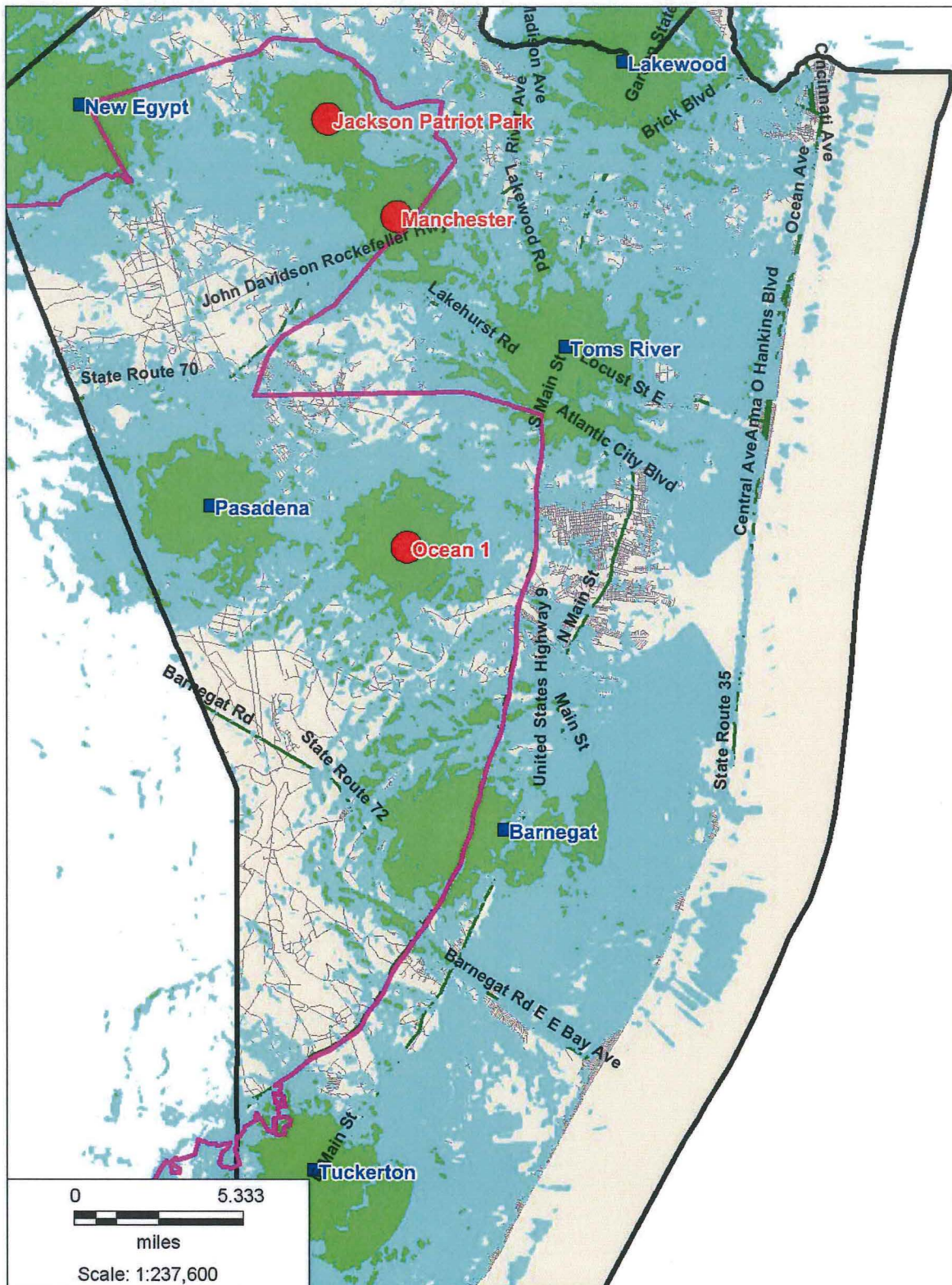
Map 48 - Existing Sites On-Street Coverage – Narrowband



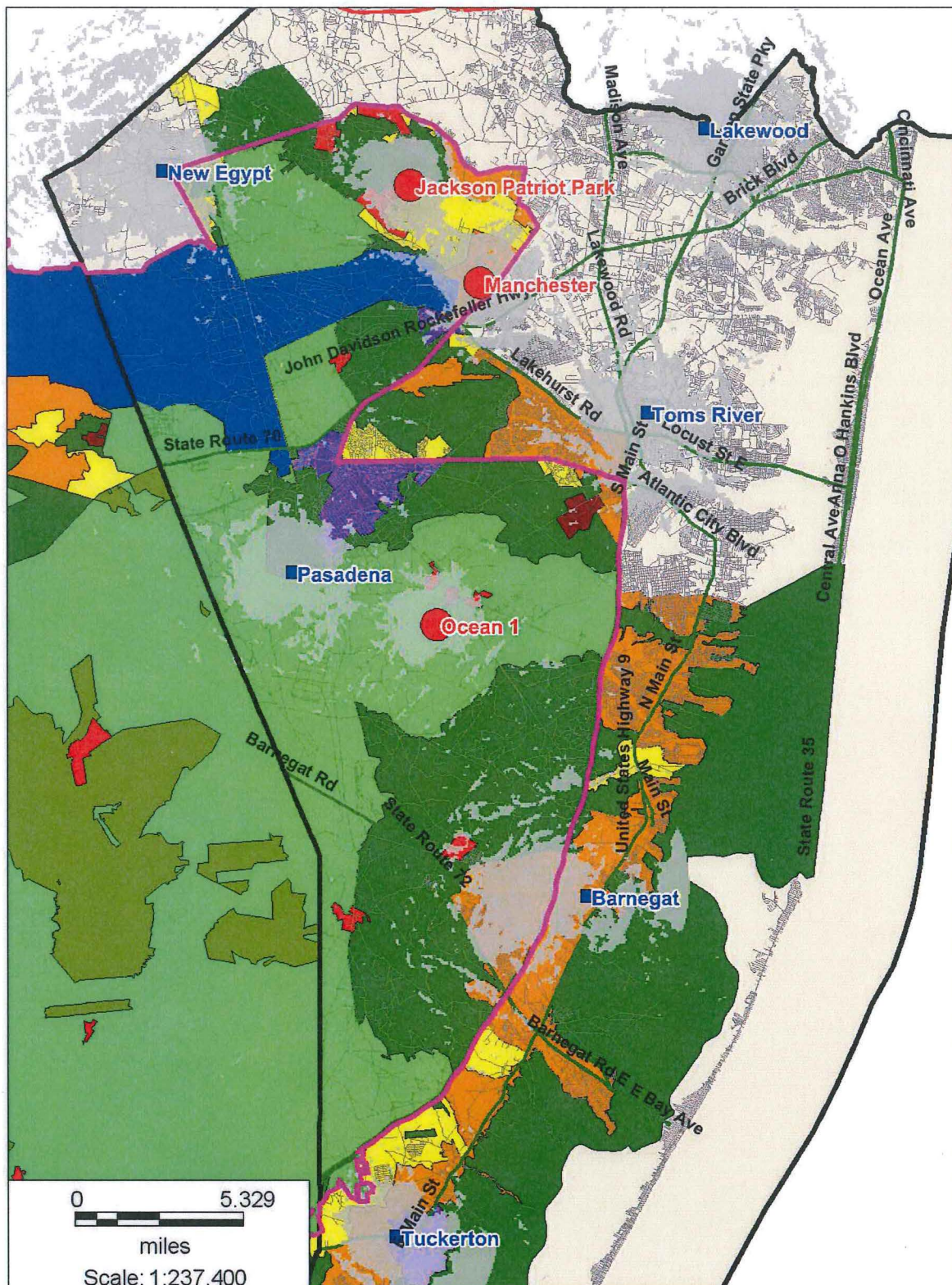
Map 49 - Existing and Phase 1 Sites On-Street Coverage – Narrowband



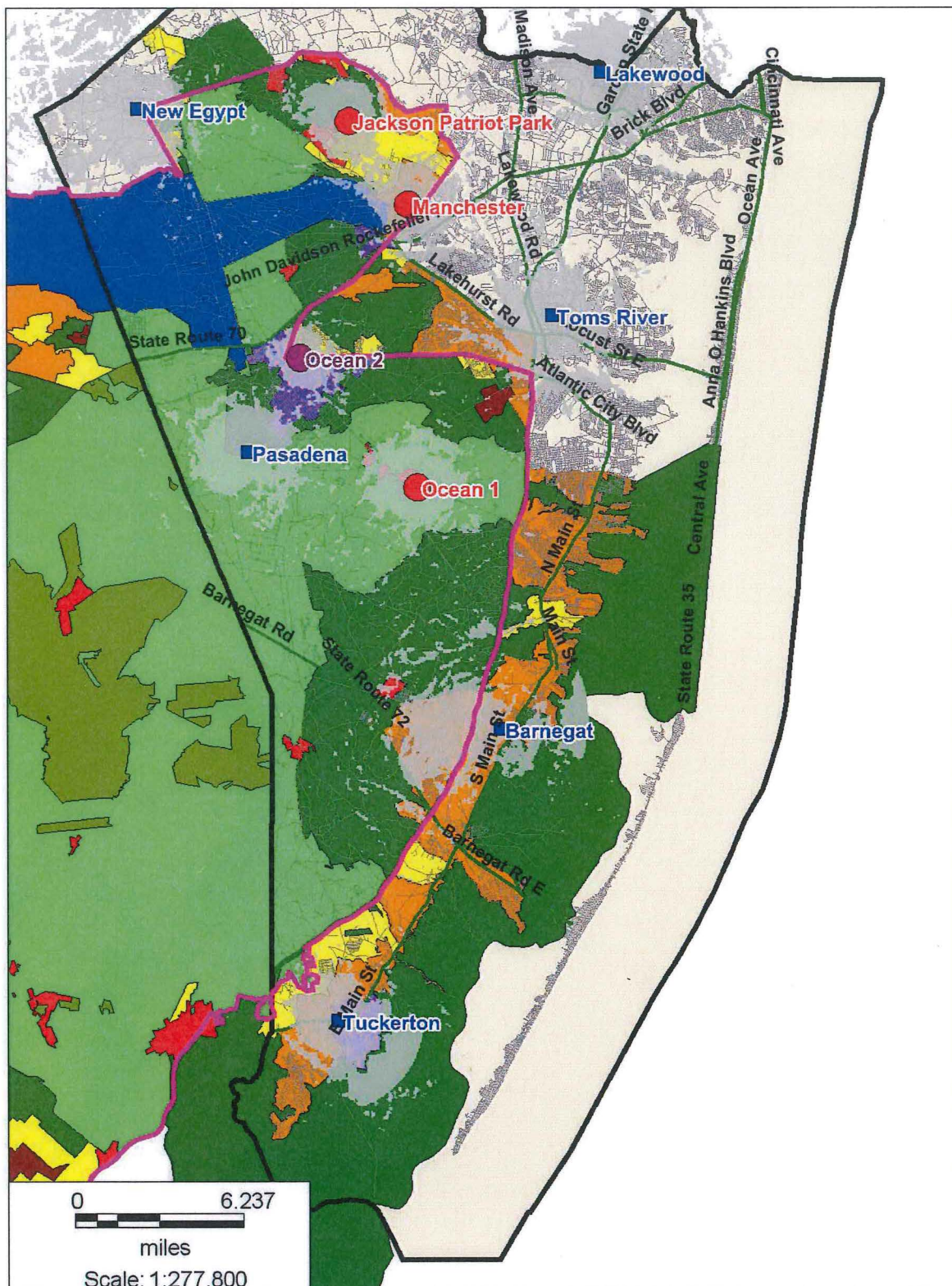
**Map 50 - Existing and Phase 1 Sites On-Street and In-Building Coverage –
Narrowband**



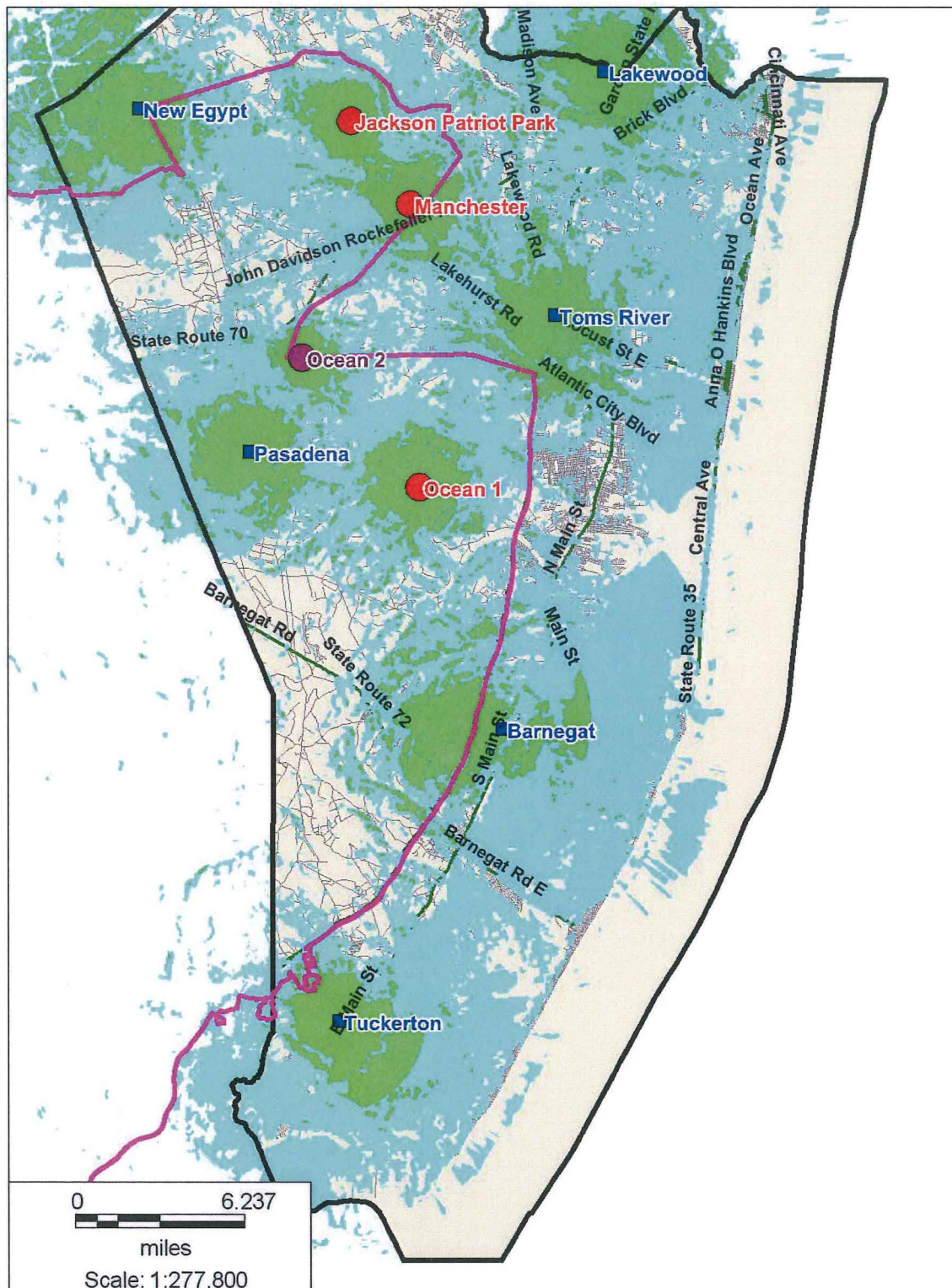
Map 51 - Existing and Phase 1 Sites In-Building Coverage – Narrowband



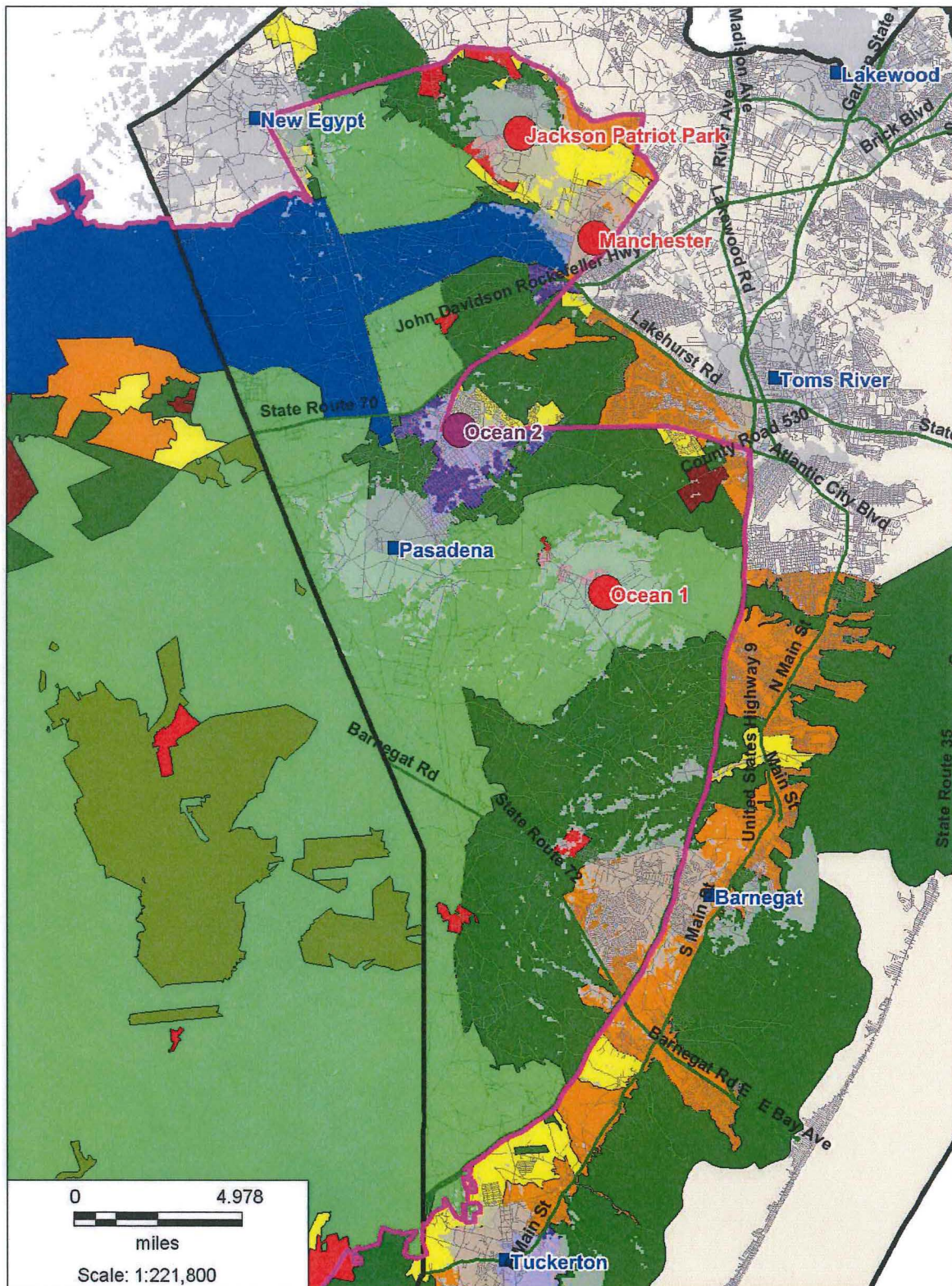
**Map 52 - Existing and Phase 1 and 2 Sites In-Building Coverage –
Narrowband**



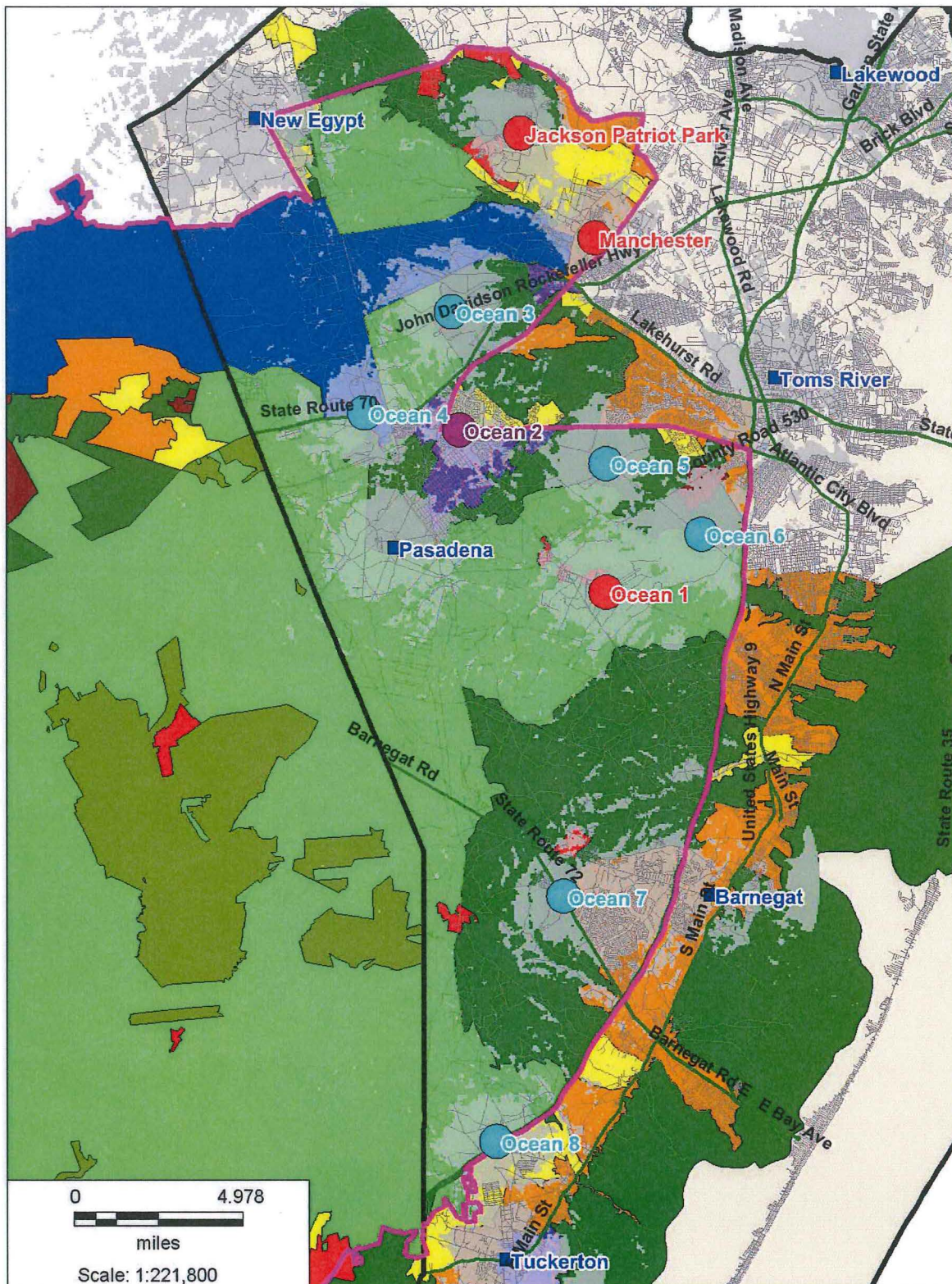
**Map 53 - Existing and Phase 1 and 2 Sites On-Street and In-Building
Coverage – Narrowband**



Map 54 - Existing and Phase 1 and 2 On-Street Coverage – Broadband



Map 55 - Existing and Phase 1, 2 and 3 Sites Coverage – Broadband



Consolidated System Maps

V-COMM has also performed a 700 MHz coverage analysis for all the seven counties to show the overall system coverage. The consolidated system maps show the on-street portable talk-back and in-building portable talk back for narrowband and broadband frequencies for existing sites and future sites designed for the three (3) phases. Provided in the maps below are the coverage plots along with the threshold levels for each analysis.

The Map 56 labeled “Existing Sites Coverage On-Street and In-Building – Narrowband” shows the existing sites coverage at -81 dBm (in-building) and -95 dBm (on-street). This map shows the existing sites coverage for the seven counties in the Pinelands.

The Map 57 labeled “Existing Sites On-Street Coverage – Narrowband” shows the existing sites coverage at -95 dBm for all the seven counties with the Pinelands management area map as the underlay.

The Map 58 labeled “Existing and Phase 1 Sites In-Building Coverage – Narrowband” shows the existing sites coverage at -81 dBm for all the seven counties with the Pinelands management area map as the underlay.

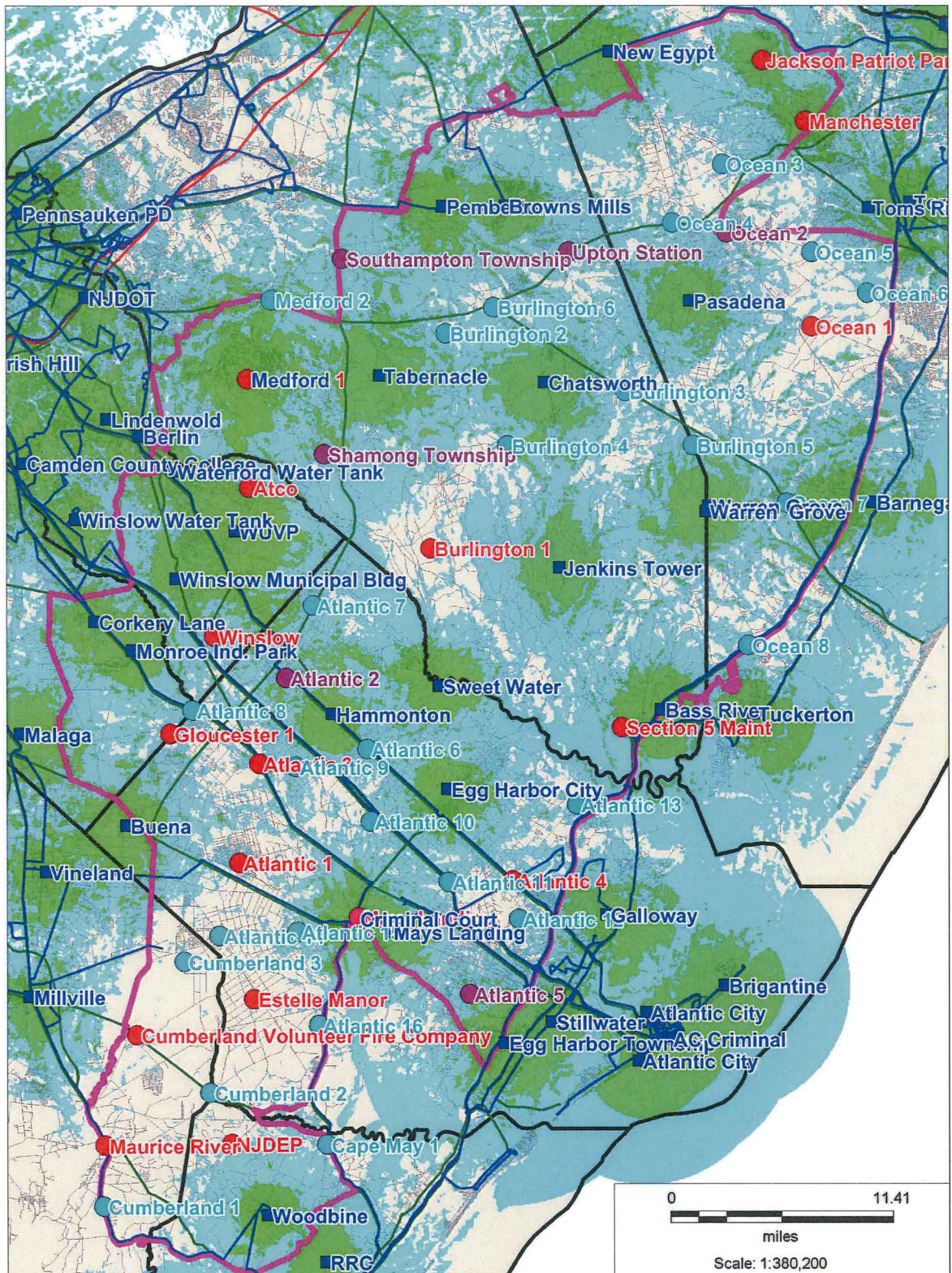
The Map 59 labeled “Existing and Phase 1 and 2 Sites In-Building Coverage – Narrowband” shows the existing sites coverage with the Phase 1 and Phase 2 sites at -81 dBm for all the seven counties with the Pinelands area map as an underlay. The phase 2 sites were designed to provide the necessary in-building coverage.

The Map 60 labeled “Existing and Phase 1 & 2 Sites On-Street and In-Building Coverage – Broadband” shows the existing sites coverage with the Phase 1 and 2 sites at -81 dBm and -95 dBm.

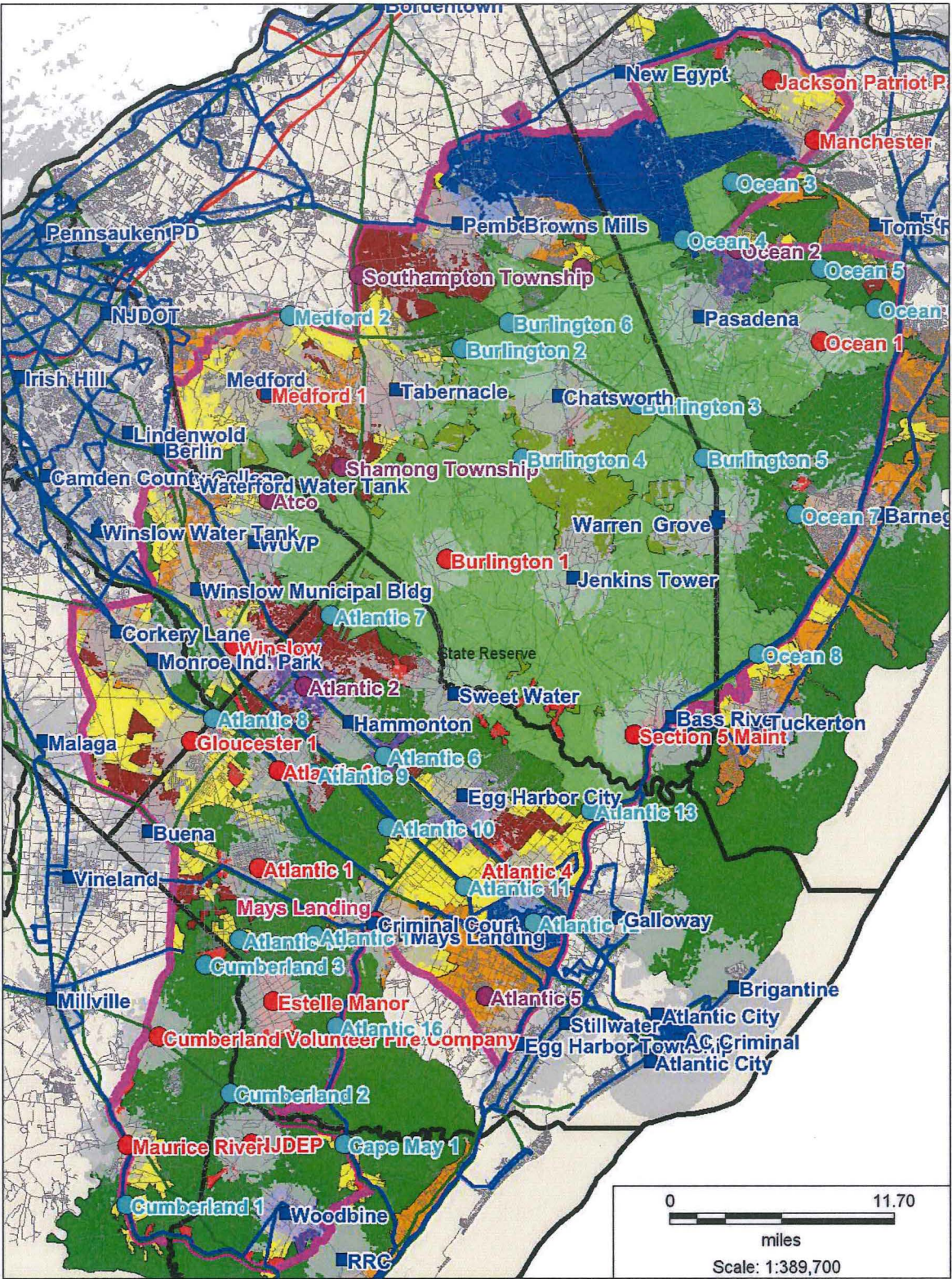
The Map 61 labeled “Existing and phase 1, 2 and 3 sites On-Street Coverage – Broadband” shows the existing sites coverage with phase 1, 2 and 3 sites at -80 dBm with the Pinelands area map as an underlay.

The Map 62 labeled “Existing and phase 1, 2 and 3 sites On-Street and In-Building Coverage – Broadband” shows the existing sites coverage with phase 1, 2 and 3 sites at -66 dBm and -80 dBm. The phase 3 sites provide on-street and a majority of in-Building coverage in the Pinelands.

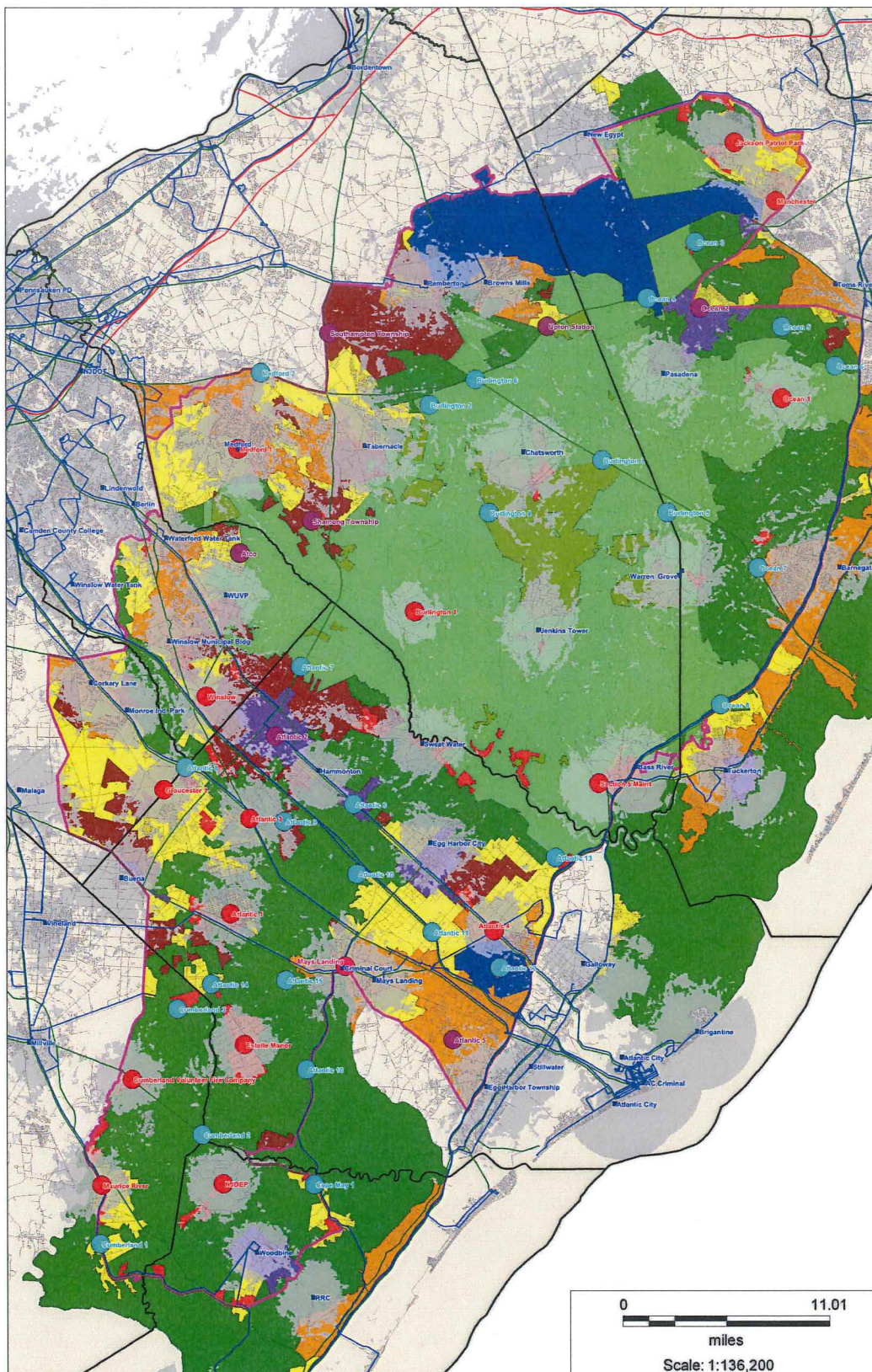
Map 56 - Existing Sites Coverage On-Street and In-Building – Narrowband



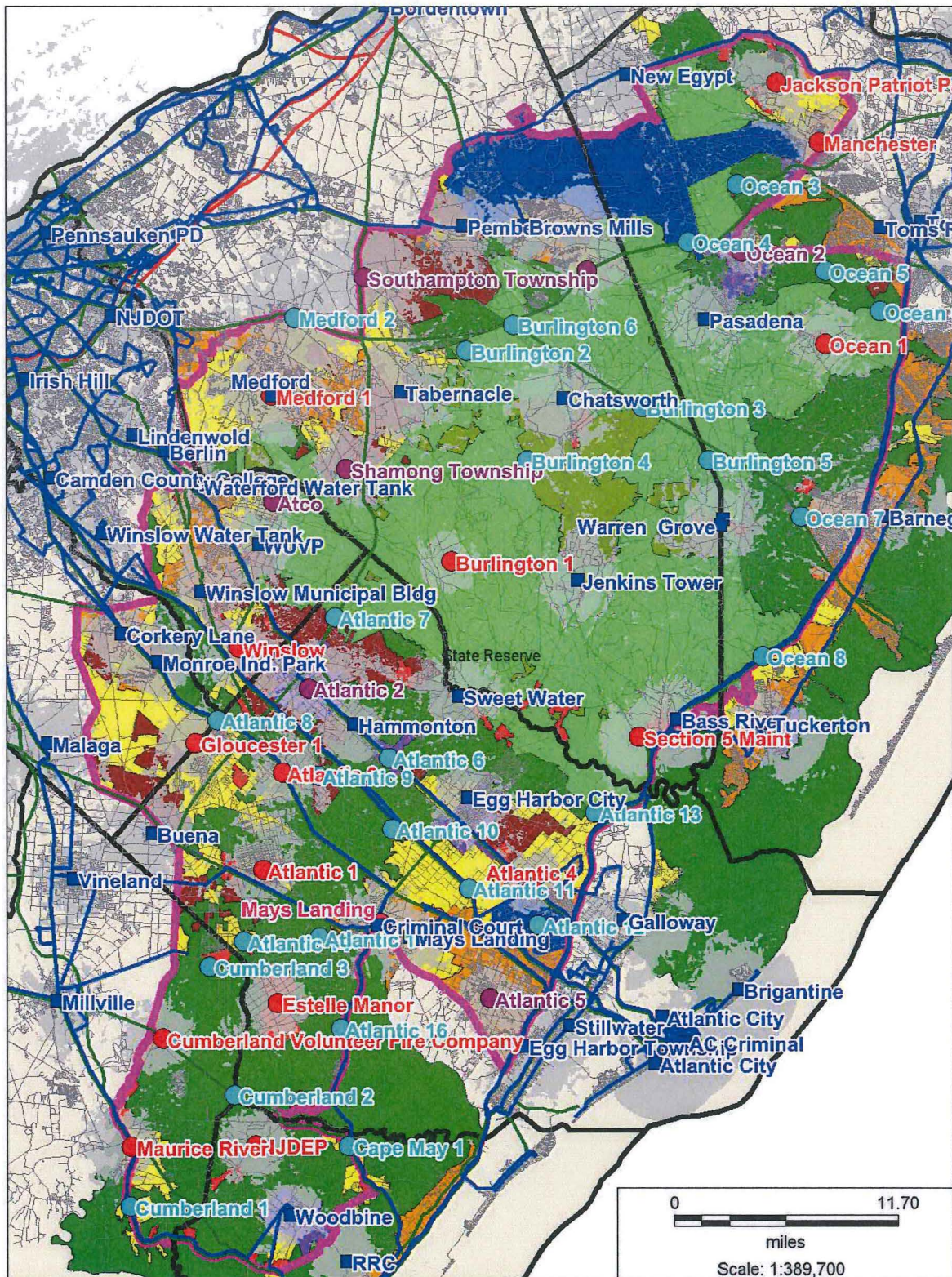
Map 57 - Existing Sites On-Street Coverage – Narrowband



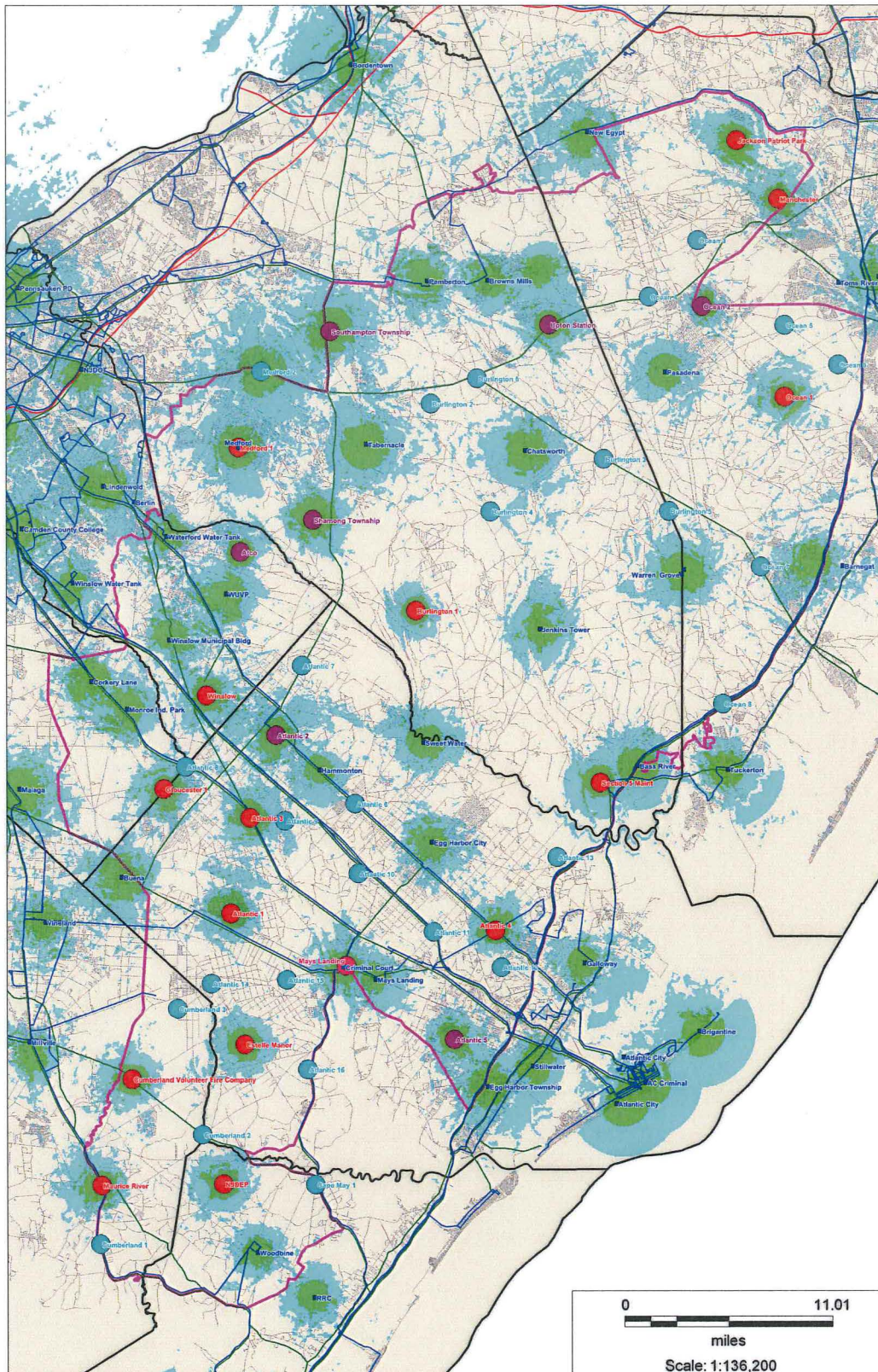
Map 58 - Existing and Phase 1 Sites In-Building Coverage – Narrowband



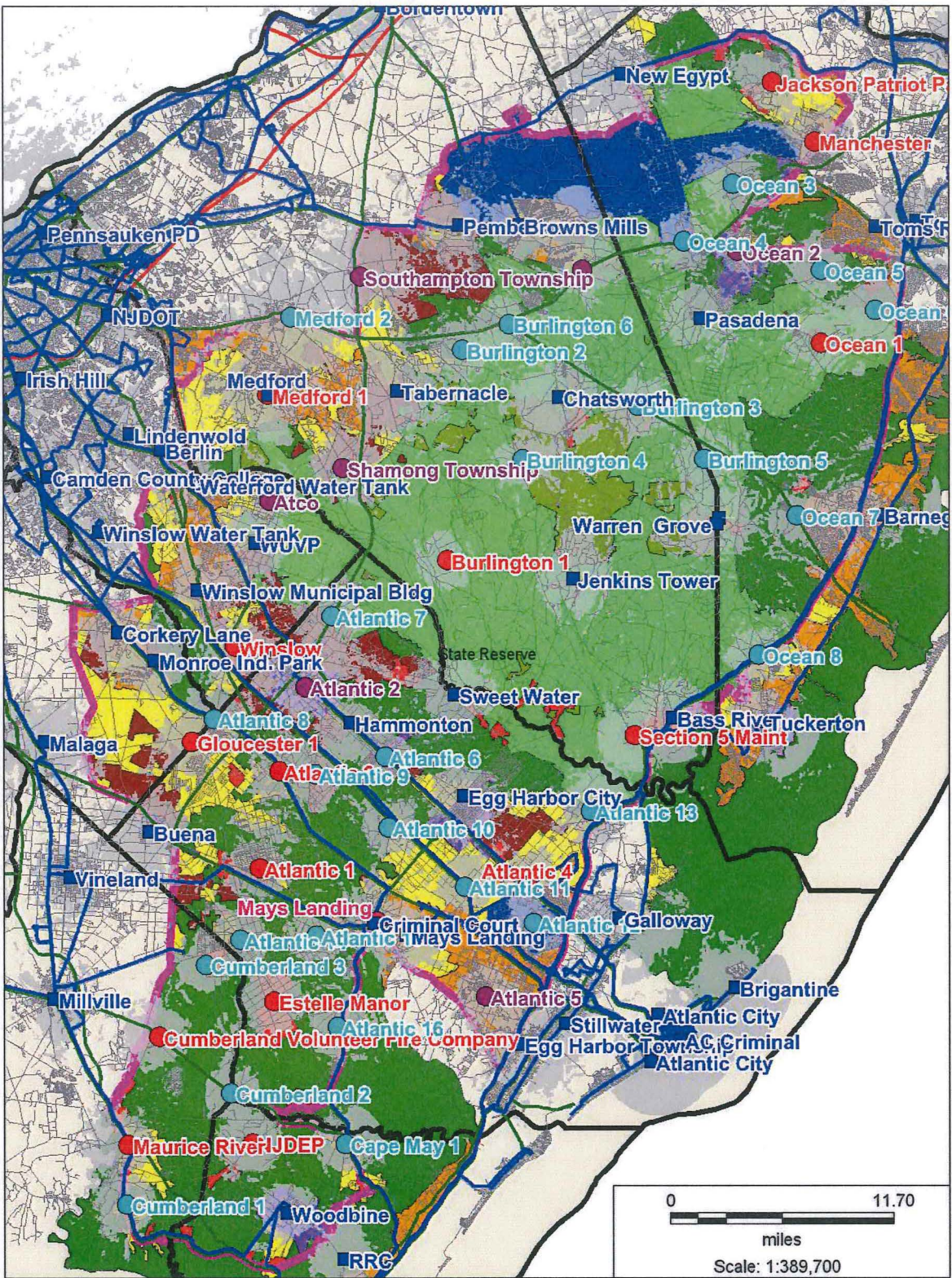
**Map 59 - Existing and Phase 1 and 2 Sites In-Building Coverage –
Narrowband**



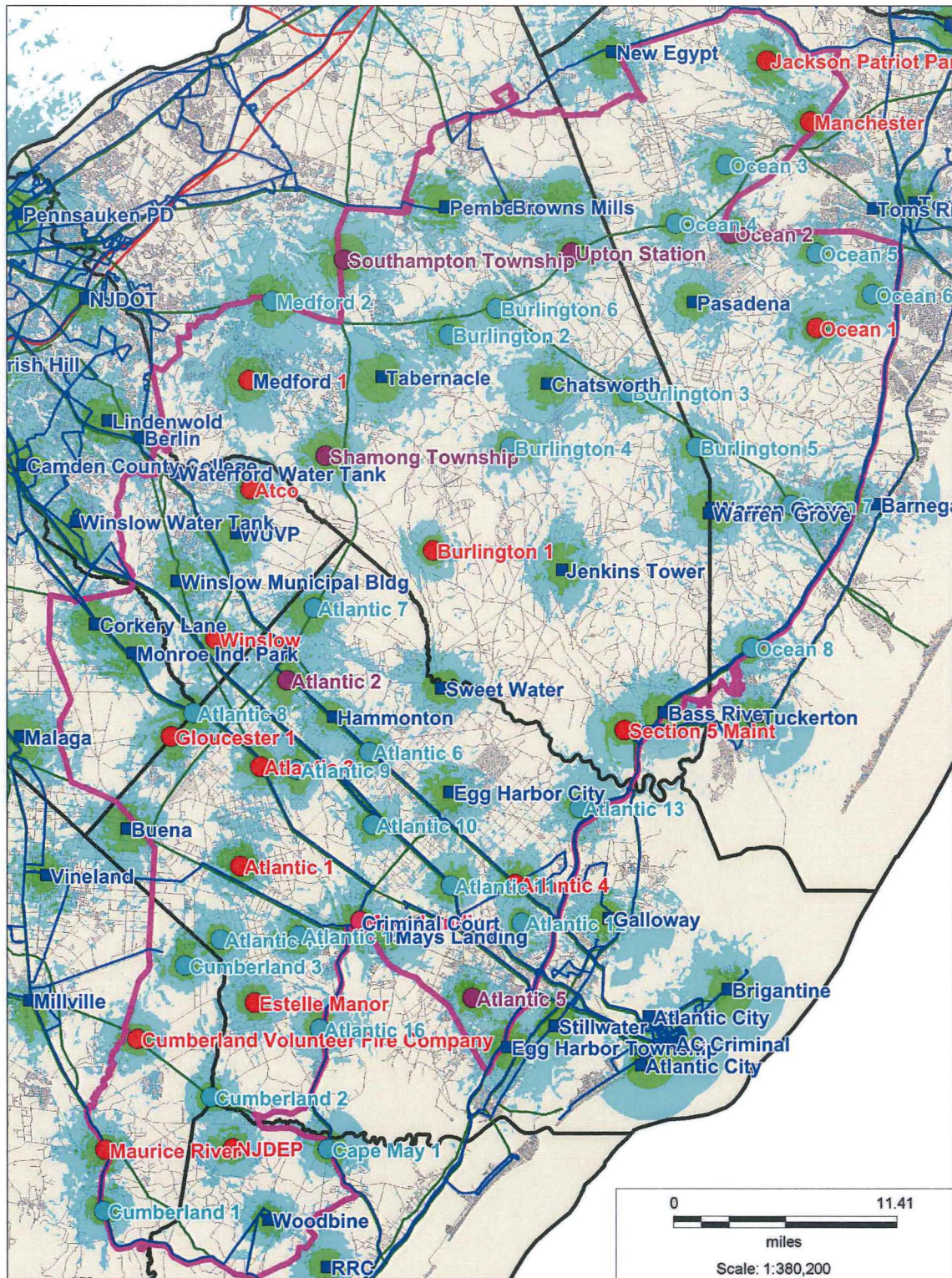
**Map 60 - Existing and Phase 1 and 2 Sites On-Street and In-Building
Coverage -Broadband**



Map 61 - Existing and Phase 1, 2 and 3 Sites On-Street Coverage – Broadband



Map 62 - Existing and Phase 1, 2 and 3 Sites On-Street and In-Building Coverage – Broadband



New Jersey State Police

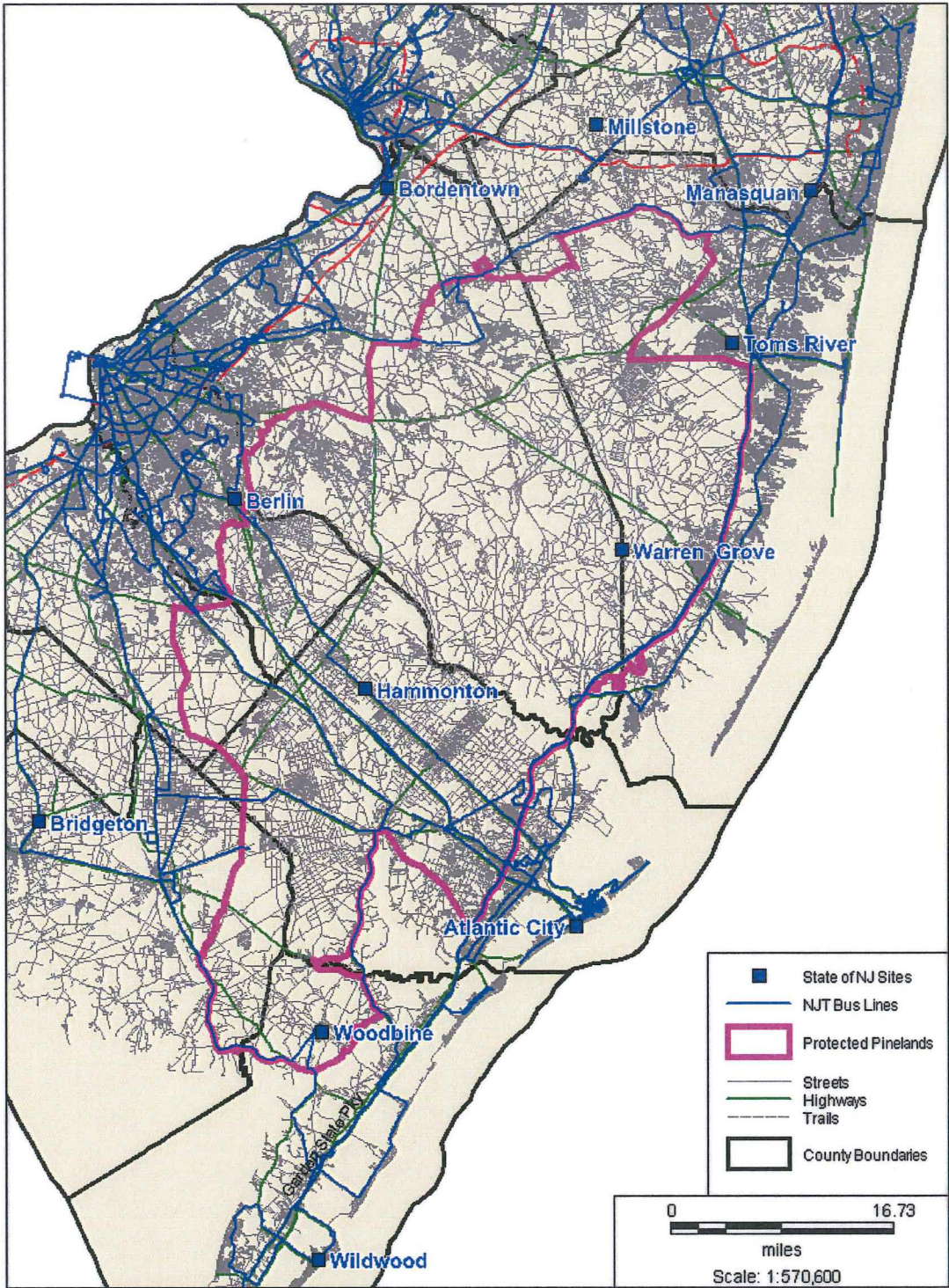
The New Jersey State Police is in the process of implementing a new 700 MHz Digital Trunked Radio system overlaying its existing 800 MHz Statewide Trunked Radio network. The focus of the State Police is to provide in-vehicle mobile coverage throughout the State. The existing tower locations identified below and on the attached map meet that requirement. The State Police is implementing redundant master controllers in Trenton that will allow the State Police to interconnect the new Digital Trunked system to the next generation Public Safety Trunked systems throughout the State. It appears that this will allow the State to expand their coverage footprint through “roaming” on other Public Safety systems. That being said, that State has stated that should it require additional towers to fill gaps in its service and should an existing or proposed tower fill those gaps, they would “piggy back” on that tower’s agency to co-locate.

The State of New Jersey has provided V-COMM with their existing sites for their new 700 MHz Digital Mobile Trunked System. Listed in the table 17 below are the sites within and just outside the Pinelands.

Table 17 – State of New Jersey Sites in and around Pinelands Area

Site No.	Site Name	Latitude (N)	Longitude (W)	Antenna Mount Height (feet)
1	Bordentown	40.1335833	74.71747222	270
2	Millstone	40.2000555	74.4247222	280
3	Toms River	39.9694444	74.2350000	190
4	Warren Grove	39.7491667	74.3908333	270
5	Berlin	39.8038889	74.9327778	280
6	Bridgeton	39.4602777	75.2077778	166
7	Atlantic City	39.3483333	74.4555556	298
8	Woodbine	39.2352777	74.8111111	200
9	Hammonton	39.6016667	74.7491667	180
10	Manasquan	40.1300000	74.1247222	150
11	Wildwood	38.99008333	74.81725	140

Figure 14 – State of New Jersey Sites in and adjacent to the Pinelands



New Jersey Transit

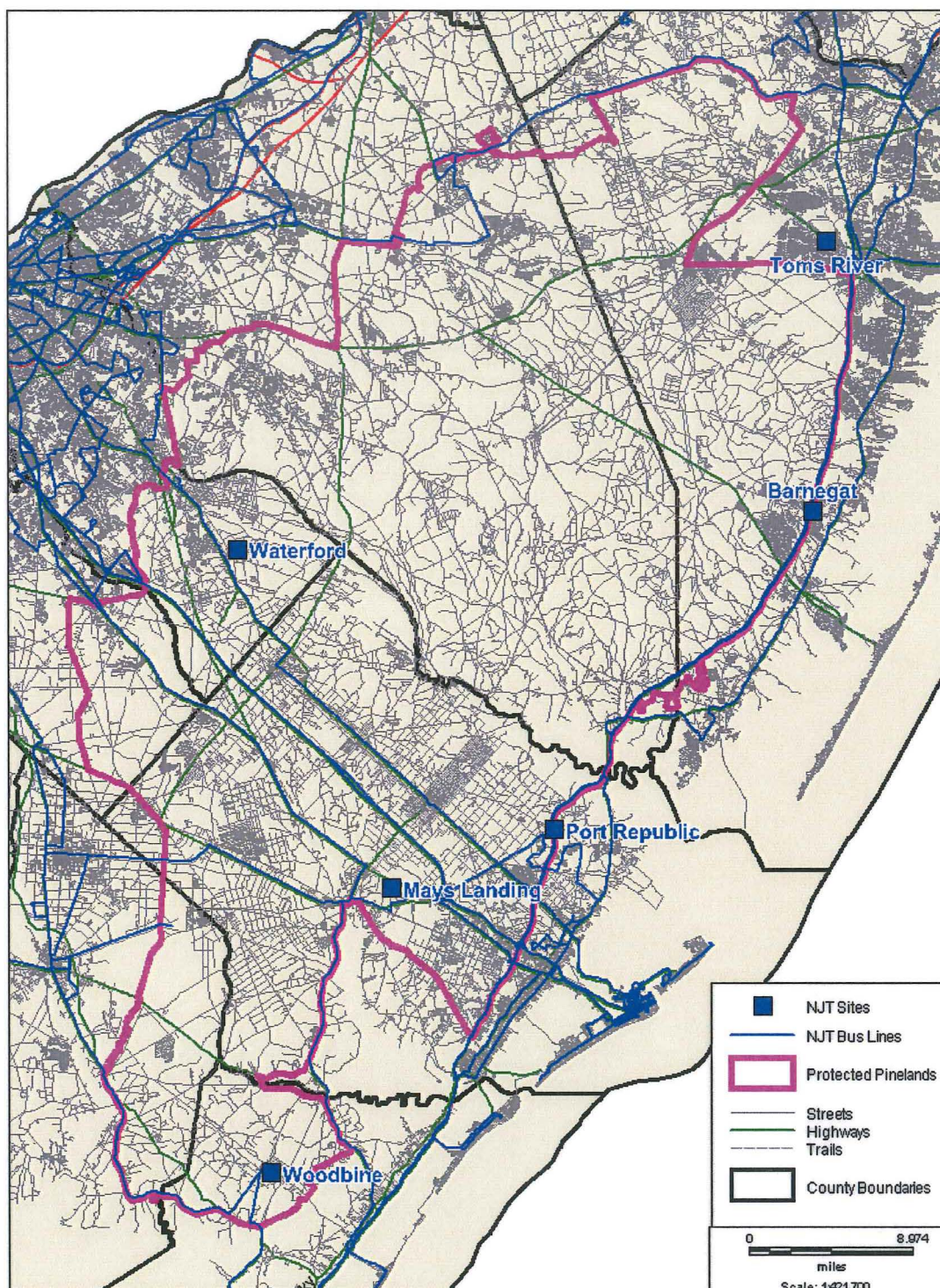
Representatives of V-COMM met with Andrew Schwartz and Ed Velez at New Jersey Transit's offices in Newark, NJ. We reviewed NJ Transits existing radio network and future coverage requirements along with a review of their bus and train routes throughout the State. NJ Transit is focused on providing mobile coverage to its buses and trains. The only train service in the Pinelands is the Atlantic City line which has sufficient coverage. The bus main transit corridors in the Pinelands area of the Garden State Parkway and Atlantic City Expressway also have sufficient coverage. NJ Transit's focus is then to fill in gaps in their mobile coverage to the bus routes that traverse the Pinelands and that should an existing or proposed tower fill those gaps, they would "piggy back" on that tower's agency to co-locate. NJ Transit is specifically interested in the proposed Jackson site location in Ocean County and the proposed Cumberland Volunteer Fire site in Cumberland County.

V-COMM has identified the New Jersey Transit existing sites for 700 MHz. Listed in the table 18 below are the sites within and just outside the Pinelands.

Table 18 – New Jersey Transit Sites in and around Pinelands Area

Site No.	Site Name	Latitude (N)	Longitude (W)	Structure Height (Feet)
1	Mays Landing	39.461111	74.685	268
2	Barneget	39.75777778	74.24972222	245
3	Woodbine	39.23527778	74.81083333	210
4	Port Republic	39.50725	74.51738889	192
5	Toms River	39.96955556	74.23458333	150
6	Waterford	39.72805556	74.84388889	822

Figure 15 - New Jersey Transit Sites in and adjacent to the Pinelands along with Bus and Rail Lines





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2540 US Highway 130, Suite 101, Cranbury, NJ 08512
P: (609) 655-1200 · F: (609) 409-1927

1730 Walton Road, Suite 100, Blue Bell, PA 19422
P: (610) 684-1000 · F: (610) 567-0150

November 3, 2011

Mr. Paul Tyshchenko, Esq.
Principal Planner
New Jersey Pinelands Commission
15 Springfield Road
New Lisbon, NJ 08064

**SUBJECT: AMENDMENT TO COMPREHENSIVE PUBLIC SAFETY TOWER PLAN FOR
PINELANDS**

Dear Paul:

Thank you for the opportunity to meet with you yesterday and discuss the open issues regarding the Public Safety Tower Plan. I believe our meeting was informative and extremely productive.

Per our discussion and upon your recommendation, we are amending the Plan as follows:

Please modify the center of the proposed site known as Atlantic 9, as listed in Table 1, to 39.578583 N, 74.782639 W. This will take the site out of the Agricultural Production area and closer to the Atlantic City Expressway. The requested height will remain 150 feet above ground level.

I believe this is the last remaining outstanding issue and that the Plan is now complete.

Thank you again for time and consideration. Please feel free to call me with any questions or concerns.

Respectfully submitted,

A handwritten signature in black ink that reads 'David K. Stern'. The signature is written in a cursive, flowing style.

David K. Stern
Vice President
V-COMM, L.L.C.

cc: Joe Picciano, NJOHSP
Craig Reiner, NJOIT
Joe Saiia, NJOIT
Marge DellaVecchia, Camden County
Dominic C. Villecco, V-COMM, L.L.C.