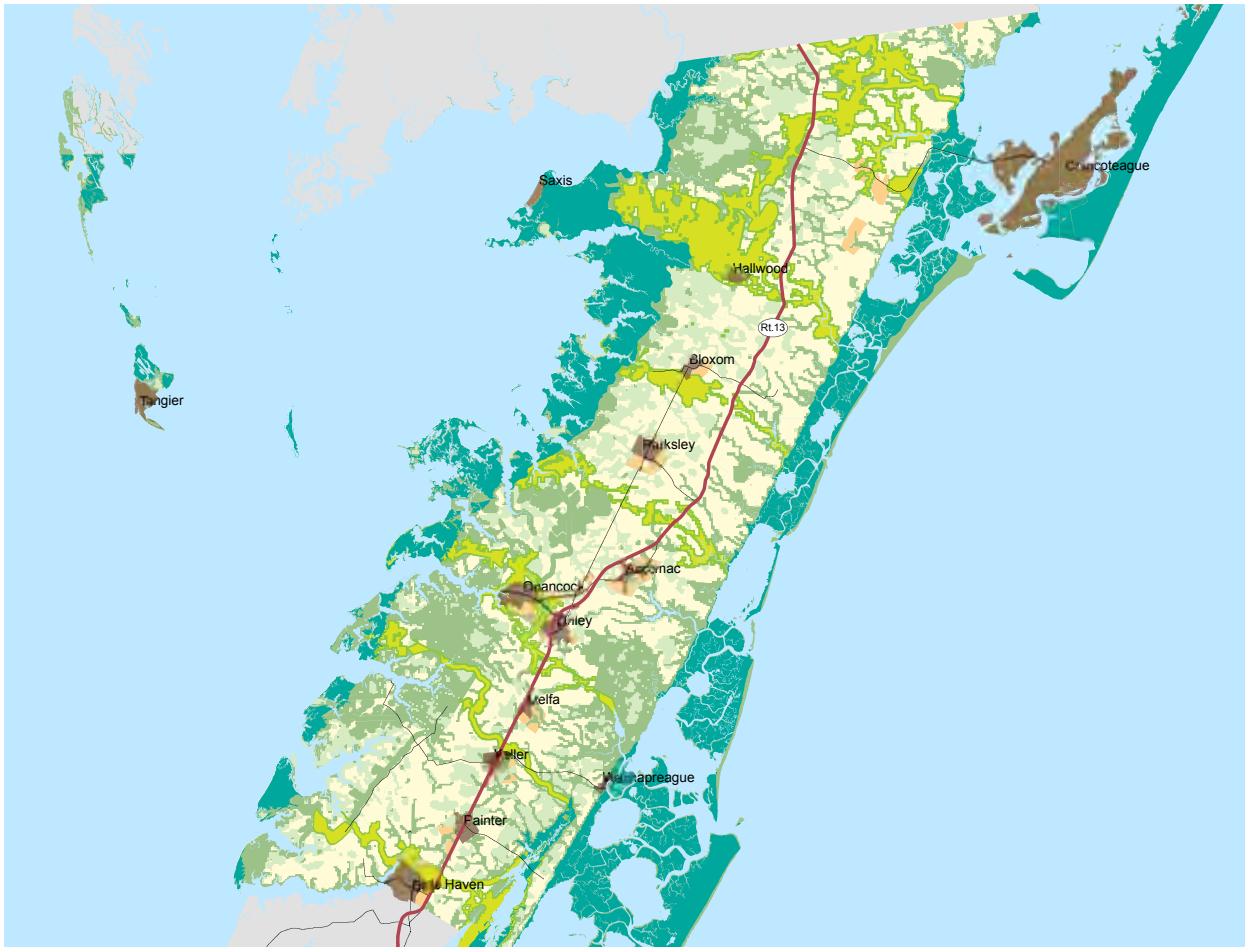
ACCOMACK COUNTY
BLUE / GREEN INFRASTRUCTURE STUDY



PLANNING FOR THE FUTURE

May 2010

ACKNOWLEDGEMENTS

The Accomack County Blue / Green Infrastructure Study has been made possible by the hard work, creativity and generosity of many individuals and organizations. Accomack County and the Green Infrastructure Center would like to thank the project's partners and participants, as well as the project's sponsors who have made the project possible. We wish to extend our thanks to the state agencies, scientists and organizations that have shared their time, data, models, technical support and expertise. Without the work of these dedicated organizations, our work would not be possible. Additional thanks are owed to the Accomack County Board of Supervisors, Planning Commission and Administrator's Office whose oversight guided this project from its inception to completion.

Additional digital copies of this project report may be obtained from the Green Infrastructure Center's project website at http://www.gicinc.org/accomack.htm. For more information on the project, please contact Accomack County's Director of Planning Jim McGowan at jmcgowan@co.accomack.va.us or GIC Executive Director Karen Firehock at firehock@gicinc.org.

Project Partners

Accomack County
Virginia Department of Conservation and Recreation, Division of Natural Heritage
Virginia Department of Forestry
Virginia Department of Game and Inland Fisheries
Virginia Commonwealth University

Project Sponsors

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Accomack County's assets include rich natural resources, scenic views, cultural and heritage resources, and working landscapes

I. INTRODUCTION

Background

In 2008, Accomack County contacted the Green Infrastructure Center (GIC) to indicate interest in developing a blue/green infrastructure study for the county. After discussions with county officials and staff, the GIC selected Accomack County as one of several field-test projects based on the following criteria:

- The project directly related to overarching goals in Accomack County's Comprehensive Plan and project findings would be available for the county's 2013 comprehensive plan update.
- Project outcomes could inform a variety of county planning activities and initiatives.
- County representatives, including department staff and elected officials, expressed significant interest in the project.
- Accomack County is home to some of Virginia's highest-value green infrastructure assets and its location allowed the GIC to explore green infrastructure planning in a coastal environment.

Following the selection process, the GIC raised funds to support the project from state and federal agencies and a private foundation. Accomack County's participation was funded by a grant from the Virginia Coastal Zone Management Program. Accomack County and the GIC undertook this cooperative, community-based project from spring 2009 through spring 2010. Project tasks included data collection, literature review, stakeholder interviews, asset mapping and opportunity mapping.

Project Purpose

The purpose of the study is to identify the county's key blue and green infrastructure assets and develop strategies for protecting the assets over time. These assets include critical forests, watersheds and wetlands, working lands (good agricultural soils, forests suitable for timber and wildlife management and fisheries in the Chesapeake Bay and Atlantic Ocean), and areas important for recreation, hunting and wildlife conservation. This information can be used to:

- guide the 2013 update of the county's comprehensive plan,
- inform planning initiatives such as strategic clustered development,
- highlight locations for future conservation, and
- identify areas where landowners and developers could work with the county to conserve land using tools such as easements or clustering or proffer land as part of rezoning requests.

The guiding principles of the project include:

1. Translate abundant available environmental resource data into meaningful green infrastructure information that can inform the County's planning activities.
2. Enhance Accomack County's green infrastructure planning capacities.
3. Ensure that the study's draft findings are shared with the Accomack County Board of Supervisors, Planning Commission, and the general public for review and feedback.
4. Institutionalize a process by which Accomack County can track county-related research and communicate on an ongoing basis with research organizations.

This report presents the outcomes from the Accomack County Blue/Green Infrastructure Study. The report provides an overview of the project's asset maps and focuses on key findings and potential opportunities and next steps for Accomack County and other interested partners. The study's findings are intended to inform ongoing county activities and initiatives as well as the county's 2013 comprehensive plan update.

The maps generated during this project provide an opportunity for the county to plan for and protect its high-value green infrastructure assets and guide development patterns that are compatible with maximizing ecological, economic and cultural returns from these assets over the long-term. When mapping land features across the county, features within incorporated towns were included since tree canopy, creeks, wetlands, dunes and other land features connect the towns to the larger landscape. Incorporated towns have their own land use regulation programs, and the findings of this report are not regulatory. Demonstrating these connections across the landscape can identify important areas for future cooperation.

Vegetated buffers along waterways, also known as riparian zones, are valuable corridors.

What Is Blue and Green Infrastructure?

Green infrastructure consists of the natural resources and working lands that provide the county's clean water and air, ensure residents' quality of life and sustain the county's economy.

Accomack County's blue/green infrastructure includes the connected natural systems and ecological processes that provide critical functions, such as rich soils for farming, habitat for wildlife, drinking water storage and filtration, and clean air. The county's green infrastructure also links to and supports historic and cultural resources which provide opportunities for hunting, hiking, horseback riding and bird watching. The county's blue infrastructure supports the rich fisheries economy, tourism and aquatic recreation opportunities.

Green infrastructure planning connects intact habitat areas (also known as intact landscapes or cores) through a network of corridors to allow people, wildlife and plants to move across the landscape (*see illustration at right*).

When a core is removed or a corridor is disrupted, connectivity is lost resulting in local species extinction (*see illustration, bottom right*). A connected landscape makes species less susceptible to extinction; by keeping habitats connected, animals, plants and pollinators can reach areas needed to survive and propagate. Disconnected habitats can threaten the survival of a species. If population numbers drop in one area and there are no connections to other areas, species can lose genetic diversity and face extinction. A connected landscape provides a more resilient ecosystem and is also important for human recreational activities, such as hunting or horseback riding.

Image credit: Dramstad, Wenche E., et al.

The results: better land use planning, protected green infrastructure and healthier communities.

Accomack County's Natural Assets

Accomack County is located on the Delmarva Peninsula between the Chesapeake Bay and the Atlantic Ocean inside the Coastal Plain physiographic region, which runs north to south along coastal Virginia. The county includes high quality fisheries, forests, wetlands, rivers, marshes, dunes and agricultural land. The county's total area is 1,310 square miles; thirty-five percent is land (455 square miles), and sixty-five percent is water (855 square miles).

The county has long-recognized the importance of its green infrastructure assets. In 2006, the county implemented a subdivision and zoning ordinance intended to manage urban growth and conserve rural lands. In 2009, the county added Village Residential and Rural Residential zoning districts in order to enable the conservation of open space and the location of residential units close to existing built infrastructure. These initiatives signify the county's commitment to conserving and capitalizing on the value of its existing green infrastructure features.

Given the significant portion of the county located adjacent to the Atlantic Ocean and the Chesapeake Bay, it is important for this study to identify the "blue" infrastructure assets of the County as well as to recognize the interaction and interdependence between the green and blue features of the county. For instance, the county's forested land improves the water quality of the creeks, streams, marshes and open waters of the county by filtering pollution out of the runoff from the land. So the forests provide an invaluable function for the county's blue infrastructure assets. This report will use the term "green infrastructure" to refer to *both* the green and blue assets of the county.

Accomack County's forests, creeks, streams, tidal marshes, open waters and open land provide **habitat** that supports a wide range species, including threatened species such as the Delmarva Fox Squirrel, common wildlife such as deer and Canada geese, as well as humans. County habitat plays a critical role in supporting migratory birds and resident species. This rich natural resource base is what makes the county so distinctive.

The county's **riparian corridors** tend to run east or west from the central spine of the county, providing a network of streams and creeks. These corridors often support a forested landscape that follows the streams and connects the central areas of the county with the open waters of the Chesapeake and the Atlantic.

Accomack County's **working lands** include fisheries, forests and agriculture. These lands support the economic vitality of the county by providing jobs and products for export, including crabs, clams, fish, timber, poultry and farm crops.

The **recreational** assets of Accomack County include areas that support land and water-based activities. Bike routes encourage residents and tourists to tour the county's scenic roads. Birding trails invite bird watchers to observe native species in their natural environments. Numerous boat launches provide access to the open water by canoe, kayak and motorized boat. The water trail on the Seaside, where the county's land mass meets the Atlantic, is a unique recreational feature.

Accomack County's **culture and heritage** are closely tied to the county's natural resources. The county's culture includes a rich Native American heritage, which is reflected in the names of towns and roads across the county. It is also closely tied to near shore environment; artisans produce wood carvings and other works of art based on the wildlife and habitat that flourish in the county.

The resources described above, the county's working landscapes and waterways, habitat, cultural history and heritage, and recreational opportunities make Accomack County a wonderful place to live, work and play. The field test project for Accomack County was designed to identify and map the county's high-quality green infrastructure assets to help the county ensure that these resources are well-utilized and maintained over time.

The official motto of the Eastern Shore is, appropriately, "You'll love our nature!" The findings provided in this report can help conserve Accomack's natural resources that support this motto.

Community Goals

Community Engagement

Accomack County and the GIC recognized the importance of local knowledge to inform planning decisions. The GIC conducted numerous field visits in the county and conducted detailed interviews with residents, business owners, community organizations, county staff and elected officials. Key stakeholder considerations gathered during these interviews include the importance of:

- Development patterns and infrastructure demands
- Water quality and wastewater management
- Conserving natural resources and wildlife
- Access to recreation

Draft findings from the project were shared with the community at the Heritage Celebration at Eastern Shore Community College in February 2010 and two public meetings in March 2010. Participants reviewed the asset maps and drew their favorite places and areas they thought were important to conserve on a map of the county. This information was digitized and is presented in Figure 1.

The GIC also presented draft findings from the asset maps and opportunity maps to the Board of Supervisors and Planning Commission at a joint session on March 10, 2010. Feedback was incorporated into the final maps presented in this report.

Accomack County Comprehensive Plan Objectives Relating to Green Infrastructure

- "Achieve safe, efficient development, compatible with Accomack County's traditional land use pattern and resource constraints by directing development towards existing population centers."
- "Conserve unique and environmentally sensitive areas for open space, recreation and habitat protection."
- "Recognize and protect the county's rural character, including historic resources and the character of villages and towns."
- "Conserve groundwater quality and quantity."
- "Protect high quality surface waters and restore degraded surface water to an excellent level of purity for aquaculture and shellfish harvesting."
- "Achieve thriving and growing seafood, agricultural and forestry industries."
- "Achieve safe and efficient provision of community services including recreational facilities and solid waste collection and disposal."

Accomack County Strategic Plan Goals Relating to Green Infrastructure

- "The rural character, natural resources and beauty of the County will be conserved."
- "Growth and development in the County will be well managed."

Accomack County Blue/Green Infrastructure Study display at the Heritage Celebration

Viewing rocket launches is an area attraction.

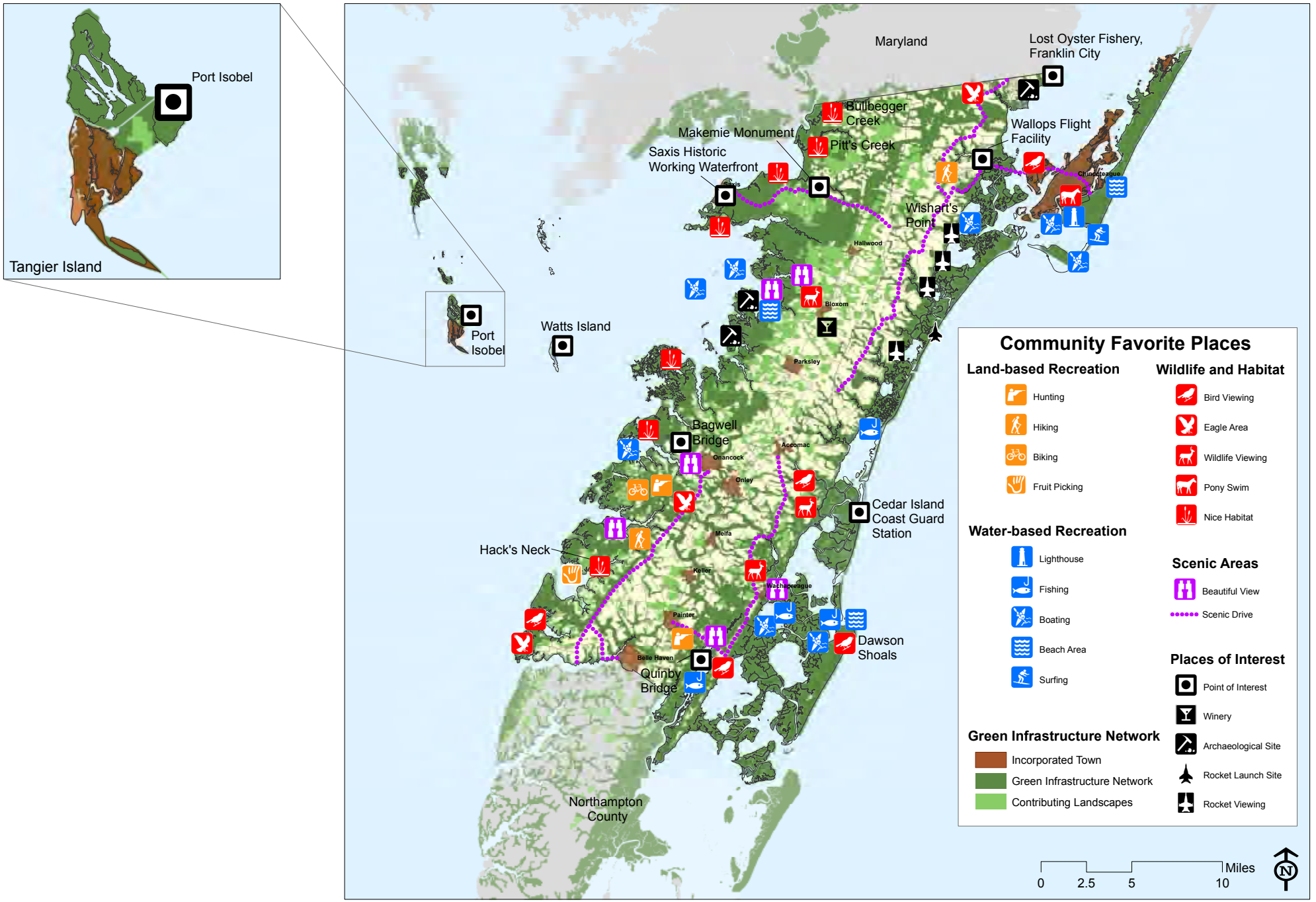


Figure 1: Community Favorite Places

Connected riparian systems are an important asset for wildlife and recreation.

Project display at Heritage Celebration, 2010.

Protecting large forested areas is important for the survival of the Delmarva Fox Squirrel.

II. RESEARCH, DATA & ANALYSIS

Review of Scientific Research

Accomack County's abundant and unique natural resources make it one of the most-studied regions in the state. While countless scientific studies have been conducted in the county, to date there has been no comprehensive review of this literature and its implications for contemporary public policy decisions. The GIC partnered with the University of Virginia to conduct a literature review to identify science-based recommendations that may inform land use planning in Accomack County. The literature review covered 120 studies and is available for download from the project website: http://www.gicinc.org/accomack.htm.

Recommendations identified in the scientific literature that have potential to inform land use planning include:

- Increase the connectivity of riparian systems.
- Protect the continuity of coastal habitats.
- Rebuild coastal habitats lost to erosion and inundation.
- Protect groundwater recharge zone.
- Enhance dunes for shoreline protection and habitat expansion.

As part of the literature review, the project team also created a database of studies, which was given to Accomack County. County staff are now able to reference the database and update it as new studies are conducted. This living document will enable staff to easily summarize and manage the information and recommendations identified by ongoing studies and projects in Accomack County. We encourage the many federal and state agencies, universities and individual researchers conducting research in the county to share new data and recommendations with the county on an ongoing basis.

Mapping Analysis Process

The project team worked through three phases of information gathering and analysis in order to develop asset maps, opportunity maps and key strategies for the county's consideration. The project team coordinated closely with county staff and elected officials during each phase.

Data Collection

In the project's opening phase, the project team focused on data collection and research. Data were gathered from field visits and interviews, county sources, state and federal agencies and other organizations. Primary data sources for the maps included:

- The Accomack County Comprehensive Plan,
- The Virginia Natural Landscape Assessment (VaNLA), developed by the Division of Natural Heritage in the Virginia Department of Conservation and Recreation (DCR), and
- The Priority Conservation Areas (PCA), developed jointly by DCR-Natural Heritage, Virginia Department of Game and Inland Fisheries (DGIF), and Virginia Commonwealth University – Center for Environmental Studies (VCU-CES).

Primary data sources for the literature review included literature published in peer-reviewed journals (44%), studies published by government agencies (34%), and works published by non-governmental organizations or by academic research institutions with funding from government agencies (22%). The table in Appendix A provides a detailed summary of the project's spatial resources. A list of the approximately 120 studies reviewed during the literature review can be obtained from the Planning Department or from the project website: http://www.gicinc.org/accomack.htm.

Asset Maps

In the project's second phase, the project team used the spatial data to identify the green infrastructure network as well as a number of visual layers, or "themes," that could be mapped using geographic information systems (GIS). These GIS layers provide a way to visualize, analyze and display spatial information, enabling the project team to identify and map Accomack County's green infrastructure assets.

The asset map themes are discussed in detail in the Mapping Accomack County's Assets section of the report and include:

- Habitat and Wildlife Conservation
- Water Quality
- Working Lands: Agriculture, Forestry and Working Waters
- Nature-Based Recreation
- Culture and Heritage

Risks and Opportunities

In the project's third phase, the project team used the Accomack County asset maps to conduct a risk and opportunity assessment. The risk assessment identified green infrastructure assets in the county that might be at risk due to changing land uses, development pressures or other factors. Maps produced include:

- Future Land Use
- Groundwater Recharge and Wellhead Protection

During the opportunity assessment, the project team analyzed both the asset maps and the risk maps to identify potential opportunities and strategies that the county could take to conserve, enhance and restore its green infrastructure assets. Strategies included identification of:

- *Riparian Rungs* (riparian areas running east to west)
- *Coastal Corridors* (habitats along the bay and ocean running north to south)
- *Recharge Windows* (area located along the central spine of the county where the rainfall recharges the deep aquifer)

Finally, the project team examined the impact of clustered development on green infrastructure through several development scenarios. These strategies and accompanying opportunity maps can help Accomack County maximize the economic, ecological and cultural returns from its green infrastructure assets over the long term.

Developing the Green Infrastructure Network

The primary data sources used for creating the green infrastructure network were the Virginia Natural Landscape Assessment (VaNLA) and the Priority Conservation Areas (PCA). The network was identified by analyzing data from both the VaNLA and the PCA and combining highest-value areas from both sources.

The Virginia Natural Heritage Program in the Department of Conservation and Recreation (DCR) has developed the VaNLA for identifying, prioritizing and linking intact habitats in Virginia (Figure 2). These intact habitat areas, or cores, are assigned an Ecological Integrity Score from 1 to 5, with 1 representing the highest priority lands. In general, higher scores are given to areas that are more biologically diverse, part of a larger complex of natural lands, and contribute to water quality enhancement. The VaNLA also identifies landscape corridors that provide linkages between these cores (Figure 3). The VaNLA was developed using year 2000 land cover data.

The PCA (Figure 4) was developed jointly by DCR, Virginia Department of Game and Inland Fisheries (DGIF), and Virginia Commonwealth University – Center for Environmental Studies (VCU-CES). Each entity developed a dataset representing "lands and surface waters identified as important for conservation of Virginia's wildlife, plants, and natural communities" (DGIF, 2009).[1] See Appendix A for a description of each dataset.

These datasets were then combined to create the PCA, or prioritized "areas for preservation, protection or specific management action" (DGIF, 2009). VCU-CES compiled the priorities from all three entities using GIS, such that at any given point on the landscape, the highest of all conservation values assigned to that area by the project partners was assigned to be the prioritization rank for that area. The final PCA is a dataset with cell values from 1-5 representing moderate conservation opportunities (1) up through imperative conservation opportunities (5). PCA data and maps are available for areas within Virginia's coastal zone, including Accomack County.

[1] Virginia Department of Game and Inland Fisheries. 16 November 2009. *Sustainable Communities: Assessment of Priority Conservation Areas and their Vulnerability to Development.* Report produced in partnership with Virginia Department of Conservation and Recreation - Division of Natural Heritage and Virginia Commonwealth University - Center for Environmental Studies through a grant from the Virginia Coastal Zone Management Program.

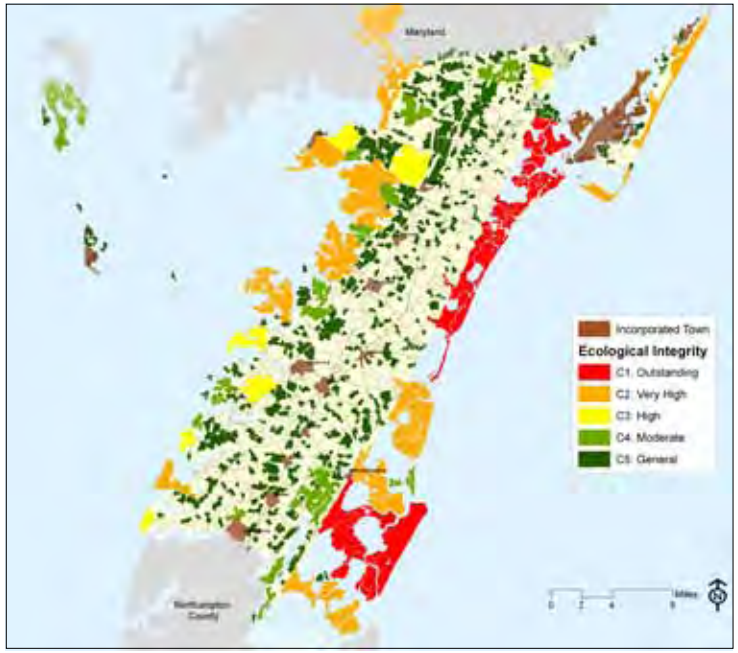


Figure 2: Virginia Natural Landscape Assessment (VaNLA)

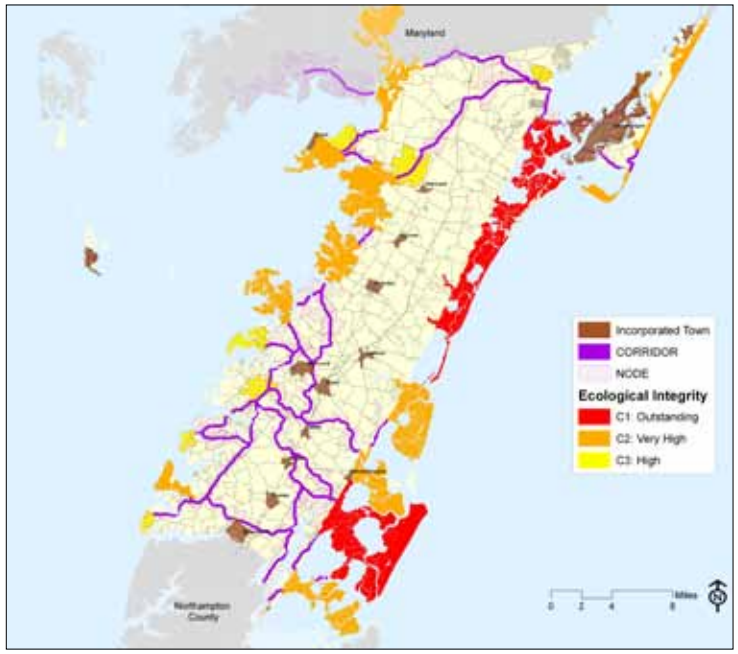


Figure 3: VaNLA demonstrating high value connected landscapes

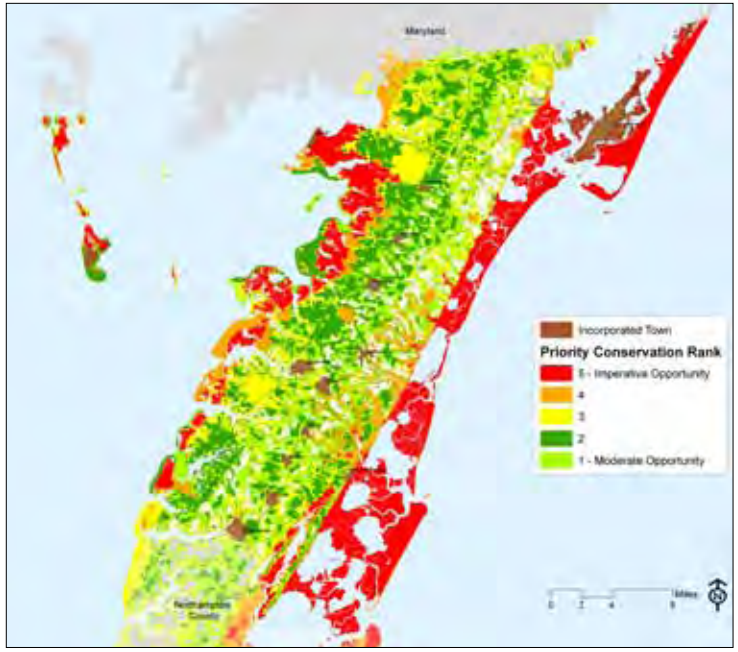


Figure 4: Priority Conservation Areas

Developing the Green Infrastructure Base Map

High Priority Conservation Areas (PCA)	+	Connected, High Quality Landscapes (VaNLA)	+	Contributing Landscapes (local priorities & study data)	=	**Green Infrastructure Base Map**

III. ACCOMACK COUNTY'S GREEN INFRASTRUCTURE NETWORK (connected, large, intact natural lands)

Green Infrastructure Base Map

The project team's first mapping task was to identify Accomack County's green infrastructure network – the connected, large intact landscapes with the highest ecological value. Figure 5 presents Accomack County's green infrastructure network as well as the supporting landscape, which supports the green infrastructure network by providing connections between high-value green infrastructure areas. The map also shows the location of the incorporated towns in Accomack County. Although incorporated towns have their own land use regulations, demonstrating the areas of connection for the green infrastructure that is within and across town boundaries – based on tree canopy, creeks, wetlands, dunes and other land features – indicates important areas for future cooperation between Accomack County and the towns.

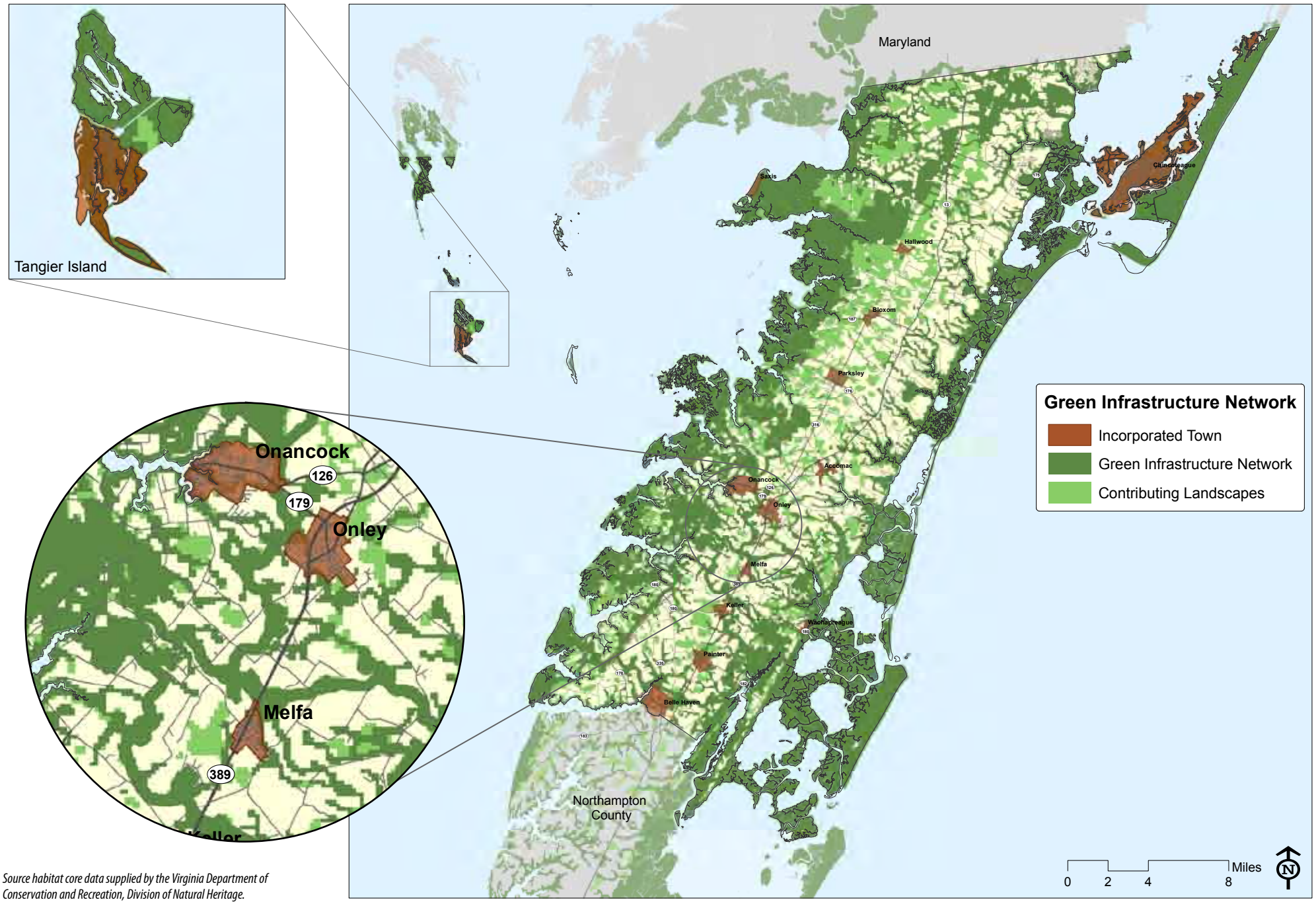
The natural asset network shown on the map consists of the intact landscapes and corridors that provide critical functions such as rich soils for farming, healthy waters for fisheries, habitat for wildlife, drinking water storage and filtration, and clean air. Intact landscapes, also known as cores, are land areas 100 acres or greater in size that are needed to provide adequate space for key ecological functions. Corridors are land and water resources of sufficient width – typically about 1,000 feet – that maintain connections between key habitat areas, allowing species to travel back and forth.

Maintaining intact natural landscapes is essential for ensuring basic ecosystem services in Accomack County. Fragmentation of these areas through non-strategic development not only results in the loss of habitat and natural corridors, but also the degradation of important ecosystem functions that provide the county with ecological services such as clean air and water and economic services such as viewsheds and recreation activities that support tourism and outdoor recreation for residents.

In Accomack's distinctive shore-influenced environment, it is also essential to consider the interaction of the coastal zones and fisheries with the land-based green infrastructure network. Maintaining adequate intact landscapes can help regulate the quality of water runoff into the Chesapeake and Atlantic as well as provide a buffer against the impact of storms.

Observations

- These maps illustrate that Accomack County has a rich, extensive green infrastructure network.
- Accomack County has intact natural resources that provide significant economic, ecological and cultural benefits.
- Corridors across the county often follow the streams, and not all of these have the recommended 1,000-foot width that provides wildlife with a high-quality connector between cores.
- Fragmentation from land clearing is one of the biggest threats to the county's high-value assets.
- Due to the county's low elevation, drainage can be a significant problem. Ensuring good vegetative land cover is an important tool for preventing excessive stormwater runoff.



Source habitat core data supplied by the Virginia Department of Conservation and Recreation, Division of Natural Heritage.

Figure 5:Green Infrastructure Network

Landscape Zones

Based on the literature review, three landscape zones were identified within the county: Seaside, Bayside and Terrestrial (Figure 6). Both the Seaside and Bayside zones include water and land influenced by inundation. The Terrestrial zone includes land running down the central spine of the county. To spatially identify the Bayside and Seaside zones, the team used storm surge zones as identified by the National Oceanic and Atmospheric Administration (NOAA) for category one and two storms. This data served as a proxy for identifying areas of land that could be influenced by water. These coastal areas along the Bayside and Seaside zones are important habitat for fisheries and migratory birds while also providing key recreation opportunities for residents and tourists.

Observations

- High-value ecological assets are linked across the county. The Seaside and Bayside zones are rich in cores that connect north to south, and the Terrestrial zone is rich in corridors that connect the cores east to west.
- Green infrastructure assets that provide natural habitat also support recreational activities in the Seaside and Bayside zones.

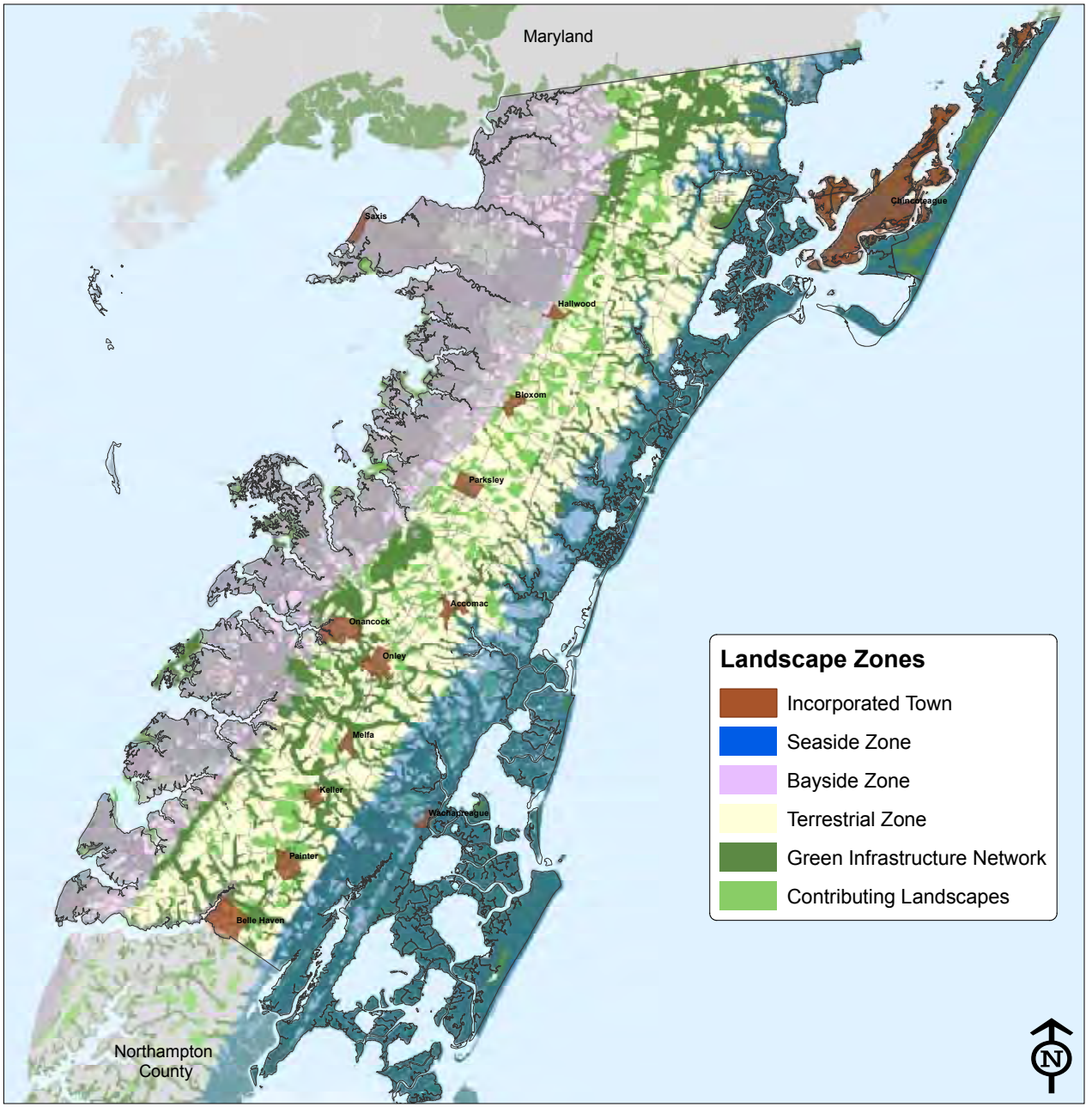


Figure 6: Landscape Zones

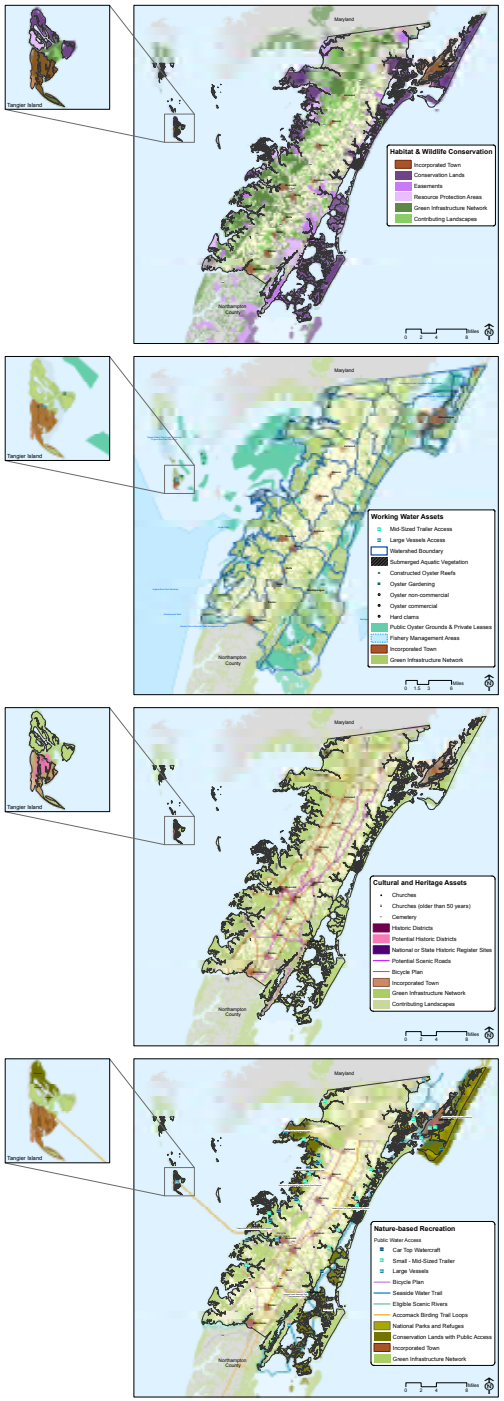
IV. ASSET MAP OVERLAYS

This section of the report presents the green infrastructure asset maps created for the Accomack County Blue/Green Infrastructure Project. These maps provide a comprehensive overview of the relationship between the green infrastructure network (see Figure 5) and significant aspects of the landscape by "theme," including:

- Habitat and Wildlife Conservation
- Water Quality and Groundwater Recharge
- Working Lands: Agriculture, Forestry and Working Waters
- Nature-Based Recreation
- Culture and Heritage

These maps are designed to inform current county activities and initiatives, as well as the county's existing Comprehensive Plan and upcoming Comprehensive Plan update in 2013. By inventorying its assets, Accomack County can plan for economic development alongside social and environmental priorities in a way that provides the community the greatest possible return now and in the future. The county's assets are the natural, cultural and historic landscapes that make it such as special place to live, work and visit. Managing and enhancing these assets can help ensure that the county maintains its distinct character over time.

All the maps in this section of the report include an inset of Tangier Island and of the central area of the county in order to provide a closer-scale look at the green infrastructure and landscape themes.



HABITAT AND WILDLIFE CONSERVATION

Overview

The Habitat and Wildlife Conservation Map (Figure 7) identifies priority habitat and wildlife conservation areas. Accomack County is home to threatened species such as the Delmarva Fox Squirrel and the Black Skimmer as well as common wildlife such as white-tailed deer and Canada geese. It is also located within the Atlantic Flyway for birds that migrate up and down the east coast, such as the Piping Plover.

This map identifies Accomack County's high-priority habitat and wildlife assets by level of protection. Conservation lands, largely located along the barrier islands and the shoreline, are owned by public or non-governmental organizations. Properties with easements, lands where development rights have been relinquished in perpetuity, may still be privately owned but cannot be further developed. Resource Protection Areas (RPA) are lands identified by Accomack County as having intrinsic value for protection of the water quality of the Chesapeake Bay and the Atlantic Ocean; these areas are classified as undevelopable land by the county. Areas with little protection from development might present opportunities for conservation or for development that is planned carefully to avoid sensitive areas and retain habitat connections.

Observations

- Protected areas tend to be located in the Bayside and Seaside zones.
- Understanding what is already protected or least likely to change can help identify areas that require special attention or targeted conservation activities.

Existing habitat protection efforts

Shoreline zones are important resources for wildlife and people.

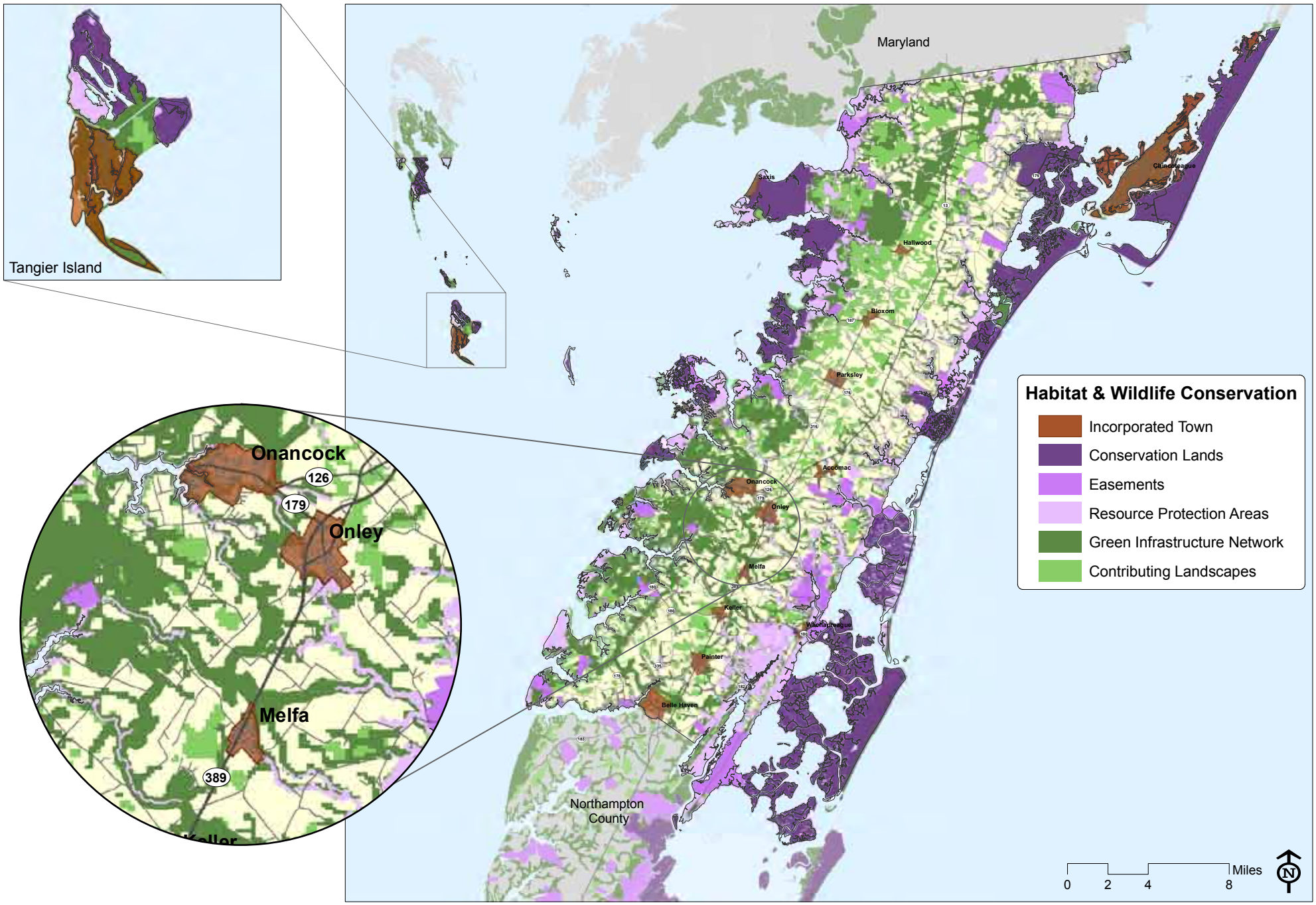


Figure 7: Habitat and Conservation Overlay

WATER QUALITY

Overview

The Water Quality Map (Figure 8) identifies Accomack County's extensive water resources, including streams that run from the center of the county and empty into the Chesapeake, Atlantic and tidal wetlands. The county's water resources supply drinking water for residents and wildlife, provide habitat for fish, amphibians, birds and insects, and are a significant component of the county's history and heritage. Open-water-based assets are shown on the Working Waters Map (Figure 11).

The map shows the county's forest cover, which helps protect water quality, in pale green. Forested wildlife corridors – 100-feet or more on both sides of a stream – are shown in dark green; these areas not only facilitate movement of wildlife but also filter runoff and mitigate erosion. Watershed boundaries, delineating an area of land that drains to a particular body of water, show how water moves from the spine of the county out towards the Chesapeake and Atlantic. Community wells, shown as purple triangles, serve 20 or more homes.

Observations

- The Water Quality Map illustrates that while many of the county's streams are forested, not all streams have 100-foot forest buffers along both sides.
- Several streams have their headwaters in developed areas, indicating the importance of best management practices to reduce polluted runoff.
- Community wells tend to be clustered in areas of development; most are located in the vicinity of Route 13.
- Tidal wetlands located along the coasts provide unique habitat areas where the land meets the Chesapeake and the Atlantic.

Vegetated stream buffers are important county-wide assets

Water quality is important for people and terrestrial and aquatic species

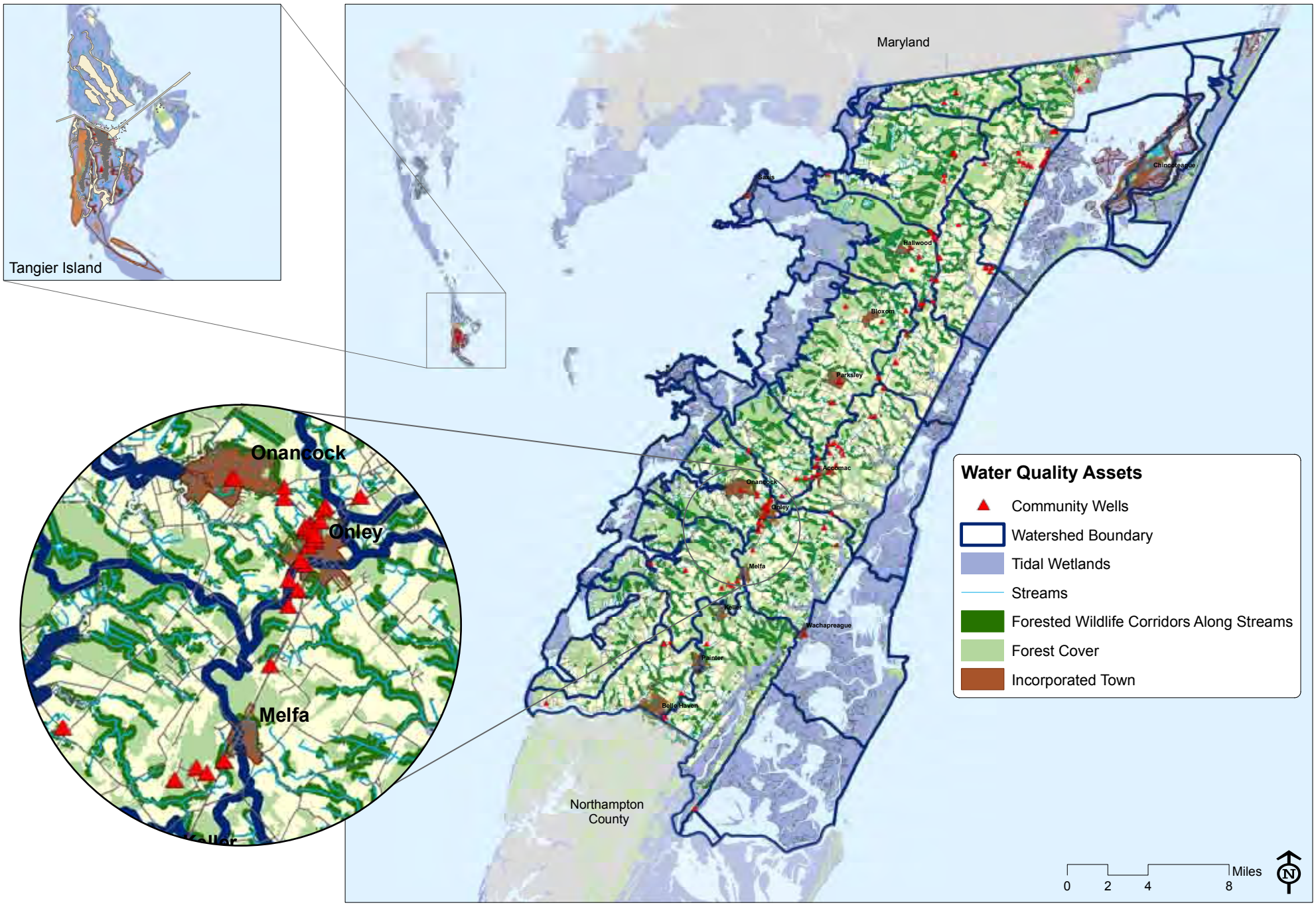


Figure 8: Water Quality Overlay

WORKING LANDS - AGRICULTURE

Overview

Accomack County's agricultural assets include prime soils for agriculture and existing Agricultural and Forestal Districts (AFDs). Prime soils for agriculture may also be prime soils for development, and competing interests may vie for use of these lands. Accomack County protects some of its forest and farm lands in AFDs. AFDs are rural zones reserved for the production of agricultural products and timber and the maintenance of open land as an important economic and environmental resource. The county's AFDs are designated for four-year terms.

The Agricultural Assets Map (Figure 9) highlights the location of prime agricultural soils in Accomack County in light orange. Existing AFDs are shown in a darker orange.

Areas with prime soil for growing crops are a key agricultural resource.

Observations

- The map shows that prime agricultural soils are located across the county.
- While prime agricultural soils are located county-wide, not all of these areas are in agricultural use.
- Some areas with prime agricultural soils may be planned for development (see the Future Land Use Map on p. 33).
- Existing AFDs do not provide permanent protection from development; the district designation must be renewed every four years.

Agricultural products are a key component of the county's economy.

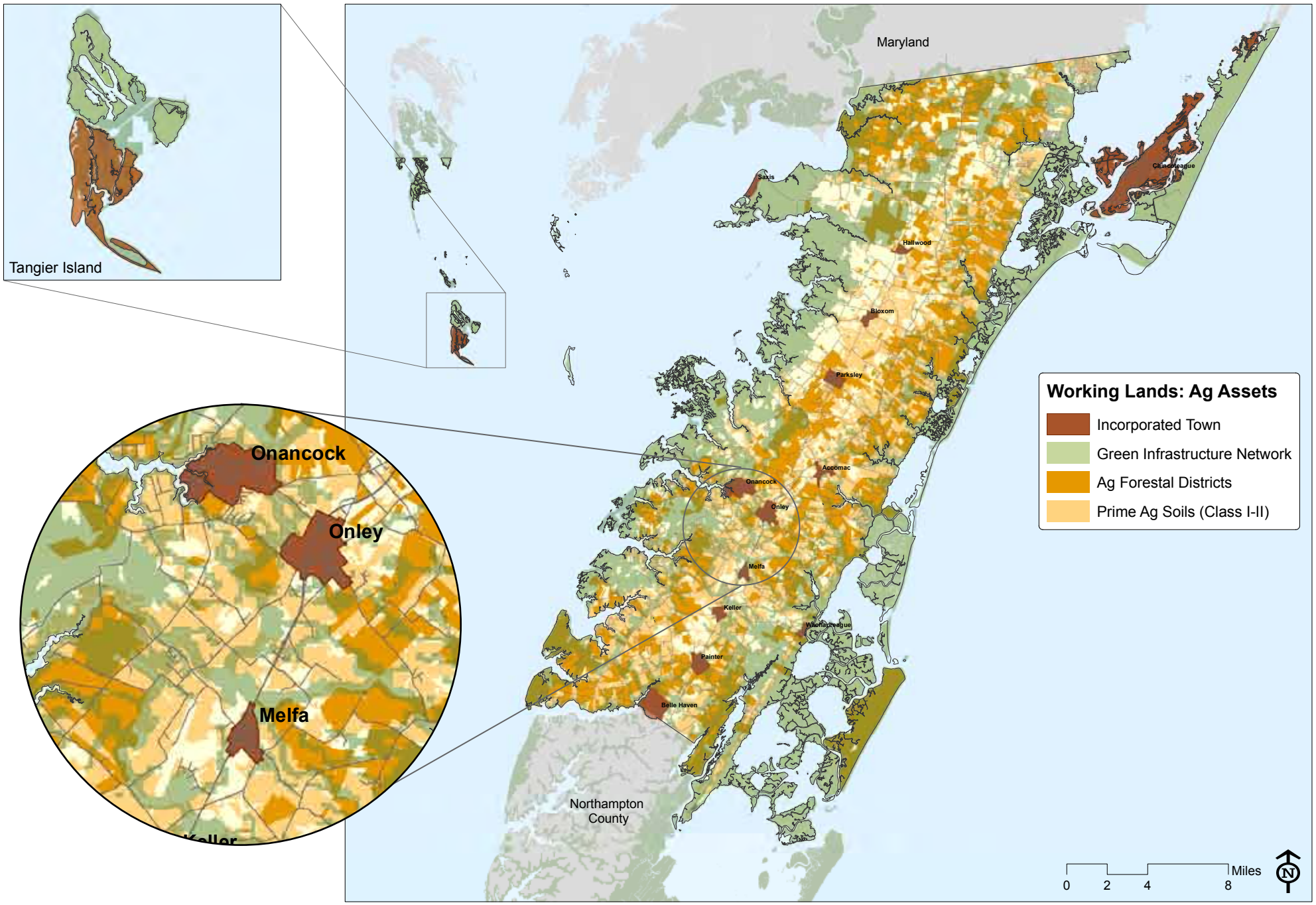


Figure 9: Working Lands - Agriculture Overlay

WORKING LANDS - FORESTRY

Overview

Accomack County has significant forest land across the county. Larger patches of forest on the coasts are connected by forested corridors that stretch across the central part of the county. The county's forests provide multiple economic and environmental benefits, including absorbing and cleaning pollutants from land runoff, reducing flooding that can damage homes and property, sequestering carbon and other pollutants that contribute to climate change, and providing wildlife habitat, recreational lands and an aesthetic value enjoyed by residents and visitors.

The Forestry Map, Figure 10, shows the large forested parcels that are located within the green infrastructure network. The Department of Forestry office located in Accomack indicated that parcels of 60 acres or larger are suitable for sustainable timber management; to manage for both wildlife and timber, DCR recommends 100-acres as a minimum acreage. While small parcels can fragment the forest into many owners, larger parcels create contiguous forest blocks that may be profitably managed and harvested.

During the course of this project, the project team worked with the Department of Forestry to catalogue all parcels which have existing forest stewardship plans. This data was shared with Accomack County, and the county has completed a GIS layer of managed parcels that can be updated as new stewardship plans are put in place. This data will help the county identify which parcels within the green infrastructure network currently have plans and can help the Department of Forestry strategically target parcels which may not have management plans yet and are within the priority green infrastructure network. This will ensure that key green infrastructure areas with active forestry are also well managed.

Observations

- Although much of the county is forested, small parcel sizes mean that much of the forested land is not suitable for long-term forest management.
- Development of smaller parcels can fragment a forest and degrade its quality as a habitat core.
- The largest parcels of land that can be managed for both timber and wildlife diversity tend to be located on the western and northern sides of the county near the Chesapeake.
- Sustainable timber management is one of the tools that can help sustain a local working lands economy while also protecting natural resources over the long term.

Forest Fragmentation

Small parcels fragment forest into many owners

Large parcels create contiguous forest blocks

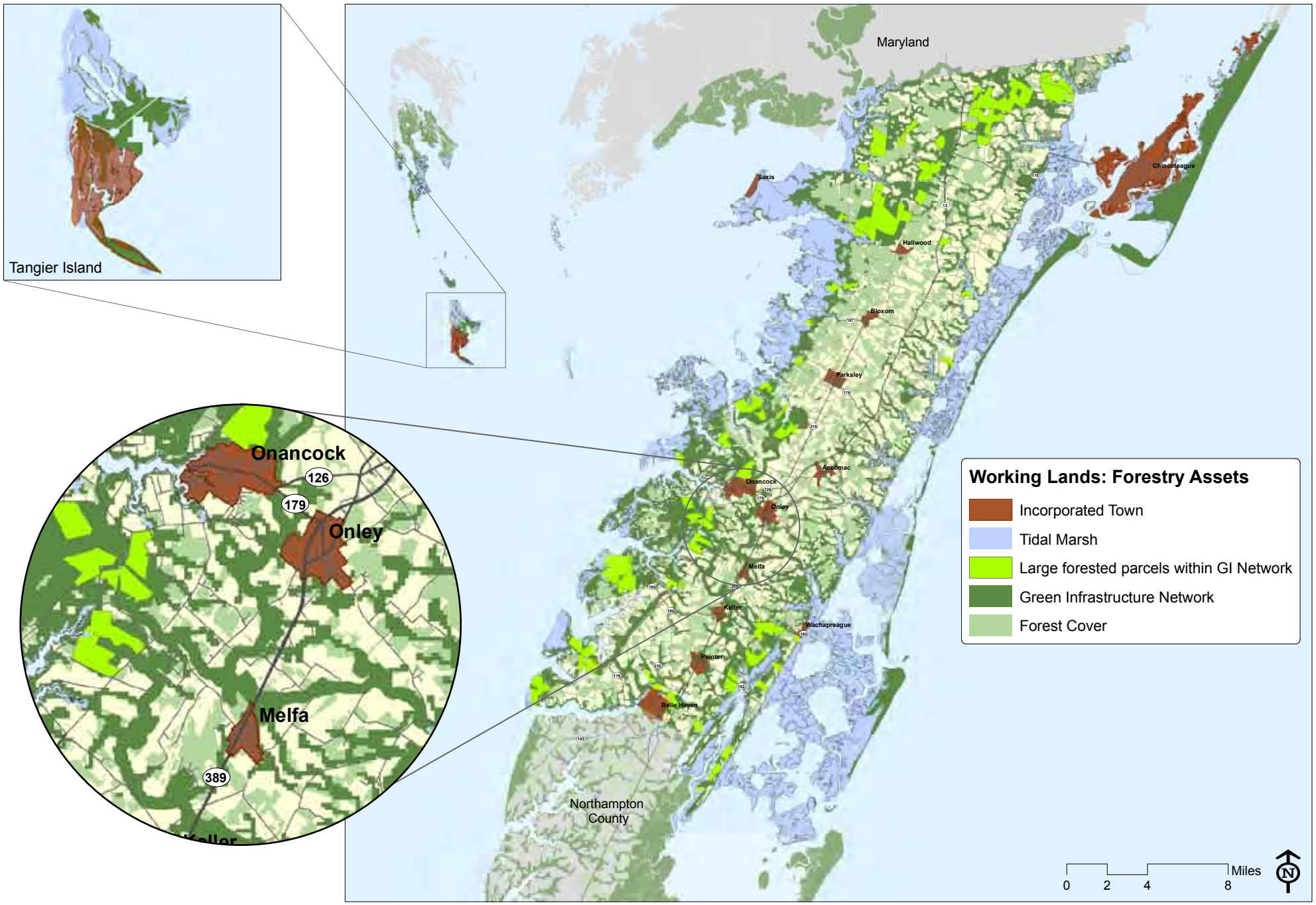


Figure 10: Working Lands - Forestry Overlay

WORKING WATERS

Overview

Working waters are an economic driver for Accomack County and are culturally and historically significant. Working water assets support local fishery and recreation economies. They also provide inspiration for many of the county's artisans who create art based on the wildlife supported by the Chesapeake Bay and the Atlantic.

The Working Water Map (Figure 11) shows the known locations for fishery management areas as well as public oyster grounds and private leases. Various types of oyster reefs and oyster gardens - floats or cages used to grow oysters until they are mature enough to be planted on the reefs - are represented as points on the map. Submerged aquatic vegetation (SAV) beds, or underwater bay grasses, are located in the Chesapeake near Tangier and are an important indicator of Bay health. Watershed boundaries are shown on the map in dark blue and illustrate the interaction between runoff from the creeks and the Bayside and Seaside habitat areas. Public boat access locations are also indicated on the map, including those for mid-sized trailer access and those for large vessel access.

Working water assets support local fishery and recreation economies.

Healthy waters support the local fishery economy.

Observations

- Locations for oysters and clams were identified from state data. It is likely that a number of additional locations exist in the county.
- There is a direct connection between the health of Accomack County's blue and green infrastructure; the green infrastructure network on land contributes to the health of creek systems. Healthy creek systems support the estuaries by providing cool, clear freshwater and food to these nurseries for young crabs and fish.

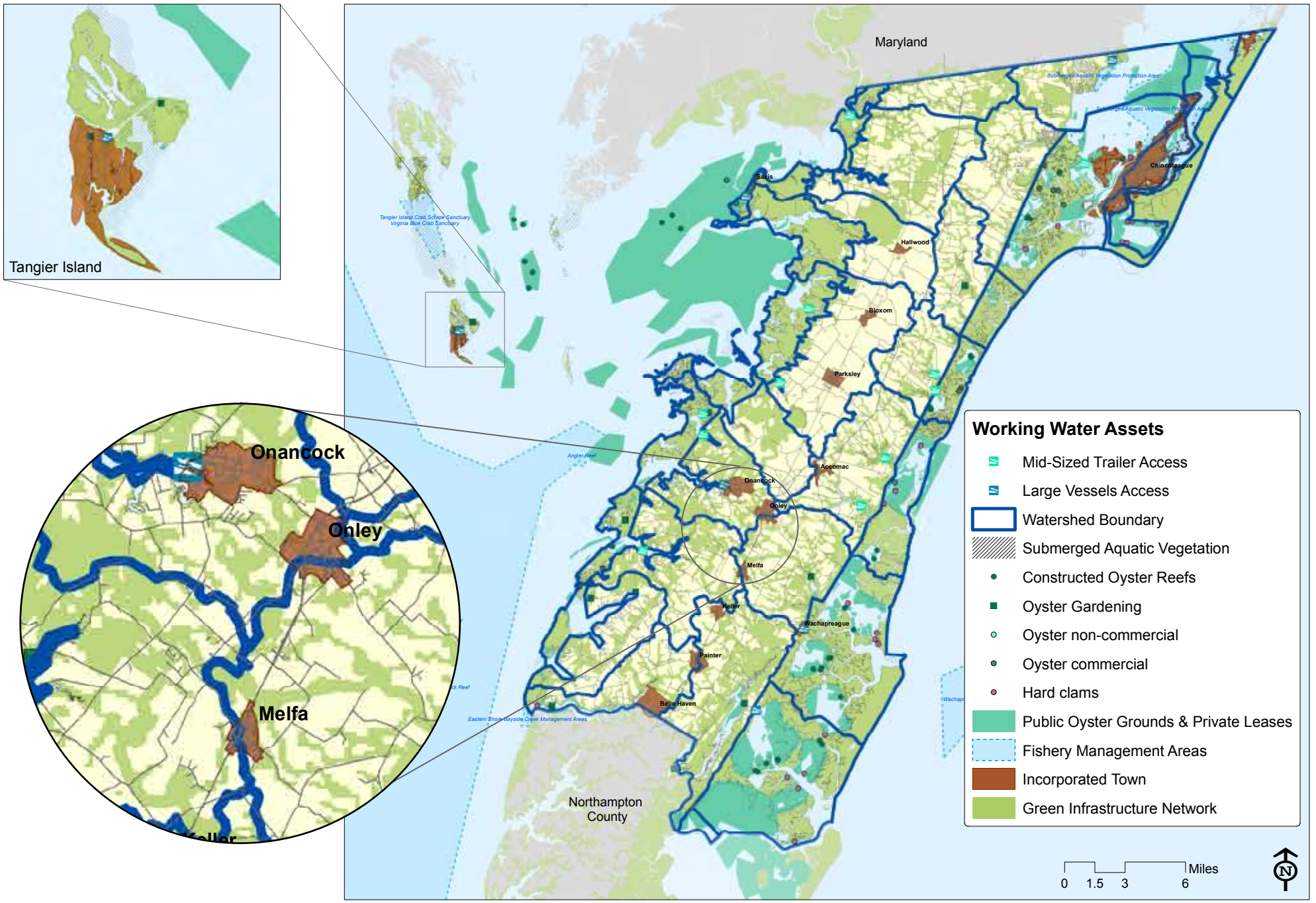


Figure 11: Working Lands - Working Waters Overlay

NATURE-BASED RECREATION

Overview

Accomack County's recreational resources are closely linked with the natural landscape. In some cases, such as boating, recreational users are directly dependent on the presence of the green infrastructure network. In other cases, such as use of the bike routes, recreational users indirectly benefit from the network's natural beauty. Additionally, many of the county's conservation lands are open to public access for recreation. The county's recreational resources provide multiple benefits to residents and visitors by promoting exercise and improved health as well as sustaining the local economy through hunting and tourist activities.

The Nature-Based Recreation Asset Map (Figure 12) shows the location of several types of recreational resources in the county: public water access points, trails, scenic rivers, parks and conservation lands with public access. Many of the resources are located within the green infrastructure network, a reminder of its importance in supporting outdoor activities. For instance, the birding trail loops represent suggested driving routes between birding sites. The birding sites themselves rely on green infrastructure as bird habitat, and the driving routes can be made more pleasant and enjoyable through the conservation and restoration of green infrastructure along the roadways.

Accomack County's nature-based recreation assets include trails.

Public access to waterways are a key asset for commercial and recreational uses.

Observations

- The county has distinctive water and terrestrial-based recreational opportunities.
- The bicycle plan and birding trail loops tend to be located in the inner areas of the county and may benefit from green infrastructure conservation and restoration along roadways.
- Conservation lands with public access tend to be located on the shoreline areas of the county; obtaining lands for conservation inland may provide long-term support for terrestrial-based recreational opportunities.

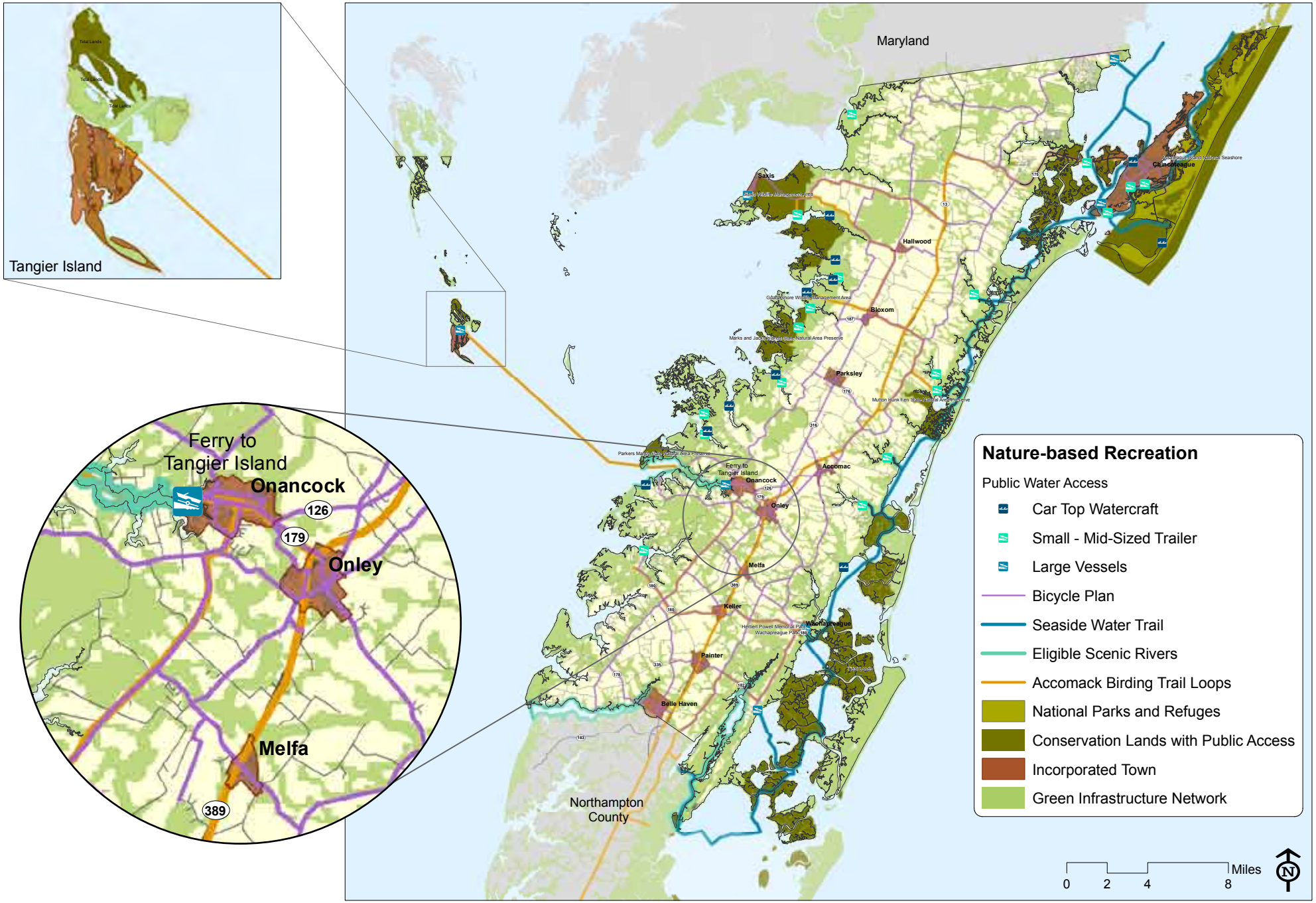


Figure 12: Nature-Based Recreation Overlay

CULTURE AND HERITAGE

Overview

The county's rural character and heritage resources contribute to its unique place in Virginia's landscape and history. These resources create the distinctive sense of place and culture that marks Accomack as part of the Eastern Shore and also support the local economy through heritage tourism and related industries. Events such as the Heritage Celebration at Eastern Shore Community College and the annual Chincoteague Pony Swim showcase local talent and draw tourists from across the nation.

The Culture and Heritage Map (Figure 13) shows the locations of churches older than 50 years and known cemeteries. It also identifies Historic Register Sites, Historic Districts and potential Historic Districts. These tend to be located in the towns, and as scenic attractions are supported by the surrounding green infrastructure network. Finally, the map also identifies potential scenic roads, including the Bayside and Seaside roads, and the bicycle plan. Additional cultural and historical assets may be identified on Figure 1.

Observations

- Many of the county's mapped Historic Districts and Historic Register Sites are located within incorporated towns. This emphasizes the importance of cooperation on green infrastructure planning between the county and the towns, as the scenic quality of these assets is dependent in part on the network.
- The potential scenic roads and the bicycle plan may identify roads with particularly important viewsheds. These roads may have distinct views of an area of land, water or other landscape features valued by the community, and special care should be taken to protect the green infrastructure network in these areas.
- The county may want to consider adoption of entrance corridor overlays to better manage views along major roadways, such as Route 13.
- Additionally, scenic road designations could direct tourists off of main roads to explore the county. Roads appropriate for this designation could include:
  - Seaside Road (Route 600)
  - Quinby Bridge Road (Route 182)
  - Upshur Neck Road, Bradford's Neck Road, and Drummondtown Road (Route 605)
  - Wachapreague Road (Route 180)
  - Bellehaven Road, Shields Bridge Road, Boston Road, Bobtown Road, Savageville Road, and Hill Street (Route 178)
  - Craddockville Road and Davis Wharf Road (Route 615)
  - Chincoteague Road (Route 175)

Historic Register Sites and Districts are key assets.

Natural heritage provides inspiration for artisan crafts.

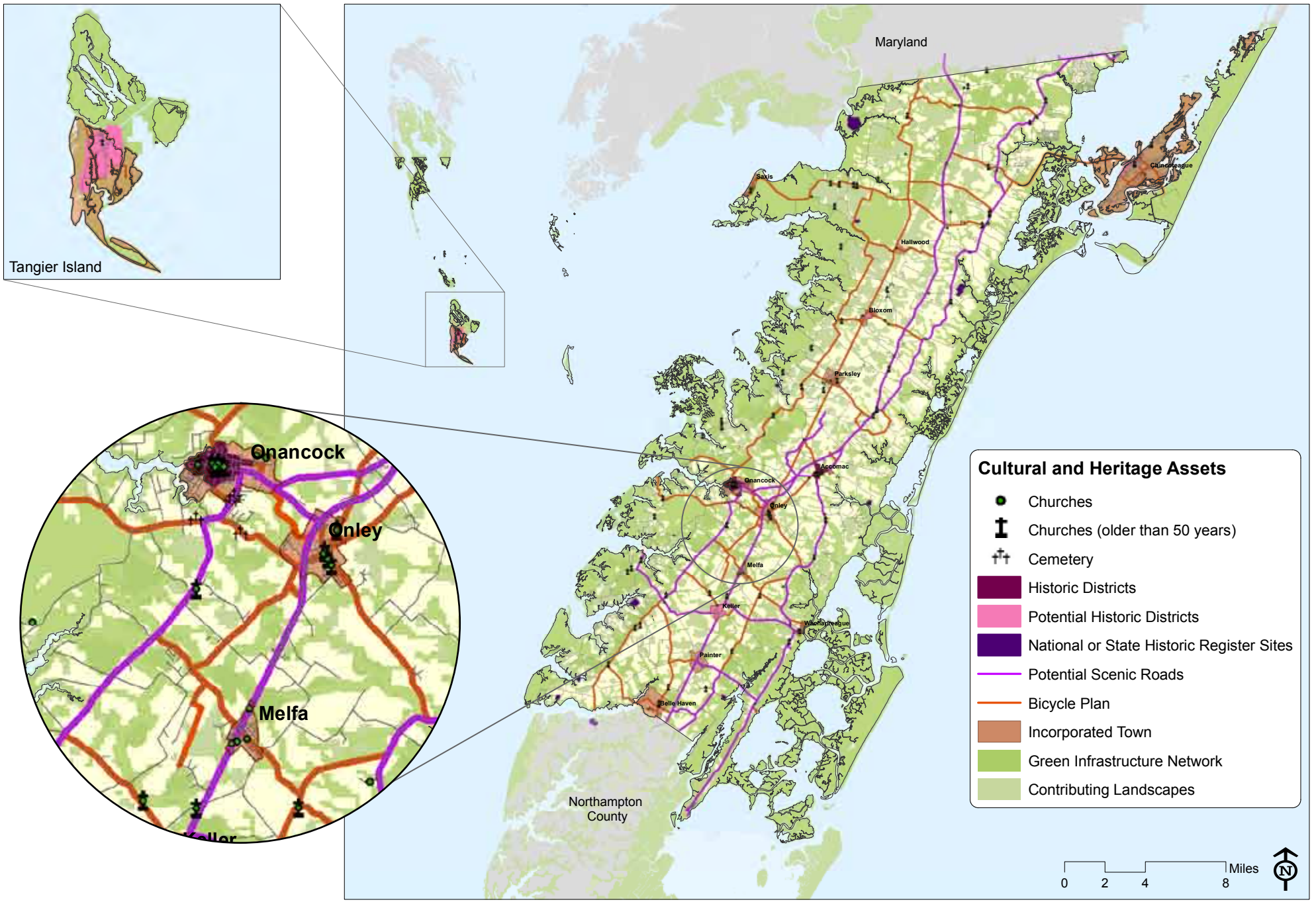


Figure 13: Culture and Heritage Overlay

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V. OPPORTUNITY AND STRATEGY MAPS

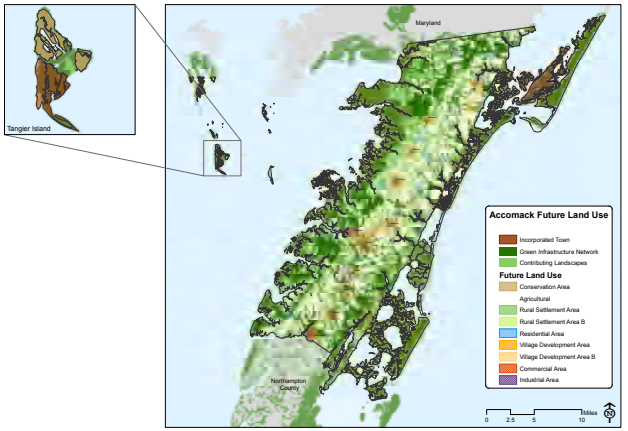
A primary goal of the Accomack County Blue/Green Infrastructure Study has been to develop maps and strategies that the county can use to inform current county initiatives and long-range planning activities. The maps in the previous section of the report identify existing green infrastructure assets; however these assets are not static. They may change as a result of development patterns or policies that either threaten or protect the network. In order to maximize conservation of the county's natural assets within a developing landscape, the project team examined the following land use opportunities.

1. *Future Land Use*: What opportunities for conservation of natural assets are possible based on the county's adopted future land use plans?
2. *Groundwater Recharge and Wellhead Protection*: What opportunities for conservation of natural assets are possible based on the existing groundwater recharge zone and wellhead protection requirements?

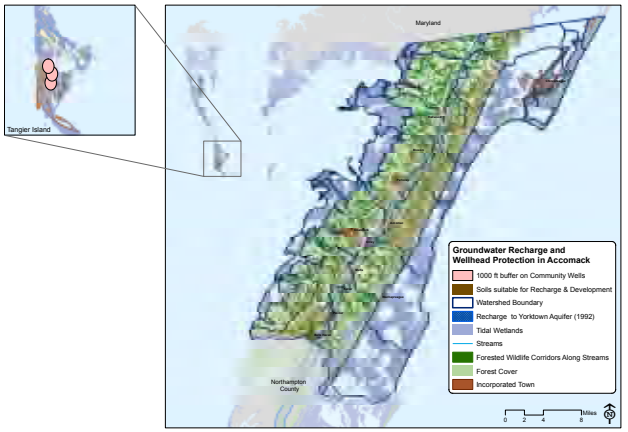
Next, the project team developed a series of recommended strategies and maps that provide a county-scale prioritization framework for the green infrastructure network. These strategies were developed based on stakeholder goals and science recommendations from the literature review and can help prioritize which natural assets may be more valuable to protect. The strategies identified include:

1. *Riparian Rungs*: Promote east-west connectivity of habitat through conservation and restoration of green infrastructure "rungs."
2. *Coastal Corridors*: Protect connectivity of coastal shoreline habitat.
3. *Recharge Window*: Protect groundwater recharge zone through best management practices in development areas and protection of rural lands.

Green infrastructure is an important source of ecological, economic and cultural resilience for Accomack County. The opportunities and strategies identified in this section of the report can help inform potential planning applicants of the green infrastructure asset data for conservation and restoration of these valuable county resources.



Future Land Use



Ground Water Recharge and Wellhead Protection

OPPORTUNITY MAPS

Future Land Use

Development in Accomack County will play an important role in the conservation of the green infrastructure network. The asset maps illustrate the relationship of existing urban development to the network by identifying the incorporated towns; however, future development across the county will not be limited to incorporated town areas. Accomack County has developed a future land use plan intended to guide the direction of development and land use. The plan emphasizes the need to focus development in the county around the incorporated towns and conserve large areas of the county for rural land use. Incorporated towns manage their own land use regulation programs, which are not shown on this map; however landscape connections between the towns and the county are identified and may indicate important areas for future cooperation.

The Future Land Use Map (Figure 14) shows the county's adopted future land use plans overlaid on the green infrastructure network. Incorporated towns are shown in brown and future land use zones are shown as hatched overlays. Conservation areas (shown as a brown hatch) are located on the shorelines, while development areas, including rural settlement, residential, village development, commercial and industrial areas (shown in colored hatching), are clustered around the towns. Areas of the county not identified as part of an incorporated town, conservation area or development area have been prioritized for agricultural use.

Example of an incorporated town within Accomack County.

Observations

- Focusing intensive development around already-developed areas can help conserve the green infrastructure network.
- Site-scale planning can address the need to conserve the green infrastructure network in areas identified as development areas.
- Conservation of the green infrastructure network may still be a concern in rural areas due to by-right development. Clustered development could address this concern.

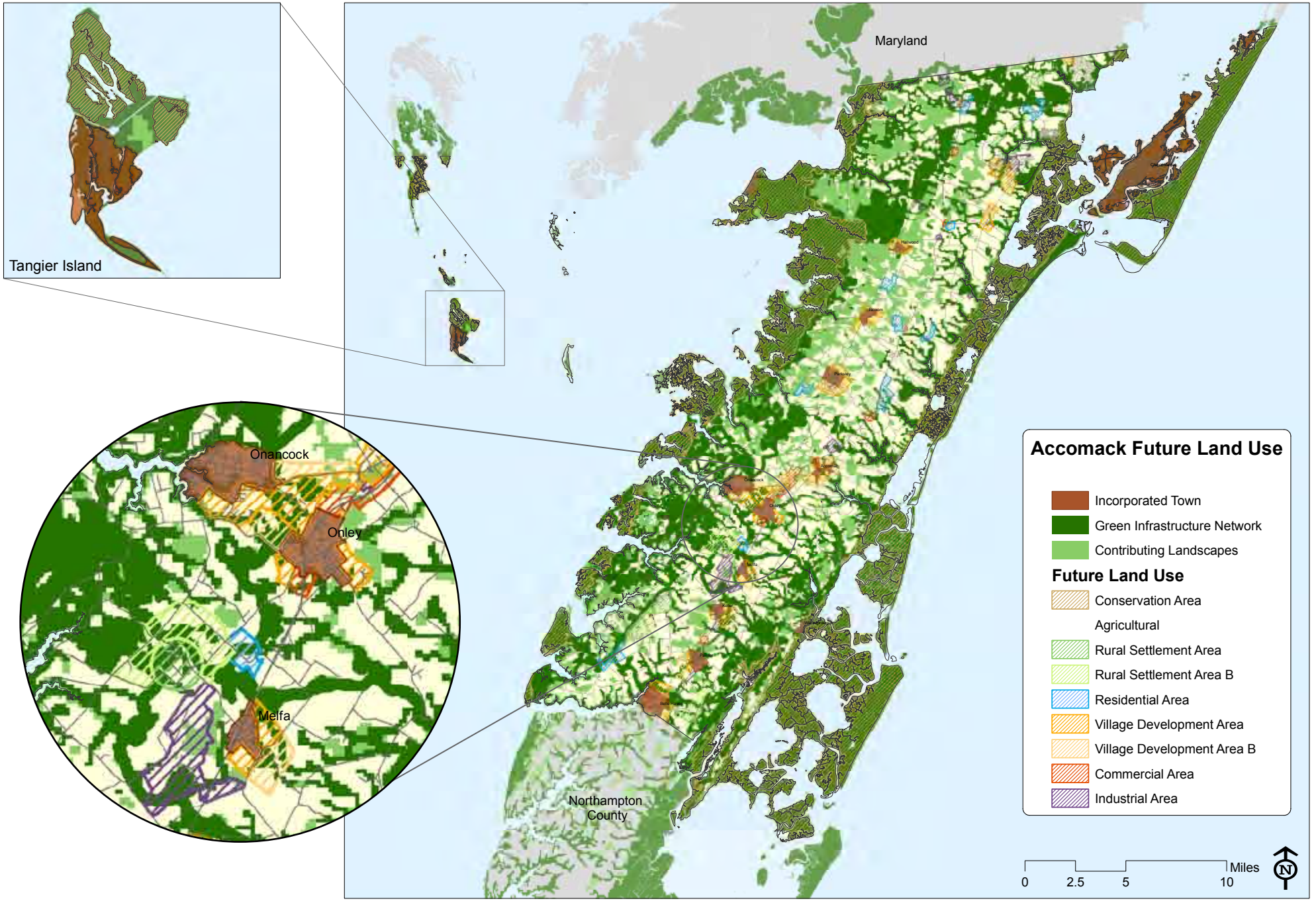


Figure 14: Future Land Use

OPPORTUNITY MAPS

Groundwater Recharge and Wellhead Protection

Water is an important resource in Accomack County. The quality of runoff impacts water quality in the groundwater as well as in the streams and ultimately the Seaside and Bayside habitat areas. The green infrastructure network provides significant economic benefit to the county by helping to filter and clean pollutants from runoff as it enters the groundwater recharge zone. Although engineered stormwater ponds and other water management techniques can be introduced to address this function in a developed landscape, forests and other natural green infrastructure features still perform this work more cost-effectively. The Commonwealth of Virginia's Wellhead Protection Plan requires a 1,000-foot buffer around community wells, as recommended by the Virginia Source Water Assessment Program in November 1999 by the U.S. Environmental Protection Agency.

The Groundwater Recharge and Wellhead Protection Map (Figure 15) highlights a number of risks and opportunities related to water quality in the county. Community wells are identified by showing the required 1000-foot protection buffer, and the groundwater recharge spine is identified as a blue crosshatched area running up the center of the county. Soils suitable for development are shown in brown. Tidal wetlands are shown in blue, and watershed boundaries are identified as blue outlines.

Observations

- The green infrastructure network is a key resource for protecting water quality in the county. Green infrastructure filters the runoff that ultimately becomes part of the groundwater supply or makes its way via the streams into the tidal wetlands.
- Most of the groundwater and wellhead resources are located in the central and northeastern areas of the county.
- Soils suitable for development may be most at risk for intensive development which could impact water quality. These soils are predominantly located on the eastern and southwestern sides of the county.

Eastern Shore of Virginia Ground Water Committee

Formed in 1990, the Eastern Shore of Virginia Ground Water Committee is composed of membership from both Accomack and Northampton Counties. The committee's mandate is to:

> *"assist local governments and residents of the Eastern Shore in understanding, protecting and managing ground water resources, to prepare a ground water resources protection and management plan, to serve as an educational and informational resource to local governments and residents of the Eastern Shore, and to initiate special studies conserning the protection and management of the Eastern Shore ground water resource."*

The commitee meets monthly, and projects include:

- Ground water awards program
- Educational programs and campaigns
- Household hazardous waste collections
- Ground water permit review and tracking

The committee's website can be found at: http://www.a-npdc.org/groundwater/projects.html

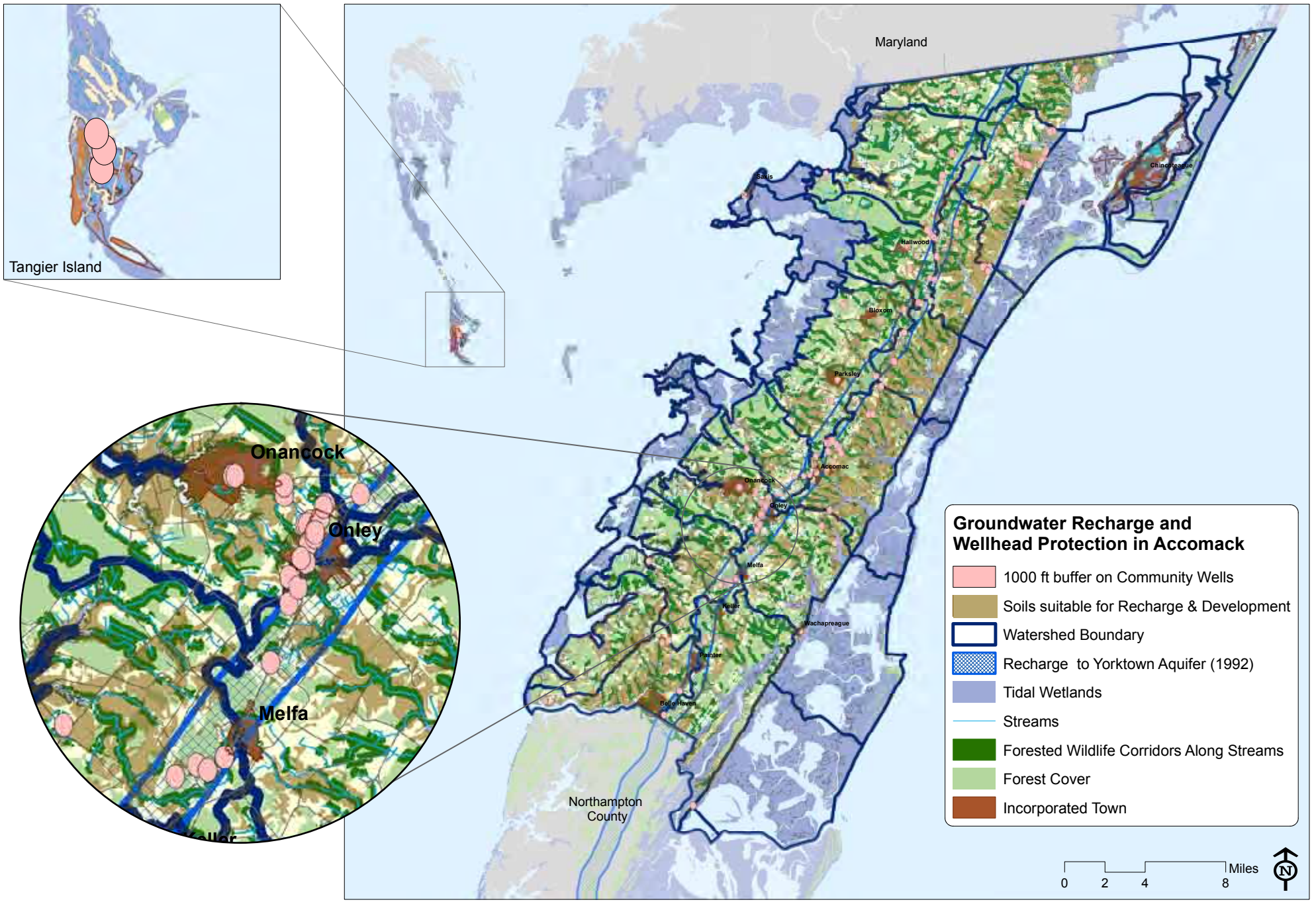


Figure 15: Groundwater Recharge and Wellhead Protection

GREEN INFRASTRUCTURE PRIORITIZATION STRATEGIES

The prioritization strategies identified by the project team are based on analysis of existing green infrastructure in the county as well as stakeholder goals and science-based recommendations from the literature review. The strategies identify priority areas for protecting green infrastructure in order to maximize the ecological and economic benefits of the landscape.

Stakeholder Values

- Development patterns and infrastructure demands
- Water quality and wastewater management
- Conserving natural resources and wildlife
- Identification of places with locally recognized environmental value
- Access to recreation

Science Recommendations from Review of Studies

- Increase the spatial continuity of riparian systems.
- Protect spatial continuity of coastal habitats.
- Replace coastal habitats lost to erosion and inundation.
- Protect groundwater recharge zone.
- Enhance dunes for shoreline protection and habitat expansion.

Riparian Rungs

Strategy: Promote east-west connectivity of habitat through conservation and restoration of green infrastructure "rungs."

A key function of green infrastructure is its ability to provide habitat connectivity between core habitat areas through habitat corridors. Accomack's core habitat areas tend to be located in the Seaside and Bayside zones of the county and are connected by the green infrastructure rungs which follow the streams across the county.

The Riparian Rungs Map (Figure 16) identifies eight key "rungs" that provide east-west connections across the county. Conservation areas are identified in blue to show where the "rungs" or corridors may connect protected habitat. The rungs on the map are characterized as needing conservation or restoration depending on whether they provide a continuous connection across the center of the county. For instance, the Bloxom Rung may need restoration to provide a connection in the area of Route 13, while the Keller Rung simply needs to be conserved in order to maintain the existing connection across the county.

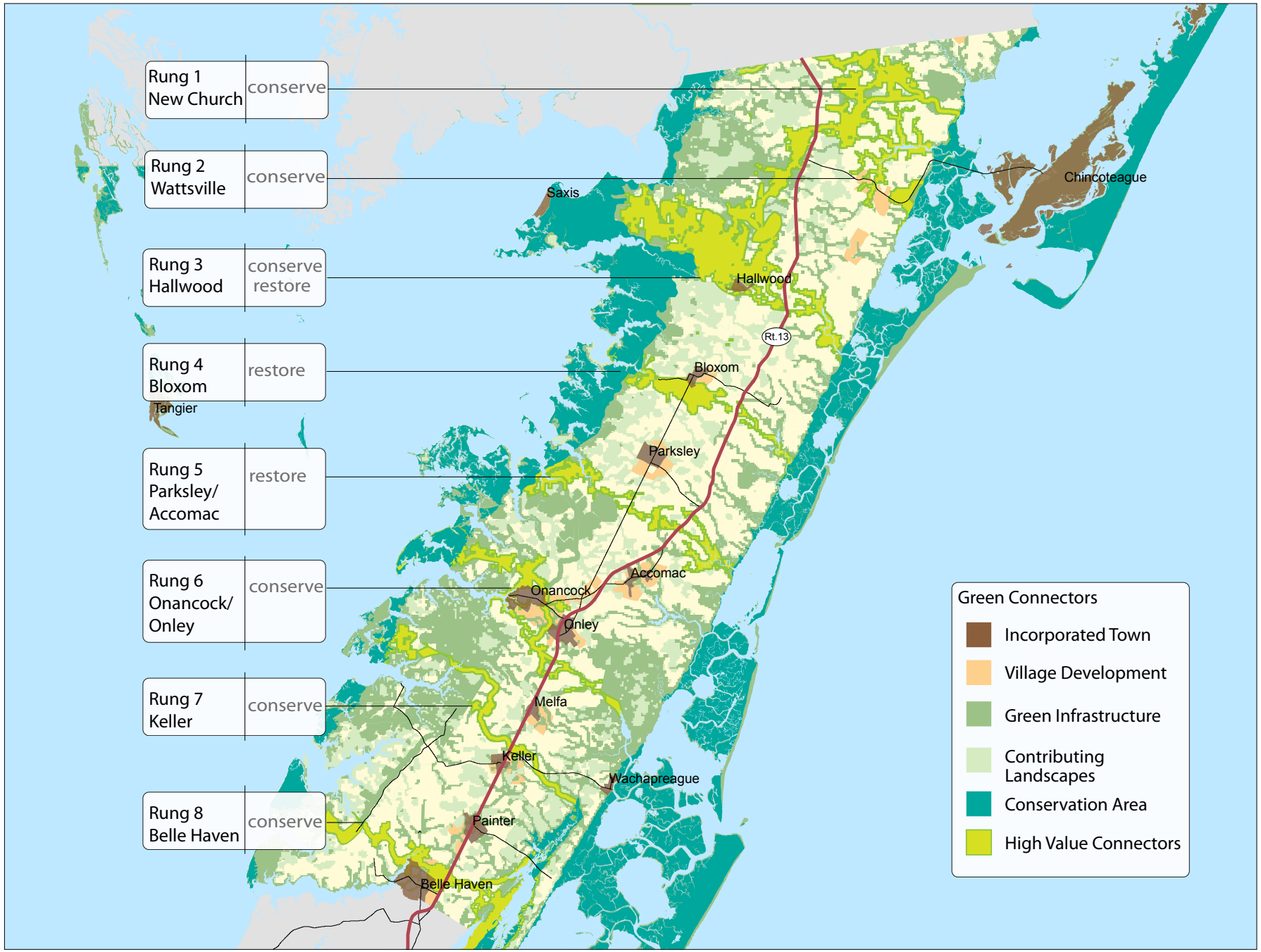


Figure 16: Riparian Rungs

Coastal Corridors

Strategy: Promote connectivity of coastal shoreline habitat.

North-south connectivity of green infrastructure is also essential to the health of the network. The shore environments of the Bayside and Seaside zones contain important tidal marsh habitat and also provide a buffer for human development against natural disasters such as storm-related flooding. Implementing policies that protect green infrastructure within this area could conserve these functions.

The Coastal Corridors Map (Figure 17) shows in blue areas that are already conserved. Additional recommended protection areas are shown in purple. Storm surge data from NOAA was used to identify two protection zones. Protection Zone A, shown in dark purple, corresponds to the storm surge of a category one storm. Protection Zone B, shown in light purple, corresponds to the storm surge of a category two storm. These zones represent areas that are influenced by water and where special protection of the green infrastructure network could yield high benefits not only for habitat conservation but also for protection of development in the Terrestrial zone of the county.

The shore environment provides an important buffer for human development against natural disasters and is also a unique ecosystem which suppports native and migratory birds.

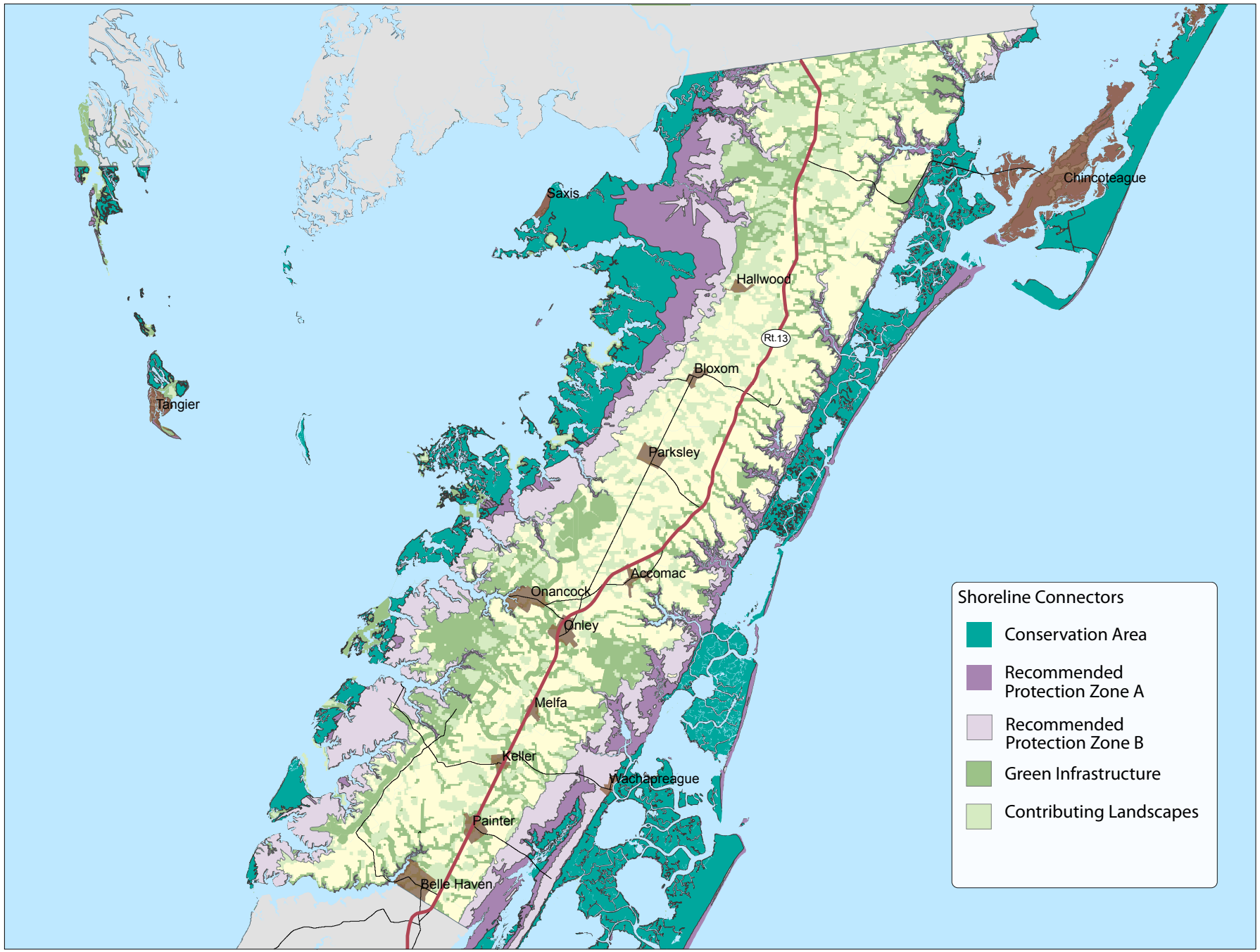


Figure 17: Coastal Corridors

Recharge Window

Strategy: Protect groundwater recharge zone through best management practices in development areas and protection of rural lands.

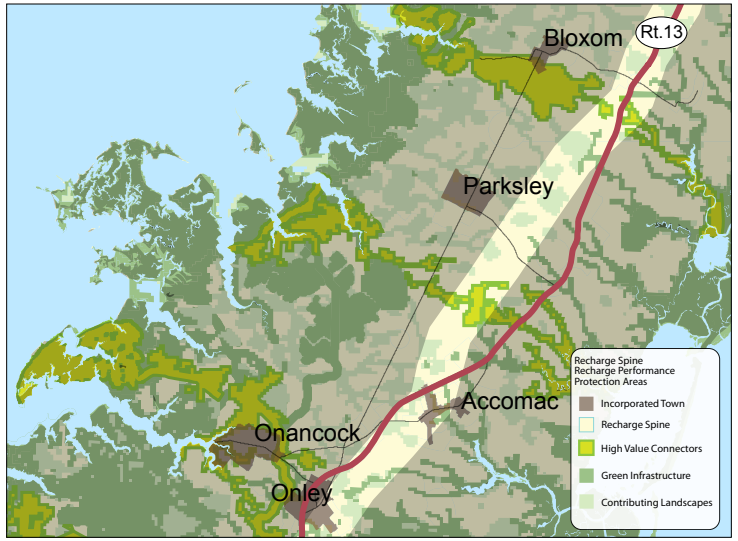
Protecting drinking water supplies through conserving forest cover in groundwater recharge zones should be a key priority for the county. The Yorktown Aquifer is recharged through rainwater infiltration along a narrow spine running along and close to Route 13, north to south through the county.

In developed areas, protection of drinking water may take the form of implementing best management practices, such as rain gardens and bioswales, to reduce and filter runoff and conserving green infrastructure where possible through clustered development. In rural areas, protection may take the form of conserving rural land use and directing development away from green infrastructure cores and corridors.

The first Recharge Window map (Figure 18), titled Recharge Protection Areas, identifies areas where the green infrastructure network and contributing landscapes intersect the groundwater recharge spine. High-value connectors, first identified on the Riparian Rungs Map, are shown in yellow-green as a reminder of their dual importance for connectivity and groundwater recharge. Other parts of the network are shown in dark green, and the contributing landscapes are shown in light green.

The second Recharge Window map (Figure 19), titled Potential Performance Inhibitors, introduces future land use areas, including village development (orange), industrial (purple), commercial (red) and residential (yellow) to the map. These areas may be important locations for implementing best management practices, such as rain gardens and pervious paving, in order to counteract the increased intensity of runoff due to impervious surfaces and the increased likelihood of pollutants due to human activity. It may also be possible to conserve some of the existing green infrastructure in these areas by directing development around it (see the Development Scenario on p. 44)

Rain gardens are an example of best management practices.



Map detail from Figure 18

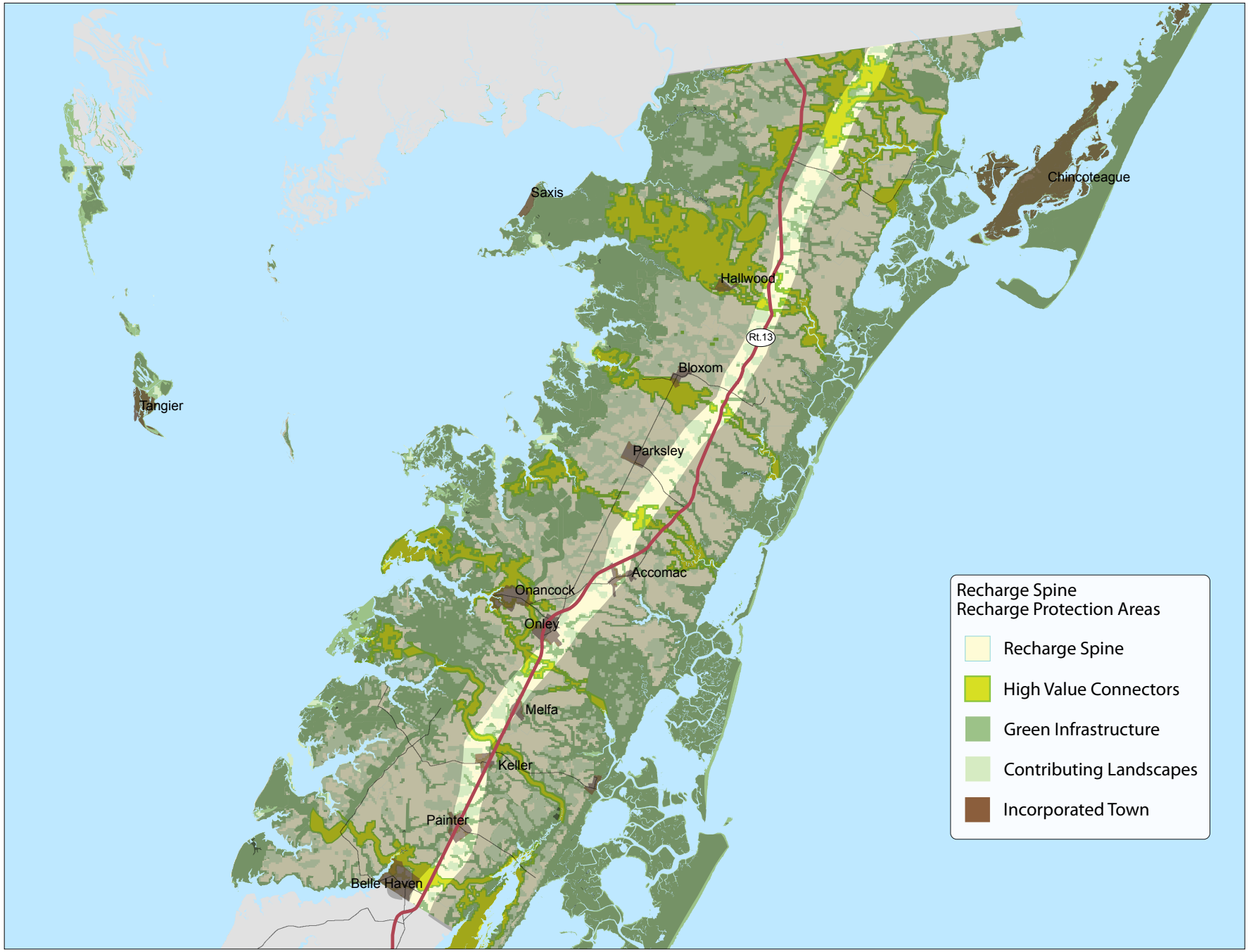


Figure 18: Recharge Window

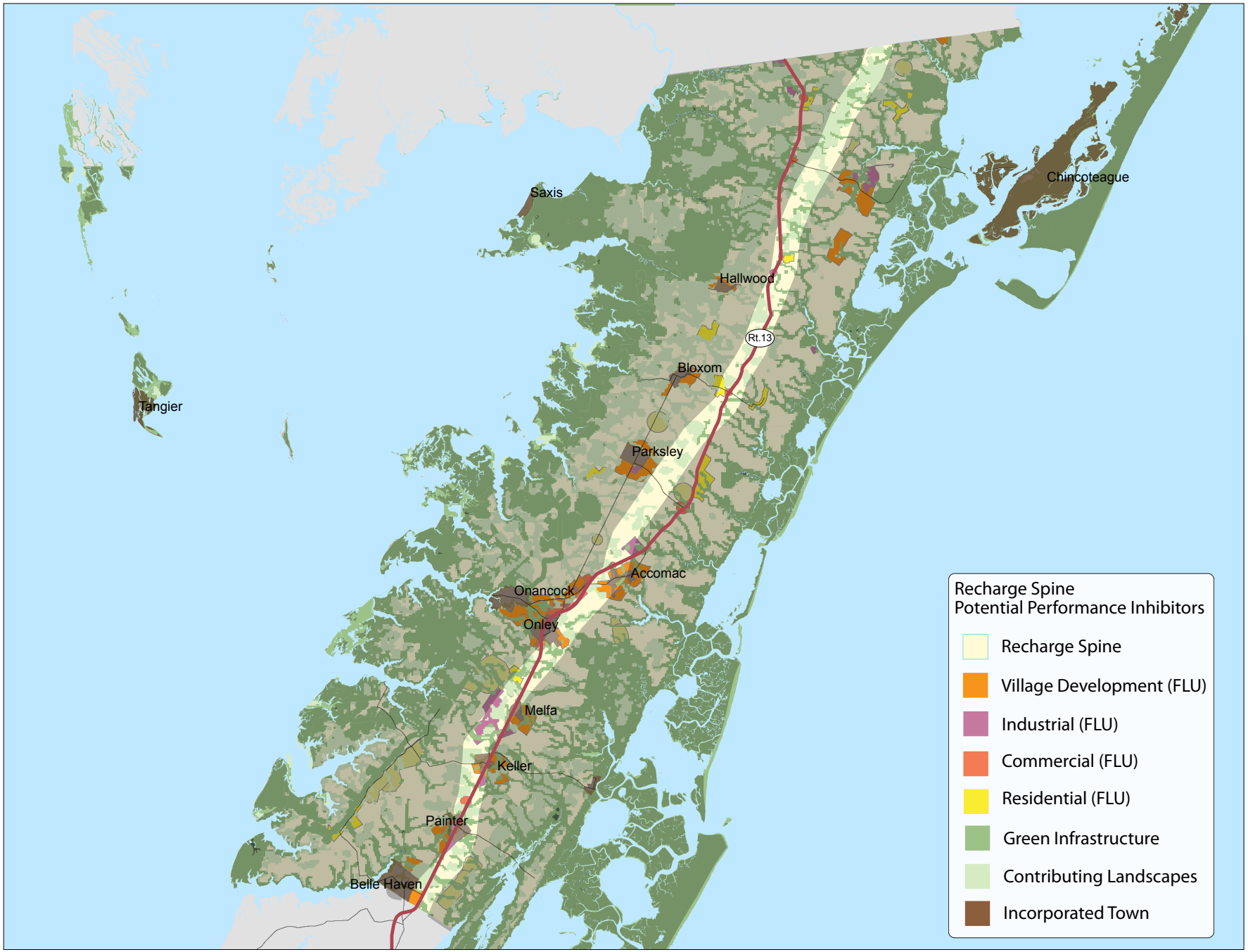


Figure 19: Recharge Window and Potential Performance Inhibitors

VI. LOOKING FORWARD

Considerations for Planning and Development

Comprehensive Planning and Zoning
At the broadest level, the project's green infrastructure asset maps will be able to inform the county's comprehensive planning, mapping and zoning activities and updates on an ongoing basis. All data gathered during the project and translated into visual layers, or "themes," that could be mapped using geographic information systems (GIS) have been transferred to the county and are now part of the county's GIS. The asset maps directly support the comprehensive plan's policy 2-5, which states that the county will "implement green infrastructure planning."

Specific applications of the project's green infrastructure asset maps could include updates to the county's comprehensive plan and zoning maps to help guide new development in appropriate locations and prioritize high-value asset areas for protection or restoration. At the site scale, knowledge of the location and value of the county's green infrastructure assets can inform developers' site plans and the planning approvals process, ensuring that these assets are retained across parcel boundaries (see illustration) within the context of the county's green infrastructure network of connected, large, intact natural landscapes. The asset maps can also help Accomack County work with private landowners in high-value asset areas to develop conservation and land management approaches.

Examples of these applications include:

- During a property rezoning request, the county could encourage the landowner to explore voluntary options to conserve land areas that have high-value green infrastructure assets. The landowner could "proffer" to set these land areas aside as open space easements.
- A developer may be interested in linking recreational trails within a proposed development to the county's green infrastructure network and could proffer an easement that would connect the trails with the network.
- Landowners could work with county staff to identify opportunities to ensure that changes in a property's land use do not "disconnect" intact natural landscapes that extend across the property. When setting aside green space as part of a planned unit development or other planning activity, these areas could be selected based on their connectivity with adjacent green infrastructure assets.
- Organizations interested in conservation easements could prioritize land areas located within the county's green infrastructure network.

INFORMING LAND USE DECISION MAKING

FRAGMENTED - Even well-intentioned land use planning approaches can result in the fragmentation of the county's high-value natural assets.

CONNECTED - A green infrastructure planning approach allows for development and growth at the same scale, while also ensuring that the county's natural assets remain intact and well-connected.

Development Scenario

In 2009, Accomack County enacted a Village Residential Zoning District Amendment that allowed higher density development in the new Village Residential (VR) zone in exchange for clustered development. This means that development can be clustered at up to 1.5 lots per buildable acre in exchange for conservation of 40% of the buildable area as open space. No areas of the county are currently zoned VR; however, the future land use plans designate certain areas of the county for Village Residential development (see Figure 14) and property owners can apply for a zoning change in order to receive VR zoning on their property.

The introduction of clustered development into the county's zoning code can help county planning staff guide development in ways that avoid construction in green infrastructure areas while still retaining the development potential of the land. This can help property owners maximize their economic returns from both their development and their green infrastructure assets. It can also assist the county staff when evaluating development proposals to ensure strategic green infrastructure connections are maintained countywide.

The following series of graphics illustrates the potential of clustered development when guided by the asset and strategy maps. Figure 20 illustrates two undeveloped parcels with road access on the southern side. Parcel A is 32 acres, and Parcel B is 38 acres. The parcels are divided by a stream that is bounded by a Resource Protection Area (RPA), and the land within that area is considered unbuildable. Like many streams in Accomack County, this stream is located in the center of a significant green infrastructure corridor.

Figure 21 shows the potential for conventional development to disturb the green infrastructure. Conventional development, under Village Residential zoning, may be constructed at 1 lot per buildable acre. Although development is not permitted inside the protection zone, there is no requirement for conserving open space outside of the protection zone and so the green infrastructure corridor may be destroyed in order to achieve the maximum buildable potential of the property - 26 lots on Parcel A and 30 lots on Parcel B. Notice that the development area (shown in orange) extends all the way to the edge of the required RPA and that the green infrastructure network has become fractured by the development.

Figure 23 shows the potential for clustered development to conserve the green infrastructure network. Clustered development may be constructed at 1.5 lots per buildable acre and requires that 40% of the buildable land be conserved as open space. Notice that the development area is balanced in this example with a 40% conservation area (shown in grey stippling) that closely follows the green infrastructure network. Although the conservation area does not cover the entire network, it conserves the majority of the corridor. In the remaining development areas, Parcel A has the potential for 39 lots and Parcel B has the potential for 45 lots.

Intent of the Village Residential District

The Village Residential district is intended to allow medium density residential development and compact clustered village residential development with central water and sewer facilities, with primarily single-family homes and provisions for some apartments and accessory dwellings, and provisions for narrow, privately maintained streets on relatively large tracts of land near the county's existing villages and towns, as generally shown on the Future Land Use Map of the Comprehensive Plan, in order to expand the traditional development pattern of existing towns and villages and conserve natural resources including the rural landscape, ground water, shellfish waters, and to preserve village character by facilitating residential development that reflects and perpetuates Accomack County's existing, historic land use pattern and the appearance of the landscape as viewed from private land and the public road system.

-Accomack County Zoning Code, Article XXI, Sec. 106-531

Clustered development allows developers to offer higher densities along with open space amenities. By referencing the asset maps and the Green Infrastructure Prioritization Strategies, county staff can help direct patterns of development to conserve the green infrastructure network using the open space requirement. This approach can create a win-win solution for county residents, developers and staff, since natural assets are protected as an integral part of the development process.

	Number of Lots	
Parcel (acres)	Conventional Development (1 lot/acre)	Clustered Development (1.5 lots/acre)
A (32)	26	39
B (38)	30	45
Total	**56**	**84**

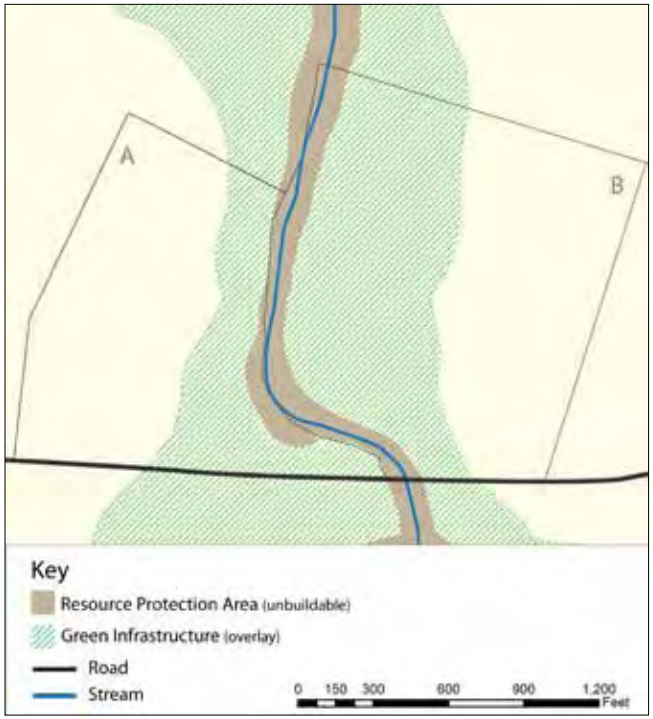


Figure 20. Undeveloped Parcels A & B

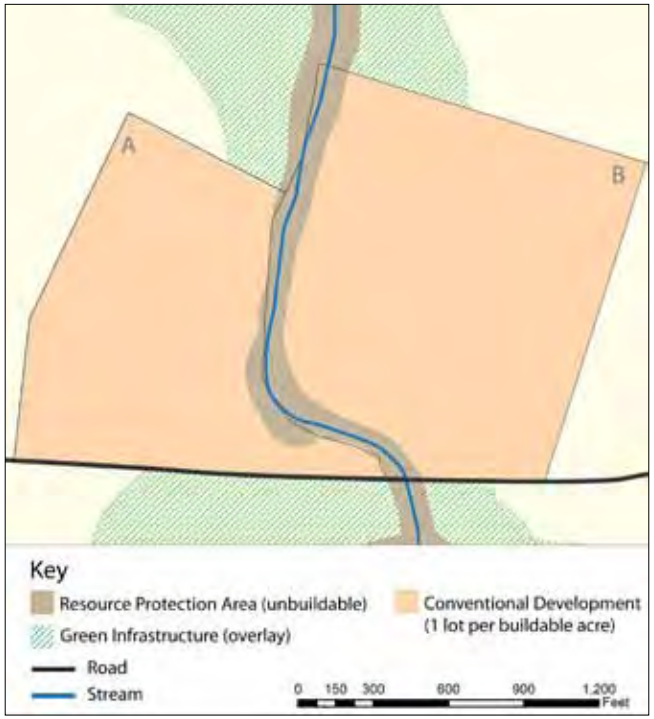


Figure 21. Conventional Development

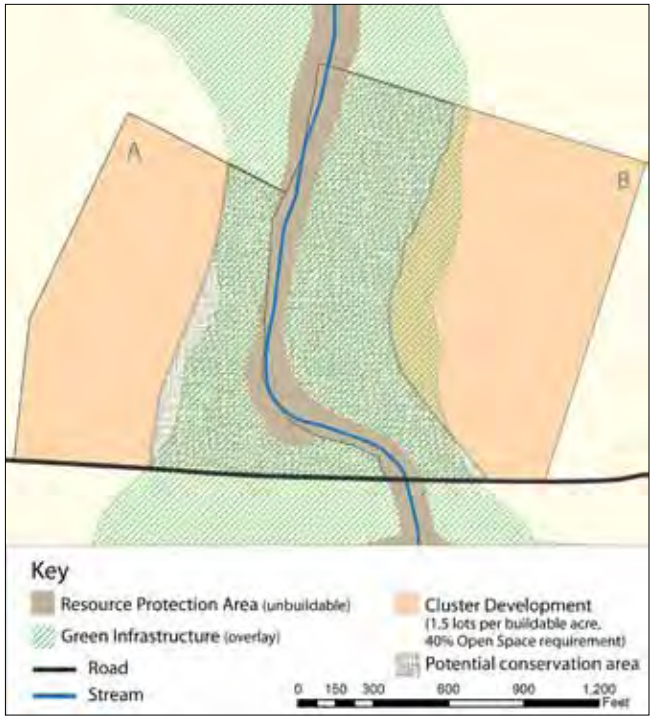


Figure 22. Cluster Development

Summary and Next Steps

The Accomack County Blue/Green Infrastructure Study sought to accomplish several tasks, including:

- Map the county's existing green infrastructure assets.
- Identify considerations for green infrastructure planning based on stakeholder engagement and feedback.
- Identify considerations for green infrastructure planning based on the best available science.
- Identify opportunities and strategies to help the county enhance its green infrastructure planning capacity.
- Institutionalize a process by which Accomack County can track county-related research and communicate on an ongoing basis with research organizations.

The final task was addressed by the completion of a research database, which county staff are now able to review and maintain on an ongoing basis. The database enables staff to track information and recommendations identified by the numerous scientific studies being conducted each year on Accomack County and the Eastern Shore.

The findings of this report address the first four tasks. These findings can be incorporated into ongoing county planning activities, including the 2013 comprehensive plan update. The strategies and development scenario provide a framework for prioritizing conservation of the existing green infrastructure identified on the asset maps. These strategies are grounded in the stakeholder goals identified during the community engagement process and in the science recommendations identified through the literature review. Furthermore, these strategies recognize the importance of development and provide a method for county staff to integrate conservation of green infrastructure with the development process.

This report summarizes only some of the ideas that can be derived from the project's asset maps, data and GIS resources. County staff and local officials can request printed maps of key features, zoom in to specific areas of interest, and update the GIS layers to remain current over time. Residents can use the maps to inform their own plans and goals as well.

Looking forward, the project team has identified several initiatives which could build on the foundation provided by this report.

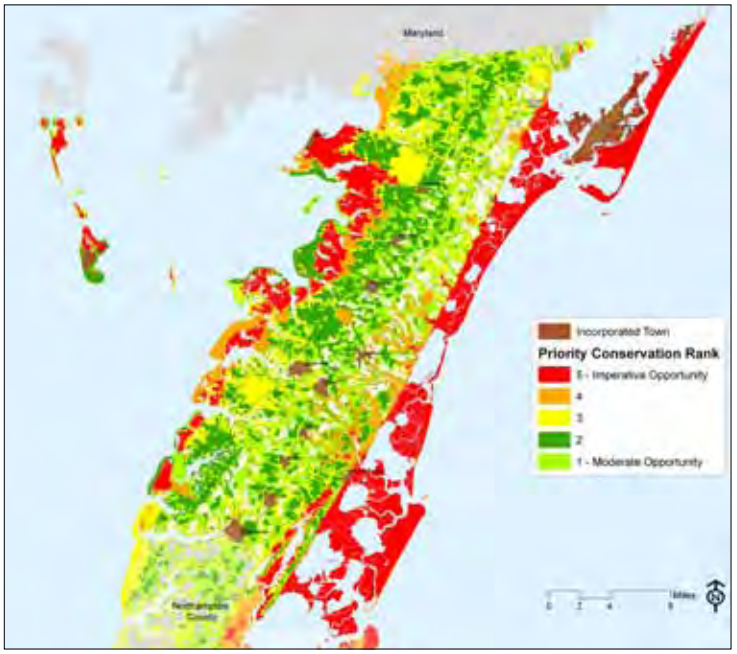
- Promote strategic land conservation for natural areas located adjacent to the coastal lands owned by the state and federal government and non-governmental organizations.
- Investigate the possibility of increasing Accomack County's protected recreational lands through investment in private recreational assets with public access.
- Develop a Blue/Green Infrastructure Form Book for the Eastern Shore. This document could explore specific development guidance and recommendations for integrating development with blue and green infrastructure and could act as a reference guide for county staff and developers.
- Create a heritage/cultural tourism route to attract and guide tourists and residents through Accomack County's distinctive landscape.

These are just a few of the near-term actions that could build on the information and strategies identified by the Accomack County Blue/Green Infrastructure Study. Additional applications and initiatives may be identified over time. This report provides tools that can help Accomack County pursue and achieve its vision for the future by considering conservation and enhancement of green infrastructure assets along with development. This will ensure that the ecological, economic and cultural value of Accomack County's green infrastructure assets is protected for years to come.

APPENDIX A – PROJECT DATA INVENTORY

The following table provides descriptions of each dataset used in creating the PCA.

Entity	Dataset	Description
DCR	Conservation Sites and Natural Landscape Network	The Conservation Sites dataset includes known species locations. The Natural Landscape Network dataset includes, from the VaNLA, all highest ranked ecological cores (C1 and C2), all landscape corridors providing linkages between these cores, as well as corridor nodes (i.e. those C3, C4 and C5 cores that intersect landscape corridors).
DGIF	Priority Wildlife Diversity Conservation Areas	Dataset created from existing GIS datasets that were identified from conservation actions in the Wildlife Action Plan. These input datasets were prioritized based on input from DGIF Wildlife Diversity biologists. The final product is a raster GIS dataset where the landscape has been prioritized on a range from 1 to 5, with 5 being the highest conservation priority.
VCU-CES	Aquatic Resource Integrity Layer	Dataset created from stream health scores and watershed integrity scores. The final product has raster cell values from 2 to 5 indicating relative stream health, with 5 representing the healthiest waters.



Priority Conservation Areas

APPENDIX A – PROJECT DATA INVENTORY (continued)

The following two-page table is an inventory of the spatial data used to develop Accomack County's asset maps.

	Data	Source
Regional Data Assessment		
	Virginia Natural Landscape Assessment	Va Dept of Conservation & Recreation (DCR) Division of Natural Heritage
	Virginia Conservation Lands Needs Assessment	DCR Division of Natural Heritage
	Virginia Priority Conservation Areas	DCR Division of Natural Heritage; Dept of Game and Inland Fisheries (DGIF), Virginia Commonwealth University
Water		
	Watershed Boundaries (HUC)	Accomack County; National Hydrography Dataset (NHD)
	Flood Zones	Accomack County (FEMA)
	Wetlands	Accomack County (National Wetlands Inventory)
	Healthy Streams	Coastal GEMS
	Streams	NHD; VGIN
	Tidal Wetlands	NWI
	Groundwater Recharge	Accomack County
	Community Wells and Intakes	Virginia Department of Health
Recreation		
natural-resource based recreation	County Boat Ramps	Accomack County
	Waters Worthy of Scenic Rivers Designation	Accomack County; DCR
	Seaside Eastern Shore Water Trail	Coastal GEMS
	Birding & Wildlife Sites	DGIF
	Birding & Wildlife Trails	DGIF
	Conservation Lands	DCR
	Blueways	DCR
	Trails	DCR, National Park Service
	Boating Public Access Sites	Accomack County
	County Parks	Accomack County
Working Lands		
ag and forest lands	Forest Cover	Va Dept of Forestry (DOF)
	Parcels >25 - <100 acres	Accomack County
	Parcels >100 acres	Accomack County
	Prime Ag Soils	USDA Soils Data Mart
	Ag. & Forestal District Lands	Accomack County
	Common Land Units	USDA

Heritage		
	Historic Register Sites	Virginia Department of Historic Resources (DHR)
	Potentially Eligible Historic Sites	DHR
	Historic Districts	DHR
	County Significant Resources	Accomack County
	American Indian Lands	Accomack County
	Trails / Routes	Accomack County
	Highway Markers	DHR
Fisheries		
	Fisheries Management Areas	Coastal GEMS
	Baylor Grounds (Public Oyster Grounds)	Coastal GEMS
	Private Oyster Leases	Coastal GEMS
	State Constructed Oyster Reefs	Coastal GEMS
	Commercial Shellfish Aquaculture Sites	Coastal GEMS
	Oyster Gardening Sites	Coastal GEMS
	Restricted/Condemned Shellfish Areas	Accomack County
Wildlife		
	Natural Heritage Screening Coverage	DCR Division of Natural Heritage
	Essential Wildlife Habitat	VDGIF
	Important Bird Areas	GEMS
	Migratory Songbird Stopover Habitat	GEMS
	Threatened & Endangered Species Waters	GEMS
Landscape Types		
	Forest Cover Types	DOF
	Submerged Aquatic Vegetation (SAV)	VIMS
	Developed Areas	DOF
	Wetlands	NWI
	Dune Systems	Coastal GEMS
Resource Protection		
	Chesapeake Bay Act Areas	Accomack County
	Conservation Lands	DCR
	Easements	Accomack County
	Coastal Barrier Resource Areas	Accomack County
Land Use		
	Zoning	Accomack County
	Future Land Use	Accomack County
Base information		
	Roads	Accomack County
	County Boundary	Accomack County
	Surrounding Counties	Accomack County
	Incorporated Towns	Accomack County

APPENDIX B – RESOURCES

This appendix provides links to state, federal and non-governmental resources that county government, residents and business owners can access to support local efforts focused on the management and enhancement of Accomack County's green infrastructure assets.

Agriculture Resources

Available agricultural resources include several programs as well as technical assistance. For example, the Virginia FarmLink program connects experienced farmers with new farmers, providing a way to share expertise and help new farmers locate farming opportunities.

- Virginia Association of Soil & Water Conservation Districts: vaswcd.org/
- Natural Resource Conservation Service (NRCS) Soils Data: soildatamart.nrcs.usda.gov/
- Virginia Cooperative Extension Publications: pubs.ext.vt.edu/index.html
- Virginia FarmLink Program: www.savefarms.com/farmlink_about.htm

Cultural Resources and Heritage Tourism

Two primary resources in Virginia that support heritage tourism activities and the preservation and rehabilitation of cultural resources are the Virginia Tourism Corporation and Virginia's Department of Historic Resources (DHR). For example, DHR offers a Rehabilitation Tax Credit Program to provide incentives for parties interested in restoring historic structures in Virginia. DHR's Threatened Sites Program provides emergency resources for research at endangered archaeological sites.

Under § 15.2-2306 of the state code, local governments can also pursue historic district and entrance corridor designations. Historic districts provide a way to recognize and raise the profile of the community's history for residents and visitors without impacting the property rights of landowners. Historic entrance corridor designations can provide a way for local governments to manage the landscapes surrounding important historical sites and architectural areas.

- Eastern Shore Tourism Commission: http://www.esvatourism.org/home.asp

Cultural Resources and Heritage Tourism (continued)

- Eastern Shore Historical Society: http://www.easternshorehistory.org
- Code of Virginia, § 15.2-2306. Preservation of Historical Sites and Architectural Areas: leg1.state.va.us/000/cod/TOC15020000022000000000000.HTM
- Virginia DHR Rehabilitation Tax Credit Program: www.dhr.virginia.gov/tax_credits/tax_credit.htm
- Virginia DHR Threatened Sites Program: www.dhr.virginia.gov/arch_DHR/threatened.htm
- Virginia Department of Agriculture and Consumer Services Century Farm Program: www.vdacs.virginia.gov/century
- Virginia Comprehensive Historic Preservation Plan: www.dhr.virginia.gov/pdf_files/CompPlan2001.PDF

Heritage Tourism Examples:

- Journey through Hallowed Ground: www.hallowedground.org
- Virginia Civil War Trails: www.culturalheritagetourism.org/successStories/virginiaSummary.htm
- Virginia Wine Trails: www.virginiawine.org/regions/hampton-roads
- Thomas Jefferson Planning District Commission Heritage Tourism Toolkit: www.tjpdc.org/workforce/tjV_heritageTourism.asp
- Virginia Tourism Corporation: www.vatc.org

Forestry Resources

The Virginia Department of Forestry (DOF) offers several programs as well as technical assistance for parties interested in protecting and restoring the county's forests. For example, the Forestland Enhancement Program (FLEP) provides funding to help landowners develop forestry management plans and certain other stewardship activities.

- Forestland Conservation Programs: www.dof.virginia.gov/land/index.shtml
- Forestland Enhancement Program (FLEP): www.dof.virginia.gov/mgt/cip-fact-flep.shtml

APPENDIX B – RESOURCES (continued)

Forestry Resources (continued)

- Accomack County Forester: Robbie Lewis, Virginia Department of Forestry, 757.787.5812
- Reforestation of Timberlands Conservation Incentive Program: www.dof.virginia.gov/mgt/cip-fact-rt.shtml
- Virginia Department of Forestry Publications: www.dof.virginia.gov/info/index-forms-docs.shtml

State Data Sources

Data sources used in this report include:

- Coastal GEMS, Virginia Coastal Zone Management Program: http://www.deq.state.va.us/coastal/coastalgems.html
- Priority Conservation Areas: http://www.dgif.virginia.gov/gis/gis-data.asp
- Virginia Conservation Lands Needs Assessment, DCR: http://www.dcr.virginia.gov/natural_heritage/vclna.shtml

Water Resources

Funding, technical assistance and information resources are available for parties interested in ensuring the quality and availability of Accomack County's water resources.

The Virginia Department of Environmental Quality (DEQ) monitors and reports on the water quality of streams in Virginia. DEQ also develops Total Maximum Daily Load (TMDL) analyses for impaired streams. In Accomack County, most of the impairments are for fecal coliform, generally measured as escherichia coli (or E. coli as an abbreviation). Resources (see below) are available to help localities work with DEQ to develop a TMDL plan that can best meet local needs and priorities as well as ensuring that localities remain in compliance with the Clean Water Act.

- Eastern Shore of Virginia Ground Water Committee: http://www.a-npdc.org/groundwater/projects.html
- Center for Watershed Protection: www.cwp.org
- National Association of Counties TMDL Watershed Planning Tool: www.naco.org/Template.cfm?Section=New_Technical_Assistance&template=/ContentManagement/ContentDisplay.cfm&ContentID=21026
- U.S. Environmental Protection Agency (EPA) TMDL Resources: www.epa.gov/owow/tmdl www.epa.gov/owow/watershed/initiative www.epa.gov/owow/funding.html www.epa.gov/owow/nps/319hfunds.html
- Virginia Conservation Reserve Enhancement Program: www.dcr.virginia.gov/soil_and_water/crep.shtml
- Virginia Cooperative Extension Publications: pubs.ext.vt.edu/index.html
- Virginia Department of Conservation and Recreation (DCR), Soil and Water Conservation Programs: www.dcr.virginia.gov/soil_and_water/index.shtml
- Virginia DCR Water Quality Guide: dcr.state.va.us/soil_&_water/documents/wshedguideb2b.pdf
- Virginia DEQ TMDL website: www.deq.virginia.gov/tmdl
- Virginia DEQ Impaired Waters List: www.deq.virginia.gov/wqa

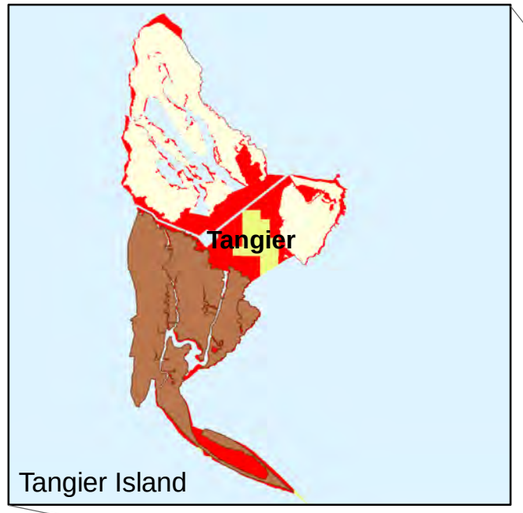
Green Infrastructure Planning

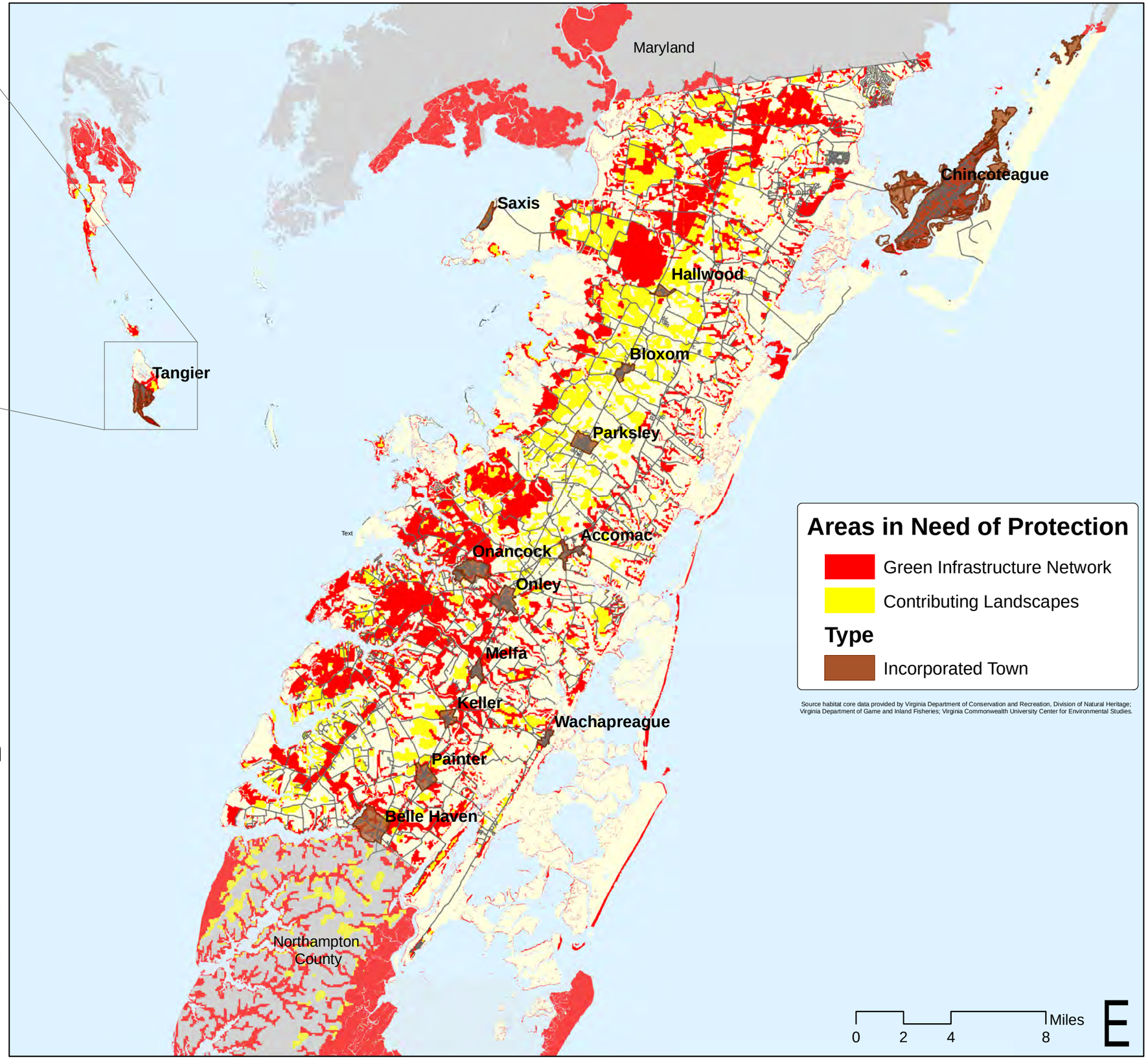
For more information on green infrastructure planning, please visit the resources page on the GIC website: http://www.gicinc.org/resources.htm

ACCOMACK COUNTY BLUE / GREEN INFRASTRUCTURE STUDY

Green Infrastructure Center
921 2nd Street SE,
Charlottesville, VA 22902
(434) 975-6700
www.gicinc.org

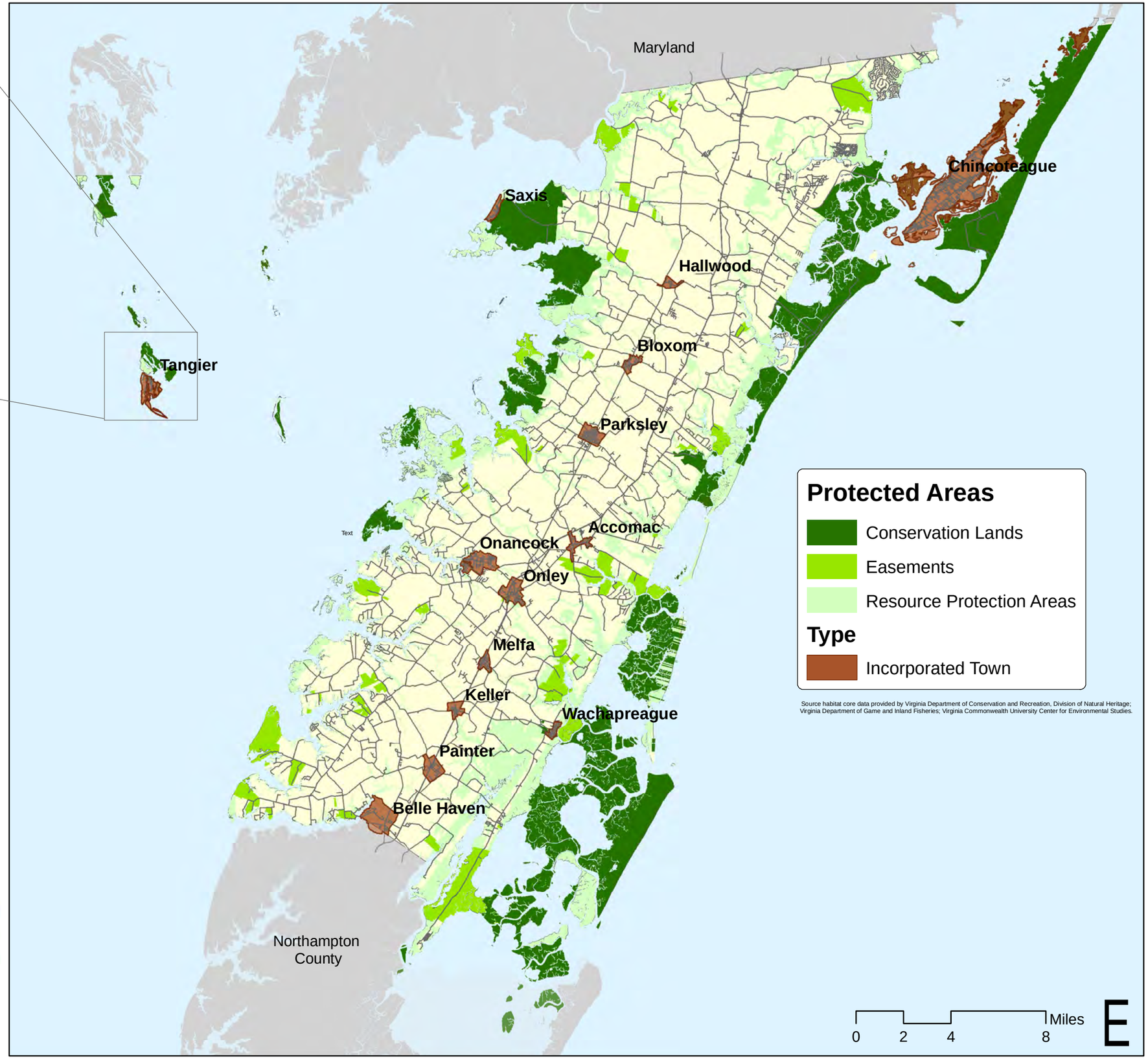
Areas in Need of Protection



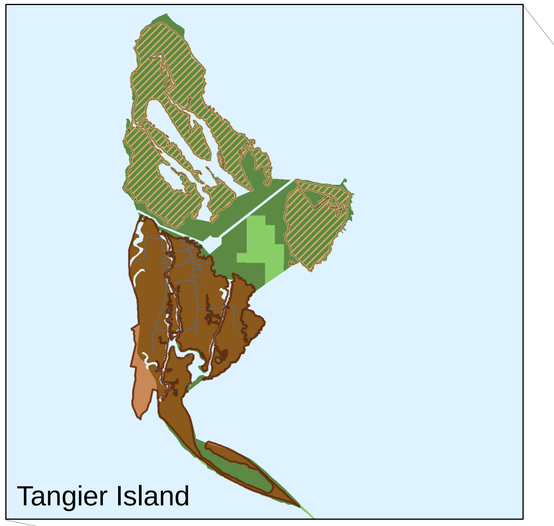


Virginia Coastal Zone
MANAGEMENT PROGRAM

Protected Areas



Virginia Coastal Zone
MANAGEMENT PROGRAM



Accomack Zoning

Zoning

- Barrier Island
- Agricultural
- Residential
- Residential (with conditions)
- General Business
- General Business (with conditions)
- Industrial
- Green Infrastructure Network
- Contributing Landscapes

Maryland

Northampton County

Green Infrastructure Network
Accomack County's green infrastructure network include priority conservation areas and large, connected landscapes that support healthy waters and provide habitat for terrestrial and aquatic species.

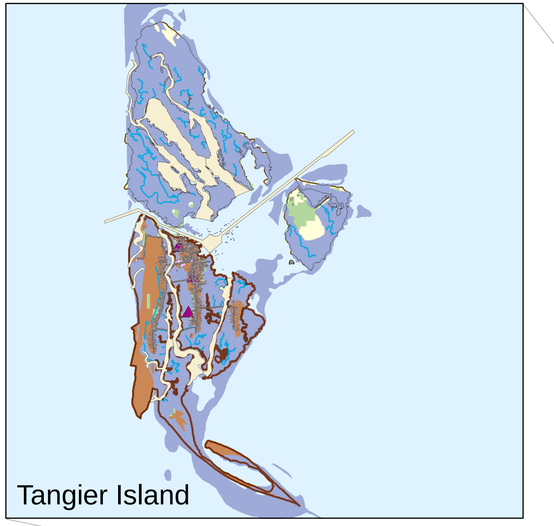
DRAFT

0 2.5 5 10 Miles

Blue/Green Infrastructure Study
Accomack County, Virginia

Virginia Coastal Zone MANAGEMENT PROGRAM

This project has been made possible by these funders and partners.



Groundwater Recharge and Wellhead Protection in Accomack

- 1000 ft buffer on Community Wells
- Watershed Boundary
- Recharge to Yorktown Aquifer (1992)
- Tidal Wetlands
- Streams
- Forested Wildlife Corridors Along Streams
- Forest Cover
- Incorporated Town

Blue/Green Infrastructure Study
Accomack County, Virginia

Virginia Coastal Zone MANAGEMENT PROGRAM

This project has been made possible by these funders and partners.

Maryland

Northampton County

Water Quality Assets
Accomack County's blue/green Infrastructure include landscape features that support and promote clean, healthy water and aquatic species habitat.

DRAFT

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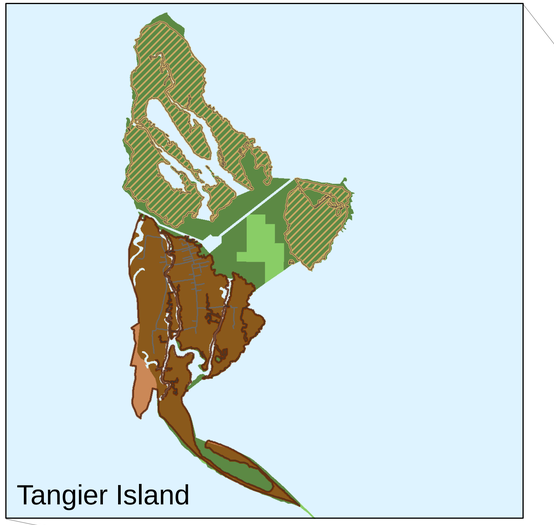
E



Accomack Future Land Use

Future Land Use

- Conservation Area
- Agricultural
- Rural Settlement Area
- Rural Settlement Area B
- Residential Area
- Village Development Area
- Village Development Area B
- Commercial Area
- Industrial Area
- Incorporated Town
- Green Infrastructure Network
- Contributing Landscapes

Maryland

Northampton County

Green Infrastructure Network
Accomack County's green infrastructure network include priority conservation areas and large, connected landscapes that support healthy waters and provide habitat for terrestrial and aquatic species.

DRAFT

0 3 6 12 Miles

N

Blue/Green Infrastructure Study
Accomack County, Virginia

Virginia Coastal Zone MANAGEMENT PROGRAM

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