

Northern Neck Planning District Commission Virginia Coastal Zone Management Program's PDC Technical Assistance Program Task #45 FY10-11 Final Report



Virginia Coastal Zone
MANAGEMENT PROGRAM



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA10NOS4190205 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Northern Neck Planning District Commission FY10/11 Coastal Program Technical Assistance Grant, Task 45 Final Report

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I. Coastal Management Support

Lancaster County Requested Maps

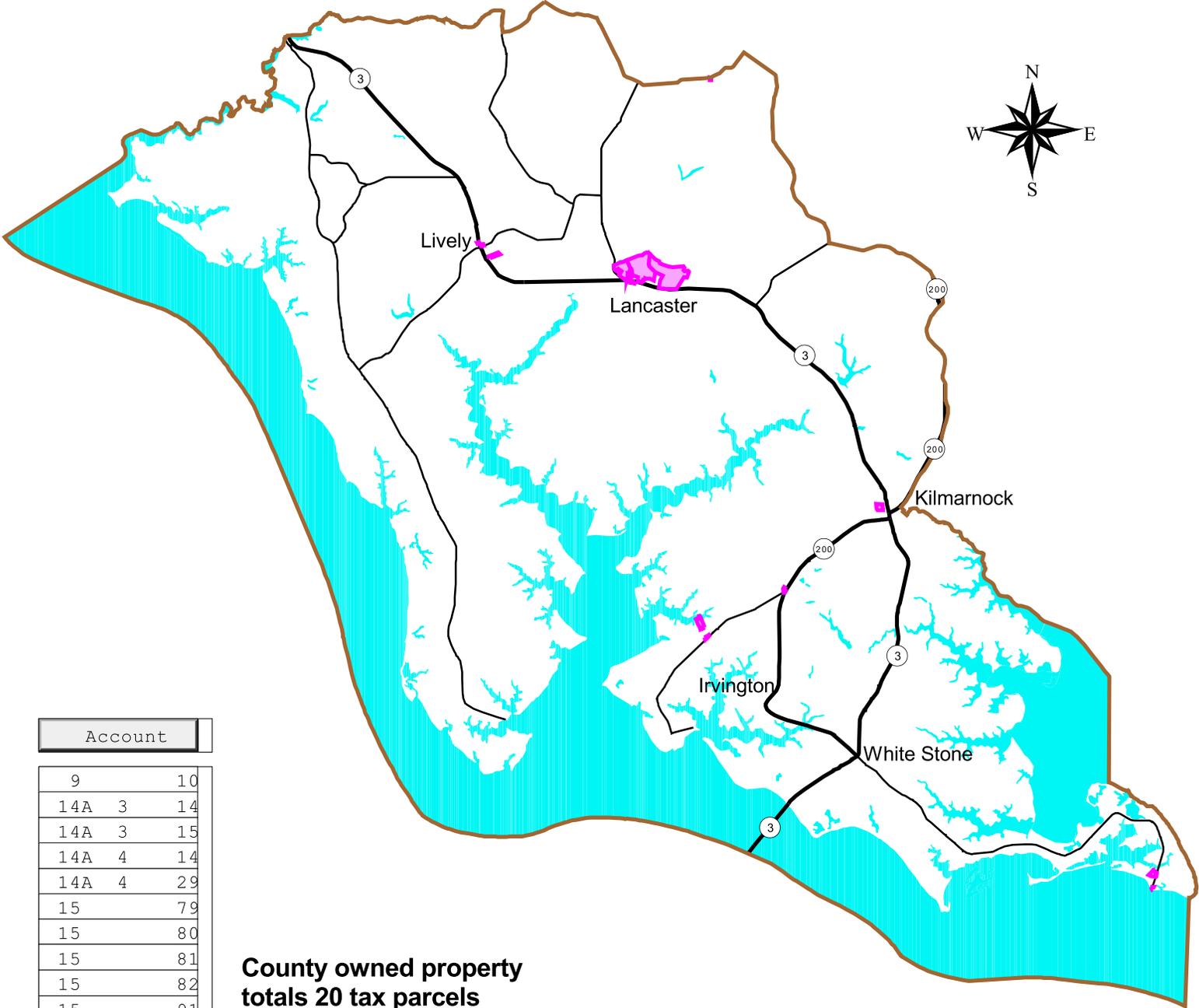
Lancaster County requested a map that identified all parcels in the county that were owned by the county. NNPDC staff queried the digital tax maps database for the various permutations of names that indicate Lancaster County ownership. Various owner names were searched, such as Lancaster County, Board of Supervisors, and School Board. In addition to identifying the parcel numbers of each of county owned properties, the county also requested the zoning classification of the properties. The map generated was to be used to guide the location of a communications tower to serve the county as well as the entire Northern Neck.

The Northern Neck Land Conservancy requested a map of land owned by Mr. Courson in Lancaster County, as they were meeting with him to discuss the possibility of entering into a conservation easement for the land he owned. The NNPDC supports the NNLC in its efforts to educate citizens on the benefits of putting their land in a voluntary conservation easement.

As noted in my previous year Virginia Coastal Zone Management Program's Planning District Commission Technical Assistance Grant Final Report, NNPDC was working with the Division of Chesapeake Bay Local Assistance of the Virginia Department of Recreation (DCR) on revision to the Town of White Stone's Chesapeake Bay 100 foot Resource Protection Area (RPA). In Virginia, the Chesapeake Bay 100 foot Resource Protection Area is defined as perennial water bodies that are connected to tidal water or wetlands adjacent to tidal waters. Non-perennial streams, those that dry up and disappear in the summer are not considered a Chesapeake Bay Resource Protection Area feature. Field staff from DCR visited the streams near the Town of White Stone to determine the perenniality of the stream and to locate the demarcation line between perennial and non-perennial part of the stream. DCR staff supplied the marked up field map to NNPDC staff and NNPDC made the modifications to the RPA digital map layer. The final map was sent to DCR staff, who in turn notified White Stone town staff of the newly revised Chesapeake Bay Resource Protection Area.

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Lancaster County County Owned Properties



Account

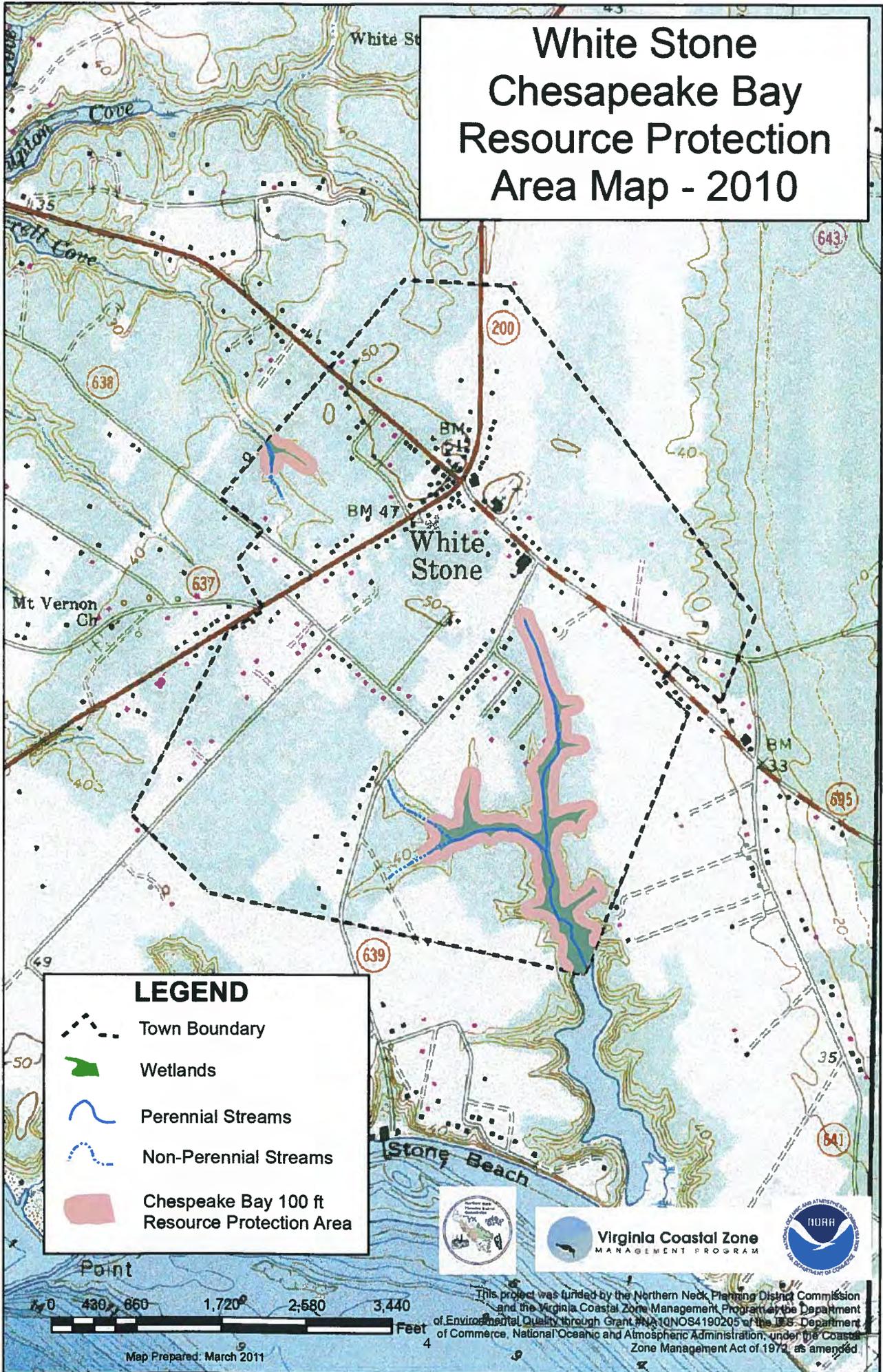
9	10
14A 3	14
14A 3	15
14A 4	14
14A 4	29
15	79
15	80
15	81
15	82
15	91
15	102
15	104
16	5
23A 21	18
27G 1	17
27G 1	18
27G 1	19
28	37
40	34
40	39

**County owned property
totals 20 tax parcels**



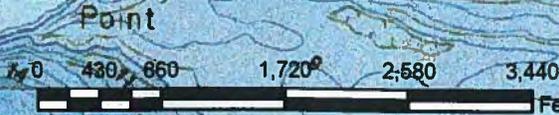
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White Stone Chesapeake Bay Resource Protection Area Map - 2010



LEGEND

-  Town Boundary
-  Wetlands
-  Perennial Streams
-  Non-Perennial Streams
-  Chesapeake Bay 100 ft Resource Protection Area



Map Prepared: March 2011



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Northumberland County Requested Maps

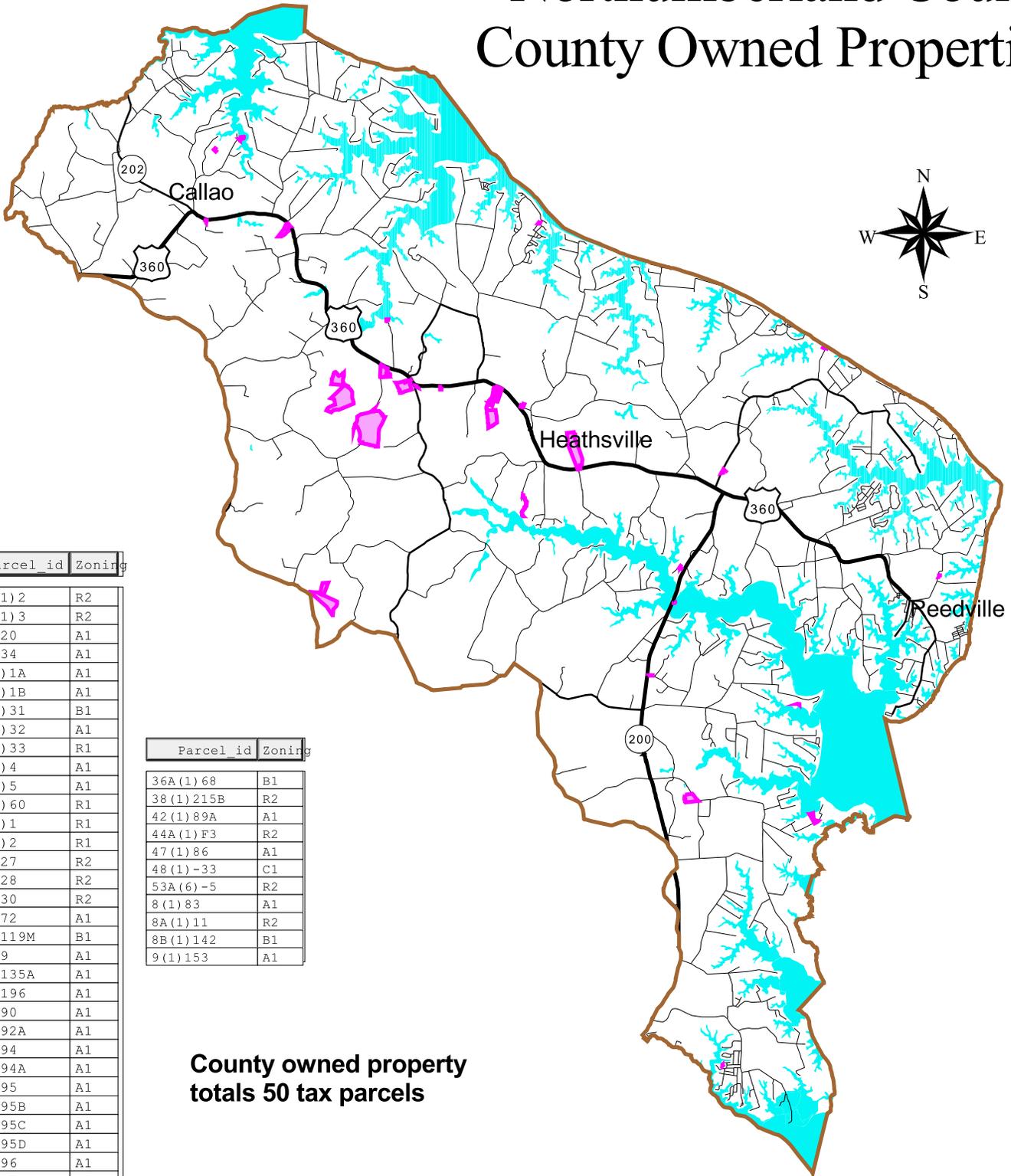
Northumberland County requested a map to show all county owned land within Northumberland County. NNPDC staff queried the digital tax parcel maps for all permutations of owner names indicating county ownership, from the Board of Supervisors, to the School Board, and other entities that are part of Northumberland County. In addition to identifying the parcel numbers of each of county owned properties, the county also requested the zoning classification of the properties. The map was delivered digitally to county staff.

From questions raised during discussions on Green Infrastructure Planning, funded through a VACZM focal area grant with Northumberland Planning Commission members, the chairman of the commission requested maps of the potential reservoir sites. The reservoir sites, as characterized by NNPDC staff, are relatively high natural areas within the county that might be considered for protection from future development. These original maps of Northumberland County reservoir sites were created under a previous Virginia Coastal Zone Management Program's PDC Technical Assistance grant the last time the county revised their Comprehensive Plan. The Northumberland County Planning Commission chairman requested the maps of the four potential reservoir sites with an 800 foot buffer around the reservoir outline, over current aerial photos. The 800 foot buffer was derived from a neighboring county, Lancaster County which has a waterfront overlay zoning district that is designed to protect water quality, which is, of course, of utmost importance when dealing with drinking water reservoirs. NNPDC staff created four maps of potential reservoir sites, and these were delivered to the Northumberland County Planning Commission chairman.

Northern Neck Land Conservancy (NNLC) staff requested a map of property owned by Mr. Garland in Northumberland County. NNLC staff had scheduled a meeting with Mr. Garland to discuss the options available to him by placing a conservation easement on his property. The Northern Neck Planning District Commission supports the mission of the Northern Neck Land Conservancy and assists them whenever possible. Aerial photographs of properties help the landowner and NNLC staff highlight the characteristics of the property and pinpoint high value natural areas such as wetlands.

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Northumberland County County Owned Properties



Parcel_id Zoning

11B(11)2	R2
11B(11)3	R2
16(1)20	A1
16(1)34	A1
16A(1)1A	A1
16A(1)1B	A1
16A(1)31	B1
16A(1)32	A1
16A(1)33	R1
16A(1)4	A1
16A(1)5	A1
16A(1)60	R1
16A(3)1	R1
16A(3)2	R1
20(1)27	R2
20(1)28	R2
20(1)30	R2
23(1)72	A1
24(1)119M	B1
24(1)9	A1
25(1)135A	A1
25(1)196	A1
25(1)90	A1
25(1)92A	A1
25(1)94	A1
25(1)94A	A1
25(1)95	A1
25(1)95B	A1
25(1)95C	A1
25(1)95D	A1
25(1)96	A1
25(1)97	A1
26(1)30	A1
27(1)191A	A1
32(1)31A	A1
32(1)32	A1
36A(1)10	R1
36A(1)11	R1
36A(1)11A	R1

Parcel_id Zoning

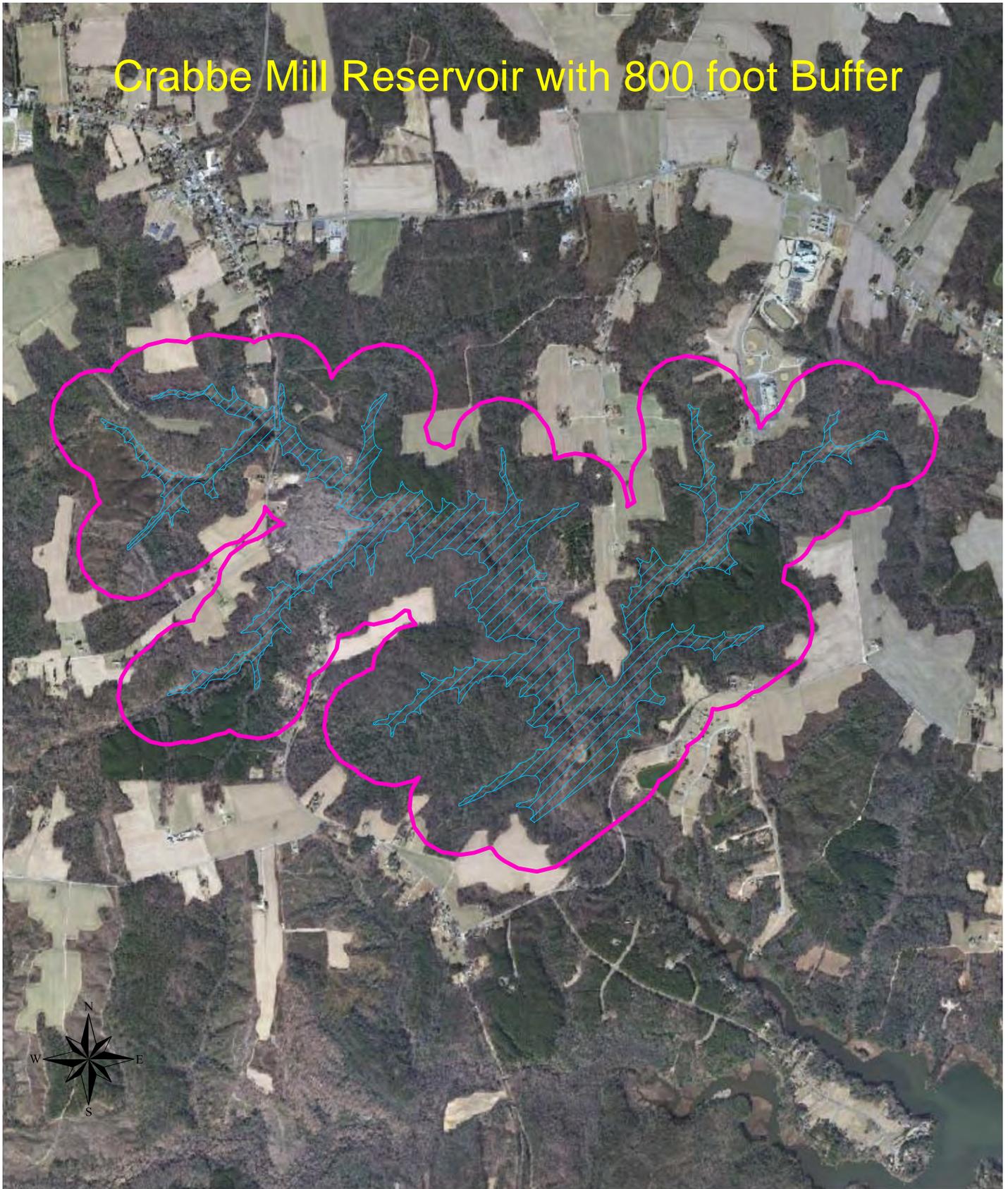
36A(1)68	B1
38(1)215B	R2
42(1)89A	A1
44A(1)F3	R2
47(1)86	A1
48(1)-33	C1
53A(6)-5	R2
8(1)83	A1
8A(1)11	R2
8B(1)142	B1
9(1)153	A1

**County owned property
totals 50 tax parcels**



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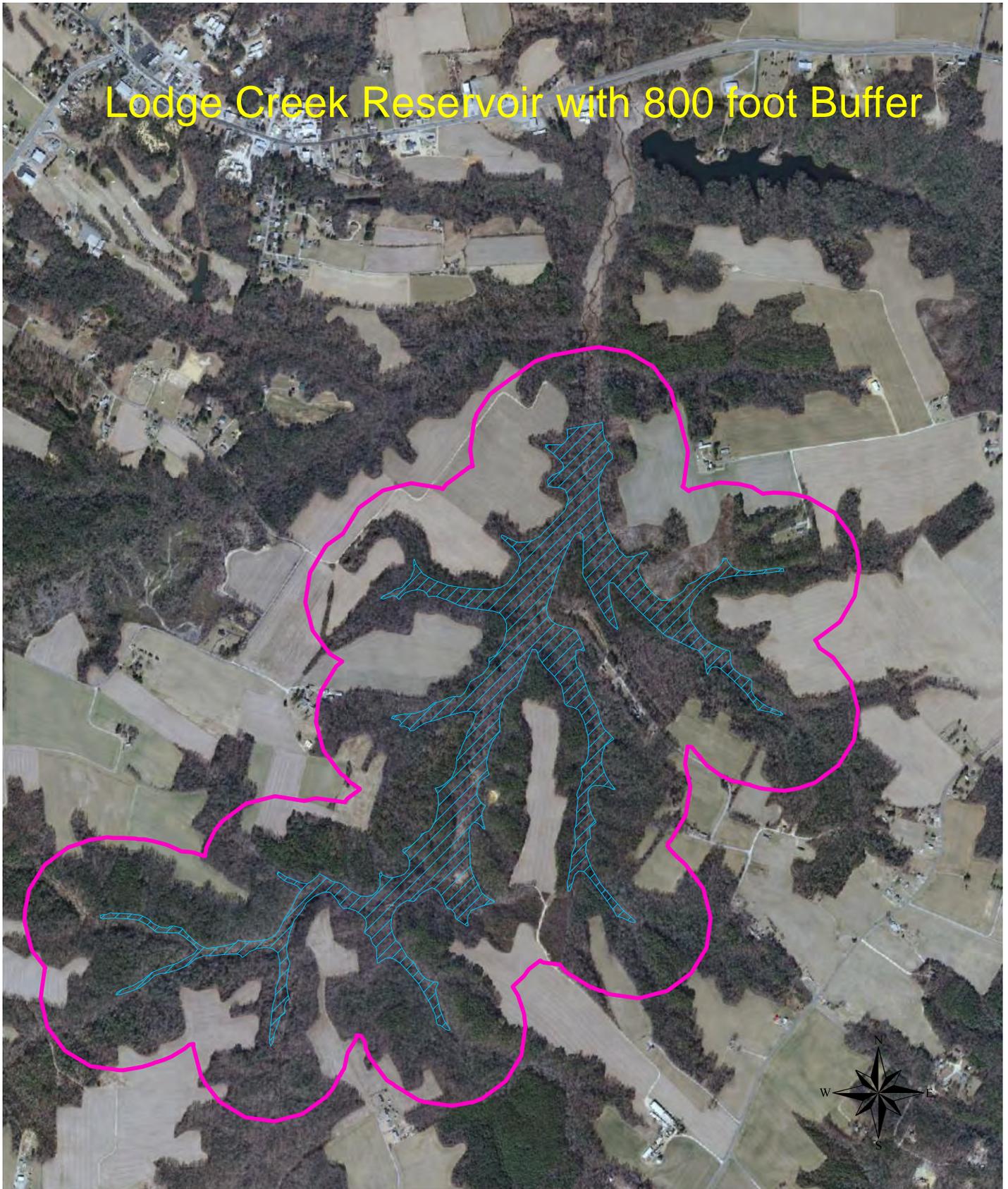
Crabbe Mill Reservoir with 800 foot Buffer



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Map Prepared February 2011

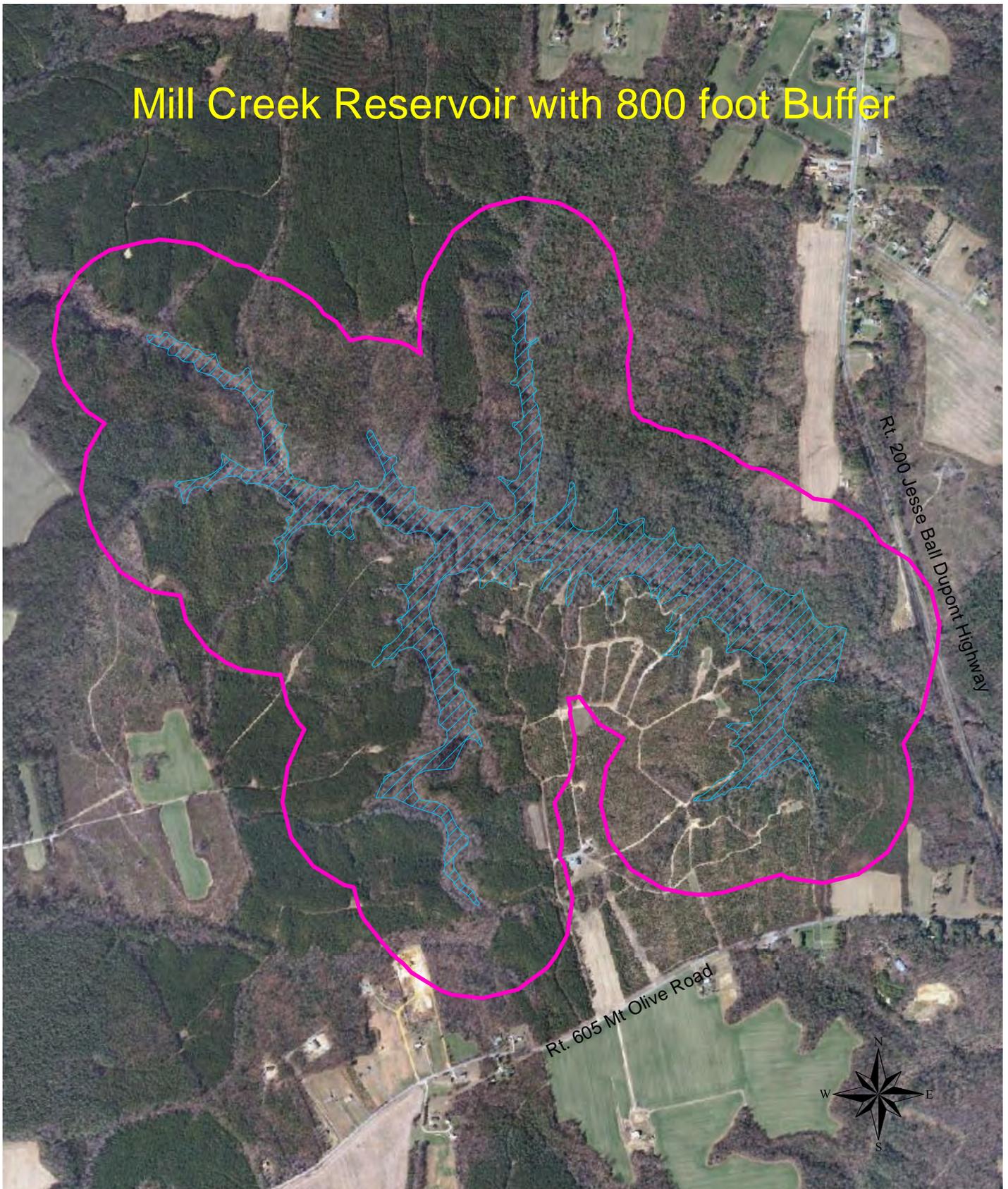
Lodge Creek Reservoir with 800 foot Buffer



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Map Prepared February 2011

Mill Creek Reservoir with 800 foot Buffer



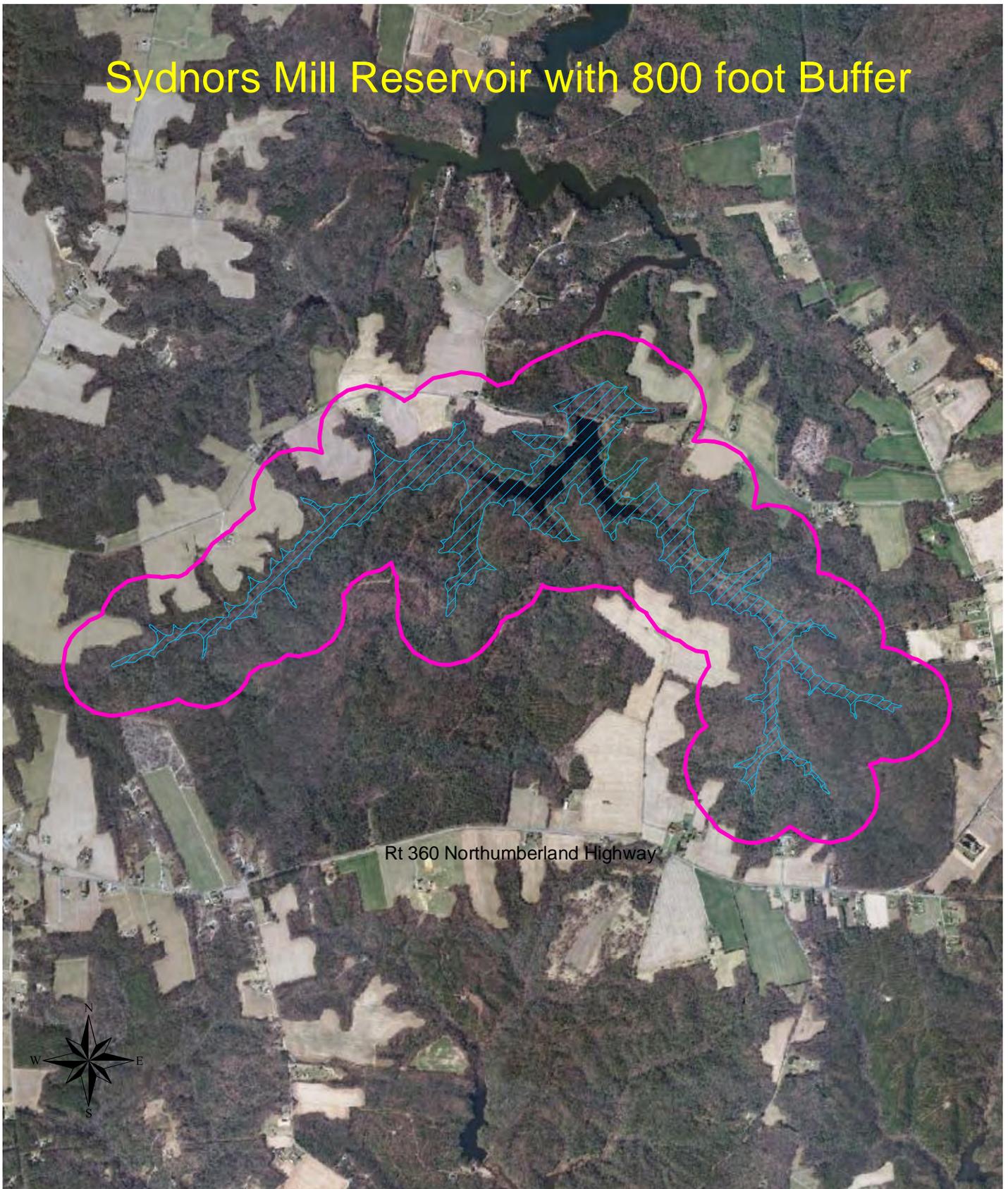
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Map Prepared February 2011

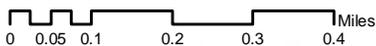
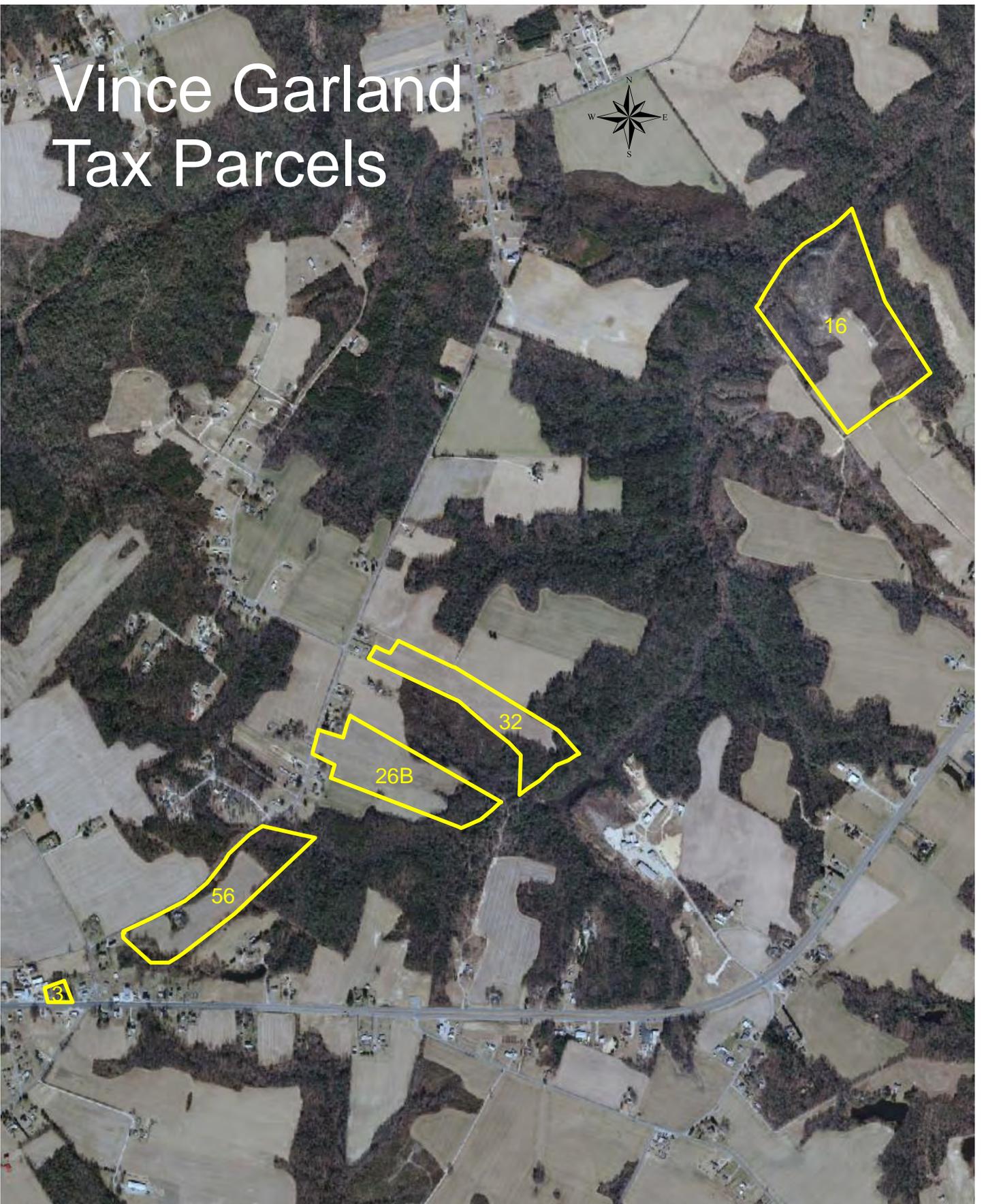
Sydnors Mill Reservoir with 800 foot Buffer



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Map Prepared February 2011

Vince Garland Tax Parcels



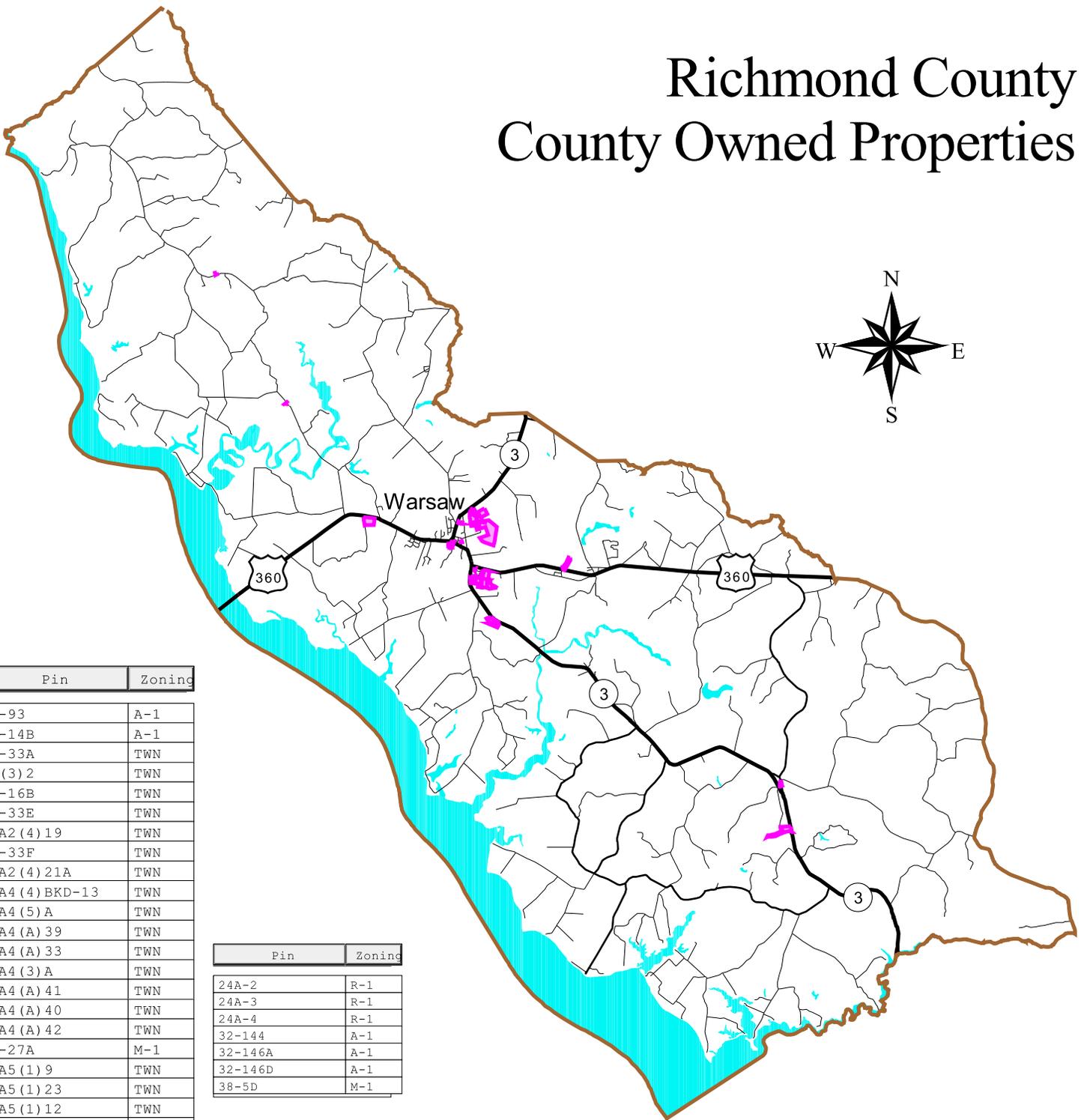
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Richmond County Requested Maps

Richmond County requested a map to show all county owned land within the jurisdiction. NNPDC staff queried the digital tax parcel maps for all various landowner names that would indicate county ownership. Properties owned by the county had various landowner names such as School Board, Board of Supervisors as well as the expected Richmond County as the landowner name. In addition to identifying the parcel numbers of each of county owned properties, the county also requested the zoning classification of the properties. The map was delivered digitally to county staff.

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Richmond County County Owned Properties



Pin	Zoning
-----	--------

10-93	A-1
11-14B	A-1
17-33A	TWN
17 (3) 2	TWN
16-16B	TWN
17-33E	TWN
16A2 (4) 19	TWN
17-33F	TWN
16A2 (4) 21A	TWN
16A4 (4) BKD-13	TWN
16A4 (5) A	TWN
16A4 (A) 39	TWN
16A4 (A) 33	TWN
16A4 (3) A	TWN
16A4 (A) 41	TWN
16A4 (A) 40	TWN
16A4 (A) 42	TWN
24-27A	M-1
16A5 (1) 9	TWN
16A5 (1) 23	TWN
16A5 (1) 12	TWN
16A5 (A) 2	TWN
16A5 (1) 30	TWN
16A5 (1) 52	TWN
16A5 (1) 53	TWN
16A5 (1) 59	TWN
16A5 (1) 60	TWN
24 (2) 4	TWN
24 (2) 3	TWN
24 (2) 1	TWN
24 (2) 3A	TWN
24 (2) 2	TWN
24-87	A-1
24-65A	A-1
24A-1	R-1
24A-2	R-1
24A-3	R-1
24A-4	R-1
24A-1A	R-1

Pin	Zoning
-----	--------

24A-2	R-1
24A-3	R-1
24A-4	R-1
32-144	A-1
32-146A	A-1
32-146D	A-1
38-5D	M-1

**County owned property
totals 47 tax parcels**



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Westmoreland County Requested Maps

As mentioned in the preceding pages, the Northern Neck Planning District Commission supports the efforts of the Northern Neck Land Conservancy in assisting citizens of the Northern Neck who wish to consider placing a voluntary conservation easement on their property. NNLC staff, from time to time, request from the NNPDC maps of parcels of landowners that they are meeting with to discuss the possibility of placing an easement on their property. This year, Westmoreland County had the most landowner meetings, and thus more map requests than the other counties. NNPDC staff created tax parcel maps over aerial photographs for five landowners, Mr. Stuart, Mr. Olif, Mr. Turnage, Ms. Hall, and Ms. Lewis. It is unknown if any of these landowners have decided to enter into a conservation easement, but in the past, NNPDC staff have noted parcels that maps were produced for the NNLC previously show up on the updated Department of Conservation and Recreation's conserved lands database.

Westmoreland County requested a map to show all county owned land within the jurisdiction. NNPDC staff queried the digital tax parcel maps for various landowner names that would indicate county ownership. Properties owned by the county were entered into the digital tax map under various county entities, such as Sewage Treatment Plant, Board of Supervisors, or School Board. NNPDC staff examined all permutation of county owner names and highlighted those properties to produce the map. In addition to identifying the parcel numbers of each of county owned properties, the county also requested the zoning classification of the properties. The map was delivered digitally to county staff.

NNPDC staff have partnered with Hull Springs Farm, owned by the Longwood Foundation on various projects, including a living shoreline demonstration project, a living shoreline suitability mapping project, as well as a rain barrel construction workshop. NNPDC attended a meeting of the Hull Springs Farm Natural Resource Advisory Council on April 21, 2011, to help brainstorm ideas for the future of Hull Springs Farm as a leader in environmental conservation and education. At that meeting, the executive director informed me that Hull Springs Farm was able to purchase additional parcels adjacent to the existing farm. The executive director noted that since they had expanded the farm, the old map that the NNPDC had produced for Hull Springs Farm (funded through a previous VACZM PDC Technical Assistance Grant) was now out of date. NNPDC staff obtained the ID's of the tax parcels that were added to Hull Springs Farm and produced a new map for Hull Springs Farm to reflect the expanded acreage.

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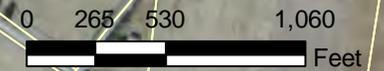
Westmoreland County Richard H. Stuart Parcel 34-11



34-11
(317.94 ac.)



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Westmoreland County Bryan G. Oliff Parcel 33-82

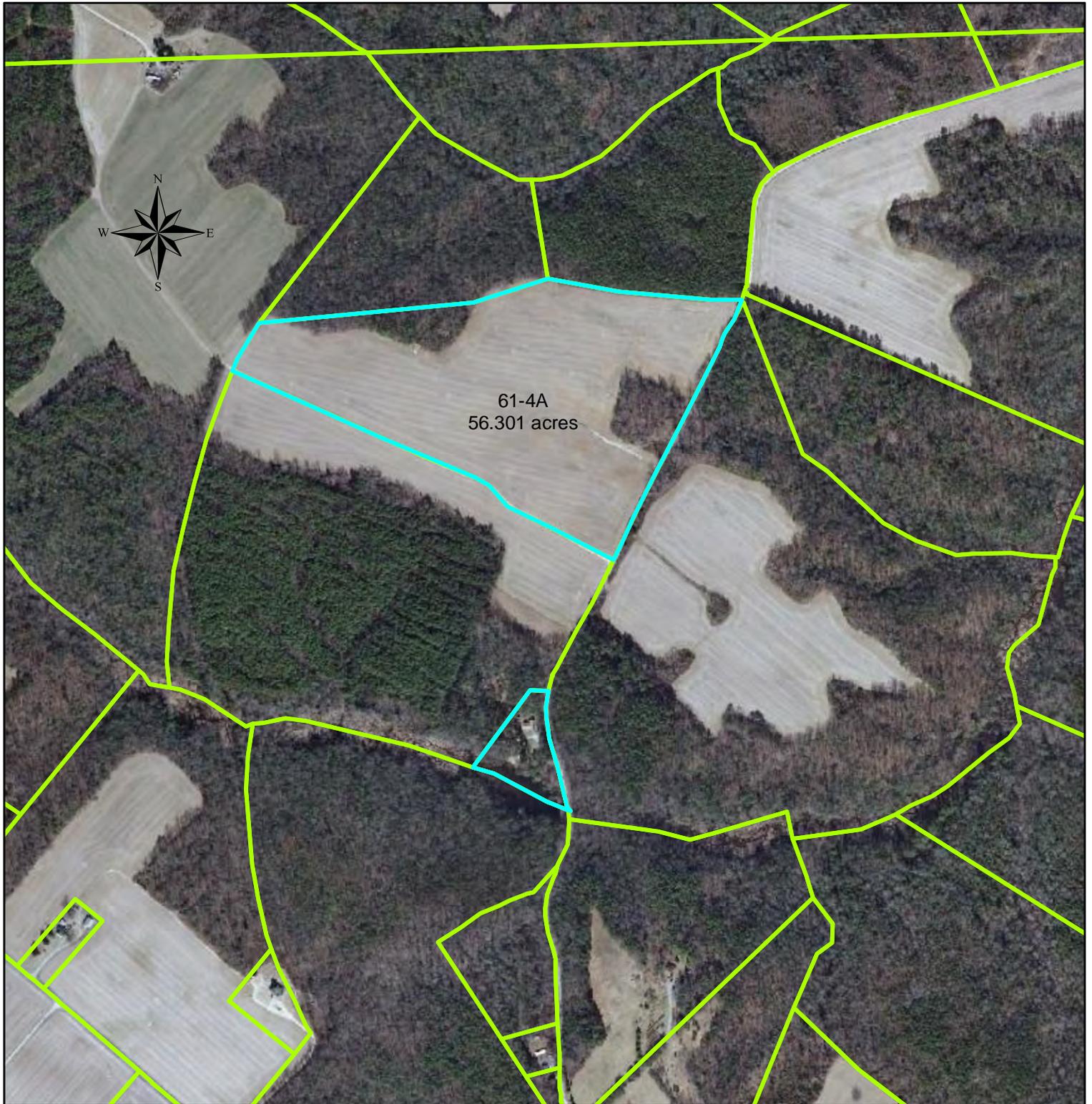
33-82
(120.6 ac.)



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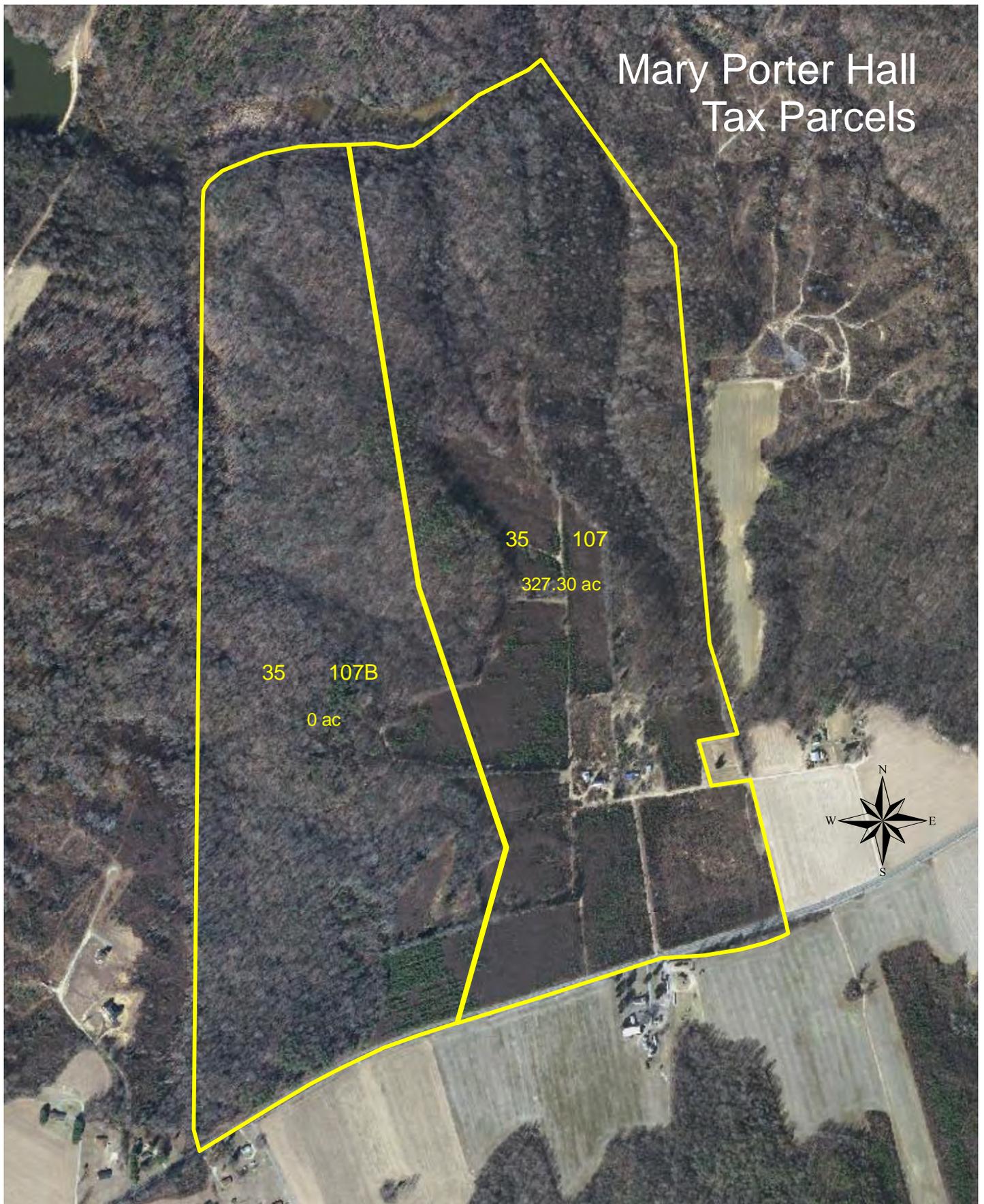


Stephen Turnage: Parcels 61-4A & 4B Westmoreland County



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Mary Porter Hall Tax Parcels



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Betty Baker Lewis
Tax Parcel

Parcel 38-177
426.1 acres



Map Prepared by

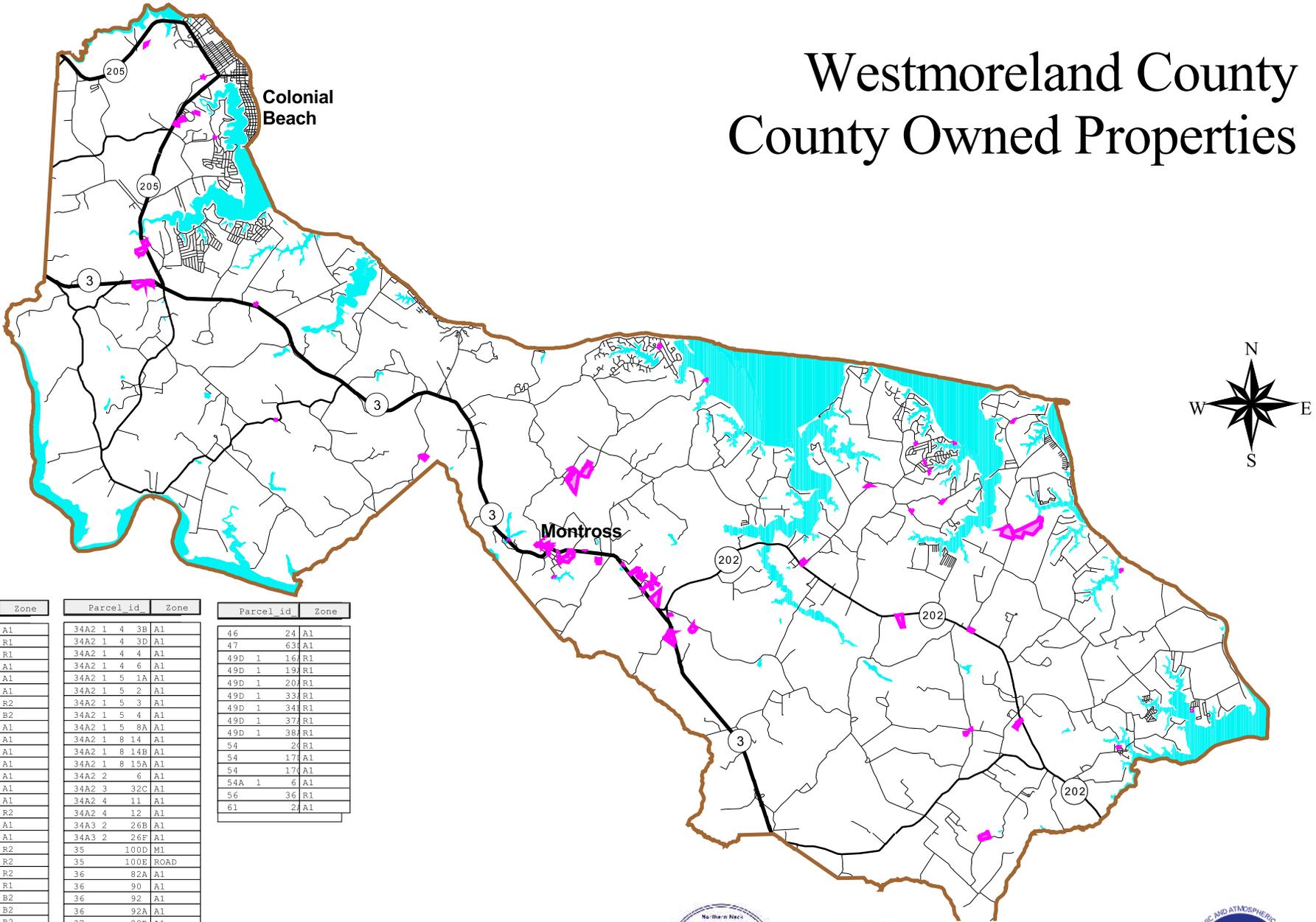


March 2011



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Westmoreland County County Owned Properties



Parcel id	Zone
2	51 A1
3	57 R1
3B 1	8 R1
6	110 A1
6	113 A1
6	130 A1
6G 1	1 R2
9	29A B2
9	57 A1
9	57A A1
9	57B A1
11	9C A1
19	24D A1
20	62H A1
23	10J A1
23C	41 R2
26	56B A1
26K1 3	32 A1
26K1 3	171 R2
26K2 1	307 R2
26K2 2	10 R2
33A 1	11A R1
34	C1 B2
34	C2 B2
34	C6 B2
34	13H A1
34	13K R1
34	17B A1
34	33 B2
34	98A A1
34	103 M1
34	115J A1
34	117B A1
34	118F A1
34	121P R1
34	137C A1
34A1 4	10A A1
34A2 1 3 33	A1
34A2 1 3 34	A1

Parcel id	Zone
34A2 1 4 3B	A1
34A2 1 4 3D	A1
34A2 1 4 4	A1
34A2 1 4 6	A1
34A2 1 5 1A	A1
34A2 1 5 2	A1
34A2 1 5 3	A1
34A2 1 5 4	A1
34A2 1 5 8A	A1
34A2 1 8 14	A1
34A2 1 8 14B	A1
34A2 1 8 15A	A1
34A2 2	6 A1
34A2 3	32C A1
34A2 4	11 A1
34A2 4	12 A1
34A3 2	26B A1
34A3 2	26F A1
35	100D M1
35	100E ROAD
36	82A A1
36	90 A1
36	92 A1
36	92A A1
37	28B A1
37	64A A1
38	11C A1
38	131 A1
39	5F A1
40	1A A1
44	3H A1
44	8 A1
44	49G A1
44	50A A1
44	50B A1
44	50C A1
44	51Y A1
44	57A A1
44A 1	7 R1

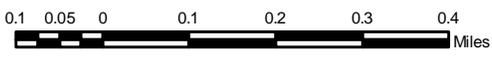
Parcel id	Zone
46	24 A1
47	63 A1
49D 1	16 R1
49D 1	19 R1
49D 1	20 R1
49D 1	33 R1
49D 1	34 R1
49D 1	37 R1
49D 1	38 R1
54	24 R1
54	17 A1
54	17 A1
54A 1	6 A1
56	36 R1
61	24 A1

County owned property totals 93 tax parcels.



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Hull Springs



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II. Local Coordination and Training

NNPDC staff were contacted by the Northern Neck Master Gardeners to give a presentation on low impact development (LID) at a January 27, 2011 workshop. There were twenty-two master gardeners in attendance at the workshop in January. The presentation examined pre- and post-development hydrographs and explained that in the past, storm water management focused on conducting water off the property as fast as possible. In contrast, NNPDC staff explained that low impact development principles seek to reduce the amount of storm water generated by reducing the amount of impervious surface, disconnecting flow and infiltrating the remaining storm water on site. All of these factors reduce storm water flows, and by corollary, also reduce the quantity of non point source pollution entering local surface waters. NNPDC then highlighted the NNPDC LID Parking Lot Retrofit that was completed in 2005 as an example of practices that could be employed by homeowners with whom the master gardeners consult most often. After the presentation, questions were fielded, many of which were very insightful, such as which is most effective at reducing nutrients; French drains or bio-retention basins? NNPDC staff responded that bio-retention basins should reduce a larger amount of nutrients, due to the retention of water for longer periods of time, as well as the biological activity in the near subsurface soil and mulch mixture. French drains, NNPDC staff explained, usually contain sand and gravel, and may filter sediment and particles from stormwater runoff, but do not reduce nutrients significantly.

NNPDC staff conducted four local coordination meetings as well as four training sessions. The first training session was held in the morning March 8, 2011. The Executive Director of Hull Springs Farm, Ms. Bobbie Burton, presented on their effort to become a wetland mitigation bank and their ongoing work as a demonstration site for living shoreline protection. A question was raised by a county staff person concerning the specific watershed that Hull Springs Farm would be able to take credits once established? Ms. Burton replied that since Hull Springs Farm was in the Potomac Basin, so they could accept credits in the Potomac watershed downstream from the Route 301 bridge in King George County, down to the mouth of the Potomac at Smith Point in Northumberland County.

NNPDC asked whether logging would be allowed in the future in the wooded wetland areas of the mitigation bank. Ms. Burton replied that as part of a regulated mitigation bank, no logging is permitted. However she added that woodland management which might involve taking out select dead or diseased trees would be allowed. Ms. Burton also extended an open invitation to county representatives to come and visit the living shorelines that have been established at Hull Springs Farm. She mentioned that Westmoreland County Middle School students had visited Hull Springs Farm on several different occasions relating to an oyster gardening project. NNPDC staff mentioned to county land use staff that members of their county wetland boards might consider a field trip to educate themselves on the advantages of living shorelines, their limitations, and how they look once established successfully.

NNPDC staff conducted the local coordination meeting after the training, NNPDC staff updated each county on the status of their VACZM grant deliverable, as well as soliciting ideas for projects for the NNPDC technical assistance Virginia Coastal Zone Management Program in the upcoming grant year (2011). NNPDC staff briefed local land use staff on the Bay TMDL

Watershed Implementation Plan (WIP) Phase I. As a member of Virginia's Stakeholder Advisory Group (SAG), NNPDC staff reported on how Virginia's WIP I was compiled, as well as other information on the process. NNPDC staff explained that Stakeholder Advisory Group members were subdivided into smaller workgroups by sector: wastewater, agriculture, urban stormwater, and onsite/septic systems. Each workgroup set up several meetings to discuss, with the help of state staff assigned to assist each group, scenarios of BMP implementation levels in that sector that could be reasonably achieved, be cost effective and reduce enough nutrients to meet the WIP I Bay TMDL nutrient reduction goals. After the workgroups presented their information to the SAG, DCR staff compiled the information to formulate what would eventually be the Phase I Watershed Implementation Plan for Virginia. NNPDC also briefed local county staff on the next steps in the Bay TMDL process, namely the Phase II Watershed Implementation Plan, as well as the accompanying timeline..

The roundtable portion of the coordination meeting, where local land use staff can float ideas or share information on trends in their county, consisted of questions regarding a large development proposal in Northumberland County. The bayside peninsula development proposal is located in lower Northumberland County. Northumberland County staff informed the attendees that county staff did not feel they had the necessary capacity to review the development proposal as it was the largest and most complex the county has received to date. Therefore, the Board of Supervisor's decided to hire a consultant to examine the proposal to see if it was consistent with the comprehensive plan and zoning ordinance. Several attendees wondered who would be in the market to purchase lots in this new community when there are many homes in the county were currently being foreclosed upon and the economy is showing little signs of recovery.

On June 17th, the NNPDC hosted Virginia Department of Conservation and Recreation staff for training on the Chesapeake Bay TMDL. DCR staff presented each locality with the Chesapeake Bay Model data from Model Version 5.3.0 for their county. The data included Chesapeake Bay model land use data, nutrient reduction progress to 2009 and the state's Watershed Implementation Plan Phase I BMP implementation levels needed to achieve the nutrient reduction goal required by the Bay TMDL by 2025, as well as the interim BMP implementation levels to meet the 60% implementation of BMPs by 2017. There were 27 persons in attendance; in addition to county administrators, land use administrators, and NNPDC staff, there were many Virginia state agencies represented. Staff from the Department of Forestry, Virginia Department of Health, as well as the Virginia Department of Transportation participated in the meeting. DCR staff explained the Chesapeake Bay TMDL process, the tight timeline that has been set by EPA, and what was expected from local governments in formulating the state's Watershed Implementation Plan Phase II. DCR staff also relayed that they had already received from EPA the new 5.3.2 version run of the Chesapeake Bay Model, but they were still internally reviewing the data. DCR indicated that it would be a couple of months (August or September) before they would have the 5.3.2 Chesapeake Bay Model Data available to counties to view and use.

After the state staff concluded the presentation and left, NNPDC staff discussed options with local county administrators and land use staff. NNPDC outlined the options to not participate in the Phase II Watershed Implementation Plan process and let the state submit their "best guess" of what levels of BMP's would work in the Northern Neck (essentially the Watershed

Implementation Phase I), or cooperate with the state and each county gather updated information on implementation achieved to tailor the Watershed Implementation Plan Phase II to the local needs and circumstances of the Northern Neck region. All four county administrator's weighed the options and chose to cooperate with the state to hopefully assist in creating a more implementable WIP II nutrient and sediment reduction plan in the region. NNPDC staff moved onto the next important question, whether the counties wanted to communicate the data to DCR directly, or work through the NNPDC, and have NNPDC staff submit information and revised plans to DCR on behalf of each of the four counties. All four counties agreed to partner with the NNPDC to coordinate all activities relating to the Bay TMDL Watershed Implementation Plan Phase II. NNPDC staff then briefly outlined what kind of data was needed from the counties and that county staff should begin to compile that data now to get ahead of the schedule. Examples of data requested were acres treated by stormwater infiltration, dry or wet detention ponds, and the number of septic systems pumped or connected to a sewer system. NNPDC staff noted that the timeline was very tight, and that the NNPDC would need county data sooner rather than later.

NNPDC staff contacted Virginia Institute of Marine Science (VIMS) staff for training on working waterfront protection initiatives in Virginia. The training was held on July 27th at the NNPDC. The NNPDC, under a previous PDC technical assistance grant, had done a rudimentary inventory of working waterfront areas in the region, and local staff were interested in learning what developments had occurred at the federal and state level since that initial inventory. VIMS staff relayed the developments in federal legislation related to working waterfronts and outlined the FY2012 NOAA budget allocations to working waterfront protection. VIMS staff then outlined the Virginia Coastal Zone Management Programs proposed project to establish a coastal zone-wide working waterfronts plan for Virginia that will guide communities in protecting, restoring, and enhancing their water-dependent commercial and recreation activities. Implementation strategies for working waterfront protection include educating communities regarding the long term costs associated with loss of working waterfronts, developing policy or specific tools to help manage changing growth pressures, and building capacity to assure that working waterfronts continue to be a thriving component of local economic development. County staff, echoing comments that were made during the initial NNPDC desktop inventory of working waterfront areas, wondered if some of the derelict and abandoned seafood houses in their county were abandoned because the carrying capacity of the resource (the oyster) had diminished to a point where there were too many facilities and not enough product available to process. County staff thought that the seafood industry infrastructure may have "corrected itself" to the new situation and that the old working waterfront areas were not needed because of the decimation of the oyster industry due to disease and pollution. VIMS staff countered by stating that with aquaculture gaining ground among seafood processors, the seafood industry infrastructure may need to correct itself the other way, and add more or expand existing facilities in the future to be able to process the increased harvest from new or expanded aquaculture activities.

After the working waterfront training discussion was finished, NNPDC staff began the local coordination part of the Northern Neck Land Use Administrator's Meeting. NNPDC staff, by request of Richmond County, invited a local electrical service cooperative staff person to encourage localities to amend their subdivision ordinance to add "installation of electrical utilities". The local electrical service cooperative employee told the administrators that there had

been a few instances where a subdivision was established without a plan for electrical transmission line easements. After the subdivision was established a landowner in a remote section of the subdivision was not able to get electrical service to his parcel because his neighbor would not agree to an electrical easement across his property. All counties in the Northern Neck currently have subdivision ordinances that require certain conditions in order to be approved, such as a VDOT compliant road structure for ingress and egress to the state highway system. Electrical service cooperative staff requested that installation of electrical utilities (or at least electrical easements shown on the plat) be added as a condition of county subdivision approval. Electrical service cooperative staff noted that in case of a problem with access to a property, if an alternative route has to be formulated, it can result in extreme costs to the landowner (not the developer or electrical service provider), and this amendment would actually protect landowners from exorbitant electrical service connection costs. Most attendees agreed that it was a good idea, but there was some discussion on whether the actual utilities needed to be installed, or whether an electrical service plan (provisions for easements in the submitted subdivision plat) would serve the same purpose. All agreed to take it to their respective county planning commissions but could not guarantee approval.

VACZM staff informed those present about recently passed legislation by the Virginia General Assembly that required localities to add a shoreline management guidance from VIMS and Virginia Marine Resources Commission into the Comprehensive Plan when next revised. The Virginia state code currently requires localities to have a Comprehensive Plan and also to review the Comprehensive Plan at least every five years. NNPDC staff queried whether the counties (or PDC's for that matter) would be able to compile a shoreline management plan for a county that would meet the criteria. VACZM staff responded that these shoreline management plans are very complex and require specialized knowledge of coastal geology and natural forces, thus could not be effectively created by a layperson. VACZM staff added that legislation states that shoreline guidance be provided by VIMS, which would require their involvement in the creation of the shoreline management plan. VACZM staff noted however that through VACZM there would be some funding available in the future to develop a portion of these local shoreline management plans. Local county staff all expressed hopes that funding would be available for their county.

NNPDC staff reminded county staff present of the Bay TMDL impending deadline on February 2, 2012, and that updated data on septic pumpouts, septic connections, and acres treated by various storm water practices was needed. NNPDC staff indicated that gathering this data would, in the long run, end up saving the county money, by making sure existing practices are counted before new programs or practices are implemented. NNPDC staff handed out data from the DCR local goals spreadsheet to remind county staff of what mix of nutrient reduction BMP's are being proposed for nutrient reduction in their county.

NNPDC staff coordinated a training session with VIMS support staff and each of the four county wetland boards in the Northern Neck region on September 28, 2011. The training session focused on the newly formulated shoreline management decision tree developed by VIMS staff to assist local wetland boards in assessing proper shoreline management techniques based upon individual shoreline characteristics. The shoreline management decision tree developed by VIMS staff is a guidance tool that resembles a flow chart which has specific questions to answer in succession. Depending on the answer of the first question, there are differing sets of questions

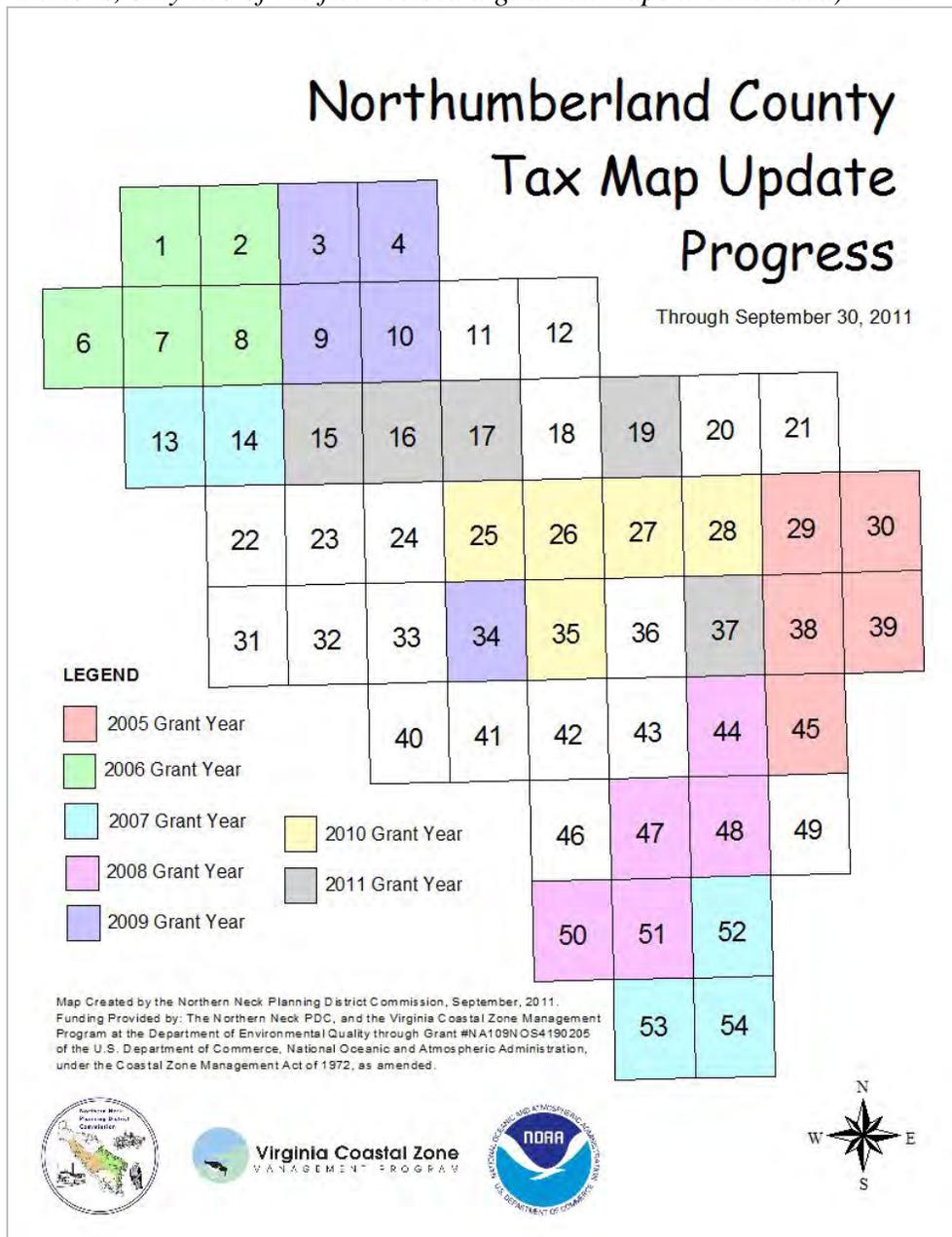
in succession. Depending on the answer of the first question, there are differing sets of questions that follow to answer, each depending on the subsequent answer to determine which branch to take in the decision tree. Depending on a particular answer, potentially different shoreline management actions could result. Invitations were sent to every wetland board member in all four counties. Eleven wetland board members from three counties attended the workshop. The training session began with a presentation by VIMS staff on the principles of the shoreline management decision tree and examples on how to utilize it to examine an individual site. After the presentation and questions, the group broke out into smaller subgroups and each subgroup was given example case studies of actual shoreline properties that included photographs, maps and background information on each site. When each subgroup had decided on a solution, generated from utilizing the shoreline management decision tree, VIMS staff would circulate and either affirm the solution, or work with the subgroup to see where the wrong turn was made in using the decision tree to learn from the mistake. After the training session, all wetland board members echoed the sentiment that they felt as if they understood the decision tool better and were more comfortable utilizing the tool for their project review.

The afternoon of September 28, 2011, NNPDC staff convened a Northern Neck Land Use Administrator's local coordination meeting with county staff from the four counties of the Northern Neck. The majority of this local coordination meeting dealt with local strategies to reduce nitrogen, phosphorous, and sediment to meet the Bay TMDL nutrient reduction goals. NNPDC staff suggested several alternatives for the counties to consider, such as urban nutrient management on county owned lands, urban nutrient management planning education, impervious surface reduction outreach/education, as well as promotion of permeable pavers for residential driveway construction. Local county staff, as a result of the economic downturn, were reluctant to take on additional local programs without any funding source secured. NNPDC staff then stressed the importance of gathering county BMP data for the 2009 progress update of nutrient reduction BMP's already implemented. NNPDC staff reasoned that while gathering that data may take considerable staff time in the near term, it will pay off dividends in the long run. NNPDC staff explained that any BMP's already implemented would reduce the need for new BMP's to be implemented (as well as financed) in upcoming years.

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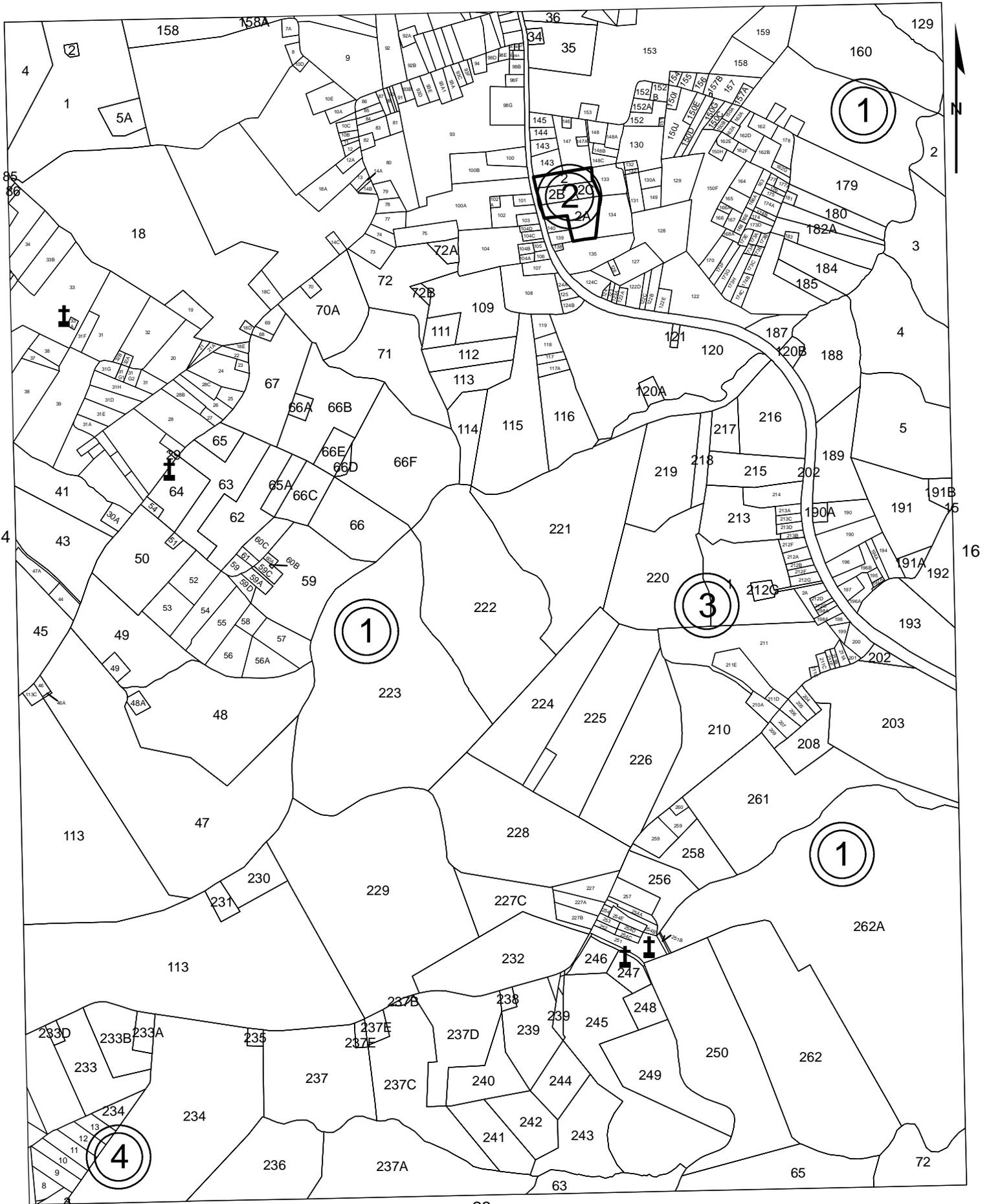
III. Northumberland County Five Revised Digital Tax Maps

NNPDC staff have been updating Northumberland Counties tax maps since 2005. The existing digital tax maps are being revised using Virginia Base Mapping Program's 2009 Aerial photography. Northumberland County has chosen this approach to update their digital tax maps to reduce the cost of having the maps revised by an outside vendor. NNPDC staff have extensive experience with digital tax maps revision, and was employed by the vendor that created the first digital set of tax maps for the county. This grant year, the five tax maps that were revised were 15, 16, 17, 19 and 37. (Due to file size limitations, only two of the five revised digital tax maps are included).



Northumberland County

19



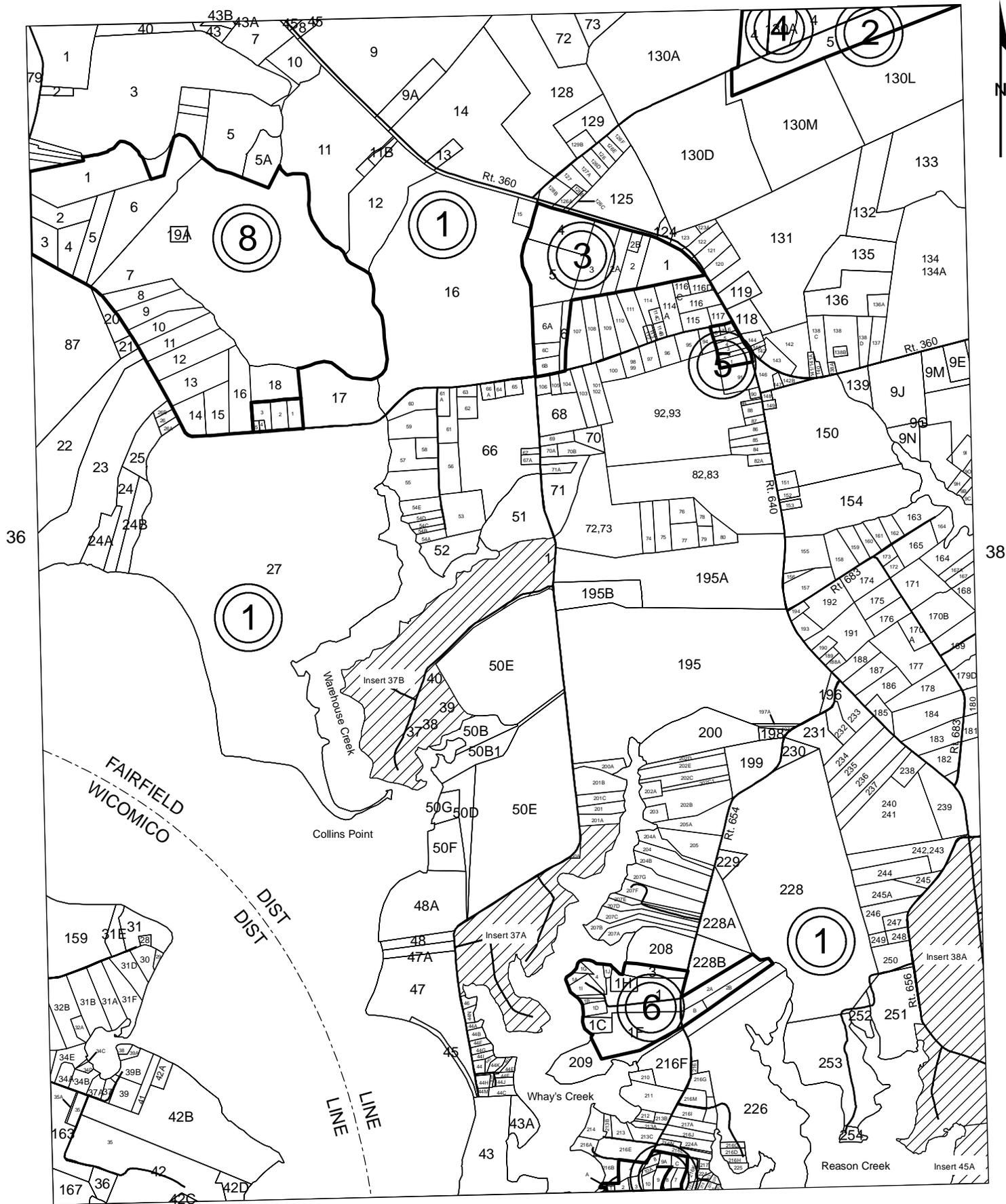
0 0.125 0.25 0.5 0.75 Miles

23
28
LOTTSBURG DISTRICT
HEATHSVILLE

SECTION 15
INSERT

Northumberland County

28



44

0 0.125 0.25

0.5

0.75
Miles

FAIRFIELD DISTRICT
WICOMICO²⁹

SECTION 37
INSERT

Northumberland County Tax Map 37 Example of Revisions



Virginia Coastal Zone
MANAGEMENT PROGRAM



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA10NOS4190205 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

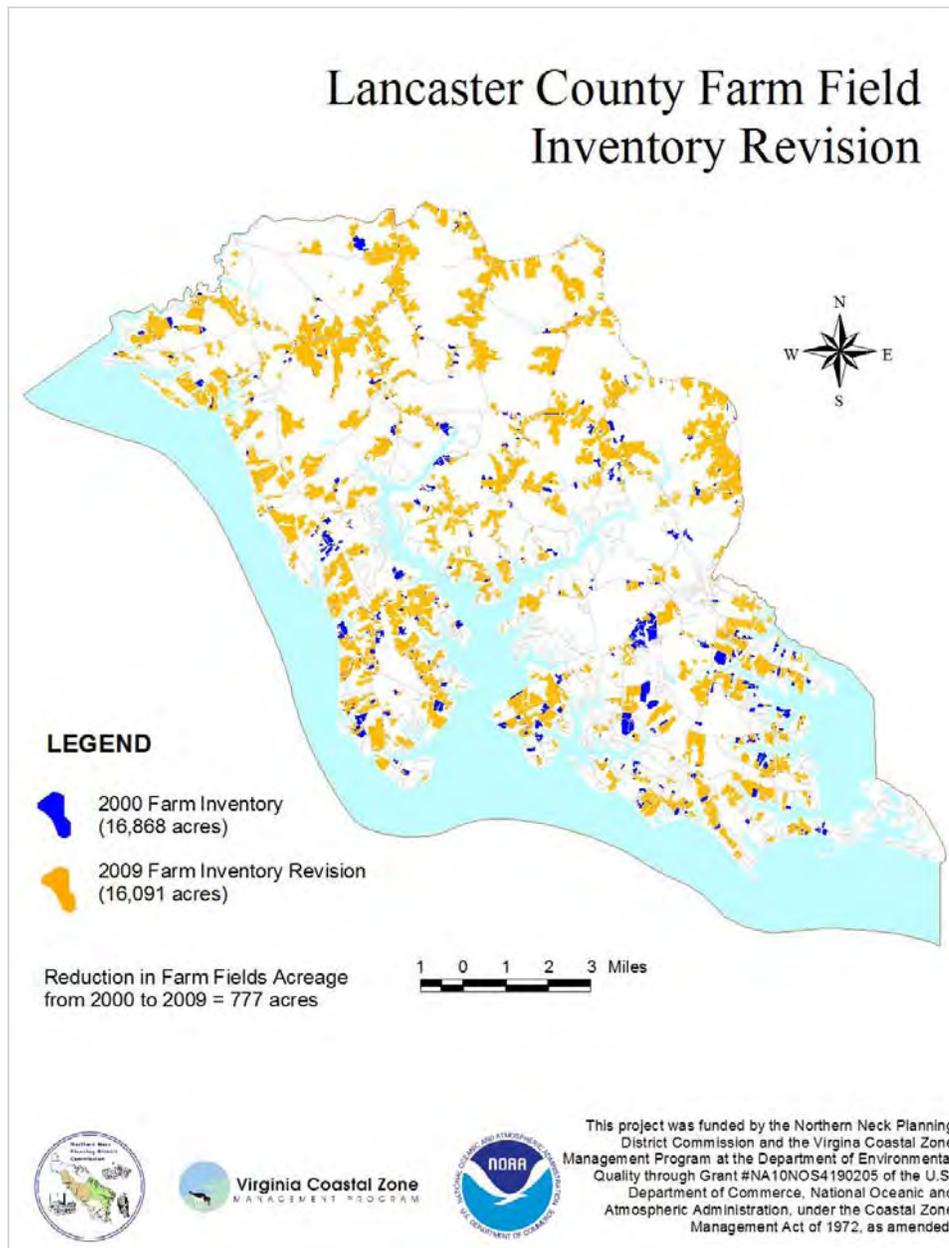
IV. Lancaster County Agriculture Data Revision Database

Virginia Department of Conservation staff, at one of the Northern Neck Land Use Administrator's Quarterly Meetings, told those present that Phase III Implementation of Virginia's Chesapeake Bay Act is proceeding. One of the requirements of Phase III is for counties to notify landowners of the requirement of the Chesapeake Bay Act that those lands in agricultural production must have an up-to-date nutrient management plan. Nutrient management plans utilize soil tests from the agricultural fields to determine the appropriate amount of nutrients need for various crop types on each field. By testing the soil in each field, nutrient management plan writers are able to determine the nutrient balance of the soil. Knowing this, they can customize a fertilizer concentration for each field that provides for the intended crops growing needs without over application. Agricultural producers need applications of fertilizer to increase production to achieve a reasonable profit margin at harvest. Over application of fertilizer (or the wrong combination of nutrients within the fertilizer mixture) can not only be costly for the farmer, but also is a leading contributor of excess nitrogen and phosphorous to the Chesapeake Bay, which can cause algal blooms and low dissolved oxygen levels. The Chesapeake Bay TMDL, a regulatory process currently underway, seeks to reduce nutrients entering the Bay to levels that will not impair Chesapeake Bay water quality. Nutrient management planning is one of the state of Virginia's cornerstone best management practices designed to reduce nutrients inputs into Virginia Chesapeake Bay tributaries. Virginia, by implementing Phase III of the Chesapeake Bay Act, hopes to increase the number of farmers utilizing nutrient management plans, thereby reducing excess nitrogen and phosphorous leaching into groundwater and eventually into the Chesapeake Bay.

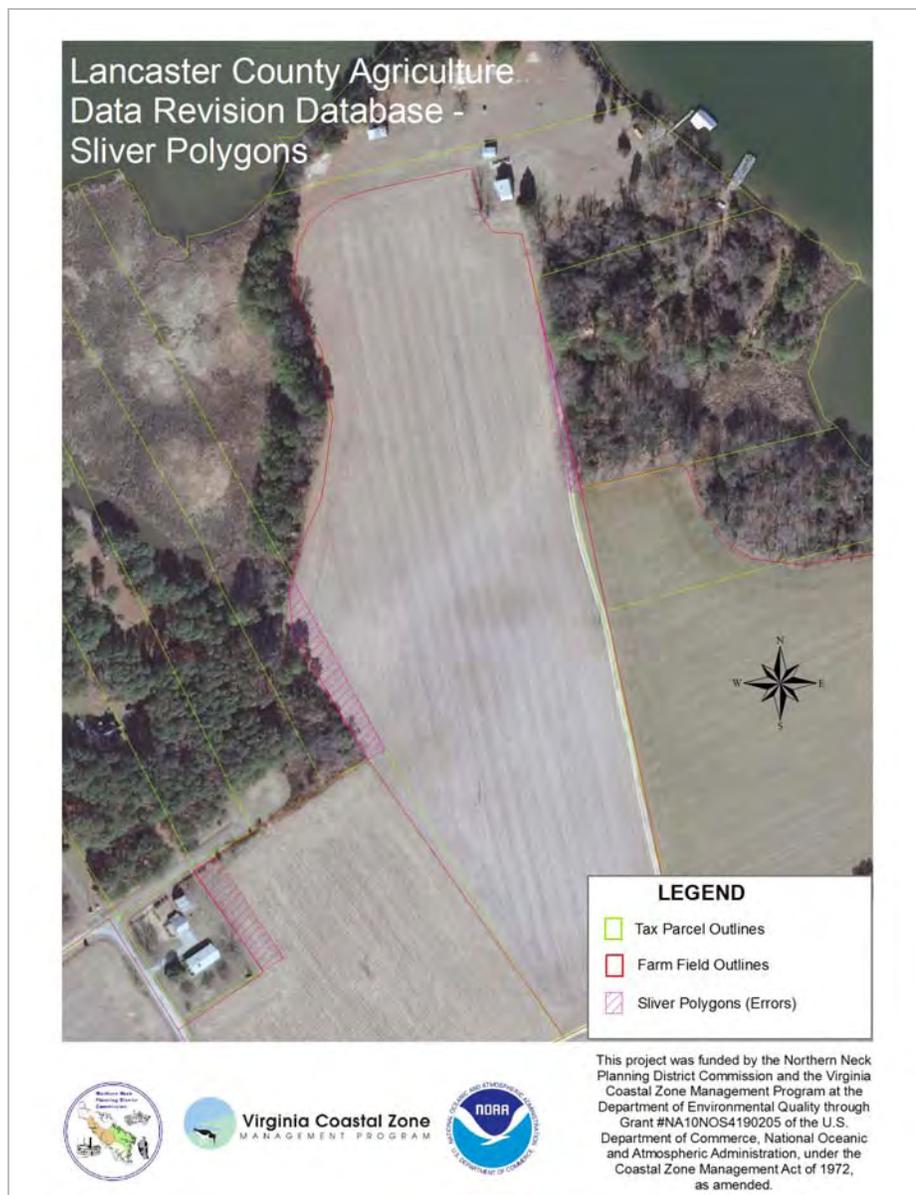
Identifying the landowners within Lancaster County with lands in agricultural production is a necessary step to contacting them regarding the requirement of up-to-date nutrient management plans. Lancaster County requested the NNPDC assist them to compile a list of landowners and parcels of land that are engaged in agricultural production.

NNPDC staff began with an existing GIS data layer, created from a previous Virginia Coastal Zone Management Program grant that inventories all known farm fields within the county. Although this farm field inventory data was dated (the original GIS data was created in 2000, then updated in 2006), NNPDC staff then overlaid the farm field inventory layer with the 2009 Virginia Base Mapping Program's Aerial Photography. Next, NNPDC staff examined each and every farm field within the county to determine if evidence from the aerial photo indicated agricultural production. NNPDC staff also examined the remainder of the county's land surface to look for new agricultural production farm fields. NNPDC staff utilized their remote sensing background to aid in the identification of agricultural tracts, relying on texture of the vegetation within the field, the evidence of rows in the fields, presence of tractor (or combine) tire tracks, presence of farm buildings, watering troughs, feed bins, as well as fencing were used to identify pastures. NNPDC staff revised fields that were partially converted and removed any fields that have been converted to forestry or residences, as well as digitizing any new farm fields identified. After completing the revision of the Lancaster County farm inventory, the data layer was up to date as of April 2009 (the date of the aerial photography). NNPDC staff, wishing to further analyze the gradual loss of farmland that is occurring in Lancaster County (and throughout Virginia), calculated the acreage of the 2000 farm field inventory and compared it to

the revised (2009) farm field inventory. In 2000, the farm field inventory consisted of 16,868 acres of farmland, while the 2009 update of the farm field inventory showed 16,091 acres, a difference of 777 acres over the nine year period. This equates to a loss of 86 acres of farmland a year in Lancaster County, according to the GIS data set. This is a disturbing trend; however the fact remains that farmland is flat, well drained, and does not require land clearing for development to begin, and as such, is the most attractive (and cheapest) land to convert to other uses. NNPDC staff, while in the course of updating the fields made note that in more than several instances, where waterfront land was developed, the interior part of the tax parcel remained in agricultural production, which gives hope that Lancaster County's agricultural base can be preserved, although at a diminished capacity, as waterfront development continues.



After the farm field inventory was revised, the farm fields were intersected with the county digital tax map layer, generating a GIS data layer that showed the location of farm fields, as well as the land ownership data of those fields that was included in the attribute table. NNPDC staff examined the revised farm fields intersected with the digital tax map and found many "sliver" polygons created from the intersection process that included tax map parcels that were not in agricultural production. Upon further investigation, it was discovered that there were multiple errors in digitization of the farm fields as well as occasional errors in tax parcel digitization. These errors in farm field outlines caused small areas (sliver polygons) of non-agricultural production tax parcels to be included in the farm data layer. In order to improve the accuracy of the final farm inventory data, NNPDC staff decided to eliminate all polygons of 1/2 acre or less, reasoning that it would be inefficient for a farmer to farm such a small field. This operation cleaned up a majority of the sliver polygons in the data. Below is map showing several sliver polygons.



The digital attribute table that is attached to the GIS data layer was copied and was further edited to remove duplicate tax parcels. In some instances, a farm field would wind in and out of a tax parcel, causing that parcel to have multiple records in the database. Since any notification letter sent from the county would not want to show more than one specific tax parcel number per letter, this operation, though tedious, was necessary in order to avoid duplication. In order to complete this operation, the tabular farm field owner data had to be separated from the geographic data, as deleting records for polygons would corrupt the geographical data. Therefore, the agricultural data revision database for Lancaster County was divorced from GIS data and is now a stand-alone database. The database was converted from its native DBase (.dbf) format to an MS Excel format, to facilitate the mail merge process when the county decides to send the notification letter to owners of agricultural production parcels.

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V. Richmond County Buildable Areas Map

The concept of the Buildable Areas Map came out of the last Richmond County Comprehensive Plan revision. Richmond County staff had wondered how much developable land was available in the county. In addition Richmond County staff thought it would be good to have a map showing where development would be appropriate, to be able to share with landowners who wish to develop their property. In this possible scenario, a landowner could contact the county to discuss the development potential of the landowners property. The Buildable Areas Map could be used as quick check to identify the constraints of a specific parcel before a site visit.

Richmond NNPDC staff coordinated with Richmond County building and land use staff in formulating the environmental constraints layer(s) to be used for creation of the Richmond County Buildable Areas Map. County staff recommended using the 100 foot Chesapeake Bay Resource Protection Area, the National Wetlands Inventory Wetlands, private land protected by conservation easements, and public land protected by conservation easements. NNPDC staff contacted staff from the Virginia Department of Conservation and Recreation and received the conserved lands data for the Northern Neck region to use in this project. NNPDC staff, utilizing a Geographic Information System, created a draft map with each of these environmental constraints layer combined. Each constraint layer was added on top of one another so that the constraints layer could be ranked. Since there are four constraints, the rank is from 0-4 (0 = no constraints or a buildable area, 4 = all four constraints together in one spot). This ranking allows a user to examine a location within the county to identify whether the area in question has one, two, three or four environmental constraints involved. With sites with only a single environmental constraint, engineered solutions can sometime overcome the problems associated with that constraint, so it is important for the Buildable Areas Map to display the graduated environmental constraint ranking. For certain constraints in this analysis that are legally based (conservation easements), this does not hold true since legally no development is allowed on land under a conservation easement, however, being able to gauge the relative level of constraints was still deemed to be important by Richmond County staff.

After producing the original draft map, NNPDC staff noticed there was no slope consideration in any of the environmental constraint layers. NNPDC staff have local knowledge of many steep ravines in Richmond County based on outdoor excursions while canoeing. While most of the topography of the county is gently rolling hills, the exception is the flatlands near the Rappahannock River. Within the county, following a dendritic nature of the creek network, are steep to very steep slopes, mostly all associated with drainage channels, streams or creeks that, over the years, have eroded the soil.

While the NNPDC has VirGIS elevation data in their Geographic Information System, that data is in a relatively coarse raster format with a cell size of approximately 100 foot (33.333 meters). This elevation data was digitized as vector contours from the USGS 1:24,000 Topographic Maps, that were interpolated into a raster elevation data layer. When NNPDC staff run a slope analysis on this interpolated elevation data, the very nature of the interpolation process smoothes the data, which hides most of the steep slopes. In addition, many of these steep ravines of drainage channels are less than 100 feet wide, and thus cannot be represented at the coarse resolution of the elevation data.

Thus, a slope map generated from the VirGIS elevation data does not accurately depict the actual slopes that are present in the county. NNPDC staff, looking for another way to show steep slopes in the county with existing GIS data layers, realized that soils data is divided into slope classes, as well as soil classes. By selecting the soils that have steep slopes associated with them (in Richmond County's case, soil type 15E, Rumford Soils occur on slopes between 15 to 50 percent), the steep slope locations within the county could be shown via GIS and added to the Buildable Areas Map.

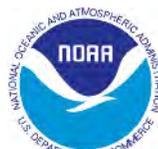
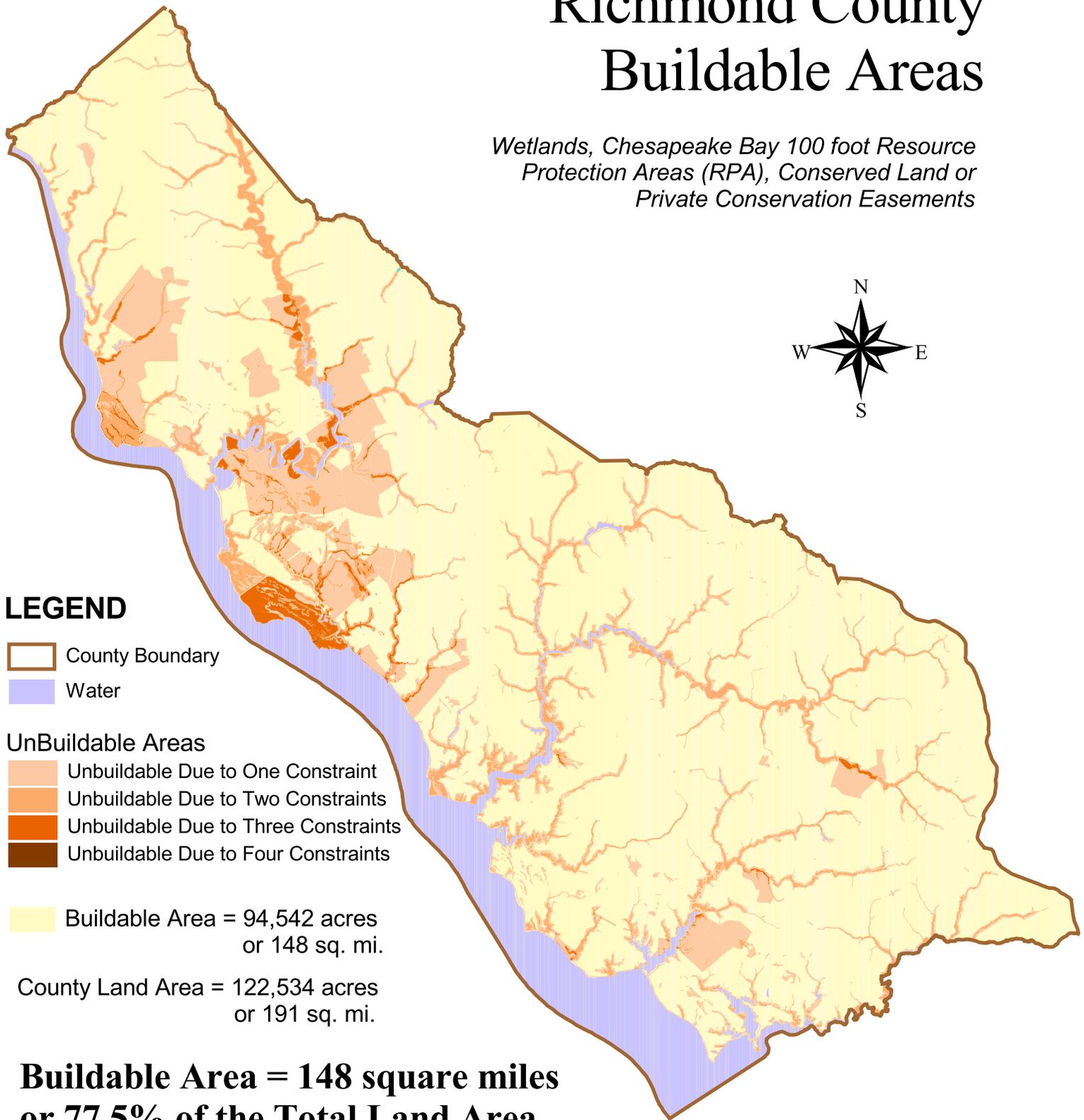
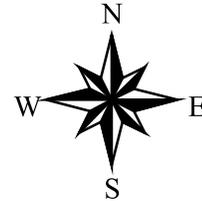
According to the Soil Survey of Richmond County, Rumford Soils have "surface runoff [that] is moderate to rapid. The surface layer has a low organic matter content and low natural fertility." The Soil Survey of Richmond County also states that "slope is the main limitation for these soils [Rumford Soils] for nonfarm use. It especially limits the soils as a site for buildings and local roads and streets, and along with rapid permeability in the substratum, is a limitation for septic tank absorption fields." After researching the limitations associated with the steep slope Rumford Soils, NNPDC staff deemed it was important to add this element to the Richmond County Buildable Areas Mapping project.

After discussing the addition of slopes to the Buildable Areas Map with Richmond County staff, it was decided to make two versions of the Buildable Areas Map, one with the slope consideration and one without. Concern was expressed by both Richmond County and NNPDC staff that by including the (steep slope) soils, there was too much land area in the County that would be shown as not able to be developed. The Buildable Areas Map without slope showed 148 square miles (77.5%) of the county as developable, whereas the Buildable Areas Map with slope only had 101 square miles (52.9%) of Richmond County. Richmond County and NNPDC staff reasoned that on the low range of slopes of these soils, around 15 percent, that development could occur, given proper engineering practices and site management (minimal vegetative and soil disturbance).

NNPDC staff sent two draft Richmond County Buildable Areas Map to Richmond County land use staff to review. NNPDC had hoped that county land use staff would decide which map was most appropriate for the county. After two weeks for review, NNPDC staff requested feedback from Richmond County staff on the two versions of the Buildable Areas Map (one with slopes included, one without). Richmond County land use staff were reluctant to choose one map over the other and suggested that I present both versions of the Richmond County Buildable Area Map to the Richmond County Planning Commission, and ask them which map was most appropriate for Richmond County. NNPDC staff presented the two versions of the Richmond County Buildable Areas Map to the Richmond County Planning Commission on December 5th, 2011. NNPDC staff, after presenting on the project and explaining both options, NNPDC staff addressed the Commission to ask them to choose one of the two Buildable Areas Maps (the one without slope considerations, or the one with slope considerations). The Planning Commission, citing the down turned economy, stated that they did not want to take any action that might slow the housing recovery in their county, and chose not to endorse either of the maps. The Commission Chairman thanked NNPDC staff for their work and stated that this information likely will be useful in the future.

Richmond County Buildable Areas

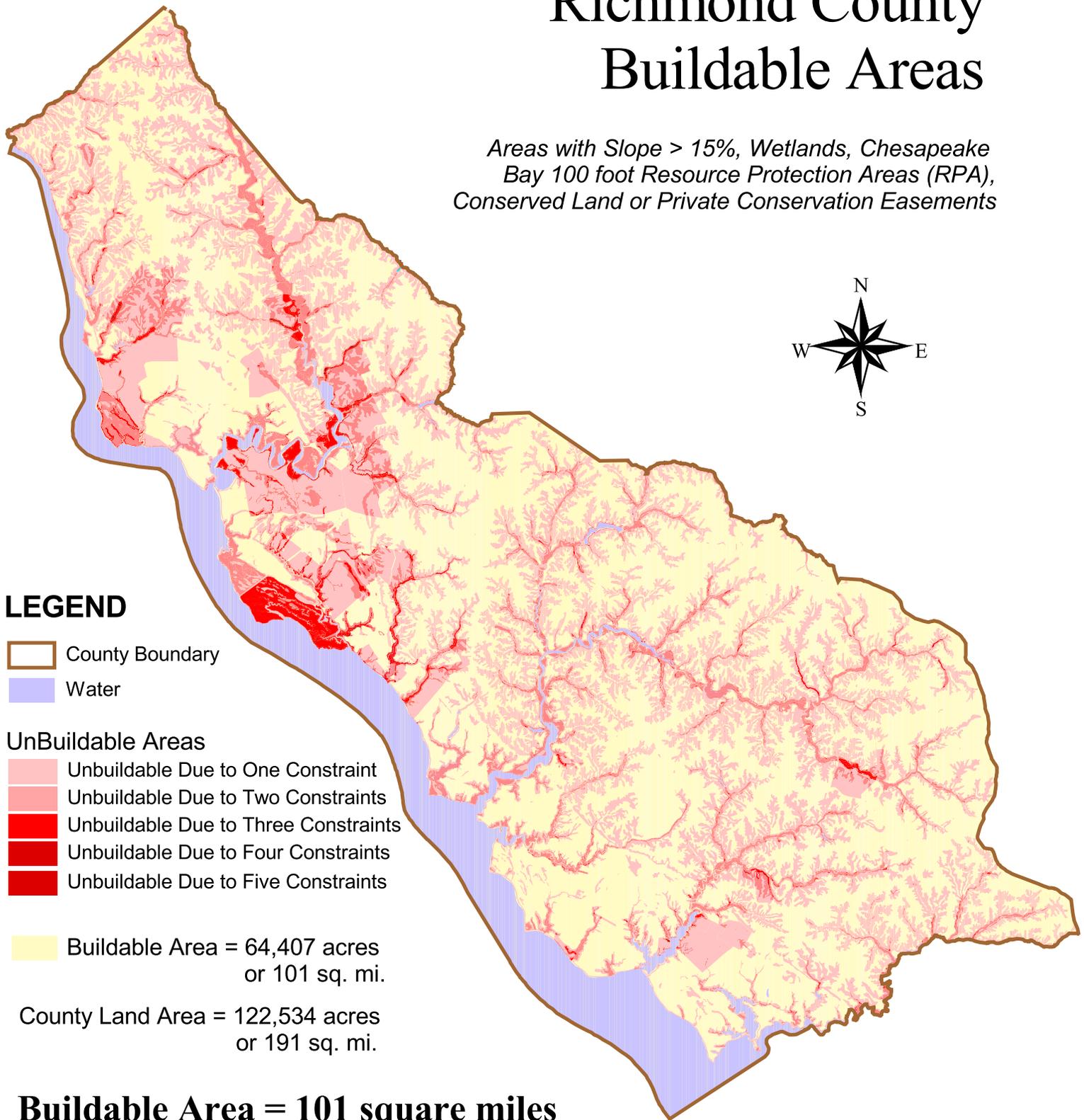
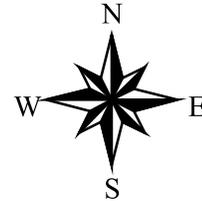
Wetlands, Chesapeake Bay 100 foot Resource Protection Areas (RPA), Conserved Land or Private Conservation Easements



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA10NOS4190205 of the U. S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Richmond County Buildable Areas

Areas with Slope > 15%, Wetlands, Chesapeake Bay 100 foot Resource Protection Areas (RPA), Conserved Land or Private Conservation Easements



LEGEND

-  County Boundary
-  Water

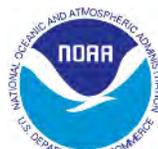
UnBuildable Areas

-  Unbuildable Due to One Constraint
-  Unbuildable Due to Two Constraints
-  Unbuildable Due to Three Constraints
-  Unbuildable Due to Four Constraints
-  Unbuildable Due to Five Constraints

 Buildable Area = 64,407 acres
or 101 sq. mi.

County Land Area = 122,534 acres
or 191 sq. mi.

**Buildable Area = 101 square miles
or 52.9% of the Total Land Area**



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VI. Westmoreland County Growth Area Build Out Analysis

NNPDC staff contacted Westmoreland County staff regarding the determination of the growth area in the county for the build out analysis. Westmoreland County has a primary growth area and several secondary growth areas and in order to leave the County flexibility, NNPDC did not specify which area to be analyzed. Westmoreland County staff responded that the growth area they were interested in examining was Coles Point, a peninsula of land between the Lower Machodoc and Potomac Rivers and a designated growth area in Westmoreland County's Comprehensive Plan. The Coles Point area is serviced by a county-owned sewage treatment plant. The sewage treatment plant is unique in that it is a no discharge facility, meaning that the effluent is not deposited into a waterway. The Coles Point Sewage Treatment Plant disposes of the wastewater treated effluent by spray irrigating reed canary grass. The growing reed canary grass uptakes a majority of the nutrients in the irrigated wastewater, thus tying up the nitrogen into bio-mass instead of allowing it to flow into a waterway.

Coles Point Growth Area
Westmoreland County



NNPDC staff contacted Virginia Commonwealth University, Center for Environmental Studies (VCU-CES) to set up a training session on software that is commonly used to conduct buildout analyses called Community Viz. NNPDC staff negotiated with VCU-CES to have the training conducted at the NNPDC offices. NNPDC staff attended the all day training session and was a bit overwhelmed by the complexity of the tasks involved in the analysis. NNPDC staff tried to replicate the steps in the exercises a few days after the training session but was unsuccessful.

NNPDC staff began compiling the data needed for the Coles Point growth area build out analysis. GIS data sets that were prepared, and clipped to the study area were tax maps, zoning maps, 100 foot Chesapeake Bay Resource Protection Areas, and conserved lands.

Beginning the third quarter of the grant, NNPDC staff realized that even though they had received training in the Community Viz software, they did not have the experience and expertise to create a buildout analysis for the Coles Point growth area. NNPDC staff contacted VACZM staff and inquired if this sub task could be contracted out to VCU-CES, and that in order to accomplish this, the grant would require a three month no-cost extension. VACZM staff agreed to allow the extension in order to get the subtask deliverable completed.

VCU-CES staff were contacted and asked if they would be willing to conduct the buildout analysis for Coles Point and they agreed. NNPDC forwarded the relevant GIS data to VCU-CES staff so they could perform the analysis. In order to make sure that Westmoreland County staff obtained information that they deemed important from this buildout analysis, NNPDC staff set up a meeting with VCU-CES staff, NNPDC staff, as well as Westmoreland County Staff before any work was done to discuss the details of the project. Westmoreland County staff were interested in learning several things from the build out analysis. Westmoreland County staff were specifically interested in 1) at what point would the Coles Point Sewage Treatment Plant need to expand the spray irrigation area? and 2) when would the Coles Point Sewage Treatment Plant need to expand its physical infrastructure? In addition to these questions, Westmoreland staff commented that a large parcel in Coles Point with a marina had recently sold at auction. As a result of the owners changing at the marina and at large adjoining parcels, Westmoreland staff requested to do two additional scenarios, one with the marina and attached parcels re-zoned to 3.6 dwelling units per acre and another with the marina parcels re-zoned to 7 dwelling units per acre. NNPDC staff noted that most new development in the Northern Neck region tends to occur near the water, either waterfront or water view. Westmoreland staff agree and suggested a 300 foot buffer from the Chesapeake Bay RPA to act as a "waterfront proximity" layer would help to replicate this preclusion of people to locate within sight of open water. The waterfront proximity layer would cause newly constructed residential to be placed near the water first, before the interior sections are populated. The waterfront proximity layer would be 400 feet from tidal waters, and it was reasoned that a majority of the properties at that distance would have some sort of water view from the residence being built.

Once the draft build out scenario was completed, NNPDC reviewed the analysis. NNPDC staff noted that there were several problems with the analysis that were discovered. First, NNPDC staff noticed that an area at the headwater of Gardner Creek had some wetland/marsh complex that houses were clustered around (due to the waterfront proximity layer). NNPDC noted that the

preference of persons to locate their residence with a view of open water most likely does not necessarily convey to views of marshes. NNPDC staff then modified the waterfront proximity layer to only be present next to open bodies of water to accurately model the predilection of people to enjoy water views. NNPDC staff then noticed that the build out had placed residential dwelling units on the sewage treatment plant parcel, as well as the sewage treatment plant spray irrigation field. NNPDC staff noted that very few people would want to locate their home on a site with a sewage treatment plant, and any development on the spray irrigation field would not be allowed. NNPDC staff then contacted VCU-CES staff and requested that they re-run the analysis with the newly revised waterfront proximity layer and with the Coles Point Sewage Treatment Plant facility parcel and spray irrigation field as non-buildable layers in the analysis (the same as the Chesapeake Bay RPA and conserved lands are assigned as unbuildable).

The results of the revised build out analysis are rather puzzling, as the scenarios that have the marina rezoned to higher densities result in a lower number of dwelling units. NNPDC staff hope to attempt to revisit the analysis in the future, to re-run the analysis (if possible) to try to determine what caused the results of higher density parcels having less dwelling units applied. The details of the build out analysis follows:

Base Scenario

In the VCU-CES base scenario, the Coles Point Growth Area Build Out analysis with a 1% growth of population each year resulted in estimating the number of dwelling units at build out as being 4,432, which occurs in the year 2221. Triggers were built into the analysis to flag when the number of dwelling units exceeded the capacity of the sewage treatment plant spray irrigation area and when the sewage treatment plant would need to expand its physical facilities. According to the analysis, the sewage treatment spray irrigation field would need to be expanded after an additional 408 dwelling units were built, which would occur between 2051 and 2101, approximately in the year 2071. The sewage treatment plant would have to expand when an additional 2238 dwelling units were built and connected to the plant, which occurs in this analysis by the year 2171.

3.6 Dwelling Unit Marina Parcel Scenario

As mentioned previously, the rezoning build out scenarios exhibited peculiar results. One would expect that with an increase in dwelling unit density zoning that the number of dwelling units would increase. For whatever reason, this was not the case, and the build-out analysis showed a total number of dwelling units at build out with the marina re-zoned to 3.2 dwelling units to be 3,990.

7 Dwelling Unit Marina Parcel Scenario

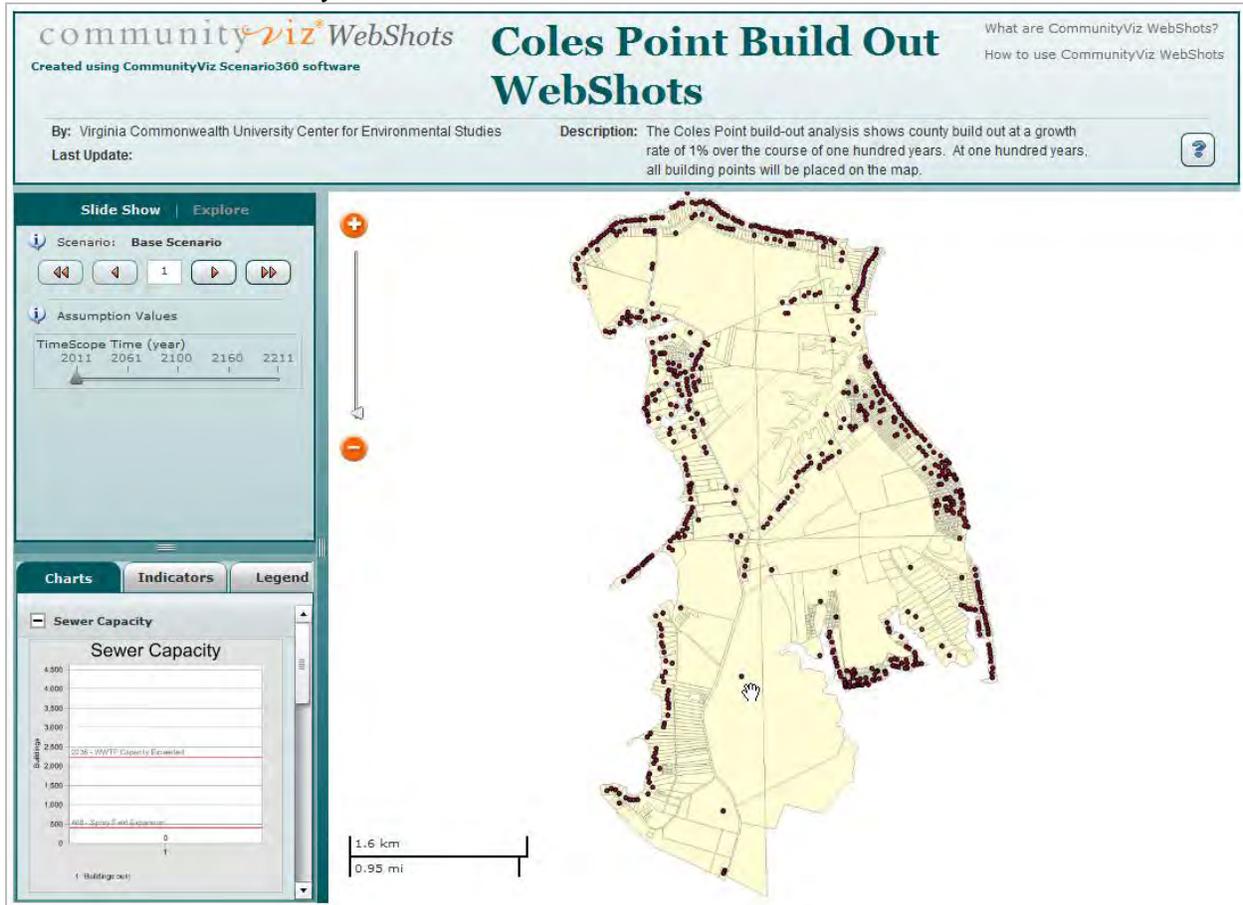
Again, the results from this scenario do not exhibit the expected results. If this parcel is re-zoned at this higher dwelling unit density of 7 dwelling units per acre, the total number resulted in only 3,946 dwelling units.

While the marina parcel re-zoning scenarios gave questionable results, NNPDC staff do believe the base scenario provides invaluable information to Westmoreland County in projecting possible timeframes in which the sewage treatment plant spray irrigation field would need to be expanded and when the plant itself would need to be expanded.

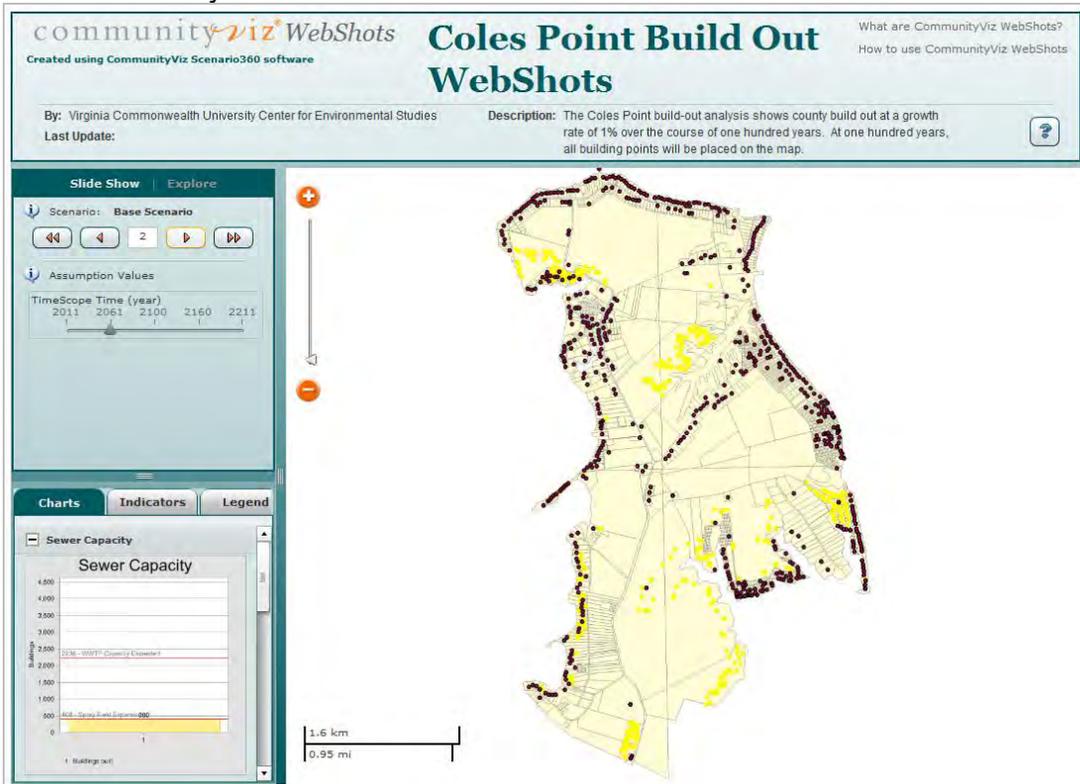
There are limitations with some of the parameters within the Community Viz software. Most notably, existing parcels that have already been subdivided and meet zoning minimum lot size criteria (thus are able to legally have a structure built on them) are not populated with dwelling units. The reason is that the Community Viz software looks at the parcel, notes that according to the zoning classification it is not large enough to subdivide, so it moves on, without placing a dwelling unit on that parcel. There are quite a few of these lots in the Coles Point area, many times, these are persons who bought their parcel of land and are paying it off before they retire to build their retirement home. Due to this software anomaly, the number of residential dwelling units at final build out are most likely underestimated.

Maps showing the sequence of the buildout analysis of Coles Point follows, with the final report on the Coles Point Growth Area Build Out analysis created by VCU-CES staff concludes this report.

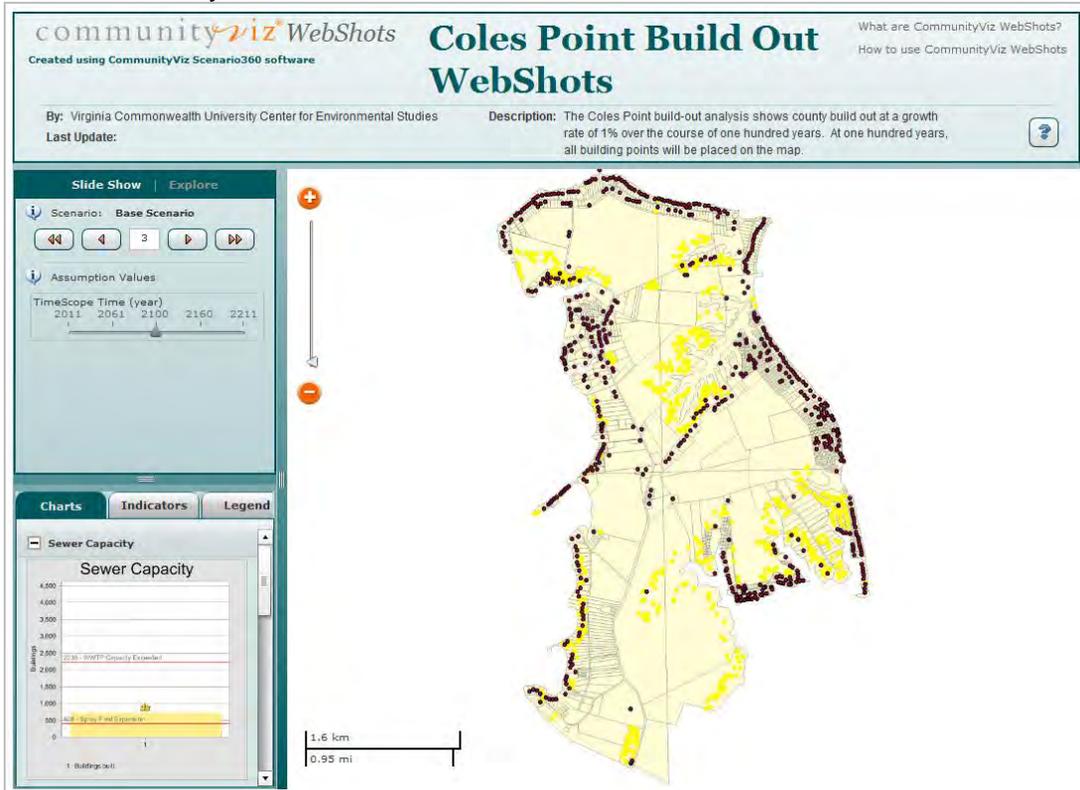
Start of Build Out Analysis - 2011



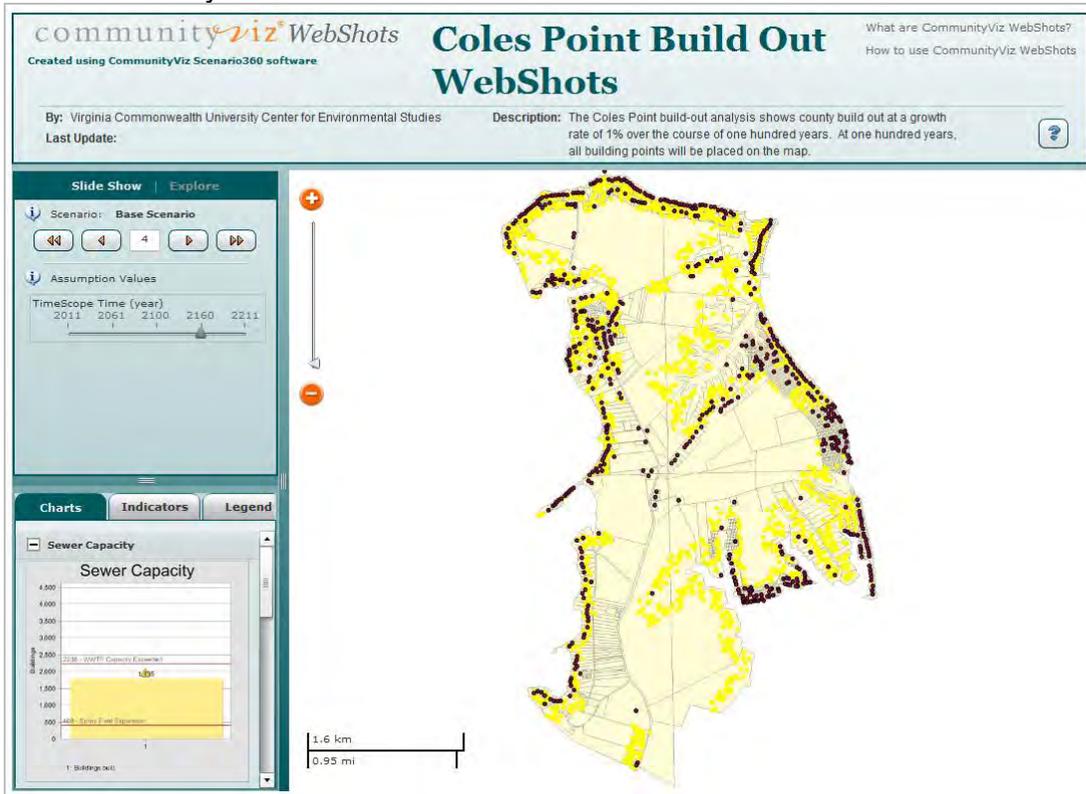
Build Out Analysis - 2061



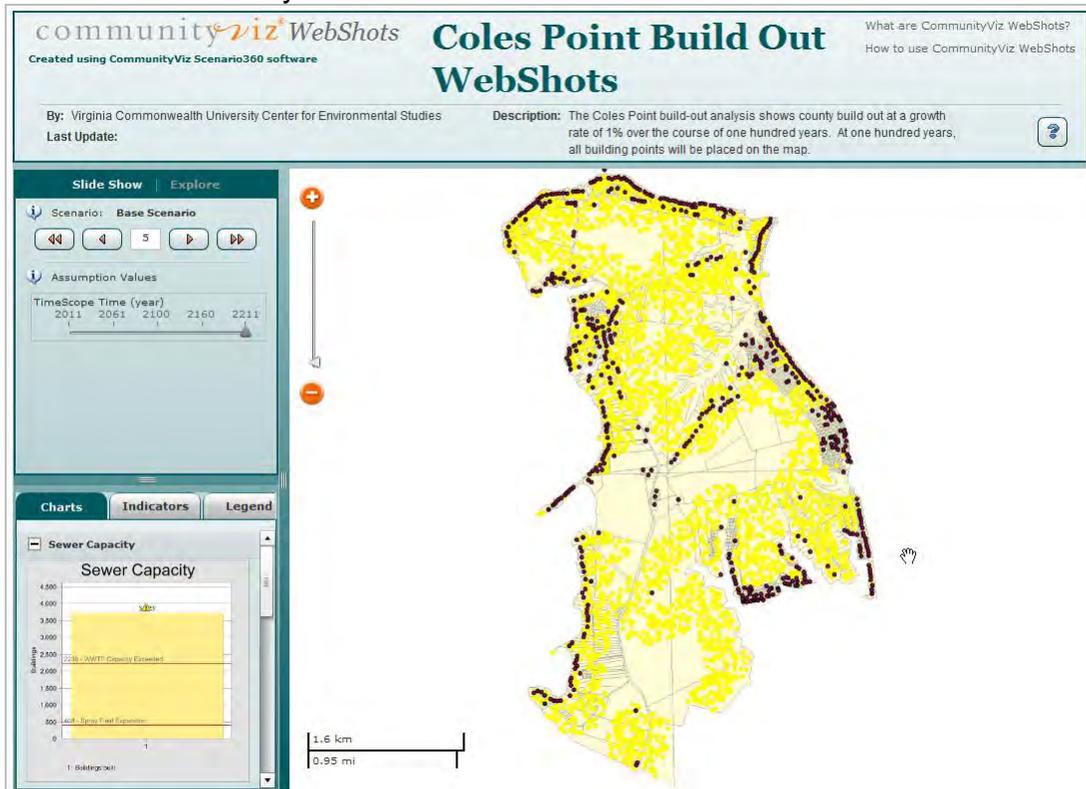
Build Out Analysis - 2100



Build Out Analysis - 2160



Final Build Out Analysis - 2221



Coles Point, Virginia Build-Out Analysis



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Coles Point Build-Out Analysis

The Coles Point Build-Out project is a focused build-out analysis conducted using Community Viz 4.1 built on the ArcGIS 10.x platform. The project objectives included:

1. Objective 1: Develop a build-out scenario for the Coles Point growth area of Westmoreland County, Virginia based on the current Westmoreland County zoning ordinance. For this objective, growth will be focused in existing lots and along the waterfront.
2. Objective 2: Create two build-out scenarios where the Coles Point Marina Plantation parcels would be rezoned to allow for 3.6 dwelling units per acre and 7 units per acre.
3. Objective 3: Incorporate alerts indicating when the Coles Point Sewage Treatment Plant would need to expand the spray field based on the number of allowable connections.

For the analysis, existing address locations (used as building locations), parcels, zoning, Resource Protection Areas (RPA) and waterfront area information were obtained from the Northern Neck Land Planning District Commission. The waterfront area is a 400 meter buffer inland from the shore representing waterfront property, often a stronger draw for development than non-waterfront areas within the County.

This project was conducted with the help of the NNPDC and the Westmoreland County Planning and Land Use Director. The following report details the process workflow taken to complete each objective along with a short, descriptive help document on how to use the Community Viz application for scenario planning.

It is important to remember that the goal of this project was to evaluate different build-out scenarios. Scenario building is different from vision planning, in that while a particular vision may be in place for how one would like to see Coles Point grow, scenario planning looks at the factors that impact growth and takes an objective approach to applying these factors to the build-out analysis. The vision and the scenarios may not agree, but without proper scenario planning, a true vision will not be reached.

Density Rules

Westmoreland County has density rules detailed in the County's Zoning Ordinance. Density rules are different for some parcels depending if the parcel has access to public sewer and / or water. Density rules for Westmoreland County zoning were gathered from the Westmoreland County zoning ordinance and are detailed as follows:

Zone	Lot Size
A-1	25,000 sq ft.
C-2	5 acres
R-1 No Sewer / Water	25,000 sq ft.
R-1 Public sewer or water	15,000 sq ft.
R-2 No Sewer / Water	25,000 sq ft.
R-2 Public sewer or water	15,000 sq ft.

B-1 No public water & sewer	25,000 sq ft.
B-1 Public sewer or water	15,000 sq ft.
M-1 Public sewer or water	15,000 sq ft.
S-1 No public sewer / water	25,000 sq ft.
S-1 Public sewer or water	15,000 sq ft.

Build-Out Analysis

“Build-out analyses allow planners to estimate the amount and location of development for an area. Performing a build-out analysis is the step in the community planning process that identifies the holding capacity of the land. Build-out is a supply-side calculation applied to a clearly delineated area that is based on assumptions for density, physical constraints to development, and land-use regulations that define the size and placement of structures for that area. A build-out analysis provides an answer to the question "how many buildings could be built in this area according to current land-use regulations?" A build-out analysis provides a convenient reference for future planning because it represents a theoretical maximum. It does not imply or forecast how many buildings will actually be built.”(Scenario 360 Help, 2011).

Three scenarios were developed for the build-out analysis. The first scenario is the Base Scenario. The **Base Scenario** is a build-out analysis for the Coles Point growth area using the existing County zoning ordinance. Growth is focused on the existing lots and waterfront area before expanding to the remaining area of the county. Scenario 2 is called **3.6 Units Per Acre** in the CV application. This scenario represents a build-out analysis for the Coles Point growth area using the existing County zoning ordinance but with the Coles Point Marina Plantation Parcels zoning set to allow for 3.6 units per acre. Growth is focused on the existing lots and waterfront area before expanding to the remaining area of the county. Scenario 3 is called **7 Units Per Acre** in the CV application. This scenario represents a build-out analysis for the Coles Point growth area using the existing County zoning ordinance but with the Coles Point Marina Plantation Parcels zoning set to allow for 7 units per acre. Growth is focused on the existing lots and waterfront area before expanding to the remaining area of the county.

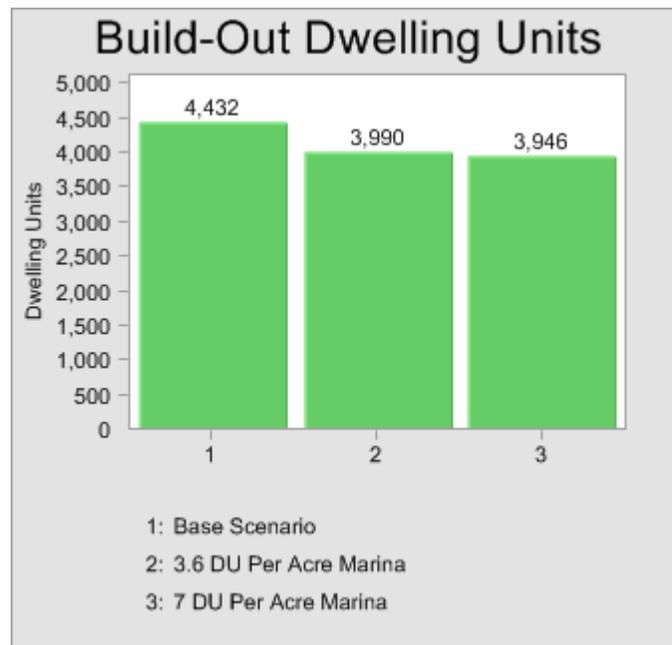
The build-out analysis takes into account the number and location of buildings that are allowed per parcel based on numeric and spatial rules. The numeric rules are determined by density rules taken from the County’s zoning ordinance and discussed above. Once a number of buildings per parcel are determined, spatial considerations are then applied to see if the number of buildings allowed per parcel simply based on density rules, how many can actually fit within the parcel based on spatial constraints.

The supplemental zoning layer used to designate parcels with split zoning was used to create a zoning layer that included split zoned parcels. Each parcel was attributed with an area field representing total square footage of the parcel polygon. Based on the zoning ordinance, each parcel polygon was attributed with the total number of Minimum Lots allowed on the parcel.

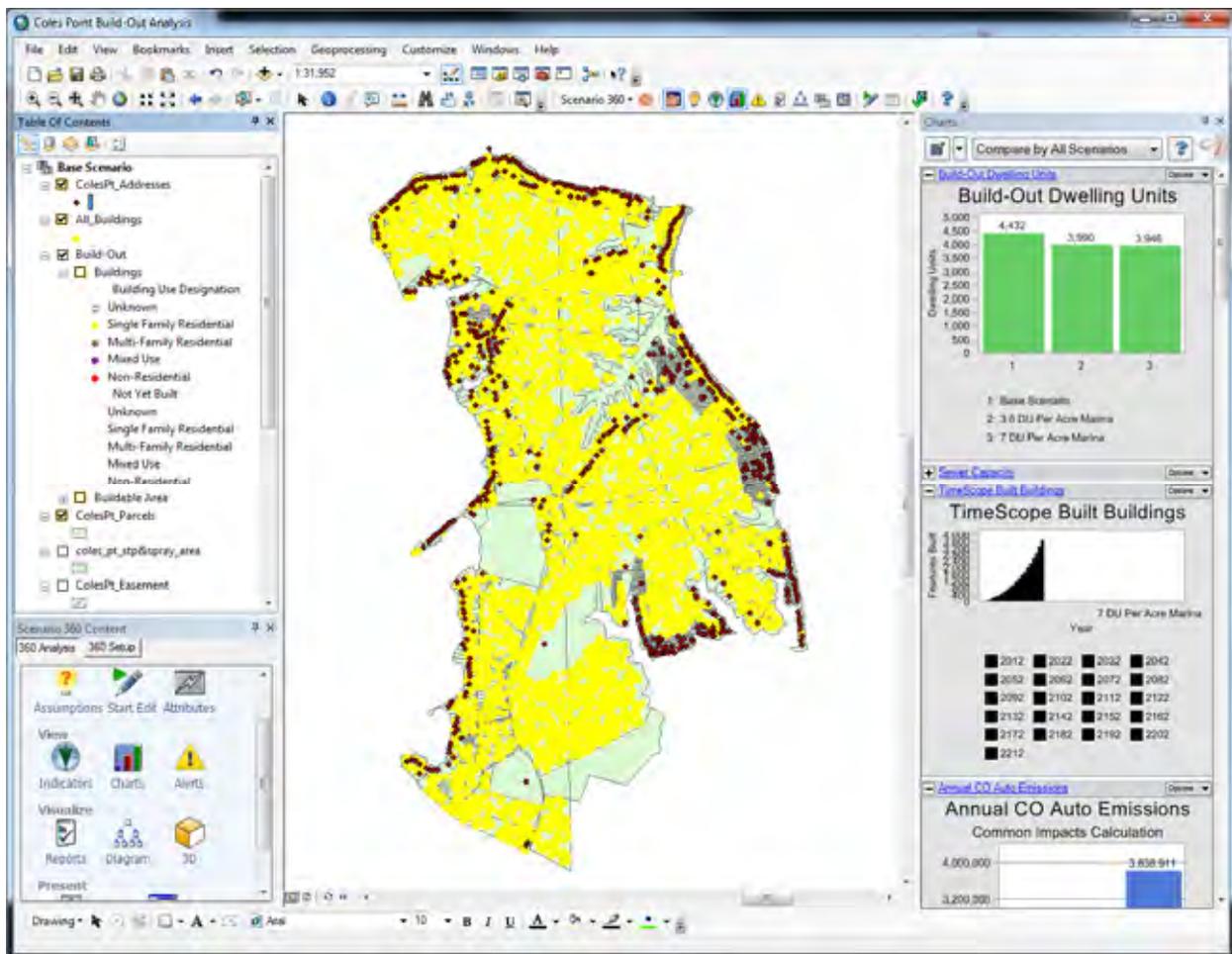
Conserved lands, perpetual easements, wetlands within the waterfront area and Resource Protection Areas were set as non-developable areas. Conserved lands and easement data were obtained in May 2011 from the Virginia Department of Conservation and Recreation Division of Natural Heritage. Resource Protection Areas data was obtained from the Northern Neck Planning District Commission.

For the Coles Point build-out settings were set to read the MinLot field calculated for the dwelling unit quantity. Existing addresses were used to account for existing building locations. The pattern of development selected was set to random (versus grid) simply because of the general nature of development in the County and because the software handles placing building locations at random points within a parcel based on the set rules better than when a grid pattern is selected. For purposes of this study, which are to gain an understanding of the general number and location of buildings, and taking into account the flexibility built into local ordinances to change setback distances for particular circumstances, the random pattern was selected. Originally, setback distances were set in place, but the build-out that incorporated setback distances had a greater number of allowable building units overall over time. Upon further examination of the data, address points were being placed in relation to the VDOT roads coverage which was not of a high enough resolution to accurately place address points (i.e. some of the roads were poorly digitized resulting in erroneous set back distances). To avoid the potential issue of poor resolution data, the building placement was set to random to get the most non-restrictive growth view.

Based on the current zoning ordinance minimum lot standards, the total number of dwelling units for the Coles Point growth area could be 4,722 units for scenario 1, 4,272 for scenario 2 and 4,218 for scenario 3.



In the graphic below, yellow buildings representing potential buildings from build-out and dark red-brown buildings representing existing addresses:



TimeScope Analysis

After running the Build-Out Analysis, a TimeScope Analysis was run. The TimeScope Analysis provides the end user a way to look at changes over time. A build-date is assigned along with a growth rate to determine how many features are built each year. The TimeScope Analysis is not a predictive model; it uses deterministic rules provided by the end user to determine growth over time.

The TimeScope Analysis was developed to show growth from 2011 to the year 2211. For the TimeScope Analysis, the build rate (or the rate at which new features are built over time) was calculated using an annual growth calculator. The calculator uses the formula:

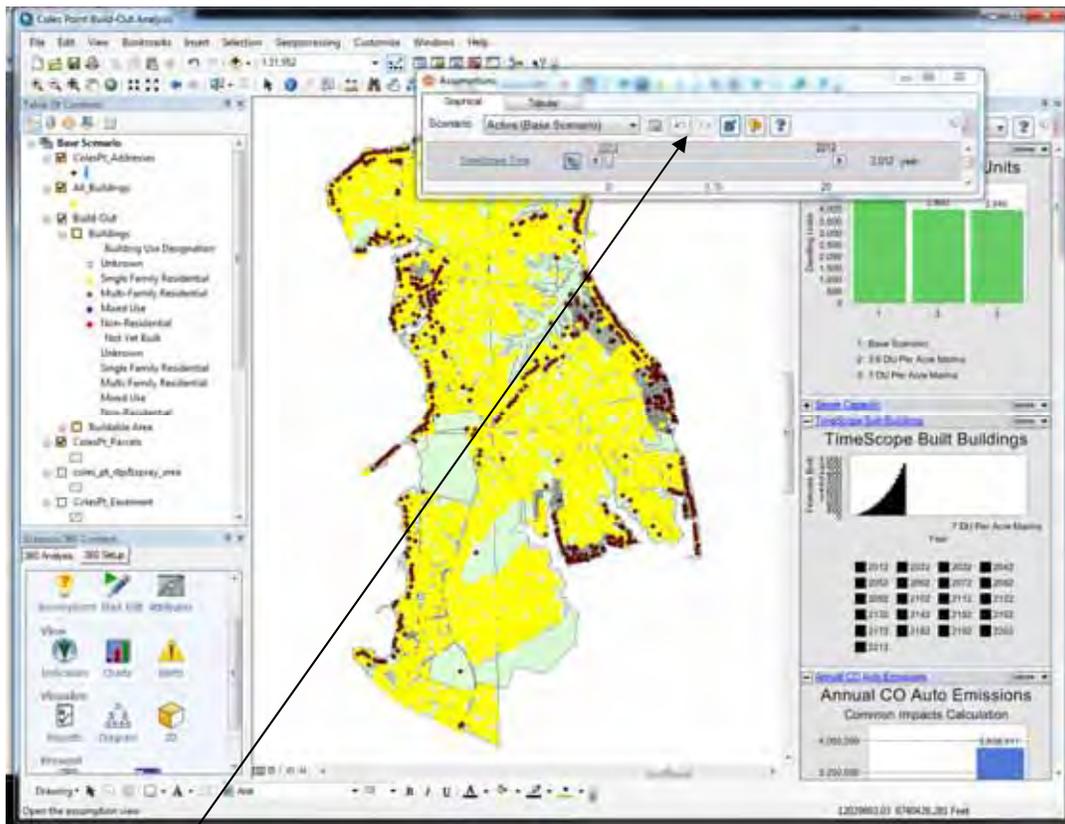
$$\left(\left(\frac{2010 \text{ Pop}}{2000 \text{ Population}} \right)^{\frac{1}{(\text{Number of years} * \text{CompoundingRate})}} - 1 \right) * \text{CompoundingRate} * 100$$

For the compounding rate, a value of 1 was used. The annual growth rate for Westmoreland County, for purposes of this project and based on the annual growth rate calculator used was set as an exponential growth rate of 0.43% growth per year.

The TimeScope function in Community Viz will not accept growth rate values less than 1. For this project, growth was set at 1% per year.

The TimeScope Analysis creates an Assumption which is simply a variable an end user can change to see subsequent changes in the data. For this analysis, the TimeScope Time is represents the year of the build-out. When the year (the assumption) is altered, the building display will change to reflect the buildings built to that time period. The buildings feature class generated in the Timescope analysis has the year a building is built stored in the TS_BUILT field. The end user can query specific dates from that field to estimate a number of potential buildings built.

In the graphic below existing and future buildings are shown for the year 2061, yellow buildings representing potential buildings from build-out and dark red-brown buildings representing existing addresses:



Notice the Assumption window. The end user can slide the bar on the Assumption to different years, apply that assumption and see the resulting changes.

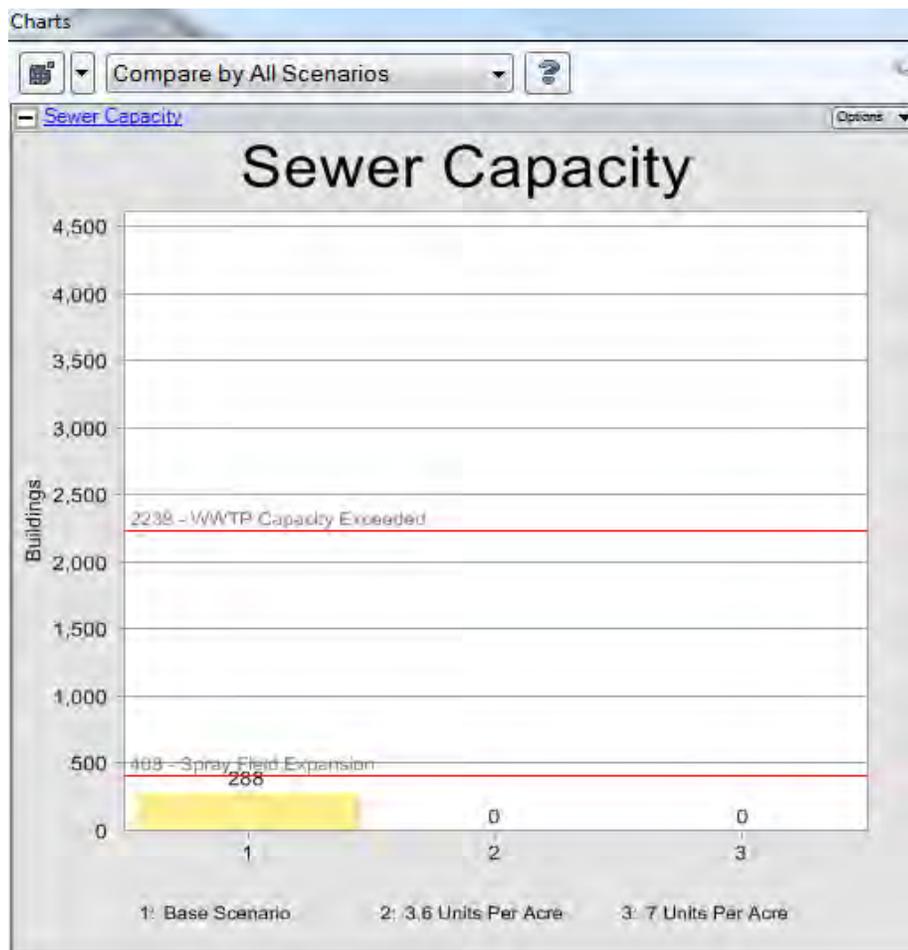
The application has a layer called All Buildings. This layer has all the building for the county when it reaches full build-out and is represented in the first county-wide graphic. The TimeScope Assumption only shows build-out until the year 2211 so not all buildings will be displayed (because of the slow growth rate), so the All Buildings layer contains the data for all buildings at full build-out.

With the annual growth set at 1%, the Coles Point Growth Area will reach full build-out (where potential build-out units = 4,432) in the year 2221.

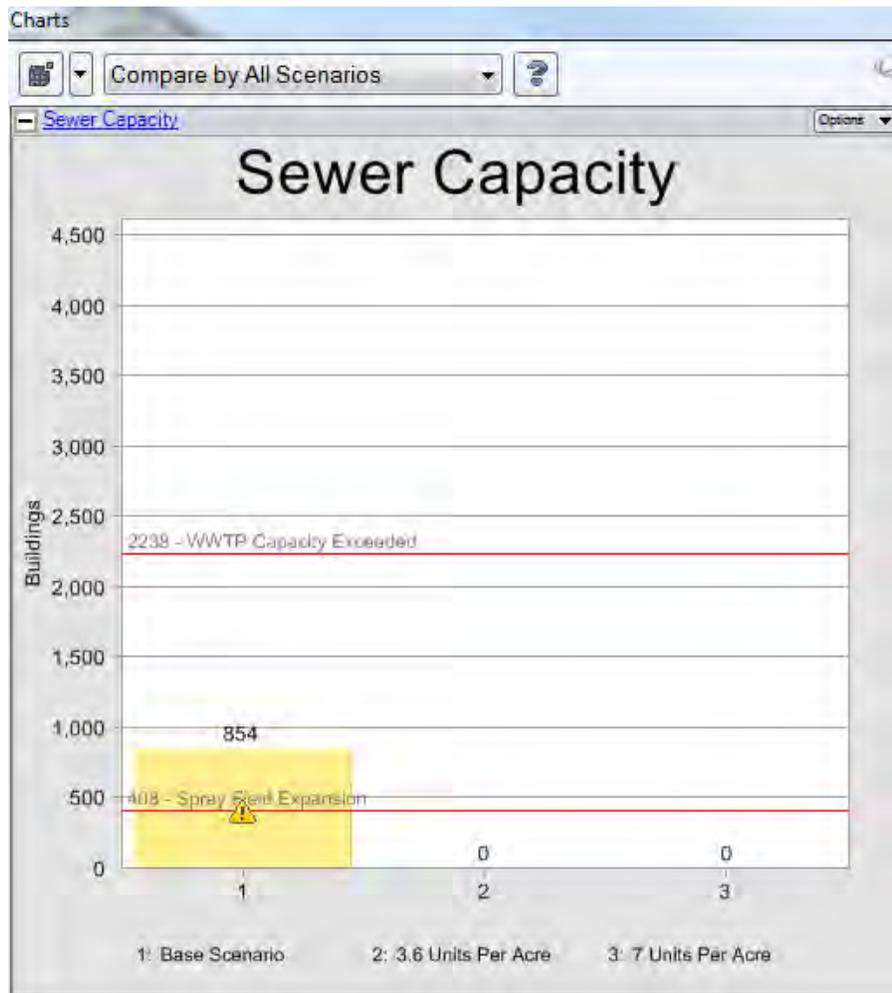
Alerts

Two alerts have been set to handle Sewer Capacity limits. A chart called Sewer Capacity was created. The chart shows the total number of dwelling units that will be built based on the TimeScope year and two red line alerts that show the number of dwelling units where the spray field will need to be expanded and where the WWTP capacity has been exceeded.

There are 662 equivalent dwelling units in place. Per Bob Fink, "Based on peak flows, the capacity of the system is about 1,070 EDUs before the 50.4 acre spray field would need to be expanded." To set the alert for the number of buildings / EDU's which would create the need for the spray field to be expanded, the 662 EDU's was subtracted from 1,070 EDU's. When an additional 408 dwelling units have been created, the first alert will be set off in the charts. In this example, the TimeScope year has been set to 2051 and the assumption applied. The result is the increase of 288 buildings, below the spray field alert:



If the TimeScope assumption year is set to 2101, there will be an increase to 854 dwelling units and the alert will be activated in the charts with a yellow triangle with an ! in the middle:



There are 662 equivalent dwelling units in place. Per Bob Fink, “Based on peak flows, the capacity of the system is about 2,900 EDUs before capacity of the WWTP itself would need to expanded.” To set the alert for the number of buildings / EDU’s which would create the need for the spray field to be expanded, the 662 EDU’s was subtracted from 2900 EDU’s. When an additional 2238 dwelling units have been created, the second alert will be set off in the charts. In the following example, when the TimeScope year has been set to 2171, both alerts are set off:

