

CHAPTER 5 WATER QUALITY AND SHORELINE PROTECTION PLAN

A. INTRODUCTION

Water quality in both saltwater estuaries and in our sources of drinking water is of paramount importance to our futures here in Northumberland County. Bay, river and stream water quality will determine the fecundity of our shores for gamefish, menhaden, crabs and oysters – and the health of our fishing industry. Both the shallow and deep aquifers, that currently supply primary sources of drinking and household water, are being threatened by over-use and contamination. Shoreline protection through protection of our riparian buffers is also an issue in an environment where tremendous quantities of various harmful chemicals are being released via ground water into the bay daily and large expanses of shoreline are being eaten away by erosion. Our waterfront is a very real economic advantage for our County. Both our fishing industry and our tourist industry are absolutely dependent on a healthy water related environment. In fact, our basic quality of life depends on careful stewardship of our once-abundant water resources and we must actively protect them for future generations.

The purpose of this Chapter is to define a broad set of policies for Northumberland County which promote the objectives of the County and the Commonwealth of Virginia to preserve the quality of waters of the Chesapeake Bay and related state waters within the County. Referred to here as the **Water Quality Protection Plan**, this Chapter has been prepared to comply with Section 62.1-44.15:67 of the Virginia Code which in part states:

Counties, cities and towns in Tidewater Virginia shall incorporate protection of the quality of state waters into each locality's comprehensive plan consistent with the provisions of this chapter.

Under the powers of that code section, the Chesapeake Bay Local Assistance Board, CBLAB, was authorized to prepare Regulations which provided guidelines to localities for preparing plans for the protection of the quality of state waters. While the Chesapeake Bay Local Assistance Board no longer exists, all oversight of local programs is conducted by the State Water Control Board under the Department of Environment Quality (DEQ). Among the provisions of those guidelines which are published in the Local Assistance Manual are five objectives of such plans.

They state that *in conjunction with other state water quality programs, local programs shall encourage and promote:*

- *protection of existing high quality state waters and restoration of all other state waters to a condition or quality that will permit all reasonable public uses and will support the propagation and*

growth of all aquatic life, including game fish, which might reasonably be expected to inhabit them

- *safeguarding the clean waters of the Commonwealth from pollution;*
- *prevention of any increase in pollution;*
- *reduction of existing pollution; and*
- *promotion of water resource conservation in order to provide for the health, safety and welfare of the present and future citizens of the Commonwealth.*

In addition to supporting the water quality objectives presented above, the County supports additional objectives to assure that sufficient quantities of water remain available to meet the future needs of the County and also that our shorelines are protected. This chapter is designed to further these objectives within the framework of the physical conditions identified in Chapter 1 and goals and strategies of Chapter 2. The Board of Supervisors recognizes that there may be situations where the requirements of one element of the Comprehensive Plan appear to duplicate, overlap or even supersede another plan element. When addressing a specific planning issue, the Board of Supervisors and the Planning Commission will give appropriate consideration to all applicable elements of the Comprehensive Plan.

Policies are organized below around the following topics related to developing and using land:

- Development within or Near Existing Development;
- Development within Areas with Topographic Constraints;
- Development within Areas where Soils will not Support Conventional On-Site Sewage Disposal
- Development within Areas where Soils have Poor Structural Qualities;
- Flood prone Areas, Wetlands and Natural Habitat Areas;
- Chesapeake Bay Act Protected Areas;
- Protection of the County's Groundwater Supply;
- Watershed Protection;
- Shoreline Preservation;
- Use of Waterfront Areas while Preserving Sensitive Environmental Areas;
- Intensively Developed Areas;
- Managing Potential Conflicts between Land Use and Water Quality Protection; and
- Soil and Water Conservation Policies.

Through the following policies, the Board of Supervisors of Northumberland County will promote the laws, policies and regulations promulgated by the state and federal governments which are designed to enhance the quality of water entering the Chesapeake Bay through tributaries located within the County.

B. POLICIES RELATIVE TO DEVELOPING AND USING LAND WITHIN PHYSICAL CONSTRAINTS

1. Development within or Near Existing Development

Existing development presents both constraints to and opportunities for further development. Constraints come from the fact that once a major use is established for a property, as a practical matter that use is permanent. There is a very low probability that the facilities erected will be removed and replaced by other uses. The opportunity for development comes from the fact that after an area is partially developed it sets community characteristics which in turn often attract additional development.

Policies for development in areas within or near existing development are as follows:

- (a) Villages with greater potential for growth may be considered for installation of public sewerage systems and water supply as development reaches a point where the services are financially feasible.
- (b) New residential development is to be directed to areas where soils and topography are acceptable for development.
- (c) Development shall be done in such a way as to preserve farmlands, working waterfronts, forests, natural resources, historic features and other environmentally-sensitive areas.
- (d) Residential development shall be planned using conservation techniques where lot size reductions are permitted if the reductions are compensated by open space, riparian buffers or other amenities.
- (e) Large residential developments should be dispersed throughout the County in order to avoid creating intensively-developed concentrations of development which could eventually require public utilities or other services. This strategy also promotes the preservation of agricultural and forest lands and reduces the threat of making excessive demands on state waters at any given point.

2. Development within Areas with Topographic Constraints

Land which has slopes in excess of 15 percent (15 feet drop per 100 feet horizontal) is generally classified as having steep slopes for planning purposes. Lands in this category are generally regarded as a deterrent to development but the extent that steep slopes have this effect depends upon the market demand within each community. Normally, developers will avoid steep land because it presents more problems and usually leads to higher costs than development on flatter land. Adding to the difficulty of development, when steep land is combined with soils that are highly erodible, the probability of erosion and costs of erosion control are increased significantly. If the land is located near tidal waters or potential reservoir sites, the resulting erosion can be a serious threat to water quality as well as to the stability of the shoreline. Policies concerning development of steep slopes are:

- (a) Development of land with slopes greater than 15 percent but less than 20 percent shall be permitted provided the proposed development shall have met strict site plan review requirements, and appropriate soil erosion protection and BMPs¹ are observed. This policy is for the purpose of reducing the potential for erosion or other damage to the underground water supply, to streams, shorelines or sensitive-environmental areas.
- (b) Development of land within the range of 20-25 percent will have the same requirements as slopes of 15-20 percent, and in addition the developer will be required to provide appropriate engineering features necessary to assure that these slopes will be permanently stabilized. It is preferred that lands with slopes of more than 25 percent should remain undisturbed, however if they must be disturbed, then they should be stabilized. Subdivisions may be laid out so as to arrange lots in a manner that avoids these slopes. Cluster development and open space planning are tools for accomplishing this objective.
- (c) When development is planned on steep slopes, additional land area over the minimum required by regulations may be required in order to: (i) avoid conflict between water supply and sewage disposal locations; (ii) avert infiltration into the water-table aquifer; or (iii) minimize shoreline erosion.

3. Development within Areas where Soils will not Support Conventional On-Site Sewage Disposal

The research data in Chapter One identifies general soil conditions which are known to have characteristics unfavorable to on-site sewage disposal. (Figure 1.5). The most critical criteria for this determination are:

¹Best Management Practices as defined by the Virginia Department of Environmental Quality.

- The percolation capabilities of the soil, which should be neither too slow nor too fast. If percolation is too slow the system will not function properly, and if it is too fast the effluent may enter the groundwater without being properly treated; and
- A high water table which determines the suitability for a conventional septic system drain field. In areas where the water table is less than 36 inches, drain fields could actually be below the water table and ineffective during periods when the water table saturates the soil where the drain field is located. If the water table does come in contact with the drainfield, pathogens and other pollutants could be directly discharged into the groundwater, possibly entering nearby residents' shallow wells. This situation also arises when the seasonal water table rises closer to the ground surface during the increased rainfall of winter months.

Since engineered systems are used in areas that are often low and naturally wet and environmentally sensitive, the rules and requirements of the County and the Health Department regarding acceptable installation and maintenance should be reviewed to establish appropriate policies that will protect the environment from catastrophic failures.

General policies for areas that do not support conventional on-site sewage disposal are:

- (a) Major subdivisions or other large-scale developments shall not be permitted in areas where soils are known to be unsuitable for on-site sewage disposal unless the development is connected to a public or private sewerage system or an acceptable engineered system is provided. These systems shall be inspected regularly by a Certified Inspector in accordance with the frequency and procedures in the manufacturer's specifications and the reports provided to the Health Department.
- (b) In subdivisions or other large-scale developments with mass remote drain fields, the Health Department may require a dilution area adjacent to the drain field to reduce nitrate loading.
- (c) In cases where the Health Department has issued an operation permit, these systems, whether residential or non-residential, shall include a water conservation plan that includes water-saving devices such as low volume toilets and water-saver shower heads. In addition to reducing the hydraulic load that needs to be treated by the sewage disposal system, this also reduces the demand on groundwater resources in the County, preserving potable groundwater for future uses. To reduce the amount of solids that enter the sewage system the use of garbage disposals is discouraged.

As a general policy it is desirable to require a 100 foot riparian buffer consisting of mature trees with a ground cover of shrubs and grasses between drain fields and the nearest water

taking into consideration the use of the property.

4. Development within Areas where Soils have Poor Structural Qualities

The primary structural quality of soil is its potential for volume change when subjected to a loss or gain of moisture. This is called "shrink-swell" characteristics. Volume changes occur mainly because of the interaction of clay mineral with water, and the amount of change varies with the amount and type of clay minerals in the soil.

Northumberland County's soils generally do not have serious problems with shrink-swell but there are some locations on the low rural shelf (Figure 1-8) with "moderate to high" characteristics. Moderate identifies soils with shrink-swell in the range of 3 to 6 percent while "high" is in the 6 to 9 percent range. Policies for areas with moderate to high shrink-swell characteristics are as follows:

- (a) County officials will advise builders of the need to have the soils examined and require engineering reports to demonstrate that soils under building foundations will support the intended load.
- (b) The Subdivision Ordinance should include requirements that the shrink-swell, soil permeability, water table and other factors be evaluated as part of the plat review process.
- (c) Approvals of site plans, subdivision plats or other documents proposing the use of land where soil characteristics are unfavorable for development will be withheld where soils are unsuitable for development and where no compensating actions are proposed to compensate for the condition(s).

5. Flood Prone Areas, Wetlands, and Natural Habitat Areas

Flood prone areas addressed in this Plan have a probability of flooding once every 100 years. Such areas are referred to as the 100-year flood plain. This floodplain overlaps the Chesapeake Bay Resource Protection Area and is subject to a separate set of regulations. Development in floodplains is not as restricted as it is in the Chesapeake Bay RPA, but floodplains are highly sensitive areas and their development should be avoided.

Tidal wetlands and natural habitat sites lie along the shoreline or at the headwaters of various rivers and streams although some are found on the tributary streams (Figure 1-10). Both wetlands and habitat sites provide a natural resource for certain rare, threatened or endangered species. These areas are protected by federal laws and may not be disturbed or altered to accommodate man-made activities.

Policies for flood prone areas, wetlands, and natural habitat areas are as follows:

- (a) Residential subdivisions or other developments involving buildings designed for

human occupancy must meet County requirements establishing that the required height of any occupied floor area of a building shall be above the 100-year floodplain level. Other uses not covered by RPA and County regulations that may be permitted within the floodplain shall be guided by the performance standards of the Federal Emergency Management Administration.

- (b) Point sources of pollution are not to be established in or designed so that they discharge waste into flood prone areas.
- (c) New lands that may from time to time be delineated as "wetlands" or "habitat sites" are subject to the same conditions as land that currently lies within the Resource Protection Area.
- (d) Public access areas developed to increase the recreational use of public waters and other natural resources of the State are to be planned within the framework of the performance standards of the Resource Management Area and/or the Resource Protection Area, as the case may be.
- (e) The 100-year flood zone, wetlands and habitat sites shall be identified on proposed plats or development plans.

6. Chesapeake Bay Protected Areas

The overlap between the Chesapeake Bay Act Protected areas and wetlands, habitat areas and 100-year flood zones has been noted. In most cases all of these conditions are contained within the Resource Protection Area and its 100-foot buffer strip. As an overlay zone in the County's zoning regulations, the RPA places restrictions on the use of affected lands within the RPA. These regulations offer considerable protection from uses that would be harmful to the natural habitat of aquatic life and water fowl in addition to protecting the waters of the Chesapeake Bay and its tributaries.

Policies for the Chesapeake Bay Protected Areas are to:

- (a) Continue to identify the RPA on individual development plans and subdivision plans submitted to the County for review and approval with specific RPA boundaries defined by engineering studies or surveys.
- (b) Continue to administer the performance standards of the Chesapeake Bay Ordinance.

7. Protection of the County's Groundwater Supply

The residents of Northumberland County obtain their drinking water chiefly from three sources: (from shallowest to deepest) the surficial (water table) aquifer, the

Chickahominy-Piney Point artesian aquifer, and the Rappahannock artesian aquifer system (made up of the Aquia, Brightseat, and Upper Potomac aquifers)². The surficial aquifer serves as a water supply for domestic water users who utilize shallow, large-bore wells. This aquifer is the one most vulnerable to pollutants from failed septic tanks, leaking storage tanks, agriculture runoff, agriculture pollution by infiltration and a variety of other point and non-point sources of pollution.

The deeper, artesian aquifers increasingly provide water for domestic, commercial, and public water systems. These aquifers are less vulnerable to pollution from surface sources than the surficial aquifer; however, hydraulic fracturing (also known as fracking, hydrofracking, or hydrofracturing) is becoming a major concern. Fracking is an oil and gas well process involving injecting under high pressure water, sand, and chemicals into bedrock to create fractures in order to increase capturing the amount of oil and/or gas flow from petroleum-bearing rock.³ While there appears to be no specific oil/gas deposits in Northumberland County, the concern is that of the Taylorsville Basin in the northern part of the Northern Neck, and what impacts fracking may have on the County's water supply being downstream from those locations. The deeper artesian aquifers are limited ultimately in the quantity of water available for withdrawal.

In 2003, the Virginia General Assembly identified the need for a regulation for the comprehensive water supply planning to protect water supplies for the future economic vitality and public health of the Commonwealth. The Virginia State Water Control Board responded to this mandate and adopted regulations on June 28, 2005 requiring all local government and regional entities to prepare local and/or regional water supply plans. The Northern Neck Planning District Commission (NNPDC) met this legislative and regulatory requirement by developing a regional plan. The NNPDC retained the services of EEE Consulting, Inc. in Blacksburg, VA to assist in this effort.

On July 14, 2011, Northumberland County approved the Northern Neck Regional Water Supply Plan (a copy can be reviewed in the Office of Building & Zoning) which includes a description of existing water sources, existing water uses, and existing water resource conditions; an assessment of projected water demand; a description of water management actions including drought response, contingency plans, and other water demand management information; a statement of need and an analysis that identifies alternatives to address projected water supply deficits; and maps identifying important elements of the plan such as existing water resources, proposed new sources, and significant existing water uses.

The Northumberland County Board of Supervisors also supported efforts to extend the Eastern Virginia Groundwater Management Area to the Northern Neck. Under VA Code § 62.1-254, DEQ is required by the Groundwater Management Act of 1992 "to conserve, protect and beneficially utilize the groundwater of this Commonwealth and to ensure the public welfare, safety and health." Due to large withdrawals from the aquifers of the

2 Reference USGS Professional Paper 1404-C

3 Reference USGS <http://energy.usgs.gov/OilGas/UnconventionalOilGas/HydraulicFracturing.aspx>

Coastal Plain of Virginia, cones of depression are being created ultimately interfering with other wells. Along with these cones of depression, there has also been observation of declining water supply. The State Water Control Board expanded the Groundwater Management Area to the Northern Neck region in an effort to assure that: 1) existing groundwater users were protected from new or expanding withdrawals, 2) resource viability continues into the future, and 3) the resource is managed comprehensively.⁴ Any person or entity within the Groundwater Management Area must obtain a permit from DEQ to withdraw 300,000 gallons or more of groundwater in any one month.

The water-supply management strategy of the County has two goals:

- 1) Protect the surficial and artesian aquifers from pollution; and
- 2) Ensure the long-term availability of potable water from the diverse sources of surficial and artesian aquifers, desalinization, and reservoirs.

The first goal secures safe and sanitary water for the residents of the County, and the second goal provides for an adequate supply of water.

a. Protection of Water Quality

The County recognizes that the Virginia Department of Environmental Quality and Health Department monitor the installation of systems for withdrawals of groundwater. Monitoring of water quality, especially nitrate concentrations in shallow wells and sodium and chloride concentrations, as well as water levels in artesian wells should be increased. The County intends to maintain liaison with and cooperate with these agencies to identify potential groundwater pollution problems.

Policies for the protection of potable water from pollution are included in the following sections.

(1). Surficial Aquifer (Conventional Shallow Wells)

Individual wells in this aquifer are subject to many types of contamination problems, some of which are addressed below. Current problems and concerns such as contamination, capping, testing and education are addressed on a regional basis.

- (a) Buffers should be required around shallow wells to avoid contamination.
- (b) In cooperation with the Department of Environmental Quality, the Virginia Department of Health and the Department of Conservation and Recreation, the application of agricultural chemicals shall be monitored to ensure that they follow an approved nutrient management plan and Best Management Practices.

⁴ Reference Status of Virginia's Water Resources. A Report on Virginia's Water Resources Management Activities. - October, 2014.

- (c) Malfunctioning sewage disposal systems present a health hazard to the water supply; appropriate action should be initiated to remedy the problem
- (d) Proper capping of a conventional well is essential to preserve the safety of drinking water. It is also necessary to secure the safety of our children. The County recommends the sealing of all well caps to prevent intrusion of contaminants. For shallow bored wells this can be done with methods that allow for access to service the plumbing. Although more a safety issue than a water quality issue, the County should continue to actively publicize and enforce the requirement that all abandoned wells be capped.
- (e) The policy which requires each residential development site to provide an adequate septic tank drain field, plus a reserve drain field, both acceptable to the Health Department, shall be continued. However, the County should discourage the identification of reserve drain fields that are smaller than required for conventional systems unless an engineered system is initially installed.
- (f) The County will cooperate with the DEQ in locating and causing the replacement of defective underground storage tanks.
- (g) Areas around wellheads used for public and private water supplies shall be protected from land uses that could contribute to the pollution of the aquifers.
- (h) The County will consult with the State Health Department regarding its requirement to abandon shallow wells when an artesian well is dug. This county has special needs. First, artesian water is high in sodium and may one day be unavailable. Second, water can be obtained from a shallow well by hand; during power outages, but not from an artesian well.
- (i) Point sources of pollution are to be addressed by upgrading existing point sources of pollution to ameliorate threats to the water systems and by imposing strict controls on the establishment of new point sources. Specific policies for point sources are:
 - (i) Existing underground fuel-storage tanks made of unprotected steel are to be replaced immediately after any finding that they have been or are leaking. As these and other tanks intended for storage of hazardous or polluting materials are added or replaced, the new or replacement tanks and piping shall be constructed of non-corrodible materials sufficient to protect against future leakage.

- (ii) When major public facilities such as waste water disposal facilities, landfills or sewage treatment plants are constructed, they shall be designed and constructed with appropriate protective devices to assure that they will not create a hazard to the underground water supply, watersheds or other environmentally-sensitive areas.
- (iii) Known sources of pollution with emissions in excess of what is permitted by applicable state and local regulations are to be upgraded or replaced to bring any point source pollution deficiencies into compliance.
- (iv) New commercial and/or industrial uses to be established within the County shall be constructed so as to produce no net increase in: pollutants to water or air; storm water discharge; chemical contaminants of any type; or any other condition that will be detrimental to state waters.
- (v) Increase the knowledge of citizens concerning the advisability of testing individual wells on a regular basis.
- (vi) Establish specific policies for the handling and disposal of hazardous materials and for seepage from large trash piles.
- (vii) The County shall cooperate with the Virginia Department of Health's program to provide reimbursement for a monitor and water testing relative to biosolids/sewage sludge land applications.

(2). Artesian Aquifer

Policies regarding the quality of the water from the deep artesian aquifer are as follows:

- (a) The high sodium content in our artesian aquifers can exacerbate health conditions and damage household plants and flowers. The County in cooperation with the NNPDC shall develop ways of making this information widely available to county residents. (*Sodium levels range from 110 to 185 milligrams per liter in the county. The United States Environmental Protection Agency recommends no more than 20 mg/l for persons whose health requires the limitation of sodium intake.*)
- (b) All artesian wells should be capped with a secure seal to prevent contamination. The County in cooperation with the Health Department should initiate a program to ensure this occurs.

- (c) Subdivisions may have either a single public water supply or multiple wells with 14 or less connections on each, subject to Health Department approval. The Virginia Department of Health regulates community wells with 15 connections or more.

(3). Other Water Quality Policies

- (a) Continue to work with the Bureau of Shellfish Sanitation and the Department of Environmental Quality to survey and monitor the health of shellfish growing areas in County waters and take necessary actions to support this industry.
- (b) Monitor the technological progress in the development of desalinization systems as a future economically viable source of potable water.
- (c) Residents should be asked to notify the County if they know the location of abandoned wells such as those used by former sawmills, former owners or land users.

b. Water Quantity: Protection of Supply Availability

The basic water-supply policy is to stress a diversity of public and private water sources including the surficial aquifer, the artesian aquifer and reservoirs. Specific policies for providing an adequate supply of potable water from each of these sources are addressed in the sections below.

(1). Surficial Aquifer

Because conventional wells are supplied by the infiltration of rain and snow melt, they are a renewable source of water. Protection and preservation of these wells is an important part of insuring that water will be available to future generations in the County.

There are many older wells remaining in the county which were hand dug. During times of drought these wells may run dry whereas wells dug by machine have proven to be successful even during drought.

To this end the County:

- (i) Prohibits the installation of hand dug wells and requires well drillers to provide enough depth in a well to allow an adequate water supply when the water table drops, and to inform the owner and the Health Department of the amount of water in a newly dug well.

(2). Artesian Aquifer

Because our artesian aquifers are rapidly being drawn down by industry and suburban development outside our region, particularly the Middle Peninsula and Southern Maryland, it is imperative that the County provide a well researched and coordinated effort to insure that drinking water will be available to future generations. Two members of the Rappahannock Aquifer System—the Bright Seat and the Upper Potomac aquifers--do not have a land surface source for recharge. Excessive draw down of these aquifers can have catastrophic effects for Northumberland County. The United States Geological Survey and the Virginia Department of Environmental Quality published a report in 2006 of the aquifer system. With better data, this report depicts maps showing the approximate depth for each aquifer. This paper is available online: U.S.G.S Professional Paper 1731, The Virginia Coastal Plain Hydrogeological Framework. This data dramatically changes much of our understanding of groundwater sources. Artesian aquifers do not have significant recharge sources that can keep up with our current use.

- (a) NNPDC in cooperation with the Planning Commission shall work to identify solutions to the decline in groundwater levels in the artesian aquifers and present them in the State mandated water supply plan. They shall identify potential partners in implementing those solutions and recommend structured liaison with partners including the Virginia Department of Environmental Quality and the Virginia Department of Health and Maryland organizations as applicable.
- (b) For large water users, a groundwater withdrawal plan shall be submitted as part of the documentation for new subdivisions and commercial places, and such plans shall have the approval of appropriate state agencies including any guidelines as set forth in the Eastern Virginia Groundwater Management Area. Major water withdrawals shall be made from the lower aquifers or from reservoirs.

Additional research data is being gathered at the state monitoring well station built in Northumberland County at Surprise Hill with information transmitted to U.S.G.S computers for each of the five aquifers. This data can be obtained at:
http://waterdata.usgs.gov/va/nwis/current/?type=gw&group_key=county_cd

(3). Reservoirs

Because a water shortage is likely in the future the County should plan for reservoirs as one of the sources of potable water.

- (a) Current recommended sites should be protected from potential sources of

contamination and development (See Chapter 3).

- (b) By 2017, the County should conduct a comprehensive study and develop a detailed economic and financial plan and determine the feasibility of a reservoir system. This will provide the ability to expand the system of reservoirs as the supply from the current deep aquifer is depleted or becomes too saline.
- (c) Other policies are addressed in Chapters 3 and 4.

(4). Other Water Supply Sources

Other sources such as rainwater harvesting should be considered and promoted as the available technology exists to make this a sanitary source of drinking water.

8. Watershed Protection for the Bay

The protection of the watersheds involves groundwater protection (discussed in the preceding item) and prevention of pollution in the Chesapeake Bay. The protection of the Bay is served by reducing the amount of runoff and groundwater discharge. Less runoff means less soil erosion and consequently fewer pollutants entering the Bay by maintaining a 100 foot RPA. Clearly, the preferred land use practices are those that reduce the amount of surface water reaching the major rivers and Chesapeake Bay.

Policies for the protection of watersheds include:

- (a) Any development or use of land shall be done in such a way as to preserve the integrity of the existing watershed, maintain natural hydrology whenever possible and in general, drainage facilities may not be designed to change the course of water from one watershed to another.
- (b) Sites intended for new development shall be designed in such a way that their post-development performance meets the criteria set forth by CBLAB and other state agencies in the following areas:
 - (1) soil erosion and sedimentation
 - (2) rainwater infiltration (stormwater)
 - (3) nutrients used
 - (4) indigenous vegetation
- (c) Enforcement of RPA and RMA regulations designed to filter runoff through buffers and to manage development so as to minimize storm water runoff is to be continued. The use of riparian buffers bordering waterways so as to intercept groundwater discharge should be encouraged as a minimum. However, the

preferred method is to use principles of Low Impact Development, LID⁵, to reduce storm water runoff in the first place, and to promote infiltration of storm water into the ground instead of conveying it off site.

- (d) Furthering watershed protection in the County, two citizen's groups have undertaken water quality testing in two watersheds. The Dividing Creek Association is monitoring 2.017 estuary miles of Dividing Creek and the Cubbitt Creek Monitors are monitoring 0.227 estuary miles of Cubbit Creek.

9. Tidal Shoreline Preservation

Shoreline erosion documented by VIMS in its 2014 Shoreline Situation (http://ccrm.vims.edu/gis_data_maps/shoreline_inventories/virginia/northumberland/northumberland_disclaimer.htm) report is significant within Northumberland County. Particularly affected are the shorelines exposed to the Chesapeake Bay (Figure 1-19). Greater rates of erosion have occurred as a direct result of northeaster storms and hurricanes.

In April 2003 VIMS published a Northumberland County Dune Inventory. Approximately 6.3 miles of dune shore consisting of 59 separate dunes were identified in the County. These are on the Chesapeake side and the Potomac River Side of Smith Point. Dunes reside in areas of sand accretion and stability, such as around tidal creek mouths, embayed shorelines, in front of older dune features, as washovers, as spits and against man-made structures like channel jetties or groin fields. The Northumberland County Dune Inventory created by the Virginia Institute of Marine Science is hosted here: http://www.vims.edu/research/departments/physical/programs/ssp/docs/northumberland_duneinventory.pdf

Dunes act as a reservoir of sand which can buffer inland areas from the effects of storm waves and, in the process, act as natural levees against coastal flooding. Dunes are protected under the Coastal Primary Sand Dune Protection Act of 1980 and, where they occur, are valuable assets in shoreline preservation.

While shoreline erosion of exposed shorelines is almost entirely a result of natural events such as waves, rising sea level and land subsidence, there are some actions that can be taken both by individuals and through County policies that can mitigate or delay the adverse effect of shoreline erosion.

Dunes also are important habitat for many species and should be preserved in their natural state. Secondary dunes are also important, in case of depletion of the primary dunes; they become the first line of defense from erosive storm surge. Secondary dunes should also be preserved intact as much as possible.

5 Op. Cit. Chapter 4

In 2011, the Virginia Assembly passed legislation to amend §28.2-1100 and §28.2-104.1 of the Code of Virginia and added section §15.2-2223.2, to codify a new directive for shoreline management in Tidewater Virginia. In accordance with section §15.2-2223.2, all local governments shall include in their comprehensive plans beginning in 2013, guidance prepared by the Virginia Institute of Marine Science (VIMS) regarding coastal resource management and, more specifically, guidance for the appropriate selection of living shoreline management practices. The legislation establishes the policy that living shorelines are the preferred alternative for stabilizing eroding shorelines.

This guidance has been prepared by VIMS for localities within the Tidewater region of Virginia. It explicitly outlines where and what new shoreline best management practices should be considered where coastal modifications are necessary to reduce shoreline erosion and protect our fragile coastal ecosystems. This guidance will include a full spectrum of appropriate management options which can be used by local governments for site-specific application and consideration of cumulative shoreline impacts. The guidance applies a decision-tree method using a based resource mapping database that will be updated from time to time, and a digital geographic information system model created by VIMS.

The Comprehensive Coastal Resource Management Portal provides information for citizens and Wetlands Boards showing preferred shoreline management practices. The weblink to the Comprehensive Coastal Resource Management Portal for Northumberland County is: <http://ccrm.vims.edu/ccrmp/northumberland/>

10. Policies Concerning the Use of Tidal Waterfront Areas while Preserving Sensitive Environmental Areas

State and County policies regarding use of waterfront areas favor additional use of the Chesapeake Bay and its major tributary rivers for recreational use. A study of shoreline access is presented in the Chesapeake Bay Area Public Access Plan which covers all of the states which border on the Chesapeake Bay and its major river tributaries. While it is one policy of the Commonwealth of Virginia to encourage responsible additional recreational use of the rivers and the bay, it has other policies which are designed to protect the shorelines from harmful erosion together with the sensitive marshes and wetlands which border tidal waters. Accordingly, the following policies are established by Northumberland County to promote the use of selected waterfront areas for additional public recreation:

- (a) The County plan for water access outlined in Chapter 4 shall be implemented.
- (b) The regulations of the RPA will be expanded to establish or expand performance standards for piers, boat houses and other structures designed to serve boat traffic.

- (c) Alternate techniques to the use of bulkheads and rip-rap for protecting shorelines will be offered through the use of vegetation and other natural devices.
- (d) Restroom facilities should be considered for busy public water access locations during boating season, e.g. Shell Landing, Lodge Creek, and Crane's Landing.

11. Intensively-Developed Shoreline Areas

Northumberland County does not have an area that would be classified as intensively developed. The most intensively-developed area within the County is in Reedville which has a residential density that averages 1.14 lots per acre. This is considerably under the criterion of four dwellings per acre that is required to qualify as an intensively-developed area by CBLAB's criteria.

The following policies are for the purpose of providing guidelines for development within the village areas:

- (a) All development within the villages will be subject to review and approval on an individual project basis. This review shall include the proposed site plan and the use of property to assure that new development, including redevelopment of existing uses, is consistent with policies established to protect state waters as well as to promote the goals of the County for economic development and to serve the public health, safety and general welfare of the County.
- (b) Management of storm or other water discharged from each site shall be performed in a manner that the run-off meets the requirements as to quantity and nutrients of the Resource Management Area of the Zoning Ordinance.
- (c) Public sewerage facilities installed in the villages or in major new developments shall be designed and constructed consistent with the State's and County's objectives to protect state waters.

12. Managing Potential Conflicts between Land Use and Water Quality Protection

The major focus of potential conflicts between land use and water quality quite naturally lies in those areas where the population is concentrated but also occur on agricultural lands. Among the specific areas more subject to potential conflicts and the possible causes of such conflict are the following:

- (a) Chemicals and other nutrients used on agricultural lands can percolate into the groundwater of the surficial aquifer and be carried into creeks by groundwater discharge and runoff. These contribute to reduction in water clarity and reduction in important underwater grasses. It has been known for over 30 years, since the first Army Corps of Engineers study of Chesapeake Bay, that agricultural practices are the major source of pollution of the Bay. In our setting, with little or no urban

runoff and effective wastewater treatment plants, it constitutes most of the nitrate and phosphate pollution of our local waterways. Future adverse uses can be reduced through use of erosion control plans, nutrient management plans and integrated pest management. Best Management Practices and the establishment of permanent forested buffers in the Bay Act are programs designed to reduce the adverse impact on water quality as a result of agricultural operations.

- (b) On-site sewage disposal for residential and limited commercial use, if not properly installed and maintained, can result in both contamination of ground water and in case of extreme failure of raw effluent being carried via runoff to creeks which flow to the Chesapeake Bay. The Bay Act requirement to inspect septic systems and to pump septic tanks every five years, if necessary, will help improve groundwater quality. The Health Department issues all sewage disposal system construction permits and inspects them. This, in general, is focused on new construction which along with the time of property transfer is the best time to initiate new requirements. A regional septage disposal system should be planned as a solution to the problem of individual Counties in the Northern Neck not having adequate disposal capability.
- (c) Development of land which abuts tidal waters increases the probability of shoreline erosion as well as diminishing the amount of protective marshlands and wetlands. This potential conflict is addressed by a strategy that discourages the use of property in a way that is potentially detrimental to water quality both in open streams and in the aquifers. The strategy includes: installation of erosion control structures or plantings that have a demonstrated ability to decrease shoreline erosion; and septic tank and underground fuel storage tank monitoring and/or replacement as necessary to prevent pollution of state waters and related actions.
- (d) Use of modern land planning techniques as a means of preserving open space, including agricultural lands and forests, will minimize the impact of residential development on the environment and on state waters. Such techniques may include: planned unit development, cluster subdivisions with open space preservation, historic landmarks preservation, density zoning and the like. The objective in using these techniques is to permit a similar level of development as would normally be permitted but to improve the efficiency of land utilization.

It is important for the County to provide information to the residents about various means to protect water quality and how each property owner can contribute. Each of the four areas above should be addressed as a minimum and could be distributed in conjunction with approval of building or land disturbance permits.

13. Soil and Tidal Water Conservation Policies

The Chesapeake Watershed Agreement, was re-affirmed and signed on June 16, 2014, and this was the first agreement that included signatories from the entire watershed. There are 10 goals restore the health of the Chesapeake Bay. To learn more about the goals and the Chesapeake Bay Program visit their website at <http://www.chesapeakebay.net/chesapeakebaywatershedagreement/page>. Unlike point sources, where treatment technologies can achieve specified nutrient reductions, non-point source controls are much more difficult to implement and maintain. These non-point source pollution controls encompass multiple strategies and must be placed on land by thousands of landowners, land managers, local governments, and others.

The non-point source pollution reduction approach under the coordination of the Virginia Department of Environmental Quality is to refocus available tools, to steer new resources to Virginia's strongest non-point control programs, and to push them to maximize reductions across the landscape. These efforts will focus on seven programmatic areas:

1. Agricultural Best Management Practices (BMP) acceleration;
2. Expansion of Nutrient Management Planning and implementation efforts to include urban and mixed open lands;
3. Consolidation and strengthening of the Virginia Storm Water Management Program;
4. Enhanced implementation of the Virginia Erosion and Sediment Control Program;
5. Strengthen implementation of the Chesapeake Bay Preservation Act;
6. Enhancement of NPS Implementation Database Tracking Systems; and
7. Enhance outreach, media, and education efforts to reduce pollution producing behaviors.

The policy and plan of Northumberland County is to support the Northern Neck Soil and Water Conservation District in the implementation of these programmatic areas and to work jointly to develop specific strategies and plans to address these issues.

C. MAJOR REGULATORY ELEMENTS OF THE WATER QUALITY PROTECTION PLAN

1. **Chesapeake Bay Act - The Resource Protection Area Regulations:** These regulations provide immediate protection to all tidal wetlands along the shores of streams and to known non-tidal wetlands adjacent to tidal wetlands. As a practical matter, the protected areas extend to most of the major and minor creeks and branches that run throughout the County. This protection area includes a buffer area around all previously defined wetlands which acts as a vegetative *strainer* to pollutants that may otherwise be carried to streams and wetlands by surface runoff and groundwater discharge.
2. **Chesapeake Bay Act - The Resource Management Area Regulations:** The

strategy in the RMA (all area not in the RPA which includes the remainder of Northumberland County) is to allow development but under a set of performance standards which are designed to reduce the quantity of potential pollutants that reach the RPA. This is done by application of Best Management Practices of the State Water Control Board and more intensive review of all building applications.

3. **Subdivision Ordinance:** provides the requirements that must be met by developers for establishing a subdivision. This Ordinance references and incorporates sections of the Chesapeake Bay Act.

4. **The Zoning Ordinance:** offers another tool which will enhance the County's capability of managing development. In addition to the RPA and RMA, the overall zoning ordinance strengthens the ability of the County to manage development. A separate ordinance contains floodplain regulations.

5. **County-wide Land Use Policies:** are proposed to upgrade over a period of time specific point sources of pollution that either contribute or could contribute to further degradations of the Chesapeake Bay. The general policies are as follows as regards water quality:

- (a) Public and private sewage treatment plants shall be located, constructed and operated in a manner so as to insure against possible contamination of the Bay through operational error or natural disaster. State-of-the-art nutrient removal should be installed in all facilities and upgraded as better technology becomes available.
- (b) Solid waste landfills, public or private, must comply with the strictest of safety and health requirements and include all state and federal standards.
- (c) Underground tanks used for storage of chemicals or petroleum products should be monitored according to state requirements. Replacement of faulty tanks with approved materials shall be done within a reasonable time.
- (d) Land development in areas that are sensitive to erosion and land developed along shorelines or in any other environmentally-sensitive area should be monitored carefully through the administration of site plan review and enforcement of RPA/RMA regulations.
- (e) Land development for subdivisions is to be encouraged to be designed to preserve open space using innovative land development techniques which promote the preservation goals of this plan.