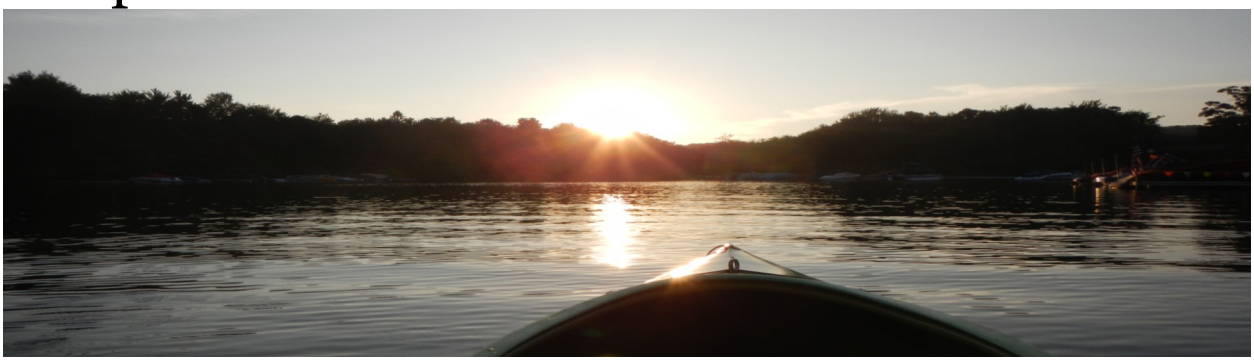
Chapter 6 Natural Resource Conservation



Vision

Because our natural resources and sensitive areas are critical to the quality of life in Talbot County and because significant components of our local economy depend upon clean and abundant waters, the County takes the necessary steps to reduce runoff and other pollutants into its waters. The means of enforcing these provisions are adequately funded, and measurable, objective criteria for monitoring the success of our efforts are in place.

Groundwater and aquifers—as well as wetlands, rivers and bays — are aggressively protected for the future. Measurable standards are in place to determine whether development threatens to deteriorate our groundwater or reduce our aquifers to unsustainable levels.

Thanks to adequate safeguards, sand and gravel extraction and closure of extraction sites avoid environmental damage. Site recovery and conversion to ponds and wooded areas controls runoff, helps maintain groundwater tables, beautifies the landscape and creates opportunities for parks and recreational areas.

To ensure the adequacy of the infrastructure prior to any development, the County strives to ensure that the cost of development is borne by the developer. Public infrastructure capacities are based on peak, rather than average, load requirements.

Goals

Conserve and protect Talbot County's most valuable and attractive assets, its natural resources.

Maintain, in cooperation with the local municipalities, a safe and adequate water supply and adequate amounts of wastewater treatment capacity.

Take steps to protect and restore water quality, and to meet water quality requirements in rivers and streams.

Conserve major accessible mineral resource deposits for future extraction while safeguarding the public by minimizing the environmental impacts of resource extraction and transport.

Establish and enforce programs and regulations to ensure preservation of natural resources, provide tax, financial, and any other incentives for compliance while allowing for moderate planned growth and development on existing lots or record.

I. Introduction

Talbot County's most notable feature is its proximity to the Chesapeake Bay and its 600 mile, irregular shoreline. Bordered by the Chesapeake Bay to the west, the Choptank River to the south and east, and the Tuckahoe River to the northeast, Talbot County is nearly surrounded by tidal waters. Along its western edge, the county takes the form of numerous peninsulas, necks, coves and creeks.

The County's history is reflected in its landscape. The land and waterways are intertwined in a unique mosaic of tidal waters, streams, farmlands and forests, following settlement patterns dating to pre-Colonial times. A scattered patchwork of farms, estates, villages and towns grew from traditions long centered on farming, seafood and maritime industries.

This Plan references the 2010 Census counts and projections. It also incorporates the septic tier system required by SB 236 into the Comprehensive Plan (see Chapter 2). New to this chapter are the recent State requirements for a Water Resources Element in the Comprehensive Plan and the Total Maximum Daily Load (TMDL) program.

The conservation and protection of sensitive natural resources transcends man-made boundaries. Loss of forest land, polluted runoff coursing into local waters, loss of agricultural land, and development in sensitive areas are all significant issues countywide.

Uniquely, over one third of the county's land area is within the Chesapeake Bay Critical Area. The County's Critical Area program contains strict regulations for the protection of these sensitive shoreline areas. Floodplain regulations extend additional safeguards within the 100-year floodplains.

Because sensitive areas are more vulnerable to environmental degradation, future development should be directed away from such areas and guided toward areas where environmental impacts would be less severe. All future development, regardless of location, should be subject to minimum performance standards for environmental protection and natural resource conservation.

The costs of resource restoration are far greater than those of resource conservation and protection. The loss of natural resources must either be accepted or the costs must be borne by County taxpayers to address the consequences of environmental degradation. The cost in tax dollars expended for water quality remediation in the Chesapeake Bay is a case in point.

Environmental quality is one attribute that makes Talbot County an especially desirable place to live and work. Efforts to conserve and protect natural resources yield long-term public benefits. The intent of County environmental protection measures is not to stop growth or development, but to ensure that development occurs without impairing the environmental sustainability of sensitive areas.

Natural Resource Policies

6.1 The County shall maintain countywide policies for conservation and protection of natural and cultural resources.

6.2 The County will enforce mandatory programs and regulations, and develop financial incentives to insure preservation of natural resources.

6.3 Where required, the County shall call for evidence of federal and State environmental permits as a condition of local development approval.

6.4 The County requires all new major subdivisions to submit an environmental impact assessment prepared by a qualified professional as part of a development application. The assessment must include all environmentally sensitive features on and adjacent to the site.

6.5 The County will maintain a Geographic Information System (GIS) inventory and map of countywide natural resources to assist with resource preservation management.

6.6 The County should promote and encourage partnerships to maintain comprehensive baseline data providing a measurable basis for pollution monitoring. Baseline data for air and water quality should be tracked to measure progress on environmental quality indicators.

6.7 The County will maintain cooperative partnerships with State, federal and town government agencies to address environmental problems as needed.

II. Water Resources Element

A. Background

The Water Resources Element represents a policy framework for sustaining public drinking water supplies and protecting the county's waterways and riparian ecosystems by effectively managing point and nonpoint source water pollution.

1. State Requirements for Water Resources Element

This Water Resources Element complies with the requirements of State law as modified by Maryland House Bill 1141, passed in 2006. Among the requirements addressed in this section are:

a. To identify drinking water and other water resources that will be adequate for the needs of existing and future development proposed in the Plan's land use element, considering available data;

b. To identify suitable receiving waters and land areas to meet stormwater management and wastewater treatment and disposal needs of existing and future development proposed in the land use element of the plan, considering available data provided by the Maryland Department of the Environment (MDE);

c. To deliver the Plan for review by the Department of the Environment to determine whether the proposed Plan is consistent with the program goals of the Department.

The original element was reviewed by MDE, and adopted by the Talbot County Council in December, 2010. It has been amended to include more recent data from the 2010 U.S. Census, along with updated growth projections as described in Chapter 1 (Background).

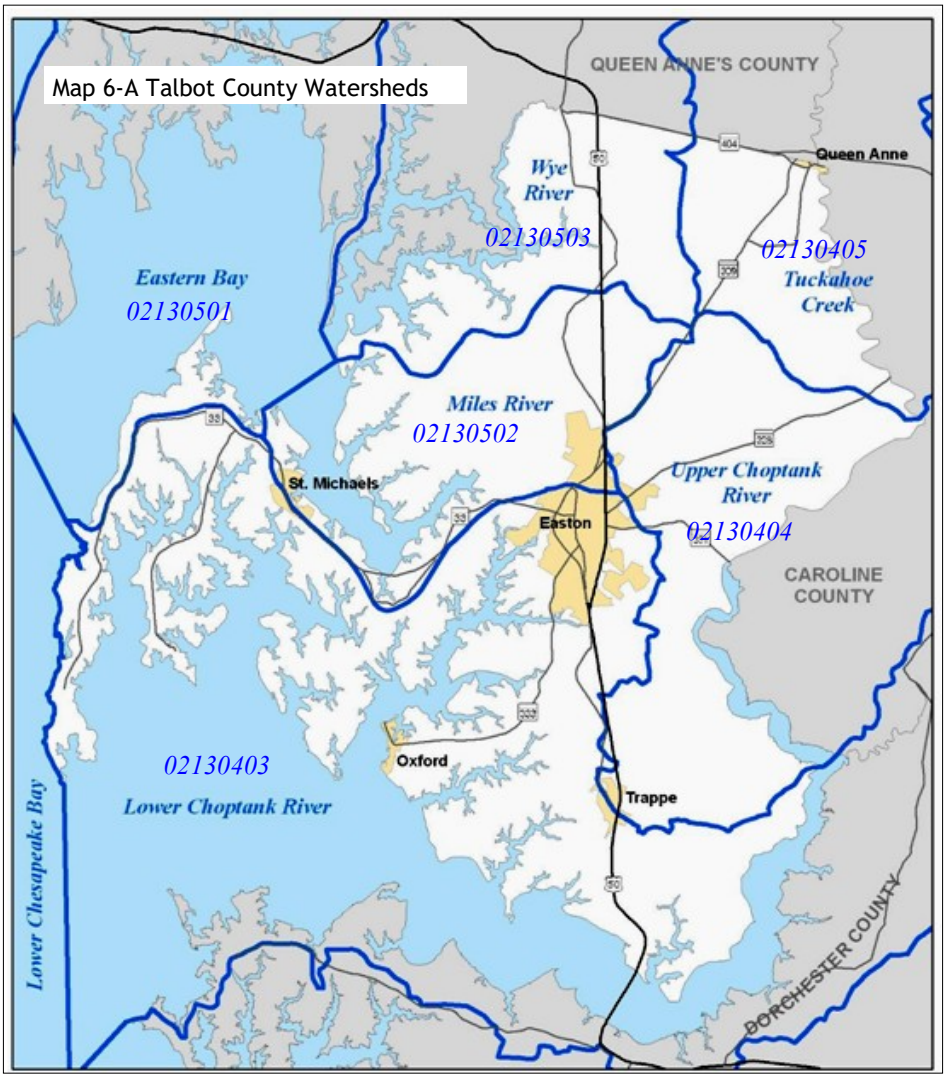
The Water Resources Element incorporated in this Plan identifies opportunities to manage existing water supplies, wastewater effluent, and stormwater runoff in a way that balances the needs of the natural environment with the County's land use plans, including the County's municipalities. The emphasis is to protect the local and regional ecosystem while ensuring clean drinking water for future generations of County residents.

This Element takes a watershed-based approach to analyze the impact of future growth on Talbot County's water resources, particularly in relation to discharged nutrients. Major water sheds are depicted on Map 6-A.

2. Inter-jurisdictional Coordination

The County recognizes the importance of inter-jurisdictional water resources planning. This Plan compiles, to the greatest degree possible, up-to-date statistics in order to coordinate water resources, growth, and land use planning. Data from municipal plans were used for this assessment. Where possible, Talbot County has also obtained data and information on water resources from adjoining counties, in order to paint the fullest possible picture of future impacts to the Choptank, Wye, and other rivers and streams that form Talbot County's boundaries.

There are five incorporated municipalities in Talbot County. Residents and businesses of the communities of Easton, Oxford, St. Michaels and Trappe receive public water and/or sewer service. Queen Anne residents and businesses do not receive public water or sewer service. Municipalities own and operate all of the public water systems in Talbot County. Easton, Oxford, and Trappe operate their own wastewater treatment plants.



3. County Projections and Scenarios

This chapter uses countywide population projections by the Maryland Department of Planning (MDP), referenced in Chapter 1. These projections indicate that the county population will reach approximately 42,900 by the year 2030, an increase of roughly 5,120 persons from the 2010 population of 37,782.

At the time the Water Resources Element was prepared in 2010, the County and its municipalities had granted at least preliminary approval for more than 5,500 housing units. Three thousand of these were planned by the Town of Trappe. For the purposes of the following analysis, it is understood that some of the approved units will not be built and occupied by 2030, nor be occupied by full-time residents.

Though MDP conducted a Development Capacity Analysis in 2010 indicating that over 20,000 new housing units could be accommodated under County zoning, subsequent actions have rendered such an outcome less likely. For example, the Sustainable Growth and Agricultural Preservation Act of 2012 (the septic tier system) has substantially limited subdivision potential for large rural parcels.

Figure 6-1 Projected Housing Unit Growth by Watershed, Through 2030

Watersheds	2007 Existing[2]	*2007-2030 Growth* Increment	2030 Total
Eastern Bay	242	85	327
Lower Chesapeake Bay	5	0	5
Lower Choptank River			
Easton[1]	5,224	1,141	6,365
Trappe[1]	368	116	484
St. Michaels[1]	327	5	332
Oxford	963	20	983
Remainder of Watershed	6,077	237	6,314
Miles River			
Easton[1]	896	119	1,015
St. Michaels[1]	693	91	784
Remainder of Watershed	2,087	119	2,206
Tuckahoe Creek			
Queen Anne	48	4	52
Remainder of Watershed	567	103	670
Upper Choptank River			
Easton[1]	506	45	551
Trappe[1]	117	336	453
Remainder of Watershed	1,386	185	1,571
Wye River	677	156	833
Total	**20,183**	**2,762**	**22,945**

Notes:
1: Includes the portion of the municipality (including areas likely to be annexed, based on the Talbot County Water and Sewer Master Plan) that falls within this watershed.
2: Source: Maryland Property View 2007

4. Future Development Scenario

A single future development scenario, based on pre-2010 population projections, was developed for the 2010 Water Resources Element in order to evaluate the sustainability of the County's 2005 Comprehensive Plan.

The non-point source loading analysis continues to anticipate the use of septic denitrification technologies to improve the quality of the County's receiving waters. Also, plans are underway to extend sewer to areas of failing septic systems and mapped communities and subdivisions in environmentally sensitive areas, further reducing the amount of nitrogen and bacteria released into rivers and the Chesapeake Bay.

Because water and sewer service is often measured in terms of equivalent dwelling units (EDU), the Water Resources element uses housing units as the basis for its water, sewer and non-point source pollution analyses.

Figure 6-1 shows the projected watershed-level distribution of housing units in the 2010 scenario. Revised (2012) population estimates change the projections slightly: There were slightly fewer households than estimated (19,577 rather than the 2007 estimate of 20,183). The number of households projected in 2030 has also been revised from 22,866 to 22,945. However, the assumption remains that about 70 percent of new housing units will be built in municipalities, including those areas identified as the towns' future growth areas. The updated projections have not changed the core planning assumptions and so the scenario has been altered little from the original.

B. Drinking Water Assessment

This section describes existing conditions and projected future demand for drinking water in Talbot County.

1. Public Water Systems

Groundwater is the source of all public and private drinking water in Talbot. Groundwater quality in the county is generally good. Elevated levels of naturally-occurring arsenic are known to be present in some areas. Saltwater intrusion in the Aquia aquifer is a known problem in the region of the Eastern Shore and may also be a special concern in the County's coastal areas. These issues are discussed in more detail in the section below.

Figure 6-2 summarizes municipal and community water sources in the County. The *Talbot County Comprehensive Water and Sewerage Plan* (CWSP) provides detailed information on county water supply sources, existing and proposed water facilities, and schedules for improvements. The County has a groundwater protection plan, and during the update process the County applied changes in accordance with new federal water quality standards.

Approximately 9,600 dwelling units in Talbot County, and a considerable share of businesses, receive drinking water from municipal and community water systems. The Towns of Easton, Oxford, St. Michaels, and Trappe all operate municipal water systems. There are also private community water systems in the communities of Claiborne, Martingham under the County's jurisdiction, and Hyde Park in the Town of Easton.

All of the major public water systems in the County have available system capacity to support projected growth through 2030. Available source water supply is covered in the *Issues and Discussion* section on the subsequent page.

2. Other Water Use

All residential units and businesses in Talbot County not served by the public water systems rely on individual or community wells. These wells are drilled in a variety of water-bearing formations, particularly the Columbia (or surficial) aquifer, Miocene, Piney Point and Aquia aquifers. Although not a precise representation of current water use, public water and private residential wells represent almost two thirds of all water use in the County.

Figure 6-2 Source Aquifers for Existing Public Water Systems, 2000

Water System[1]	Source Aquifer (number of wells)	Source Concerns / System Issues
Easton	Aquia Greensand (1), Magothy (3), Upper Patapsco (2)	Elevated arsenic levels
Oxford Area	Aquia Greensand (2)	Elevated arsenic levels
St. Michaels	Aquia Greensand (2)	Elevated arsenic levels
Trappe[1]	Piney Point (2)	
Claiborne	Aquia Greensand (2)	System size limitations, leakage. Elevated arsenic levels
Hyde Park	Aquia Greensand (2), Federalsburg (1)	Elevated arsenic levels
Martingham	Aquia Greensand (2)	Elevated arsenic levels

Sources: 2002 Talbot County Water and Sewer Master Plan; 2009 Trappe Comprehensive Plan (WRE); 2009 Easton Comprehensive Plan (WRE).

Notes:
1: Trappe also has groundwater allocations from the Matawan Aquifer, although there are no active production wells in this formation.

There were 329 active groundwater appropriation permits in Talbot County in 2002, drawing a daily average of 6.4 million gallons per day (MGD). A complete summary, *Hydrogeology of the Coastal Plain Aquifer System in Queen Anne's and Talbot Counties,* can be accessed at http://www.mgs.md.gov/publications/report_pages/RI_72.html.

The remainder of this section discusses non-public water uses in greater detail.

3. Private Residential Wells

About 10,500 residential units in Talbot County rely on individual wells or (in a few cases) community wells for drinking water supply, as do most businesses in rural areas. Private residential wells generally draw water from the Piney Point aquifer in the western and southern portions of the county, and the Aquia and Miocene aquifers in the central portion. Some older residences, particularly in the north and east continue to draw from the Columbia aquifer.

The total projected new demand for public water systems includes the transfer of some homes and businesses from private wells to public systems. These connections would add to the demand for public water service but not to the overall withdrawals from aquifers.

4. Major Commercial and Industrial Users

Commercial and industrial activities outside of municipal systems account for approximately one-fifth of all water used in Talbot County. The largest concentrations of such water use are found in Cordova and in areas adjacent to Easton and Trappe. The majority of non-municipal commercial/industrial water use is scattered throughout the county's rural areas, typically along U.S. 50 and other major roads.

5. Agricultural Water Users

As is the case throughout the Eastern Shore, Talbot County's farmers employ irrigation using both surface water and groundwater. Irrigation is most frequently used in areas to the south and east of Easton. Most surface water used for irrigation is drawn from Tuckahoe Creek. Groundwater for irrigation is generally drawn from the surficial aquifer. Recent droughts and near-droughts have led to an increased number of acres under irrigation since 2000, however usage is not consistent from year to year. In the 2014 Farm Services Agency report, irrigation was available on approximately 4,660 acres of farmland.

Figure 6-3 Talbot County Groundwater Withdrawals by Use Category, 2007

Type of Withdrawal	*Total Withdrawals (MGD)*			Percent of County Withdrawals
	Surface Water	Groundwater	Total	
Industrial	0	0.88	0.88	11%
Livestock Watering	0.02	0.12	0.14	4%
Irrigation	0.69	1.35	2.04	14%
Residential self-supplied	0	1.61	1.61	26%
Public Supply	0	2.55	2.55	39%
Total	**.71**	**6.51**	**6.00**	**100%**

Source: USGS MD-DE-DE Water Science Center http://md.water.usgs.gov/freshwater/withdrawals/

6. Issues and Discussion – Water

a. Groundwater Recharge

Talbot County's public and private water users draw drinking water from several major confined aquifers, many of which are widely used throughout the region. The capacity of these confined aquifers is increasingly strained by new development on the Delmarva Peninsula and west. (See Figure 6-3, Talbot County Groundwater Withdrawals by Use Category, 2007.)

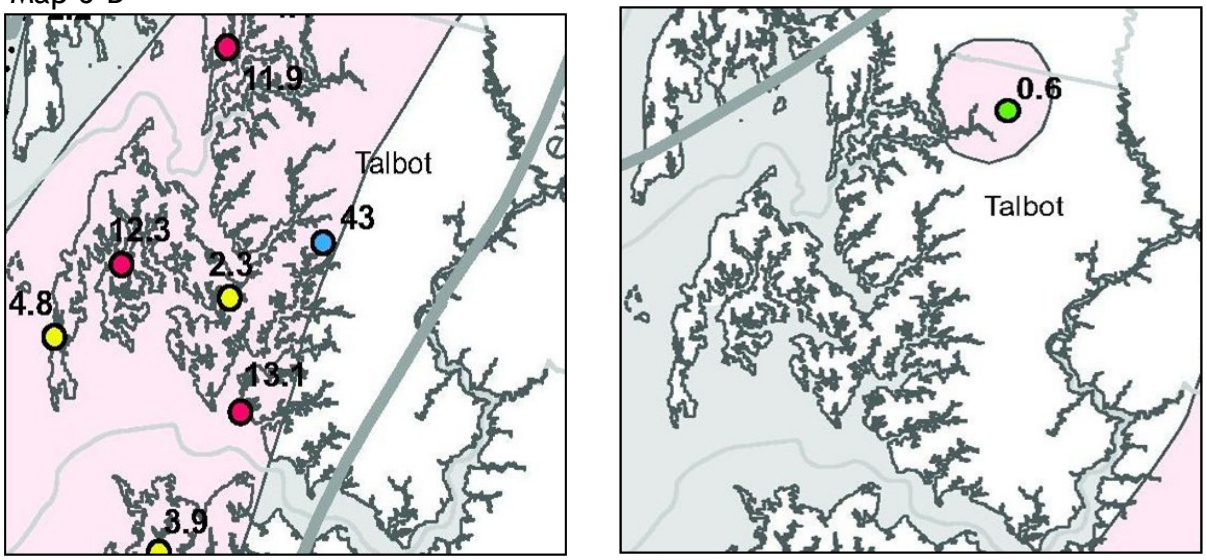
The U.S. Geological Society (USGS) reports that "withdrawals from Maryland Coastal Plain aquifers have caused ground-water levels in confined aquifers to decline by tens to hundreds of feet from their original levels. Continued water-level declines could affect the long-term sustainability of ground-water resources in agricultural areas of the Eastern Shore" (*Sustainability of the Ground Water Resources in the Atlantic Coastal Plain of Maryland*. USGS Fact Sheet 2006-3009). In most cases, the recharge areas for these aquifers extend to the Western Shore.

No comprehensive study exists of the water-bearing formations used by Talbot County residents and businesses. While the County understands that its groundwater supplies are limited and declining, there is no reliable measure of water supply against which to compare current and especially projected water demands. Project-specific groundwater studies do not take into account the cumulative impacts, on both sides of the Chesapeake Bay, of increasing demand on the Aquia and other formations. Concentrations of arsenic in groundwater is a localized concern which is illustrated in Map 6-B.

MDE, the Maryland Geological Survey (MGS), and the U.S. Geological Survey (USGS) have begun work on a Coastal Plain Aquifer Study, but that study remains incomplete. The County should use the data and recommendations of the Coastal Plain Aquifer Study (once completed) to shape its own water use policies and ordinances.

For purposes of this Plan, it is assumed that groundwater permits issued for public drinking water systems by MDE reflect the maximum

Map 6-B



Generalized areas where arsenic concentrations exceed 10 micrograms per liter in the Aquia (left) and Piney Point (right) aquifers (shaded areas). Source: *ARSENIC IN GROUND WATER IN THE COASTAL PLAIN AQUIFERS OF MARYLAND* by David D. Drummond and David W. Bolto*n, 2010.*

safe yield of the aquifer or aquifers used by that system. However, the County also recognizes the need for the development of regional plans and policies to protect our diminishing groundwater resources. To that end, the County will work with the State and appropriate county governments to encourage the establishment of a multi-county organization to better manage our major aquifers. Talbot County supports the commitment by the MGS and USGS to complete the Coastal Plan Aquifer Study, followed by a management plan to steward our shared water resources. Local resources are inadequate to the task. Implementation of a management plan will require effective inter-jurisdictional coordination and management.

b. Groundwater Protection

In addition to these concerns about water supply in the Aquia, individual wells in the surficial aquifer are at risk for elevated nitrate levels due to cross-contamination from failing or inadequate septic systems or agricultural fertilizer.

The *Talbot County Groundwater Protection Plan* (GPP) was developed in 1987, and identifies areas where septic systems may be allowed. The GPP establishes the design criteria and construction requirements for all septic systems, and designates areas that require maximum protection of shallow groundwater aquifers. The GPP is adopted as an appendix to the County's *Water and Sewer Master Plan*, and is enforced by the Talbot County Health Department.

c. Water Conservation

The County and its municipalities implement, through building codes, the Maryland Water Conservation Plumbing Fixtures Act (MWCPFA), which requires that plumbing fixtures sold or installed for new construction be designed to conserve water. In addition, the *Water and Sewer Master Plan* enumerates several benefits of water conservation and encourages water conservation as an official policy. The County and its municipalities actively encourage water conservation through education and water use monitoring.

d. Potential New Water Supplies

To assure sustainability, the County and its municipalities should begin to investigate the limits of existing source capacity and the feasibility of other drinking water sources, including different aquifers and surface waters.

Although not widely used for water supply, the Matawan, Patapsco, and Upper and Lower Pawtuxet formations are also under Talbot County, as described in *Hydrogeology of the Coastal Plain Aquifer System*. The Town of Easton draws some of its water from the Matawan, while the other aquifers listed above are not widely used for water supply.

More detailed investigation is necessary to determine whether these aquifers are of sufficient quality to produce a reasonable quantity for human consumption. Also, the aquifers listed above also exist at significantly greater depths than the Aquia and Piney Point, adding to the cost of wells.

Surface water impoundments are not currently used for drinking water in Talbot County. Nevertheless, surface water cannot be ruled out as a potential new source and should be included in any comprehensive study of new drinking water sources.

The County acknowledges however, that surface water is unlikely to be a preferred source. Though the County has access to the Choptank and other moderate-sized rivers, preparing surface water for public consumption can be costly and difficult. All of the County's major rivers are impaired by nutrients and several are also impaired by a variety of other pollutants, including biological material, bacteria, and sediments.

To address concerns about water supplies, some Maryland counties have begun to

Figure 6-4 Overview of Existing Wastewater Treatment Systems

Wastewater Treatment Plant	Discharge Location (Watershed)	Treatment Technology	Planned/Potential Upgrades or Expansions
Public Systems			
Region V (Tilghman)	Chesapeake Bay (Lower Chesapeake)	Lagoons	Potential upgrade/expansion
Easton	Upper Choptank River	Enhanced Nutrient Removal (ENR)	Service to additional areas around Easton (see below)
Oxford	Town Creek (Lower Choptank River)	Lagoons	Potential phosphorus upgrade, relocated discharge point.
Trappe	La Trappe Creek (Lower Choptank River)	Biological Nutrient Removal (BNR)	Likely upgrade/expansion of existing WWTP and/or construction of new WWTP.
Region II (St. Michaels)	Miles River	ENR	None planned
Private/Community Systems			
Hyde Park	Onsite Bermed Infiltration Pond		Annexed and Connected to Easton WWTP.
Martingham	Lagoons and spray irrigation		Flow permanently diverted to Region II WWTP.
Preserve at Wye Mills	Onsite Spray Irrigation	BNR	None planned

Source: 2002 Talbot County Water and Sewer Master Plan, updates 2012, 2014.

Figure 6-5 Capacities and Projected Demands for Public Wastewater Systems

		Region II (St. Michaels)	Region V (Tilghman)	Easton[4]	Oxford	Trappe[5]
Current System Capacity	MGD	0.66	0.15	4.00	0.10	0.20
	EDU	2,640	600	16,000	416	800
Current Average Daily Flow	MGD	0.37	0.09	2.65	0.09	0.15
	EDU	1,460	368	10,596	360	582
Current Net Available Capacity	MGD	0.30	0.06	1.35	0.01	0.05
	EDU	1,180	232	5,404	56	218
System Capacity, 2030[1]	MGD	0.66	0.15	4.00	0.10	0.20
	EDU	2,640	600	16,000	416	800
Total Projected New Demand, 2008-2030	MGD	0.16	0.06	0.39	<0.01	0.13
	EDU	648	256	1,577	23	520
Total Demand, 2030	**MGD**	**0.53**	**0.16**	**3.04**	**0.09**	**0.28**
	EDU	**2,108**	**624**	**12,173**	**383**	**1,102**
Net Available Capacity, 2030	**MGD**	**0.13**	**(0.01)**	**0.96**	**< 0.01**	**(0.08)**
	EDU	**532**	**(24)**	**3,827**	**33**	**(302)**

Notes:
1: Incorporates all ongoing or planned capacity upgrades.
4: For Easton, 2007 Average Daily Flow includes existing flow, plus capacity committed to future development, based on the Town's WRE. Future demand assumed that Hyde Park system will eventually be connected to the Easton WWTP.
5: Trappe future system capacity does not reflect conceptual system improvements as outlined in public sewer discussion.

investigate the feasibility of withdrawing and treating brackish tidal waters for public water supplies. Though desalinization technology necessary for such systems is expensive and energy-intensive, it should also not be ruled out over the very long term.

C. Wastewater Assessment

This section describes existing conditions and projected future demand for public wastewater treatment capacity in Talbot County.

1. Public and Community Sewer Systems

Wastewater systems in Talbot County are quite varied, ranging from individual systems with septic systems, to innovative community systems, to municipal systems using mechanical equipment. All Public systems are summarized in Figure 6-4. The *Comprehensive Water and Sewer Plan* (CWSP) outlines the characteristics and capacities of the central and community wastewater treatment collection and disposal systems within the County. The CWSP also details plans for expansions and improvements at each of these facilities. The County has adopted a Shared-Facilities Ordinance which allows for the expanded development of community-owned and operated wastewater disposal systems and the creation of new types of systems serving more than one household.

County owned and operated facilities are:

- Region II: located in St. Michaels, serving the Town of St. Michaels, the communities of Rio Vista, Bentley Hay, and the villages of Newcomb, Royal Oak, Bellevue, Unionville, Tunis Mills, and Copperville. The community system in Martingham, on the outskirts of St Michaels, pumps effluent to Region II for processing.
- Region V: located in and serving the Village of Tilghman and presently serving only that community.

Public systems not owned and operated by the County include:

- Easton's municipal system, serving the largest proportion of county residents, has begun processing effluent from the community system in Hyde Park, which has been annexed into the Town.
- The Towns of Oxford and Trappe operate municipal systems.

Also, the MEBA Engineering School operates a private community system.

More than half of all dwelling units in the county (over 13,500 EDUs), and a considerable share of businesses, discharge wastewater to one of the county's municipal or private wastewater treatment plants (WWTP). Figure 6-5 shows existing and projected public sewer supplies, demands, surpluses and deficits for these wastewater systems in 2030.

All of the county's major public sewer systems have available capacity to support some additional growth and development. The Region V plant may not have adequate capacity to accommodate projected growth through 2030without system improvements.

The Town of Trappe's municipal sewer system will not have adequate capacity to support projected development, unless the proposed 540,000 gpd WWTP upgrade (and spray irrigation system) is built to support the planned Lakeside development.

2. Private Septic Systems

The majority of residential properties in the county are served by individual on-site septic systems. Permits for these systems are reviewed and approved by the Talbot County Health Department as an agent of the Maryland Department of Environment.

Soil and water table conditions generally determine the suitability of sub-surface

disposal systems. The County Groundwater Protection Plan has delineated soils in the area mainly to the east of U.S. 50 as suitable for sub-surface discharge of wastewater, except in areas with a high water table. The historic riverfront Town of Queen Anne is an exception, with generally less suitable soils for on-site septic systems.

The groundwater protection plan has designated most areas to the west of U.S. 50 as susceptible to sub-surface system failures because of high water tables, low elevations, and soils with low permeability.

Communities in this area are impacted by failing septic systems, groundwater infiltration or concentrations of small lots on poorly drained soils; the communities include the Villages of Williamsburg, Sherwood, Wittman, McDaniel, Bozman, Neavitt, Claiborne, Fairbank and Bar Neck. The County will work to revise sewer connection and allocation policies to concentrate available capacity on addressing existing failing or polluting septic systems in villages, and allow for moderate planned growth and development on existing lots of record within established sewer service areas.

Plans to extend sewer service to these areas have been drafted while funding is being pursued. Connecting communities to effective wastewater treatment plants will help achieve the County's water quality improvement and environmental health objectives.

3. Nutrient Discharges

Nitrogen and phosphorus (more generally referred to as nutrients) from wastewater treatment plants (WWTPs), stormwater and other non-point sources have been identified as primary contributors to degraded water quality in the Chesapeake Bay and its tributaries. Through the Water Resource Element, local governments are required by the State to identify suitable receiving waters for the discharge of additional stormwater and wastewater.

The Total Maximum Daily Load (TMDL) is a series of calculations required by the federal Clean Water Act. A TMDL is the maximum load of pollutant that a water body can receive without impairing its quality below water quality standards. The TMDL is typically expressed as separate discharge limits from point sources such as WWTPs, and non-point sources such as stormwater or agricultural runoff.

Figure 6-6 Nutrient Loads and Discharge Capacities for Public Wastewater Systems

		Region II	Region V	Easton[2]	Oxford	Trappe
Existing Nutrient Loads	TN[1]	5,000	5,000	23,800	4,900	4,900
	TP[1]	603	1,700	2,400	1,600	183
Likely Nutrient Caps, 2030	TN	8,040	4,406	48,729	5,621	6,100
	TP	603	457	3,655	457	183
Projected ADF, 2030	MGD	0.53	0.16	3.00	0.10	0.28
Assumed Treatment Technology, 2030		ENR	BNR	ENR	BNR	ENR
Estimated Nutrient Discharges, 2030	TN	4,810	3,794	27,415	2,330	1,328
	TP	481	948	2,742	583	251
Remaining Discharge Capacity	TN	3,230	612	21,314	3,291	4,772
	TP	122	(491)	913	(126)	(68)

Notes:
1: TN = Total Nitrogen (lbs/year); TP = Total Phosphorus (lbs/year)
2: Includes the Hyde Park system as connected to the Easton system.

Water bodies are classified as impaired when they are too polluted or otherwise degraded to support their designated and existing uses. Like other waterways in the state, all of Talbot County's major waters are classified as impaired for nutrients, sediments and in some areas fecal contamination, and so by definition are not suitable receiving waters (see Figure 6-8). All counties are committed to Watershed Improvement Plans (WIPs) under an agreement between the federal Environmental Protection Agency (EPA) and the State of Maryland. The WIP, which maps a strategy for reducing pollutants to meet the TMDL, is discussed in Section II C of this chapter.

4. Point Source Caps and Discharges

To address nutrient loads from point sources such as WWTPs, the State has established numerical limits, expressed as pounds per year, on the amount of nitrogen and phosphorus that can be discharged into the Bay and its tributaries. Point source caps for nitrogen and phosphorus have been established for the Region II (St. Michaels) and Easton WWTPs. A phosphorous cap has been established for the Trappe WWTP, and a nitrogen cap has been established for the Oxford WWTP.

Figure 6-6 lists nutrient caps as well as existing and projected future nutrient discharges for the county's major WWTPs. This summary assumes that by 2030, the Region V (Tilghman) and Oxford WWTPs will both be upgraded to BNR, or biological nutrient removal technology.

A Region V plant upgrade would trigger the establishment of a nutrient cap for that facility. The default cap for such minor facilities (those that discharge less than 0.5 million gallons per day) is 6,100 lbs/year of nitrogen and 457 lbs/year phosphorus. The Tilghman facility may need to go beyond BNR or consider alternative effluent disposal methods (see below) to meet the phosphorus cap. A similar situation may exist for the Oxford WWTP.

The Trappe WWTP would be upgraded to enhanced nutrient removal (ENR). Such upgrades will be necessary to support projected growth in Trappe. It appears that even with ENR upgrades, the Trappe WWTP will not be able to meet the very stringent phosphorus cap for La Trappe Creek, the WWTP's current discharge point. The Town may need to consider relocation of its outfall pipe, or alternative effluent disposal methods.

The Region II (St. Michaels) and Easton WWTPs have adequate nitrogen and phosphorus discharge capacity to support projected growth through 2030 and beyond.

5. Alternative Wastewater Disposal

The application of treated wastewater effluent directly to the soil allows nutrients to be naturally disposed of by bacteria before the effluent reaches receiving streams or groundwater. Spray irrigation is the most common form of land application, although other options such as drip irrigation or subsurface discharge can also be considered.

Spray irrigation is already used as a disposal method for the Preserve at Wye Mills and may be appropriate for larger public systems in addition to, or instead of, point source outfalls. Factors such as slope, soil depth and granularity, water table depth and behavior, and buffers from streams and developed areas are important in determining true suitability.

Beyond soil and water table characteristics, other important considerations for land application include storage and seasonal restrictions. Land application systems typically require large storage lagoons capable of holding several months' worth of effluent. Land application is not permitted during winter months when frozen soil prevents infiltration of the effluent, or during other months when water tables rise, again preventing absorption.

Any future land application system would likely be paired with the nearby surface discharge to maximize system capacity without exceeding nutrient caps or TMDLs.

6. Programmatic Assessment of Nonpoint Source Policies

This section characterizes the policies and procedures in place to manage non-point source pollution in Talbot County.

Nonpoint sources of nutrient pollution include agricultural runoff, erosion and sediment from development, stormwater runoff from roads, atmospheric deposition, and any other source other than an outfall pipe. Non-point sources involve widely dispersed activities that are difficult to measure. All non-point sources of pollution eventually reach the waters of the Chesapeake Bay unless filtered or retained by some structural or nonstructural technique.

The Chesapeake Bay Program and other researchers report that statewide, agriculture is the largest source of non-point nitrogen, phosphorus and sediment loads. Stormwater runoff from developed land is also a significant contributor and has remained steady or increased over the past several decades.

Rural stormwater retrofit demonstration

Nutrient reduction technologies for non-point source pollution, referred to as best management practices (BMPs), include animal waste storage, agricultural nutrient management planning, stormwater settling ponds, and erosion controls. Natural controls or "low-impact" development techniques are extremely effective in reducing the amount of pollutants that reach waterways. Woodlands and wetlands release fewer nutrients into the Bay than any other land uses. For these reasons, forests, grasslands, and wetlands are critical to restoring and maintaining the health of the aquatic environment.

a. Septic Denitrification

Maryland law requires all new development on septic systems to use best available technology (BAT) for nitrogen removal, as defined by MDE. Septic system repairs and replacements in the Critical Area must also upgrade to a BAT system.

Strategies for non-point source improvements assume that rural (i.e. not connected to a public sewer system) residential and commercial development will use denitrification units. Installation of denitrification retrofits will continue at the pace of 100 per year through 2030, contingent on the availability of Bay Restoration Fund fees.

As of 2013, 314 residential and commercial septic systems in Talbot County have been upgraded with denitrification units. The County Department of Public Works' objective is to maximize use of the State's Bay Restoration Fund to continue such installations.

b. Stormwater

The 2000 Maryland Stormwater Design Manual, which is incorporated by reference into the Talbot County Code, serves as the official guide for stormwater management principles

and practices.

The 2007 Maryland Stormwater Management Act mandated substantial revision to the Stormwater Design Manual. The most notable provision of the 2007 Act is the requirement that new development use Environmental Site Design (ESD) techniques to the maximum extent possible, which will ideally "maintain pre -development runoff characteristics" on the site. ESD emphasizes the minimization and treatment of stormwater on each parcel through a variety of small-scale techniques that mimic natural stormwater absorption and dispersal processes.


Impervious Cover—Rural Residential

In January of 2012, the County amended its stormwater management ordinance to incorporate the revision of the *Maryland Stormwater Design Manual* and other enhanced stormwater management policies recommended by MDE, pursuant to the Stormwater Management Act of 2007.

County departments will coordinate activities in recognition of the following stormwater management objectives:

1.) Stormwater retrofits can help to reduce non-point source pollution, particularly in more densely developed areas. The County strives to identify locations where retrofits could address concentrations of non-point source pollution or help to protect environmentally sensitive areas. Future retrofit funds and implementation activities should be targeted to these priority areas.

2.) Outside of towns and populated areas where pedestrian facilities are a priority, new roads in the county should continue to be developed with open sections (i.e., without curb and gutter), to better disperse stormwater.

Figure 6-7 Existing and Projected Impervious Cover by Watershed, Through 2030

Watershed	Total Acreage[1]	*Impervious Surface*			
		Existing		2030	
		Acres	Percent	Acres	Percent
Eastern Bay	2,870	55	1.9%	56	2.0%
Lower Chesapeake Bay	142	1	0.4%	1	0.4%
Lower Choptank River	68,521	3,157	4.6%	3,352	4.9%
Miles River	27,368	1,225	4.5%	1,256	4.6%
Tuckahoe Creek	15,583	209	1.3%	230	1.5%
Upper Choptank River	36,371	717	2.0%	810	2.2%
Wye River	20,811	271	1.3%	292	1.4%
Total	**171,666**	**5,634**	**3.3%**	**5,997**	**3.5%**

Notes:
1: Excludes areas of open water within County boundaries.

3.) Sedimentation and other impacts resulting from construction activity and increased stormwater flows to streams and rivers from development are also a potential threat to water quality. All new non-agricultural development with a disturbance greater than 5,000 sq. ft. requires a sedimentation and erosion control plan.

c. Impervious Land Cover

Impervious surfaces create runoff that can cause stream bank erosion, sedimentation of streams, and adverse effects on water quality and aquatic life. The amount of impervious surface in a watershed is a key indicator of water quality.

Countywide, no more than three percent of all land is impervious. Even in Talbot County's most developed watersheds—the Miles River and Lower Choptank River—impervious surface coverage is under five percent.

Under the land use and development scenarios considered here, most watersheds would experience some increase in impervious coverage. While none of the county's major watersheds would approach ten percent impervious (the first tipping point with regard to water quality), some smaller sub-watersheds, particularly in and around municipalities, may already approach or exceed such thresholds. In these cases stormwater management retrofits can help reduce the impact of large areas of impervious surface.

Figure 6-7 summarizes existing and potential impervious coverage in the county by watershed.

D. Total Maximum Daily Loads (TMDLs)

The federal Clean Water Act of 1972 required the estimation of the amount of pollutants that could be assimilated by the waters of the United States. This requirement resulted in the creation of the TMDLs. Each impaired water body is required to have a TMDL calculated for it, along with its current loading of the pollutant of concern.

Figure 6-8 Approved TMDLs for Talbot County Watersheds

Watershed	Substance	Approval Date
Choptank (upper)	Nitrogen	12/2010
Choptank (upper)	Phosphorus	12/2010
Choptank (upper)	Sediment	12/2010
Choptank (upper, segments)	Fecal Coliform	11/2006
Choptank (lower)	Nitrogen	12/2010
Choptank (lower)	Phosphorus	12/2010
Choptank (lower)	Sediment	12/2010
Choptank (lower. segments)	Fecal Coliform	11/2006
Eastern Bay	Nitrogen	12/2010
Eastern Bay	Phosphorus	12/2010
Eastern Bay	Sediment	12/2010
Miles River	Nitrogen	12/2010
Miles River	Phosphorus	12/2010
Miles River	Sediment	12/2010
Miles River (segments)	Fecal Coliform	09/2005, 09/2010
Tuckahoe Creek	Nitrogen	12/2010
Tuckahoe Creek	Phosphorus	12/2010
Tuckahoe Creek	Sediment	12/2010
Tuckahoe Creek (segments)	Fecal Coliform	11/2006
Wye River	Nitrogen	12/2010
Wye River	Phosphorus	12/2010
Wye River	Sediment	12/2010
Wye River (segments)	Fecal Coliform	11/2006

Source: MDE

Water Resource Policies

6.8 The County will continue to study groundwater resources and establish follow-up mechanisms to monitor changes that may occur over time.

6.9 The County will encourage policies and programs that support reasonable water use.

6.10 The County's building and land development codes will ensure that, per the International Building Code (IBC), water conserving fixtures and appliances are required for all new development and retrofits outside of public water systems.

6.11 The County will work with MDE, MGS, and USGS to complete the Coastal Plain Aquifer Study and use the results of this Study to guide future decisions regarding groundwater withdrawals.

6.12 The County will work with MDE to identify new sources of drinking water, specifically by evaluating the quality and quantity of water in the County's deeper and less frequently used aquifers.

6.13 The County should increase efforts to monitor the condition of county surface waters including streams, rivers, and submerged aquatic plant resources.

6.14 The County will require properties with failing septic systems to be connected to sewer if that service is available, or, if it is not, the property owner will be encouraged to install a "Best Available Technology (BAT) septic system.

6.15 The County will work to identify and prioritize for connection to sewer systems, areas of failing, inadequate and substandard septic systems and other non-point source pollution "hot spots", especially in coastal communities and subdivisions but not limited to villages and current PFAs.

6.16 The County will continue to identify communities and subdivisions where failing, inadequate and substandard septic systems or other public health concerns exist, and work to extend public water and/or sewer service to existing lots of record within Tier III-B and Tier III-C.

6.17 The County should insure that privately owned and operated water and sewer facilities are adequately maintained by requiring comprehensive and legally binding maintenance agreements between system owners and users.

6.18 As wastewater treatment facilities are modified or upgraded, increased demand for sewer treatment should be limited to the plant's peak capacity at the most current State standards.

6.19 The County will encourage the establishment of a multi-county organization to manage our major aquifers.

6.20 The County shall actively seek ways to implement the periodic inspection of septic systems, in order to protect public health and environmental quality by correcting failing conditions.

6.21 The County shall work to provide sewer service to western villages, communities and subdivisions mapped as Tier III-B and III-C for the purpose of protecting the health and safety of its citizens through improvements in water quality. This extension of sewer service is not intended for the purpose of supporting new development outside the boundaries of Tier III-B and III-C.


Tuckahoe Creek near Queen Anne

All of the State's major watersheds are on the 303(d) list of impaired waters and so fall under the Chesapeake Bay TMDL as well as a TMDL for each water body.

To address TMDLs, the State and its jurisdictions have prepared Watershed Implementation Plans. These Plans contain goals for improvement by land use sector and a strategy for implementing Best Management Practices to meet the TMDLs. Also, two-year milestones are established to produce short term progress toward achievement of TMDLs.

Talbot County has produced its Watershed Implementation Plan which contains a scenario of currently accepted best management practices that numerically achieve the improvement standards for the Bay TMDL. This scenario will be refined as more cost effective Best Management Practices are vetted and accepted by the State and the Environmental Protection Agency.

Talbot County expects that its Watershed Implementation Plan will use adaptive management to produce the greatest pollution reduction for each dollar of investment. For this reason, the County will pursue no and low cost Best Management Practices as a first priority. One such approach may include participation in the State's nutrient trading program. The County will also pursue lawn fertilizer management programs to meet its nutrient reduction goals.

III. Natural Resource Conservation

County resource conservation policies are broad and extend beyond mandated requirements for targeted areas. All parts of the county feature valued natural resources that should be protected and conserved. The level of protection required for each resource should be appropriately scaled to its significance.

A. Chesapeake Bay Critical Areas

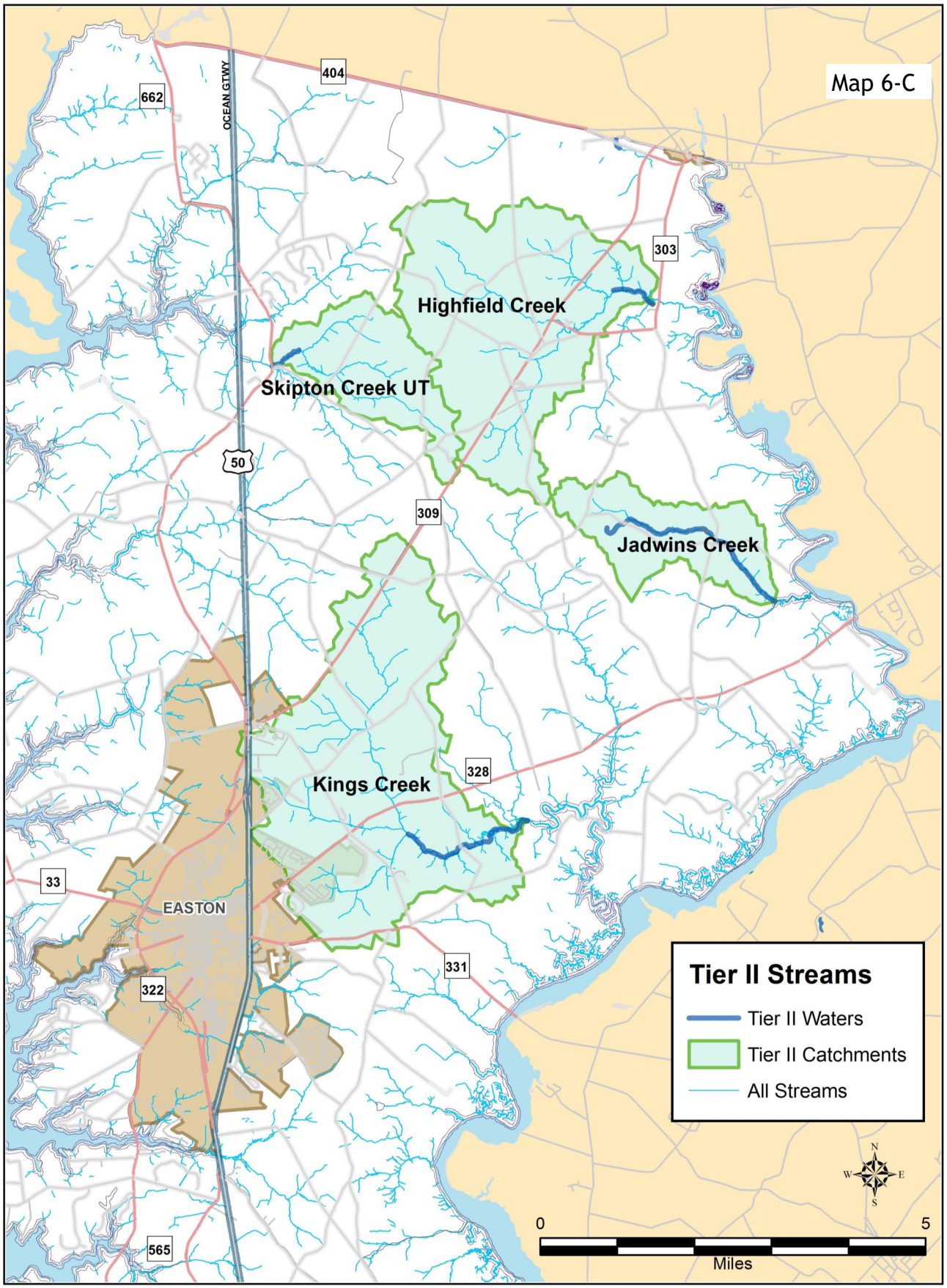
The Chesapeake Bay Critical Area Protection Program was passed by the Maryland General Assembly in 1984 to address concerns about the decline of the Chesapeake Bay.

This legislation required each Maryland county and municipality adjacent to the Bay or its tributaries to adopt a local Critical Area Plan and corresponding development ordinances. Local Plans are required to meet land use and development criteria established by the Maryland Chesapeake Bay Critical Area Commission and are intended to minimize impacts on the Bay's water quality and plant, fish and wildlife habitat.

The Critical Area includes all lands and waters within 1,000 feet landward of the boundaries of State or tidal wetlands and the heads of tides. It encompasses 65,260 acres, or about 38 percent, of the county's total land area. These 600 miles of shoreline are an important environmental, recreational and scenic resource.

Portions of Talbot County are subject to severe soil erosion caused by wind and wave action. The western-most part of the county is subject to the direct wave action of the Chesapeake Bay and some shoreline reaches can incur losses of as much as 18 feet of land per year.

Talbot County adopted its Critical Area Program in 1989. The County Zoning Ordinance and maps are tied to Critical Areas maps and were revised to incorporate boundary


Map 6-C
662
404
OCEAN GTWY
303
Highfield Creek
Skipton Creek UT
50
309
Jadwins Creek
Kings Creek
328
33
EASTON
331
322
565
Tier II Streams
Tier II Waters
Tier II Catchments
All Streams
N
W
E
S
0
5
Miles

updates (see Map 6-D at end of chapter). Local zoning and other regulations implementing Critical Area Program policies are also updated as necessary; most recently in the fall of 2014.

B. Sensitive Area Protection

The State of Maryland requires local comprehensive plans to contain a Sensitive Areas element which describes how the County will protect streams and stream buffers; 100-year floodplains; habitats of threatened and endangered species; and steep slopes. In Talbot County, these sensitive areas are protected through a variety of means, including agricultural zoning, Priority Preservation Area designation (see Chapter 5) and Tier IV designation (see Chapter 2).

1. Rivers, Streams and Stream Buffers

County streams and their buffers are important resources supporting recreational fishing and serving as spawning areas for commercial fish stock. Streams and their adjacent buffers are home to countless species of animals and plants and transport valuable nutrients to rivers and creeks, and in turn the Chesapeake Bay. The floodplains, wetlands, and wooded slopes along streams are important parts of the stream ecosystem.

Stream buffers serve as protection zones and reduce sediment, nitrogen, phosphorus, and other runoff pollutants by acting as a filter, thus minimizing stream damage. The effectiveness of buffers to protect stream water quality is influenced by their width, the type of vegetation within the buffer, as well as proper maintenance. Other aspects of buffer effectiveness include contiguous or nearby slopes, soil erodibility, or the presence of adjacent wetlands or floodplains.

Buffers also provide habitat for wetland and upland plants which form the basis of healthy biological communities. A wide variety of animals use the natural vegetation as travel corridors, for food and for cover. A natural buffer system provides connections to support wildlife movement between remaining patches of forest in the county.


Lower Choptank River

Tributary stream buffers in the Critical Area must be at least 100 feet wide, and may be expanded beyond that distance to include contiguous sensitive areas. For waterways outside the Critical Area, the County requires a 100 foot natural buffer for perennial streams and a 50 foot natural buffer for intermittent streams.

Maryland's anti-degradation policy significantly limits new discharge permits that would degrade water quality in Tier II (high quality) waters, as defined by the U.S. Environmental Protection Agency (EPA).

Four stretches of Tier II waters have been identified in Talbot County; portions of Highfield Creek, Jadwins Creek, Kings Creek, and Skipton Creek (see map 6-C).

New nutrient discharges can be permitted in these areas, as long as they do not degrade existing water quality below water quality standards. All development activities near these rivers and streams are required to provide a natural buffer.

2. Floodplains

Certain areas of the County are subject to periodic flooding which pose risks to public health and safety, and potential loss of property. Flood-related property damage is most often the result of locating a dwelling or structure within a designated floodplain, or by constructing structures in a floodplain to an inadequate elevation.

Two types of flooding occur within the County: riverine and coastal. Nontidal areas of the County are subject to riverine flooding. In these areas, stream buffers will provide substantial protection to nearby floodplain resources.

While protection of life and property is the initial basis for limiting development within floodplains, it can also serve a variety of additional functions with important public benefits. Floodplains moderate and store floodwaters, absorb wave energy, and reduce erosion and sedimentation. Wetlands within floodplains help maintain water quality, recharge groundwater supplies, protect fisheries, and provide habitat and natural corridors for wildlife.

3. Steep Slopes

Slopes precipitate movement of soil and pollutants when land disturbances occur. Control of erosion potential is usually achieved through regulation of development on steep slopes because such areas represent the greatest danger for accelerated soil loss and resultant sedimentation and stream pollution.

4. Threatened and Endangered Species

As a basis for establishing habitat protection measures for threatened and endangered species in Talbot County, this Plan defines habitat as '*Areas which, due to their physical or biological features, provide important elements for the maintenance, expansion, and long-term survival of threatened and endangered species listed in COMAR 08.03.08. Such areas may include breeding, feeding, resting, migratory, or overwintering areas.*'

The key to protecting threatened and endangered species is protecting the habitat in which they exist. The Maryland Nongame and Endangered Species Conservation Act provides definitions of threatened and endangered species. Twelve animal and 32 plant species are considered to be rare, threatened, or endangered in Talbot County, as of 2010. (Though the status of at least two species may have been changed from endangered to threatened or rare, State regulations and documents have not been revised to date, and the two species remain a conservation concern.) Habitat destruction and degradation is estimated to threaten some 400 native Maryland species with extinction.

Maintenance of biological diversity today sustains future opportunities to advance healthcare and provide a number of other societal benefits. Materials and chemicals produced by plants and animals are potential storehouses for beneficial products. More than half of all medicines in use today can be traced to wild organisms. Plant chemicals are the sole or major ingredients in 25 percent of all prescriptions written in the United States each year.

Likewise, agriculture depends on the development of new varieties of crops, often created by cross-breeding strains with wild relatives of crop species, in order to promote a desired trait.

5. Wetlands

Wetland areas are valuable natural resources for the ability to act as collectors and filters of excess nutrients. Wetlands also reduce floodwater peaks by storing water and reducing velocity, serve as groundwater discharge and recharge areas, improve water quality and provide food and habitat for fish and wildlife. Wetlands are recreational and aesthetic resources as well.

Development activities in wetland areas are regulated by the U.S. Army Corps of Engineers and Maryland Department of the Environment. Tidal wetlands are protected by a 100 foot natural buffer and nontidal wetlands are protected by a 25 foot natural buffer. No development activities are allowed within the wetlands or buffer areas without all required federal, State and County approvals and permits, and compliance with all mitigation requirements.

6. Forest and Vegetation

Approximately 25 percent of the County is in forest cover (See Map 6-E, and Figure 1-11). Forests are the ideal land use for maintaining water quality because they generate low levels of pollutants while filtering pollutants from both surface and subsurface flows. Trees serve as natural habitat for wildlife, and are important to the carbon and oxygen cycle. Forest areas also provide a cooling effect and visual buffer in both developed and undeveloped areas.

The Forest Conservation Act of 1991 was enacted to protect the forests of Maryland by making forest conditions and character an integral part of the site planning process. The Act is regulated by the Maryland Department of Natural Resources, but implemented and administered by local governments. The Forest Conservation Chapter (73) of the *Talbot County Code* was most recently amended in July, 2011 to conform to the most recent State legislation.

Regulations require that any person making an application for subdivision of a tract of land 40,000 square feet or greater, or disturbing more than 40,000 square feet of forest in conjunction with a project plan, building permit or sediment and erosion control plan; must submit a Forest Stand Delineation and Forest Conservation Plan to the Planning Department for review and approval. Mitigation for forest removal and forest establishment are both required by the act under specified circumstances.

Natural Resources Policies

6.22 The County will continue to enforce regulations to implement the Talbot County Critical Area Program.

6.23 The County will continue to enforce its floodplain regulations and development within the 100-year floodplain will be limited to minimize disturbance and protect life and property.

6.24 The County recognizes the importance of stream corridors as water quality buffers and wildlife habitat and encourages their protection in an undisturbed state. The County should continue to enforce buffer requirements for all tributary and intermittent streams in the County.

6.25 The County should continue to monitor shoreline erosion conditions and recommend appropriate standards for shoreline stabilization and protection. Also, the County should adopt legislation improving the effectiveness of shoreline buffers for all land uses when research and science indicates such actions can improve buffer functions.

6.26 In order to reinforce existing regulatory protection programs, the County should maintain and review protection measures for sensitive areas including streams and their buffers, 100-year floodplains, steep slopes adjacent to streams and habitats of threatened and endangered species.

6.27 New development shall be restricted in sensitive areas and the protection and enhancement of environmental resources should be ensured.

Natural Resources Policies

6.28 The County will recognize the interdependence of floodplains and preservation of sensitive areas, wetlands, wildlife habitat and stream corridors.

6.29 Forests and vegetation should be preserved in stream corridors to preserve the integrity of associated waterways. The County should adopt legislation authorizing substantial fines and penalties for clearing trees and vegetation in forest shoreline buffers. Any trees cut should be replaced per County mitigation regulations.

6.30 The County will coordinate with federal and State agencies to preserve existing wetlands where possible and to mitigate their destruction when necessary, in accordance with federal and State Policy and goal of "no net loss" of wetlands.

6.31 The County should develop and enforce mandatory programs and regulations, as well as financial incentives, to ensure preservation of natural resources.

6.32 All new development and redevelopment shall result in minimized pollutant loadings and runoff through the implementation of sediment, stormwater and erosion control plans.

6.33 Forest and woodland resources should be conserved and replenished through tree conservation, reforestation and compliance with the Maryland Forest Conservation Act. Alternatives should be developed to avert tree planting on prime agricultural soils.

6.34 In development plans, maintaining natural topography, drainage ways and tree cover should be a priority when determining the location of roads, placement of structures and site improvements. Local regulations should be developed to ensure that the landscape is preserved insofar as practical, by minimizing tree and soil removal.

6.35 The County shall coordinate with the Maryland Department of Natural Resources and the U.S. Department of Interior in the protection of rare, threatened, and endangered species habitat and shall take direct action when necessary to insure habitat protection. County zoning will direct intense growth and development away from threatened and endangered species habitat and maintain low density conservation zoning in areas where such habitats are identified.

6.36 The County should utilize open space and recreation planning efforts to pursue acquisition and protection opportunities in sensitive areas.

6.37 Marina facilities should be required to comply with Maryland's Clean Marina Initiative.

7. Soils

Prime farmland is the foundation of the county's agricultural industry, one of Talbot's largest and most valuable economic sectors. The importance of agriculture in the County's economy and lifestyle makes high quality soils an especially important resource which, once lost, cannot be reclaimed. Therefore the County strives to maintain agriculture and the soil that supports farming.

Prime agricultural soils are those best suited for continuous agricultural use and account for approximately 51 percent of the county's soils. They are usually found in areas that are nearly level and well drained and watered. The strategy for addressing conservation of this resource correlate with policies in the agriculture chapter (Ch. 5).

Generally, the soils of the eastern half of the county tend to be the best for both agriculture and development. Many areas in the western

part of the county contain soils that are poorly drained and have a high water table, presenting severe limitations for development. However, notable pockets of prime agricultural soils are located on the western peninsula between St. Michaels and Tilghman Island (see Map 6-F).

IV. Mineral Resources

The sand and gravel extraction industry in Talbot County provides basic raw materials for the construction and paving industries and plays an important role in supporting local growth and development. Talbot County's mineral resources consist primarily of sand and to a lesser extent, gravel.

Because geologic conditions dictate the location of economically recoverable mineral deposits, opportunities to meet the future demand of the county's construction industry will be controlled by the availability of these deposits and future access to these deposits for construction industry use.

To be economical, sand and gravel must be mined close to where they will be used. According to industry and regulatory agency sources, transportation costs quickly exceed the on-site cost of these resources, with the price of sand and gravel roughly doubling every 25 to 40 additional miles the material is transported.

Sand and gravel deposits are confined principally to two stratigraphic units that can be in excess of 25 feet thick. They are principally located east of U.S. 50 and are generally found on major stream corridors, in areas where conservation of forests and farmlands are a key issue.

Deposits commonly vary in thickness and composition over short distances, so site investigations are typically required to estimate reserves on a specific site. Based on estimates provided by the Maryland Department of the Environment and various sand and gravel operators, annual production has been in the range of 200,000 tons in recent years.

Mineral extraction is permitted by special exception in the **Agricultural Conservation (AC), Countryside Preservation (CP), Western Rural Conservation (WRC)** and **Rural Conservation (RC)** zoning districts. The County has enacted policies prohibiting mining activities in the Critical Area and designated habitat protection areas. Proposals for new mining operations are subject to site plan review for compliance with environmental protection regulations.

To ensure mining sites are restored to a usable state, appropriate action must be taken before, during, and after extraction. Currently, the licensing process for an extraction permit requires reclamation plans for any site mined. As part of the application process, the post-extraction intended use of the property must be identified. The restoration plan should be consistent with the future land use of the site.

The County recommends the following post-extraction uses:

1.) Recreational land uses: parks and lakes

2.) Forestry

3.) Aquaculture

4.) Residential Development

5.) Disposal of non-toxic solid fill material, clean fill material, and inorganic solid fill material originating from Talbot County.

Bonds are required to be posted to assure the availability of funds for reclamation should an operator abandon the site. Restoration guidelines and regulations have been successful in ensuring the remediation of sites where extraction has taken place since the licensing process was established.

Reclamation of abandoned extraction sites is also a concern. An initial step toward addressing reclamation would be an inventory and evaluation to determine reclamation needs and the potential for other land uses. Such an inventory could provide a basis for future targeting of priorities, evaluating funding

Mineral Resources Policies

6.38 The County will maintain land use policies and regulations that discourage the preemption of mineral extraction by other uses.

6.39 The County will provide adequate regulation and monitoring of mineral extraction operations to ensure compliance with applicable permitting requirements, including those established for reclamation or restoration of mineral sites.

6.40 The County will use appropriate methods to protect existing neighborhoods from the impacts of extraction operations and the transportation of extracted resources.

6.41 The County will ensure that all available measures are taken to protect the natural environment from all sources of pollution resulting from extraction activities.

6.42 The County will require post excavation uses for mined sites to be consistent with its plans and regulations.

6.43 The County will require that any post excavation use of a quarry for rubble fill is limited to product generated in Talbot County, and will provide opportunities for construction of rubble recycling facilities in conjunction with extraction facilities.

6.44 The County will identify and use any programs that support reclamation or reforestation of older or abandoned borrow pits or mined sites not subject or reclamation requirements.

needs, and assessing opportunities to secure assistance for site reclamation.

Options for funding reclamation of abandoned sites include imposing a tax on mineral products, a tax exemption, or a reduction or rebate for landowners who reclaim sites.

Mining operations to date have been limited in number and have not significantly impacted the County road system. However, long-term mining utilization can cause increased damage to low-capacity roads by haulers' trucks and disturbance to neighbors or travelers who use the same routes.

The County should continue to monitor levels of extraction activity and be prepared, should the need arise, to seek legislation to allow imposition of a surcharge or tax on mineral products that would generate revenue for a roadway maintenance or improvement fund. These funds could be directed specifically to roads frequently used to haul mineral products, or pro-actively, to areas where the County wishes to facilitate recovery of mineral deposits.

V. Summary

Talbot County's 1990 Comprehensive Plan begins by characterizing the County's landscape as land and waterways intertwined in a mosaic of tidal waters, streams, farmlands and forests with 600 miles of shoreline on the Chesapeake Bay and rivers. Even the first Comprehensive Plan — from 1973 — expresses the objectives to preserve the county's natural assets, agricultural soils, wetlands and wildlife habitats and waters. The strong affinity for the area's natural resources informs the conservation objectives outlined in each successive edition and is carried forward in this Plan.

Talbot County's concerns have coincided with growing State concerns about natural resource conservation, growth management and strategic planning. Significant legislation has been passed in attempts to reverse past trends of resource degradation. Many of the laws and regulations dealing with these concerns are reflected in this chapter, from Critical Areas legislation, septic tier designation, water resources planning and the Total Maximum Daily Loads (TMDLs).

The County has consistently required that, in order to protect its resources as well as to meet State requirements, all future development will be subject to minimum performance standards for environmental protection and natural resource conservation. This approach has received an even stronger mandate with the advent of the Bay TMDL. This Plan and this chapter in particular establish a basis for such standards and an evaluation of the current state of natural resources.

The water resources element of this chapter is the most current and most comprehensive study of drinking water, stormwater and wastewater management to date. It establishes the County's pro-active stance on managing the resources within its jurisdiction. The analysis indicates that:

A. The largest County wastewater facility uses the best available treatment technology and discharges minimal quantities of nitrogen and phosphorus.

B. Drinking water, derived from private wells outside municipal areas, generally deliver water of good quality in ample supply.

C. Water supplies and wastewater treatment capacity appear to be adequate to meet projected population growth through the next 20 years or more.

D. Nonpoint source water pollution has been, and continues to be, a challenging and costly problem. The strategies to address existing sources involve retrofits to existing infrastructure or utilities arrayed throughout the County. Managing potential new non-point sources imposes additional regulations on construction and development and implies long-term monitoring responsibilities on the part of County government.

Critical Area regulations are a long-standing and complex group of development standards, restrictions and offset that impact a significant proportion of rural residential property. Program accomplishments are measured in acres of undeveloped land and numbers of trees planted or conserved, though the ultimate goal of the program is more qualitative than quantitative. It is impossible to know the amount of erosion that has not occurred or the amount of stormwater that has been absorbed to recharge water tables. However, most will agree that the natural landscape has been preserved and enhanced through compliance with the regulations.

Talbot County partnered with the Conservation Fund, State and federal agencies to develop a Green Infrastructure Plan, published in 2004. The Conservation Fund analyzed protected land, land use, acreage of undeveloped land and proximity to important natural resources to generate several focus areas for natural resource protection. The recommendations are consulted when opportunities arise to permanently preserve properties or to evaluate development proposals.

The Chesapeake Bay Total Maximum Daily Load, or Bay TMDL, attempts to consolidate all the point and non-point source pollution strategies and Critical Area strategies into a series of Watershed Implementation Plans (WIPs) for the State and each county.

Nutrient reduction goals for each county are divided into land use sectors, including agriculture, industry and 'urban'. The County's responsibility to address non-point source pollution from the built environment relates directly to the water resources analysis, the Watershed Implementation Plan and other analytical tools developed by the State in recent years. These strategies are discussed in detail in the County Watershed Implementation Plan recorded with the Maryland Department of the Environment.

These and other programs are all directed toward the goal of maintaining and protecting the natural resources of Talbot County for the enjoyment, health and benefit of its current and future citizens. In embracing these policies, Talbot County also affirms its contribution and commitment to regional environmental quality.