

Chapter 6 Natural Resource Conservation



Vision

Because our natural resources and sensitive areas are critical to the quality of life in Talbot County and 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.

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.

Thanks to adequate safeguards, sand and gravel extraction and closure of the sites avoid environmental damage. Site recovery and conversion to ponds and wooded areas control runoff, helps maintain ground water tables, beautify the landscape and create opportunities for parks and recreation areas.

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

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 to serve projected growth.
- 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.

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 water. Along its western edge, the County takes the form of numerous peninsulas, necks, coves and creeks.

This plan update adds current Census counts and projections. It also incorporates the septic tier system into the comprehensive plan. New to this chapter are the recent state requirement for a water resources element in the comprehensive plan and the Total Maximum Daily Load program.

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.

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.

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 towards 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 borne by taxpayers to address the consequences of environmental degradation. The 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.



Water Resources Element

The following Water Resources Element of this Plan creates 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. It complies with the requirements of state law as modified by Maryland House Bill 1141, passed in 2006. Among the requirements to be included are:

- Identified 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;
- Identified 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);
- Plan 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 US Census along with updated growth projections, as described in Chapter 1 (Background).

The Water Resources Element **as 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 projected growth, 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.

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 municipal, 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. Michael's 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 County's public water systems. Easton, Oxford, and Trappe operate their own wastewater treatment plants.

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 County population will reach approximately 42,900 by the year 2030, an increase of approximately 5,120 persons from the 2010 population of 37,782.

As the Water Resources Element was prepared in 2010, the County and its municipalities had granted at least preliminary approval for more than 5,500

Objective: Conserving Natural Resources by Managing Growth and Development

Talbot County will continue to take a measured and conservative approach to public facilities development, in order to minimize negative impacts on its natural resources. Public facility and service improvements will be efficiently coordinated with the County's land use plan, Comprehensive Water and Sewerage Plan, Master Plan for Education and other County plans related to capital improvements programming.

- Public facilities and services, which are intended to meet countywide needs, should be centrally located. Likewise, those facilities and services intended to serve local community needs should be located within the community.
- Public facilities and services should be scaled to the needs of the area they are designed to serve. Rural areas of the County should be provided facilities and services which match rural needs. Planned growth areas around towns should be provided a level of facilities and services matched to needs that are more intensive.
- Wherever possible, the existing public facilities and services of the County and its towns should be efficiently expanded rather than creating new services and facilities.
- Public facilities and service improvements designed to correct existing system inadequacies should be completed prior to beginning County-funded improvements designed to accommodate new growth.
- All planned major County public facilities shall be prioritized and scheduled as part of a Comprehensive Five Year Capital Improvements Program.
- The costs of new or expanded community facilities and services should be equitably and proportionally shared by all those who will benefit from the improvements.
- New development projects should not be approved or built in areas of the County where infrastructure and services such as roads, schools, sewer service, water supply, and fire and police protection are not adequate to accommodate the needs of the development. Exemptions to this policy might be considered provided the developer contributes the money needed to improve the facility.
- The County should seek regional solutions to providing community services or facilities when demonstrated to be cost effective.
- The County should seek State coordination to assist the County and towns to establish effective public facilities available for development.



Objective: Coordination and Engagement with Regional, State and Federal Natural Resource Programs

It is the policy of Talbot County to:

- 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;
- Utilize County zoning to direct intense growth and development away from threatened and endangered species habitat as part of the plan review process;
- Maintain low-density conservation zoning in areas where threatened and endangered species habitats have been identified;
- Encourage use of cluster development to restrict disturbances when development is proposed on a parcel containing listed species habitat.



Talbot County will:

- Work with MDE, DNR, and the Maryland Department of Agriculture (MDA) to assist farmers in adopting Best Management Practices to reduce nonpoint source loads of nutrients and other pollutants.
- 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 ground water withdrawals.
- Continue to enforce its floodplain regulations in recognition of the

interdependence of floodplains and preservation of open space, wetlands, wildlife habitat, and stream corridors.

- Continue to monitor shoreline erosion conditions and recommend appropriate standards for stabilization and protection.
- Encourage property owners to place environmentally sensitive lands and forested areas under conservation easements in cooperation with national, regional, state and local land trust organizations.
- Support the efforts of local land trusts and conservancies to protect threatened and endangered species habitat.
- Continue to maintain a countywide Geographic Information System (GIS) inventory and map of natural resources to assist with natural resource preservation management. The County has acquired digital elevation models (DEM) to more accurately determine location of floodplains.

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.

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 nonpoint source loading analysis continues to anticipate the use of septic denitrification technologies to impact the County’s receiving waters. Also, plans are underway to extend sewer to areas of failing septic systems, 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 nonpoint source pollution

Projected Housing Unit Growth by Watershed , Through 2030			
Watersheds	2007 Existing ²	2007-2030 Growth	
		Increment	2030 Total
Eastern Bay	242	85	247
Lower Chesapeake Bay	5	0	5
Lower Choptank River			
Easton ¹	5,224	1,141	6,365
Trappe ¹	368	116	443
St. Michaels ¹	327	5	373
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	1,572
Wye River	677	156	833
Total	20,183	2,683	22,866

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

analyses.

The table on page 6-6 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 in 2010 than estimated (19,577 rather than the 2007 estimate of 20,183). The number of households projected in 2030 has also been scaled back (to 22,521 from 22,866 in the scenario). However the assumption remains that about 70 percent of new housing units will be built in municipalities, including areas the town's future growth areas. The updated projections have not changed the core planning assumptions and so the scenario has been altered little from the original.

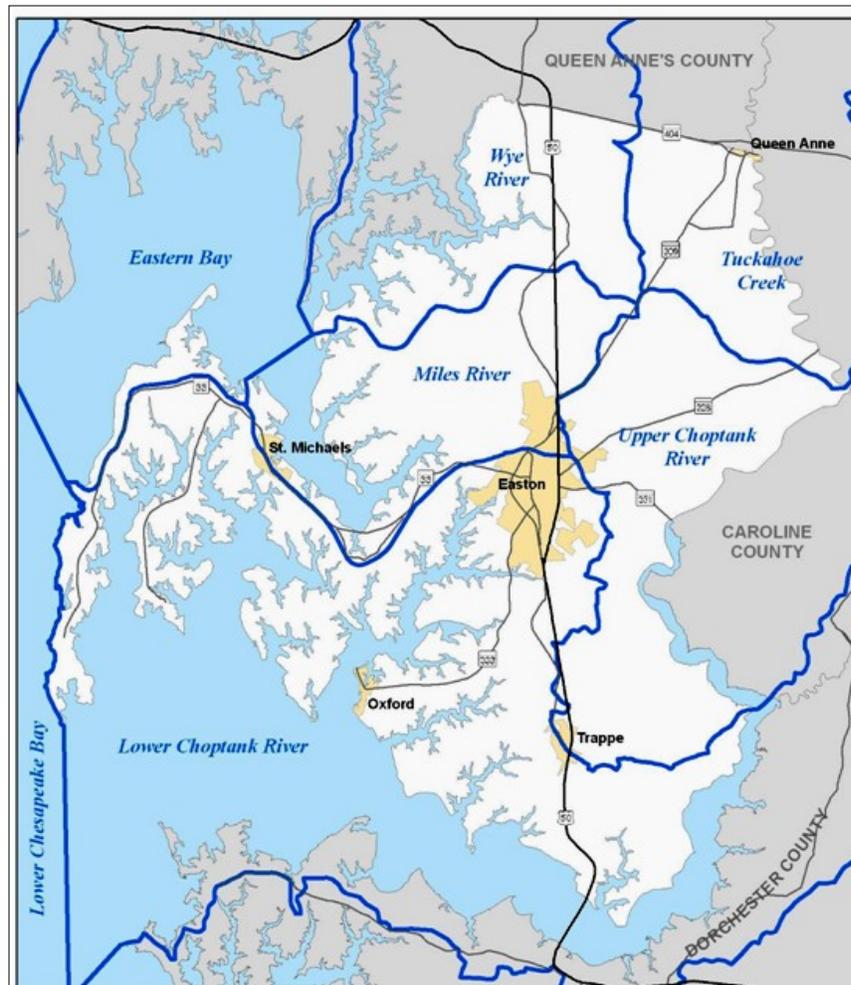
Drinking Water Assessment

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

Public Water Systems

All public and private drinking water in Talbot County is supplied by groundwater. 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.

The table on page 6-8 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 when updating the plan the County applies changes in federal water quality standards.

Approximately 9,600 dwelling units in Talbot County and a considerable share of businesses receive drinking water from town 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, and Hyde Park.

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 below.

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. 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/hydro/qatalsum.html>.

There were 329 active groundwater appropriation permits in Talbot County in 2002, drawing a daily average of 6.4 MGD. 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. The remainder of this section discusses non-public water uses in greater detail.

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

Source Aquifers for Existing Public Water Systems		
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

Notes

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

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

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.

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 US 50 and other major roads.

Agricultural Water Users

As is the case throughout the Eastern Shore, Talbot County’s farmers employ irrigation using 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 or throughout the County.

Issues and Discussion - Water

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.

The US 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

Type of Withdrawal	Total Withdrawals (MGD)			Percent of County Withdrawals
	Surface Water	Groundwater	Total	
Commercial	0	0.36	0.36	6%
Industrial	0	0.64	0.64	11%
Mining	0	0.01	0.01	< 1%
Livestock Watering	0.03	0.21	0.24	4%
Aquaculture	0	0.01	0.01	< 1%
Irrigation	0.40	0.44	0.84	14%
Residential self-supplied	0	1.58	1.58	26%
Public Supply	0	2.32	2.32	39%
Total	0.43	5.57	6.00	100%

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

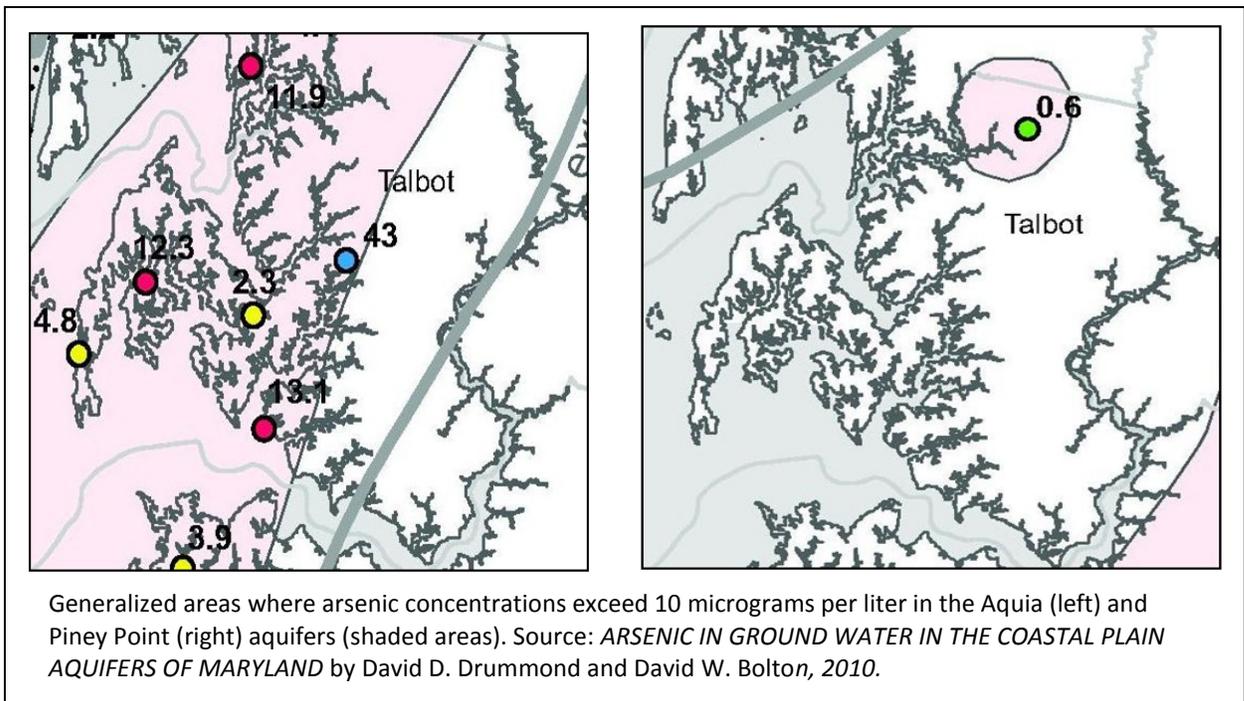
aquifers extend to the Western Shore.

Groundwater and surface water resources are also linked. Water from surficial aquifers can comprise a significant amount of stream and river base flows. While groundwater withdrawn through wells is typically returned to the aquifer via point source discharges, septic systems, and absorption of runoff, large withdrawals can potentially impact the quality and quantity of flows in nearby surface water bodies.

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.

MDE, the Maryland Geological Survey (MGS), and the US 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 reflects the maximum safe yield of the aquifer(s) used by that system. However, the County also recognizes the need for and supports the development of broader regional water policies to protect already scarce resources. Talbot County supports the commitment by the MGS and USGS to complete this 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.



Groundwater Protection

In addition to these concerns about water quality 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.



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 are 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.

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 present 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. 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.

However, the County acknowledges 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, many Maryland counties have begun to 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.

Wastewater Assessment

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

Public 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. 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.

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 and the MEBA Engineering School operates a private community system.

More than half of all dwelling units in the County (approximately 10,500) and a considerable share of businesses discharge

Overview of Existing Wastewater Treatment Systems			
Wastewater Treatment Plant	Discharge Location (Watershed)	Treatment Technology	Planned/Potential Upgrades or Expansions
<i>Public Systems</i>			
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
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
<i>Private/Community Systems</i>			
Hyde Park	Onsite Bermed Infiltration Pond		Repairs to failed infiltration pond.
Martingham	Lagoons and spray irrigation		Flow temporarily diverted to Region II during repair/upgrade.
Preserve at Wye Mills	Onsite Spray Irrigation	BNR	None planned
<i>Source: 2002 Talbot County Water and Sewer Master Plan</i>			

wastewater to one of the County’s nine municipal, or private wastewater treatment plants (WWTP) The table below 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 2030, without system improvements.

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

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 generally to the east of US 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 plan has designated areas generally to the west of US 50 as susceptible to sub-surface system failures because of high

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.

2: Estimated. Assumes that new nonresidential development in Towns is 15% of residential development. See note in Table 4.

3: Source: Maryland Property View 2007 and Talbot County Water and Sewer Master Plan. Based on acreage of active non-residential properties, using 0.892 EDU per acre, the default value in the MDE nonpoint source model.

4: For Easton, 2007 Average Daily Flow includes existing flow, plus capacity committed to future development, based on the Town’s WRE. Future demand assumes that effluent from the Hyde Park system will eventually be directed to the Easton WWTP.

5: Trappe future system capacity does not reflect conceptual system improvements as outlined in public sewer discussion.

water tables, low elevations, and soils with low permeability. Communities in this area are impacted by failing septic systems, high groundwater tables or concentrations of small lots on poorly drained soils, including the villages of Wittman, McDaniel, Bozman, Neavitt, Claiborne, Fairbank and Bar Neck.

Currently on-site septic systems are inspected and monitored to insure they are functioning properly. Plans to extend sewer service to these areas are under consideration and should be pursued to meet water quality improvement objectives.

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. Local governments, through the water resource element, are required by the state to identify suitable receiving waters for the discharge of additional stormwater and wastewater.

One measure of assimilative capacity is the

Total Maximum Daily Load (TMDL), 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.

Water bodies are classified as impaired when they are too polluted or otherwise degraded to support their designated and existing uses. All of Talbot County's major watersheds are impaired for nutrients and so by definition are not suitable receiving waters. 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 watershed implementation plans map a strategy for reducing pollutants to meet the TMDL.

Point Source Caps and Discharges

To address nutrient loads from point sources such as WWTPs, the state has established numerical limits on the amount of nitrogen

Nutrient Loads and Discharge Capacities for Public Wastewater Systems						
		Region II	Region V	Easton ⁵	Oxford	Trappe
Existing Nutrient Loads ²	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 ³	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 ⁴	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: Sources of nutrient discharges are described in Table A-9, the Defalut NPS Model, of the WRE Appendix.
 3: Sources of nutrient caps are described in the WRE Appendix.
 4: Assumes discharge concentrations of 3 mg/L TN and 0.3 mg/L TP for ENR; 8 mg/L TN and 2 mg/L TP for BNR. Assumes that only flows to the existing Trappe WWTP would discharge to surface water.
 5: Includes the Hyde Park system as connected to the Easton system.

and phosphorus that can be discharged into the Bay and its tributaries, expressed as pounds per year of nitrogen and phosphorus. 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.

The table on 6-14 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 biological nutrient removal (BNR) technology, and that the Trappe WWTP would be upgraded to enhanced nutrient removal (ENR). Such upgrades are anticipated but not yet planned, but will likely be necessary to support projected growth.

Upgrade of the Region V plant 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.

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. In evaluating upgrades and expansions to accommodate new growth, 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.

Talbot County will work to identify areas where failing septic systems or other public health concerns exist, and work with municipalities to extend public water and/or sewer service to existing lots of record. The county will work to identify and prioritize areas of failing septic systems and other concentrations of nonpoint source pollution.

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 system 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.

Programmatic Assessment of Nonpoint Source Policies

This section characterizes the policies and procedures in place to manage nonpoint 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. Nonpoint 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 agriculture is the largest source of nonpoint nitrogen, phosphorus and sediment loads statewide, though the pounds per year have declined precipitously since 1995. Stormwater runoff from developed land is also a significant contributor and has remained steady or increased over the same period.

Various nutrient reduction technologies for nonpoint 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 use. For these reasons,



forests, grasslands, and wetlands are critical to restoring and maintaining the health of the aquatic environment.

Policies and Considerations

Septic Denitrification

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

Projections for nonpoint source analysis assumes that half of all new rural (i.e., not connected to a public sewer system) residential and commercial development will use denitrification units, and that denitrification retrofits will continue at the pace of 100 per year through 2030.

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.

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 feasible, which are intended to “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.

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 coordinate activities in recognition of the following stormwater management objectives:

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

- 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. Most new non-agricultural development in Talbot County requires a sedimentation and erosion control plan.

Impervious Land Cover

Impervious surfaces cover creates 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

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.

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.

The table on 6-17 summarizes existing and potential impervious coverage in the County by watershed.

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 resource that should be protected and conserved. The level of protection required for each resource should be appropriately scaled to the significance of the resource.

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 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 65,689 acres, or about 38 percent, of the County's total land area. This 600 miles of shoreline is an important environmental, recreational and scenic resource.

The Talbot County Critical Area Program contains goals and policies relating to:

- Development in the Critical Area;
- Water Quality Protection;
- Habitat Protection;
- Shoreline Buffer Protection;
- Agriculture in the Critical Area;
- Forests and Developed Woodlands Protection;
- Natural Parks;
- Surface Mining/Solid Waste/Sanitary Landfills; and
- Marinas and Water Dependent Facilities

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 have been periodically

revised to incorporate new regulations and maps implementing Critical Area Program policies.

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.

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

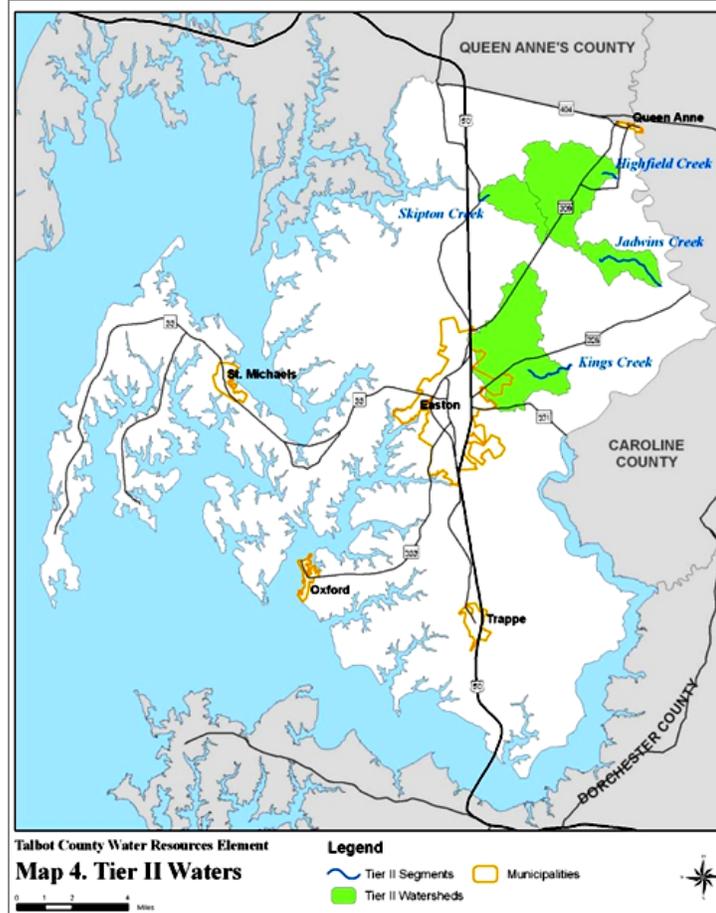
vegetation within the buffer and maintenance of the buffer. Other aspects of buffer effectiveness include contiguous or nearby slopes, soil erodibility, adjacent wetlands or floodplains.

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 a corridor for food and cover. A natural buffer system provides connections between remaining patches of forest in the County to support wildlife movement.

In the Critical Area, tributary stream buffers must be at least 100 feet wide, and may be expanded beyond that distance to include contiguous sensitive areas. For all other

waterways the County requires a 100 foot natural buffer for perennial streams and a 50 foot natural buffer for intermittent streams.

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



Four stretches of Tier II waters have been identified in Talbot County, as shown in the map on this page: portions of Highfield Creek, Jadwins Creek, Kings Creek, and Skipton Creek.

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.

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 losses and flood-related losses are created by inappropriately located structures which are inadequately elevated or otherwise unprotected and vulnerable to floods or by development which increases flood damage to other lands or development.

Two types of flooding occur, within the County, riverine and coastal. Nontidal areas of 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 are the initial basis for protection of floodplains, limiting disturbances within floodplains can serve a variety of additional functions with important public benefits. Floodplains moderate and store floodwaters, absorb wave energy and reduce erosion and sedimentation. Wetlands found within floodplains help maintain water quality, recharge groundwater supplies, protect fisheries, and provide habitat and natural corridors for wildlife.

Total Maximum Daily Loads (TMDLs)

The federal Clean Water Act of 1972 required the estimation of the amount of panopoly 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.

All of Talbot County's waters with very few

exceptions (see listing of Title II waters) are on the 303d list of impaired waters.

Therefore they will fall under the Baywide TMDL as well as a TMDL for each water body.

The County will encourage the preservation of prime agricultural soil resources for agricultural, horticultural and forestry use.

Agricultural and forestry activities should be conducted in accordance with approved Best Management Practices for Soil and Water Conservation and management of nutrients.

To address TMDLs the state and its jurisdictions have prepared watershed implementation plans. These plans contain for the generator of the plan a strategy for implementing best management practices to meet the TMDLs. Also two-year milestones are established to produce short term goals to achieve the TMDL.

Talbot County has produced its watershed implementation plan which contains a scenario of currently accepted best management practices that numerically achieve the TMDL standard for the Bay TMDL. This scenario will be refined as more cost effective best management practices are vetted and accepted by the model the state and the Environmental Protection Agency uses to tract TMDL achievement.

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 will likely include participation in the state's nutrient trading program.

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.

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 Maryland Nongame and Endangered Species Conservation Act provides definitions of threatened and endangered species. Eight animal and 40 plant species are considered to be rare, threatened, or endangered in Talbot County.

Habitat destruction and degradation is estimated to threaten some 400 native Maryland species with extinction. The key to protecting threatened and endangered species is protecting the habitat in which they exist.

Maintenance of biological diversity today sustains future opportunities to advance health care 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

ingredient 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.

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 US Army Corps of Engineers and Maryland Department of the Environment. Tidal wetlands are protected by a 100 foot natural buffer and non-tidal wetlands are protected by a 25 foot natural buffer. No development activities are allowed within the wetlands or buffer areas. Exceptions are allowed for certain water-dependent activities.



Forest and Vegetation

Approximately 25 percent of the County is in forest cover. 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.

Urban tree canopy while often limited in coverage provides important benefits. Trees in developed settings reduce stormwater, provide habitat, reduce the urban heat island and tangibly increase aesthetics and property values. Urban tree cover will assist with meeting the County's TMDL goals. Strategically placed landscaping can reduce structure's energy costs significantly.

The County should pursue requiring street

trees during development review and actively encourage property owners to voluntarily increase the County's forest and urban tree coverage.

Soils

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

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.

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.

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. Because geologic conditions dictate the location of economically recoverable mineral deposits, opportunities to meet the future demand of the County construction industry will be

controlled by the availability of these deposits and future access to these deposits for construction industry use.

The major mineral resources of Talbot County consist primarily of sand and to a lesser extent, gravel. They are principally located east of US 50 and are generally found on major stream corridors in areas where conservation of forests and farmlands are a key issue.

Sand and gravel deposits are confined principally to two stratigraphic units that can be in excess of 25 feet thick. 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.

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.

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 insure 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:

- Recreational land uses: parks and lakes
- Forestry
- Aquaculture
- Residential Development
- 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 insure 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 needs, and assessing opportunities to secure assistance for site reclamation.

Options for funding reclamation of abandoned sites include imposing a tax on mineral products, or a tax exemption, 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.

Conclusion

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 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 legislation, 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 TMDL program. 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 established the County's pro-active stance on managing the resources within its jurisdiction. The analysis indicates that:

- The largest County wastewater facility uses the best available treatment technology and discharges minimal quantities of nitrogen and phosphorus.
- Drinking water, derived from private wells outside municipal areas, generally deliver water of good quality in ample supply.
- Water supplies and wastewater treatment capacity appear to be adequate to meet projected population growth through the next 20 years or more.
- 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 nonpoint 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 offsets 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 as a result through compliance with the regulations. 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 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 other properties or to evaluate development proposals.

The Chesapeake Bay Total Maximum Daily Load, or Bay TMDL, attempts to consolidate all the point and nonpoint 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 nonpoint source pollution from the built environment relate 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 County watershed implementation plan recorded with the Maryland Department of the Environment.

These and other programs are all directed towards 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 affirmed its contribution and commitment to regional environmental quality.



Summary of Policies and Actions

Topic	Citation	Policy	Action
Natural Resource Conservation		<p>Talbot County will continue to take a measured and conservative approach to public facilities development, in order to minimize negative impacts on its natural resources.</p> <p>Public facility and service improvements will be efficiently coordinated with the County’s land use plan, Comprehensive Water and Sewerage Plan, Master Plan for Education and other County plans related to capital improvements programming.</p> <p>Wherever possible, public facilities and services of the County should be efficiently expanded rather than creating new services and facilities.</p> <p>Public facilities and service improvements designed to correct existing system inadequacies should be completed prior to beginning County-funded improvements designed to accommodate new growth.</p>	<p>The County should seek regional solutions to providing community services or facilities when demonstrated to be cost effective.</p> <p>The costs of new or expanded community facilities and services should be equitably and proportionally shared by all those who will benefit from the improvements.</p> <p>New development projects should not be approved or built in areas of the County where infrastructure and services such as roads, schools, sewer service, water supply, and fire and police protection are not adequate to accommodate the needs of the development. Exemptions to this policy might be considered provided the developer contributes the money needed to improve the facility.</p> <p>The County should seek state coordination to assist the County and towns to establish effective public facilities available for development.</p>
	<p>Zoning Ordinance § 190-3 § 190-10 § 190-123 § 190-124 § 190-192</p>	<p>The County maintains countywide policies for conservation and protection of natural and cultural resources.</p>	<p>Done: Establish cooperative partnerships with state, federal and town government agencies to address environmental problems as needed.</p>
		<p>The County should encourage property owners to place environmentally sensitive lands and forested areas under conservation easements in cooperation with national, regional, state and local land trust organizations.</p>	<p>To do: Actively develop working relationships with area schools, nonprofits and environmental organizations to leverage greater public participation in conserving natural resources. Utilize local open space and recreation plans to investigate land acquisition and protection opportunities.</p>
		<p>Develop and enforce mandatory programs and regulations, as well as financial incentives to insure preservation of natural resources.</p>	<p>To do: Develop comprehensive baseline studies to provide a measurable basis for pollution monitoring. Baseline data for air and water quality should be regularly updated to track progress on environmental impacts.</p>

Topic	Citation	Policy	Action
Natural Resource Conservation	Zoning Ordinance § 190-13	Require 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.	Done: The County requires clustering in the development of parcels over 6 acres, in order to conserve open space and protect fragile environmental and natural resources.
	Z O § 190-124 § 190-127C(4) § 190-129 § 190-131 § 190-190 C	The County shall require evidence of federal and state environmental permits as a condition of local development approval.	Done
		The County should maintain a countywide Geographic Information System (GIS) inventory and map of natural resources to assist with natural resource preservation management.	Done
Water Resources		The County should increase efforts to monitor the condition of County surface waters including streams, rivers, and submerged aquatic plant resources.	To do: Enhance baseline-monitoring efforts to better observe the condition of County surface waters and submerged aquatic vegetation. The County should encourage volunteers to participate as Creek Watchers.
	Zoning Ordinance § 190-129	The County will require failing septic systems to meet high standards of treatment.	To do: A Public Works Management Plan including requirements that: All new septic systems and repairs meet high standards of treatment; Requires routine inspections and pump-out of septic systems; Establishes a system for inspection and monitoring septic systems, beginning in the Critical Areas; Establishes a financial assistance program to aid low income homeowners to repair or replace failing systems; In Critical Areas, require installation of de-nitrification systems at the time of an arms-length-sale of real property.

Topic	Citation	Policy	Action
Water Resources	County Code § 148	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.	Done: Peak and seasonal loads are considered in the design and operation of facilities. Environmental impacts are evaluated in the design phase and include stormwater and wastewater load calculations.
	ZO § 190-177 § 190-200 County Code § 152	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.	Done
		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.	To do: The County should work with MDE to investigate the feasibility of systems whereby treated wastewater effluent can be used to recharge groundwater aquifers.
		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.	To do Consider participating in a regional water resources committee, along with MDE, MDP, and neighboring counties. The purpose of such a committee would be to coordinate information and decisions involving groundwater, surface water discharges (particularly to shared rivers such as the Choptank), and growth and development.
	Building Code	The County's building and land development codes will ensure that water conserving fixtures and appliances are required for all new development and retrofits outside of public water systems.	Done
		The County will continue to identify areas where failing septic systems or other public health concerns exist, and work to extend public water and/or sewer service to existing lots of record. The county will work to identify and prioritize areas of failing septic systems and other nonpoint source pollution "hot spots".	Done: Continue the use the of Bay Restoration Funds to install denitrification units on existing septic systems, concentrating on the Chesapeake Bay Critical Area. To do: Consider requiring all new development outside of existing or planned public sewer service areas to use septic denitrification systems.

Topic	Citation	Policy	Action
Water Resources		Marina facilities should be required to comply with Maryland’s Clean Marina initiative.	To do
		Amend the County’s Stormwater Management ordinance to incorporate by reference the Maryland Stormwater Design manual, as revised by MDE to reflect provisions of the Stormwater Management Act of 2007—including the required use of ESD for new development.	Done See Talbot County Stormwater Management Process & Implementation Guide, adopted December, 2011.
Development Areas	ZO § 190-114 A(3) (4) § 190-127 C(1)	In designated growth areas, new development may be required to install “dry” water and sewer lines so that a development can be connected to public water and sewer when services are available.	Done
	Zoning Ordinance § 190-190 C	The County should coordinate the technical review of large-scale development projects with various County and/or town development review agencies and private utility companies in order to insure that utilities and easements are provided in a planned and efficient manner.	Done
Sensitive Areas	Zoning Ordinance § 190-134	Forest, tree canopy and woodland resources should be conserved and, wherever possible, replenished through tree conservation measures, replanting programs, and through compliance with the Maryland Forest Conservation Act.	Done: Guidance encourages increases in tree canopy cover for its water quality, stormwater reduction, property value and aesthetic improvement. To do: Alternatives should be developed to prevent tree planting on prime agricultural soils.
	ZO § 190-123 § 190-127 County Code § 72 § 73	Local regulations should be developed which insure that the landscape be preserved in its natural state, insofar as practical, by minimizing tree and soil removal.	Done: Guidance encourages increases in tree canopy cover for its water quality, stormwater reduction, property value and aesthetic improvement. To do: Alternatives should be developed to prevent tree planting on prime agricultural soils.

Topic	Citation	Policy	Action
Sensitive Areas	Z O § 190-127C(4) § 190-190 C County Code § 70	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.	Done
		The County should continue to monitor shoreline erosion conditions and recommend appropriate standards for stabilization and protection.	To do
		Adopt legislation improving the effectiveness of all shoreline buffers for all land uses when research and science indicate such actions can improve buffer functions.	To do
Agricultural		The County will encourage the preservation of prime agricultural soil resources for agricultural, horticultural and forestry use.	Done See Agricultural and Rural Conservation
Streams and Floodplains		The County recognizes the importance of stream corridors as water quality buffers, and wildlife habitat; and encourages protection of these buffers in their undisturbed state.	Done: Maintaining natural drainage ways are a priority when approving the location of roads, placement of structures and site improvements in development plans.
		The County should continue to enforce buffer requirements for all tributary and intermittent streams in the County.	Done
		The County should specifically encourage establishing conservation easements on land that drains to Tier II waterways and in sub-watersheds where impervious coverage approaches or exceeds 10 percent.	To do

Topic	Citation	Policy	Action
Streams and Floodplains		The County recognizes the interdependence of floodplains and preservation of open space, wetlands, wildlife habitat, and stream corridors and will continue to enforce its floodplain regulations.	Done
		Development within the 100-year floodplain will be limited to minimize disturbance and protect life and property.	Done
		When sites subject to development contain land located both within and outside of the floodplain, development should be located in the area outside of the floodplain where practical.	Done The County has acquired digital elevation models (DEM) to more accurately determine location of floodplains.
		It is the County policy to continue to protect steep slopes adjacent to streams and tidal waters.	Done County site plan approval procedures require depiction of site topography and slope, and submission of a stream buffer protection plans when appropriate.
Threatened or Endangered Species		<p>It is the policy of Talbot County to:</p> <ul style="list-style-type: none"> 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; Utilize County zoning to direct intense growth and development away from threatened and endangered species habitat as part of the plan review process; Maintain low-density conservation zoning in areas where threatened and endangered species habitats have been identified; Encourage use of cluster development to restrict disturbances when development is proposed on a parcel containing listed species habitat. 	<p>Done</p> <p>To do: Incorporate threatened and endangered species habitat in required open spaces established through “Reservation of Development Rights Agreements” when required to satisfy the minimum open space requirement of cluster subdivisions or cluster subdivisions utilizing transferable development rights (TDRs).</p>
		Support the efforts of local land trusts and conservancies to protect threatened and endangered species habitat.	See Agricultural and Rural Conservation

Topic	Citation	Policy	Action
Mineral Resources		<p>The County will provide adequate regulation and monitoring of mineral extraction operations to insure compliance with applicable permitting requirements and maintain land use policies and regulations that discourage the pre-emption of mineral extraction from other uses.</p> <p>The County should not create a cumbersome permitting process that denies reasonable access by to lands with economically recoverable deposits.</p>	<p>To do:</p> <p>The County should monitor mineral resource extraction projects to ensure compliance with the zoning ordinance.</p> <p>The County should monitor the effectiveness of current zoning provisions which permit extraction activities by special exception in the RAC and RC districts.</p> <p>Maintain low permitted densities and encourage cluster development on the majority of the land area where recoverable sand and gravel deposits may be located to insure access to these resources is available in future years.</p>
		<p>The County will require that post-excavation uses for mined sites be consistent with county plans and regulations, require that any post excavation use as a rubblefill is limited to County generated rubble, and provide opportunities for construction of rubble recycling facilities in conjunction with mineral extraction facilities.</p>	
		<p>The County will utilize appropriate methods for protecting existing neighborhoods from the impacts of adjacent extraction operations and the transportation of extracted resources.</p>	<p>To do:</p> <p>Reduce impacts of mining sites to public infrastructure by identifying the additional cost resulting from an increase in mining activity.</p> <p>All new mineral extraction sites should provide a 100 foot buffer of natural vegetation between the operation and the edges of streams. Wash plants, including ponds and spoil piles, should not be located and equipment should not be stored within this buffer area.</p>
		<p>The County will identify and use any programs that can support reclamation or reforestation, of older or abandoned borrow pits or mined sites not subject to reclamation requirements.</p>	<p>To do:</p> <p>The County should seek the assistance of the Maryland Department of the Environment in conducting a site inventory as a cooperative effort.</p>