5. Stormwater and Watersheds

5.1. Introduction and Purpose

The health of the Chesapeake Bay is dependent upon a variety of factors, including point sources of pollutants (wastewater treatment plants) and non-point sources of pollutants (stormwater, septic, agriculture, resource land run-off). Water quality regulations have traditionally focused on point source pollutants because they are easier to define, test and control; however, they only constitute a minor portion of the total nutrient loading in Kent County as demonstrated in Figure 5-1. To address the non-point source pollution, Maryland has developed the Tributary Strategy Statewide Implementation Plan (Tributary Strategy). Maryland is divided into 10 tributary areas each with a Best Management Practice (BMP) implementation plan. All six watersheds in Kent County are contained within the Upper Eastern Shore Tributary Strategy Area. The non-point source element demonstrates how growth decisions at the county level can affect nutrient loading and TMDL progress. Improving the health of Chesapeake Bay by reducing storm water and non-point pollution is a process that will involve many state agencies, local governments and private citizens.

5.2. Kent County Watersheds

TMDLs are designed on two levels, the macro level of the Chesapeake Bay and the micro of individual watersheds. The Maryland Department of the Environment (MDE) characterizes watersheds by USGS hydrologic unit codes, the more digits in the code the smaller the watershed. For example each six digit watershed will contain several eight digit watersheds. Kent County is composed of six, six digit watersheds, the Upper, Middle and Lower Chester River, Still Pond-Fairlee, Sassafras River and Langford Creek Watersheds. The individual watersheds are documented and characterized in this report to more fully understand Kent County's impact on the Chesapeake Bay and comply with the requirements of the Water Resources Element. A map of the watersheds is shown in Figure 2-3. Characteristics of the watersheds are shown in Table 5-1.

MDE categorizes the streams and rivers according to impairment level at the 8 digit watershed scale. Healthy streams are listed as category 1; the numerical listing increases as the pollution level increases until category 5 (impaired streams) is reached. The category 5 streams are listed on the 303d impaired waters list. The Middle and Upper Chester River and Sassafras River watersheds contain rivers or streams that are listed on the 303d impaired waters list.

Harvesting shell fish has historically been a vital part of the economy on the Eastern Shore of Maryland. Due to degrading water quality and increased demand the Maryland Department of the Environment has restricted shell fishing in certain water bodies in Kent County. Grey's Inn Creek, Portions of the Chester River, Fairlee Creek and Worton Creek, Still Pond Creek and the Sassafras River are MDE restricted shellfish waters. The maps can be seen in Appendix 5-A.

MDE has established total maximum daily loads (TMDLs) for selected watersheds to limit the pollutants that reach the Chesapeake Bay. A TMDL is comprised of point, non-point and air deposition and the composition is demonstrated below.

The TMDLs that have been established for the watersheds in Kent County are documented in Table 5-1. TMDL details can be found in Appendix 5-B. Non-point (stormwater) sources are not fully regulated by MDE and the TMDLs are not legally enforceable at this point in time, however they may soon be and awareness is the first step in a proactive approach to meeting the TMDLs.

5.3. Growth Simulation Analysis and Non-point Source Loading Analysis

The Maryland Department of Planning has developed a non-point source nutrient loading analysis to determine how growth trends and land use decisions will impact future (2030) nutrient loading. The 2030 land use is determined by a growth simulation model, which uses 2002 land use and current growth trends as the input. Nitrogen and Phosphorus loading rates (lb/acre/year) based on current practices are applied to the 2002 and 2030 land use to establish a baseline. These baseline results can be compared to alternative scenarios.

Non-point loadings from the TMDLs have been identified for each tributary and have also been grouped by County for this plan. Tributary strategy loading rates assume that there has been 100% implementation of the tributary strategy BMPs for the Upper Eastern Shore, which are detailed in Appendix 5-C. BMPs include but are not limited to: Soil Conservation and Water Quality Plans, Precision Agriculture and Forest Buffers. Details can be seen in the Maryland Tributary Strategy Upper Eastern Shore Basin Report for 1985-2005 Data.

Non-point source analyses to examine current and future nutrient loads for the six watersheds in the county were developed by the Maryland Department of Planning, Housing, and Zoning (MDP). The results of the analysis on a county-wide basis are shown in Figures 5-2 to 5-3 and show that the majority of the nutrient loading is the result of non-point source loading from stormwater runoff from agricultural and resource lands. There will be a dramatic decrease in nutrient loadings if the non-point Tributary Strategy loading rates are achieved. There will be little difference in nutrient loading as a result of the land use change from 2002 to projected 2030 land use.

MDP has offered to model alternative scenarios for the Langford, Middle Chester, and Upper Chester Watersheds. This is where the majority of the potential growth and planning decisions will occur in the foreseeable future. The Middle Chester watershed contains Morgan Creek, which has 3 wastewater treatment plants discharging into it. Kent County would like to manage growth to minimize future deterioration the Creek. The Langford, Middle Chester and Upper Chester Watersheds contain proposed areas of growth and annexations. The alternative scenarios proposed were 1) smart growth with Tributary Strategy loading rates and 2) annexations.

Kent County is currently awaiting the results from MDP and will incorporate the results into future amendments or updates to the plan.

5.4. Stormwater

The population of the Chesapeake Bay is increasing and expanding through the process of low density development. For example, between 1990 and 2000, Bay population climbed by 8%, but impervious cover climbed by 41% and turf cover has climbed by nearly 80% (Stormwater Consortium, 2007). As land is transformed from forests to general development and agricultural land, the volume of stormwater runoff will increase. This can result in erosion in downstream water bodies and flooding of adjacent land. There will be additional nutrient and sediment loading to the local water bodies degrading the health of the water system and resulting in pollution and eutrophication of the Chesapeake Bay. Stormwater regulations have been developed to protect the water resources of Maryland, including the Chesapeake Bay, from the effect of development.

The Maryland Stormwater Management Act of 2007 was signed into law by Governor Martin O'Malley in Senate Bill 784. This Bill gives the Maryland Department of the Environment the authority to regulate stormwater throughout the state of Maryland. The state is developing model ordinances which will be

adopted by the counties. Kent County will be exempt from the NPDES Phase I and II permits but will have to comply with general regulations. The formal regulations of the stormwater management act will be finalized and communicated to Kent County in late 2008. Future updates of this plan will incorporate these regulations where appropriate.

The Stormwater Management Act of 2007 is based upon Environmental Site Design (ESD) Principles, which attempt to mimic natural hydrology on developed sites. The Stormwater Management Act of 2007 is based upon 13 core principles, which are listed below.

1. Increase Onsite Runoff Reduction Volumes
2. Require a Unified Early ESD Map
3. Establish Nutrient – Based Stormwater Loading Criteria
4. Apply ESD Technique to Redevelopment
5. Integrate ESD and Stormwater Together at Construction Sites
6. Provide Adequate Financing to Implement the Act and Reward Early Adopters
7. Develop an ESD Ordinance that Changes Local Codes and Culture
8. Strengthen Design Standards for ESD and Stormwater Practices
9. Ensure All ESD Practices can be Adequately Maintained
10. Devise an Enforceable Design Process for ESD
11. Establish Turbidity Standards for Construction Sites
12. Craft Special Criteria for Sensitive and Impaired Waters of the State
13. Implement ESD Training, Certification and Enforcement

Kent County implements the stormwater management through the Kent County Code Chapter 210 Stormwater Management and its Land Use Ordinance as amended which sets regulations governing stormwater in Section 10 Stormwater Management. This ordinance encourages responsible growth and establishes minimum requirements protect the health of the Chesapeake Bay with procedures to control adverse impacts associated with increased stormwater runoff. Kent County promotes the use of non-structural stormwater BMPs over structural BMPs. Kent County also regulates agricultural, residential and commercial landowners to utilize technology to reduce the volume and improve the quality of runoff from their property.

5.5. Kent County On-Site Disposal Systems and Problem Areas

Onsite Sewage Disposal Systems (OSDSs) are a valuable investment in rural areas where sewer service is not available. While OSDSs perform a valuable function for rural residents, if not properly maintained, they can become a public health hazard through bacterial groundwater and potential nitrogenous contamination. Residents are expected to comply with Kent County policy, which is to abate and prevent OSDS failures and subsequent public health emergencies. Several areas in Kent County are not in compliance and have bacterial contamination of the ground water used for domestic consumption. Abatement of OSDS problem areas will decrease non-point discharge of nitrogen to the watersheds. These areas include the communities of Chesapeake Landing, Golts, Still Pond/Coleman, and Lover's Lane. Figure 5-4 shows the location of the problem areas. Some of these areas have been addressed through water or wastewater service; other areas are in the planning stage. The current status of these areas is as follows.

- Chesapeake Landing is a large existing subdivision with small lots and failing septic systems. The county has decided to proceed with a study to determine the feasibility of providing water and sewerage service to the area.

- The Sharptown area along with the Wesley Chapel corridor, Skinners Neck and Piney Neck areas are currently being provided with sewer service. The Wesley Chapel corridor is currently provided water by the town of Rock Hall, the line is extended to Edesville system for an emergency backup system.

- The Spring Cove and Green Lane areas have been connected with sewer service from the Town of Rock Hall. No water service is planned at this time.

- There is no water or sewer service planned for the Golts area in the near future.

- The Still Pond/Coleman area is being considered for a feasibility study for sewer service by the Town of Betterton or a new facility to serve both the Still Pond/Coleman area and the town.

- Allen's Lane is served by the Rock Hall system.

- Lover's Lane near Chestertown is being considered for sewer service by expansion of the Quaker Neck service area. A feasibility study is under consideration by the county.

Recognizing the potential impact on both local and downstream water quality, Maryland's Tributary Strategy includes an OSDS element. The Bay Restoration Fund Program estimates that on average 12.2 pounds of nitrogen per year per OSDS reaches surface water. OSDS upgrade goals are:

- One hundred percent of new OSDSs installed beginning in 2010 will include enhanced denitrification technology.

- One hundred percent of all existing septic systems will need to be upgraded to improve nitrogen removal.

While the Tributary Strategy assumes one hundred percent implementation of upgraded OSDSs is necessary to close the gap for reducing nitrogen loading to the Bay, the Trib Strategy recognizes the difficulty of achieving the goal of upgrading one hundred percent of OSDSs. Currently, no legislative mandate exists to enforce upgrading OSDSs. Funding through the BRF program has overcome some implementation barriers.

MDE has estimated that Kent County has approximately 4,850 OSDSs. The Kent County Department of Water and Wastewater Services, Department of Public Works, and the Department of Health have been jointly participating in the BRF OSDS Grant Awards and Installations Program. To date, the County has received $597,000 in grants to upgrade qualifying onsite systems and has installed 26 upgrades. Kent County's BRF plan targets OSDSs in the Critical Area. The County's current comprehensive plan promotes the use of BAT systems, but with this funding mechanism in place, they will be able to provide better awareness of these types of units. The County intends to use the data gathered under this program to assist in developing future watershed restoration strategies for the remaining five watersheds within the County boundaries.

5.6. Agricultural Nonpoint Source Analysis

The Agriculture Strategy element of the Tributary Strategy includes a plan to work with Maryland's farm community to implement a range of BMPs on farmland across the watershed to reduce nutrient and sediment loads. These BMPs are conservation practices that accomplish water quality goals while balancing the needs of crop and livestock production. This strategy has significantly expanded BMP options, including more than 23 different practices that work to protect the soil and natural resources.

Projected statewide implementation schedules emphasize cost effective practices and the need to continue to pursue additional state and federal funding to increase implementation rates.

The County promotes the use of best management practices and support for full funding of technical assistance and cost share programs. Farms are employing best management practices, however, there is a need to develop comprehensive farm management plans and update existing practices. Comprehensive farm management means coordinated nutrient and erosion control practices, which are one of the best ways to mitigate the environmental impacts of agriculture. One way to introduce new practices to farmers, contractors and the community is with agricultural and habitat restoration field days. Increased funding is necessary to provide the technical assistance to prepare the plans and the cost share to then implement the plans.

NRCS, MDA and the Kent Soil and Water Conservation District, known collectively as the District, work together to promote best management practices that address nonpoint source pollution on agricultural land in the County and align with the Tributary Strategy for Agriculture. The goals of this partnership include protection of the soil resource base from degradation by erosion and the protection of surface and groundwater from excessive sedimentation and detrimental runoff from animal waste, nutrients and pesticides.

The District promotes and develops complete conservation plans on all agricultural land including Comprehensive Nutrient Management Plans, Grazing Plans, Prescribed Burn Plans, and Irrigation Water Management Plans. Technical assistance is provided to all agricultural landowners and operators with the planning, design, and implementation of BMPs. A priority has been placed on innovative BMP development for nurseries. Some of the typical BMPs routinely implemented by producers in the county include no-till and conservation tillage, nutrient management, cover crops, riparian herbaceous and forested buffers, filter strips, grassed waterways, grade stabilization structures, sediment ponds, shallow water wildlife areas, waste storage facilities, micro-irrigation, and prescribed grazing.

The District promotes participation in federal, state and local conservation programs by providing outreach, education, planning and technical assistance to county landowners and operators on Farm Bill Conservation Programs (EQIP, WHIP, AMA, CSP, CRP and CREP) and MDA Conservation Programs (MACS, Cover Crop, Manure Transport, Nutrient Management). The District staff is responsible for the administration of the MDA conservation programs. NRCS has program management responsibility for all Farm Bill Conservation Programs except CRP and CREP which is managed by the USDA Farm Service Agency

5.7. Current Programs

A critical water quality issue for water bodies in and bordering Kent County is nitrogen and phosphorus from non-point sources. The problem and its mitigation is a long term prospect based on implementation of OSDSs and Best Management Practices (BMPs) by the County, state and federal agencies and corresponding programs and is at a broad planning level of detail. This element of this document is a starting point for future non-point source analyses requiring collaboration of many agencies.

Kent County, through the Kent County Code, its Zoning, Land Use Ordinance/Stormwater Management Ordinance, Comprehensive Plan, Draft Village Master Plans, Watershed Restoration Action Strategies, and Total Maximum Daily Load Committee's Draft Local Implementation Plan, promotes growth that will minimize future deterioration of watersheds and further encourages improvements to all of its watersheds.

The County has completed and is currently pursuing a wide variety of both funded and unfunded water quality improvement initiatives including but not limited to the following:

- Middle Chester River Watershed Restoration Action Strategy
- Upper Chester River Watershed Restoration Action Strategy
- Early Action Compact
- Draft Kent County Local Basin Implementation Plan
- Draft 2010 Trust Fund Program for the Middle Chester River
- Hazard Mitigation Plan
- Kent County Bay Restoration Fund Program

There are many state agencies and sources of funding providing assistance for TMDL non-point source program implementation. Several state agencies and funding sources are available to assist land owners in participating in the TMDL program. All of the initiatives noted below are also listed in the Kent County Local Basin Implementation Plan, along with the project goals and outcomes of each initiative.

OSDSs (Conversion to Denitrifying OSDSs)
- Maryland Department of the Environment (Bay Restoration Fund)

Riparian Buffers
- Conservation Reserve Enhancement Program (CREP)
- Chesapeake Bay Foundation
- Ducks Unlimited
- Maryland Department of Agriculture (MACS) Forest Conservation
- Maryland State Woodland Incentive Program
- USDA Stewardship Incentive Program (WIP)

Wetland Restoration
- USDA Wetland Reserve Program (WRP)

Improve Fish and Wildlife Habitat
- USDA Wildlife Habitat Incentive Program (WHIP)
- Fish and Wildlife Service (FWS)

Cover Crop
- Maryland Department of the Environment (Bay Restoration Fund)

The programs listed above are meant to assist landowners in implementing BMPs and to help to achieve the TMDLs; however no one landowner or government agency can solve the problem independently. Achieving TMDLs and improving the water quality of the Bay will require the cooperation of different state agencies, counties and individual stake holders for many years.

5.8. Funding Sources for Non-Point Source Programs

Programs providing funding to address non-point sources of nitrogen, phosphorus, and other pollutants include the following:

- OSDSs (Conversion to Denitrifying OSDSs)

  The Kent County Department of Water and Wastewater Services, Department of Public Works, and the Department of Health have been jointly participating in the BRF OSDS Grant Awards

and Installations Program. To date, the County has received $597,000 in grants to upgrade qualifying onsite systems and has installed 26 upgrades.

- Environmental Quality Incentives Program (EQIP)
  EQIP provides financial assistance of up to 75% for the installation of BMPs, with a maximum of $450,000 for any individual or eligible entity through 2007. Approximately 60% of the funds are directed to livestock related conservation practices. Funds are also available to address locally identified conservation concerns. Contracts are from 1 to 10 years in length. The program is administered by the Natural Resource Conservation Service (NRCS) through local Soil Conservation Districts. Projects may be co-cost-shared with MACS Program support.

- Wildlife Habitat Incentive Program (WHIP)
  WHIP provides cost-share assistance to private landowners to help them enhance wildlife habitat areas on their lands. WHIP complements other cost share/incentive programs and provides a mechanism capable of overcoming two major obstacles to increasing wildlife habitat area. First, WHIP compensates landowners for the lack of market incentive to invest in public goods, such as watershed and wildlife protection. Second, it encourages landowners to make long term investments in maintaining the natural resource base (particularly land management practices capable of improving habitat areas).

- Agricultural Management Assistance (AMA)
  AMA provides cost share assistance to agricultural producers to voluntarily address issues such as water management, water quality, and erosion control by incorporating conservation into their farming operations. Authorized by the Agricultural Risk Protection Act of 2000, AMA is available states where participation in the Federal Crop Insurance Program is historically low.

- Conservation Security Program (CSP)
  This program supports ongoing conservation stewardship of agricultural lands by providing assistance to producers to maintain and enhance natural resources. Administered through NRCS, it provides tiered payments to qualified farmers who are managing natural resources on their farms to achieve certain levels of soil and water quality as well as other identified natural resource objectives. Cost-share is also available to enhance current conservation efforts. Farmers in the Chester-Sassafras watersheds are eligible for this program.

- Conservation Reserve Program (CRP)/ Conservation Reserve Enhancement Program (CREP)
  The USDA administers these programs. They are designed to set aside and implement conservation measures to protect highly erodible land and other sensitive farmland for a period of 10 to 15 years. CREP also targets the creation of riparian buffers and wetland restoration. The State also offers cost-share through the MACS Program for installation of BMPs and may purchase easements under CREP.

- Maryland Agricultural Water Quality Cost-Share (MACS) Program
  MACS was established by State law in 1984 to help farmers control nutrient runoff and protect water quality and natural resources on their farms and comply with Federal and State environmental regulations. MACS provides farmers with grants to cover up to 87.5% of the cost to install BMPs on their farms to control soil erosion, manage nutrients, and safeguard water quality. A maximum funding level of up to $20,000 per project and $50,000 per farm applies. Farmers receiving MACS funds for animal waste treatment and containment projects may receive up to $75,000 per project with a maximum of $100,000 per farm when combined with other BMPs. In many instances, MACS and U.S. Department of Agriculture (USDA) funds may be combined.

- Cover Crop Program

  The Cover Crop Program provides cost share assistance to farmers to implement this BMP through the BRF. Since October 1, 2005, a $30 annual fee is collected from each home served by an OSDS. The total estimated program income is $12.6 million per year in Maryland. Forty percent of these funds will be used for cover crops. Cover crops absorb unused crop nutrients remaining in the soil following the fall harvest and act as a ground cover to keep the soil from eroding during the winter months. Maryland continues to refine the program, providing tiered incentives to encourage early planting, which maximizes nutrient uptake. Cost-share support is administered through MACS.

- Manure Transport

  This program provides cost-share assistance of up to $20 per ton to transport manure from animal operations with excess waste or documentation of phosphorus over-enrichment to farms where it is land applied in accordance with a nutrient management plan or for alternative uses. Poultry companies provide a 50% match for litter transported from their growers' farms. Cost-share support is administered through MACS.

- Maryland Nutrient Management Program

  This program provides financial and technical assistance to farmers to help them meet requirements of the Water Quality Improvement Act. Farmers who have a gross income of $2,500 or more or who have 8,000 pounds or more of animals must have a nutrient management plan. Nutrient management plans address the timing, application, and management of all nutrient sources used in the farming operation. The Maryland Department of Agriculture (MDA) certifies and licenses private and public sector nutrient management consultants who provide technical assistance in the development and implementation of nutrient management plans. Maryland Cooperative Extension develops nutrient management plans for farmers and trains consultants and farmers to become certified planners, enabling farmers to prepare their own plans. Cost share for private sector development of plans is available from MACS or the Environmental Quality Incentives Program (EQIP).

- Wetland Reserve Program (WRP)

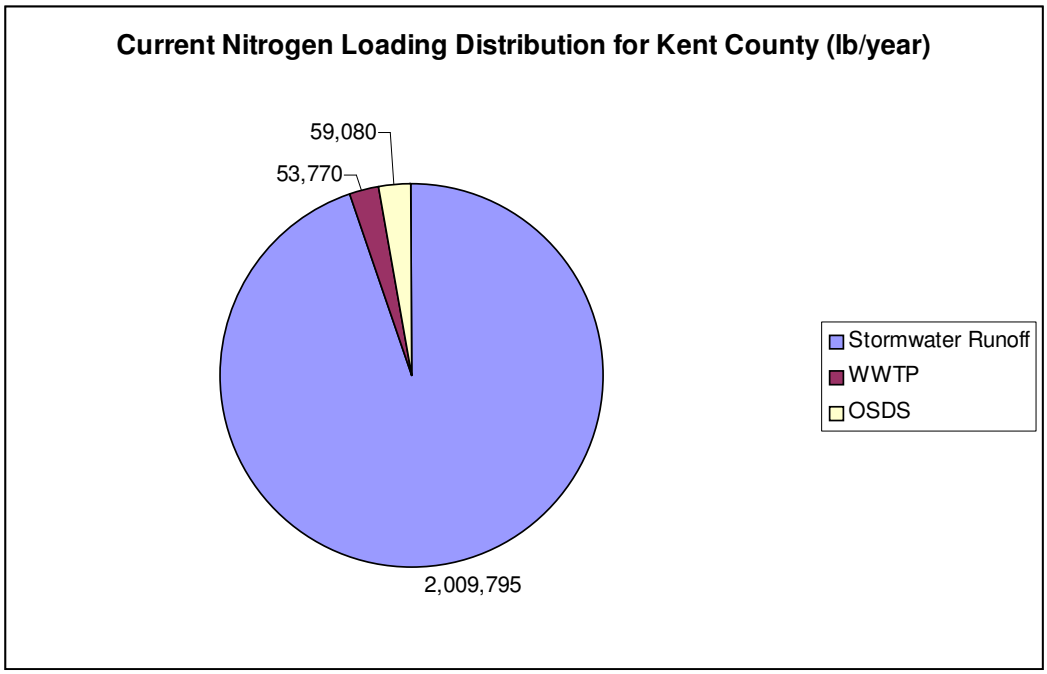
  NRCS administers this program to provide financial incentives to landowners seeking to restore nontidal wetlands. Payment includes compensation for a wetland easement as well as cost-share funding to restore wetlands. There are three options for participants:
  - Permanent easements are conservation easements in perpetuity. USDA pays for the easement as well as 100% of the cost of restoring the wetland.
  - A 30-year easement is a conservation easement lasting for 30-years. USDA pays 75% of what would be paid for a permanent easement as well as 75% of restoration costs.
  - A restoration cost-share agreement is an agreement to reestablish a degraded or lost wetland habitat. USDA pays 75% of the restoration costs. This does not place an easement on the property. The landowner provides the restoration site without reimbursement and agrees to maintain it for a minimum of 10-years.

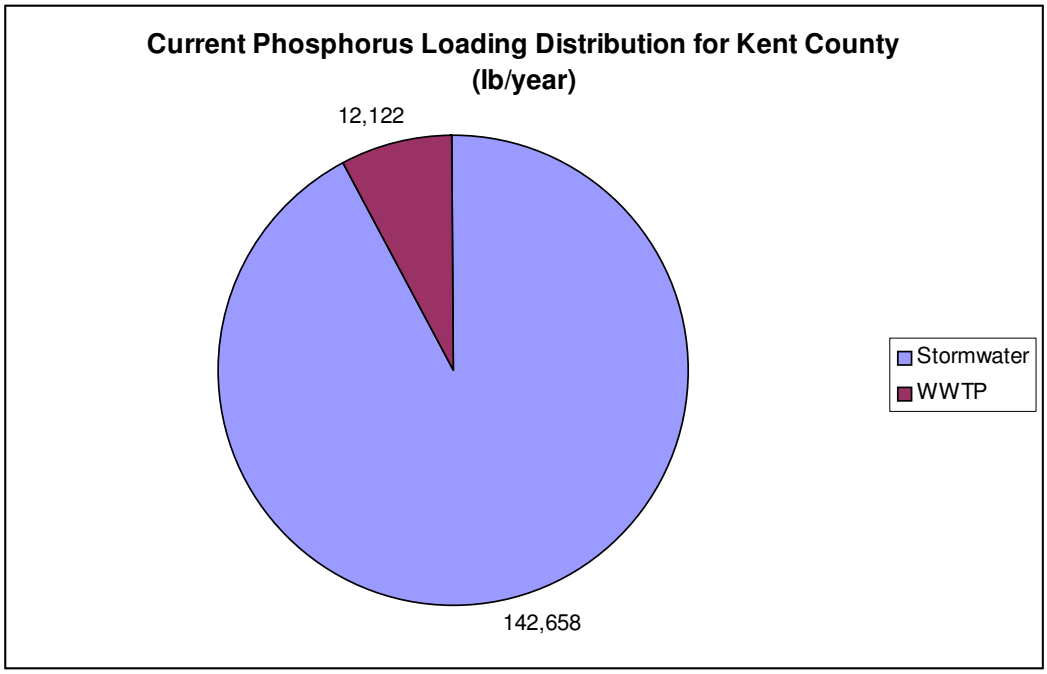
The programs, subject to annual appropriations and eligibility listed above are meant to assist landowners in implementing BMPs and to help to achieve the programs that foster achieving TMDLs. No one landowner or government agency or program can solve the problem independently. Achieving TMDLs and improving the water quality of the Bay will require the cooperation of different state agencies, counties and individual stake holders for many years. Funding support will be an appropriate incentive to advance the programs.

Table 5-1 Characteristics of Kent County, MD Watersheds

Watershed	Area (Acres)	Wastewater Plants located in Watershed	TMDL	Date	303D Impaired List (Category 5) Environmental Concern
Upper Chester River	87,980	Millington WWTP	Nitrogen Phosphorus	November 28th, 2006	Combination Benthic Fishes Methylmercury-Fish Tissue Atmospheric Deposition Toxics Fecal Coliform
Middle Chester River	39,948	Chestertown WWTP Kennedyville WWTP Worton WWTP Velsicol WWTP	Nitrogen Phosphorus Nitrogen (Worton) Phosphorus (Worton)	November 28th, 2006 February 6th, 2002	Contaminated Sediments Fecal Coliform PCB in Fish Tissue
Sassafrass River	56,935	Galena WWTP Betterton WWTP	Phosphorus	April 1st, 2002	PCB in Fish Tissue Contaminated Sediments
Lower Chester River	82,241	Rock Hall WWTP	None		
Langford Creek	27,025	None	None		
Stillpond Fairlee	40,909	Tolchester WWTP Great Oaks Resort Club WWTP	Nitrogen (Still Pond) Phosphorus (Still Pond) Nitrogen (Fairlee) Phosphorus (Fairlee)	March 25th, 2002 March 18th, 1999	Nitrogen

Figure 5-1 Nutrient Loading Distribution for Kent County (Draft)





MDP, 2008

Figure 5-2 Total Nitrogen Load for Kent County (MDP, 2008)

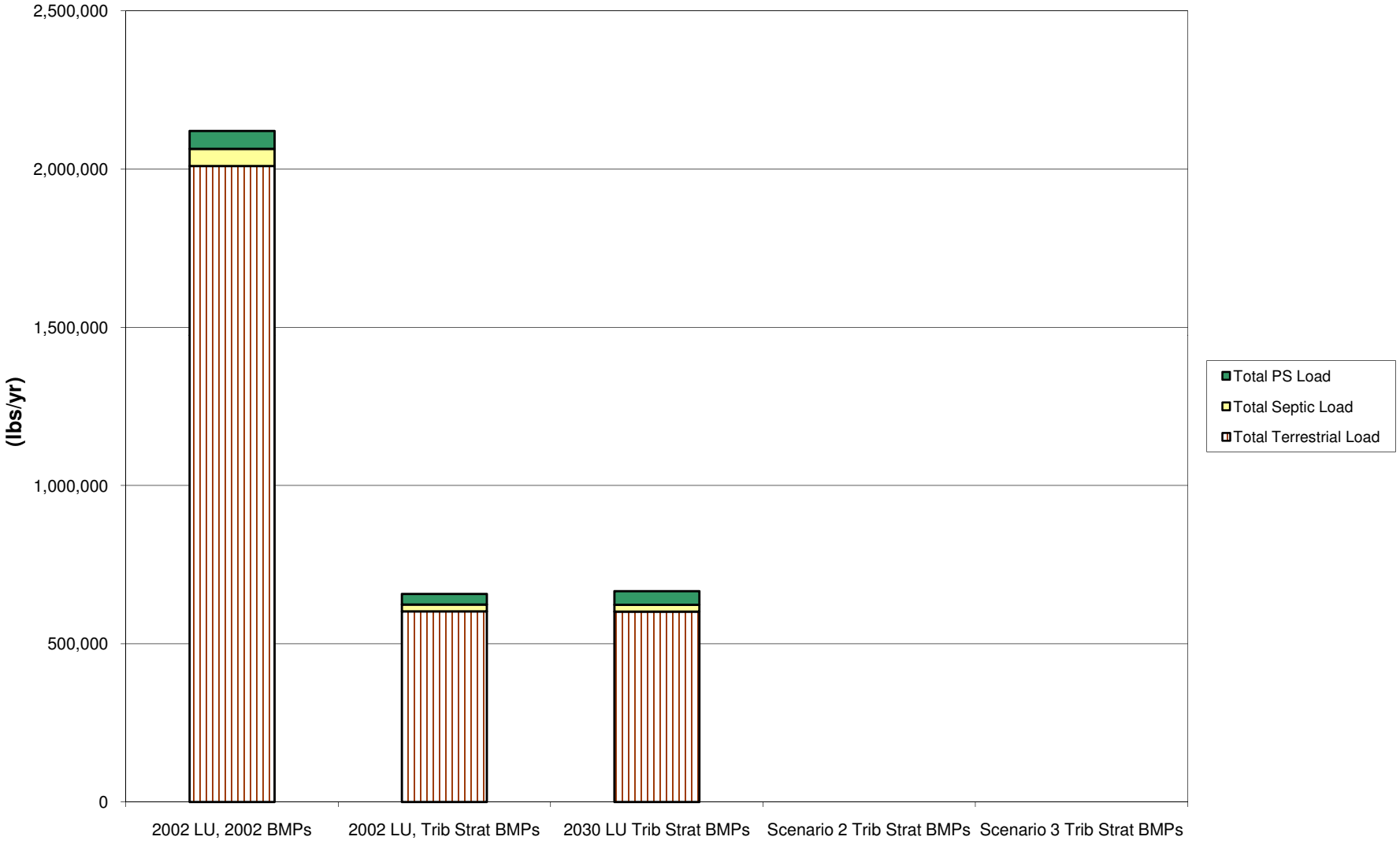
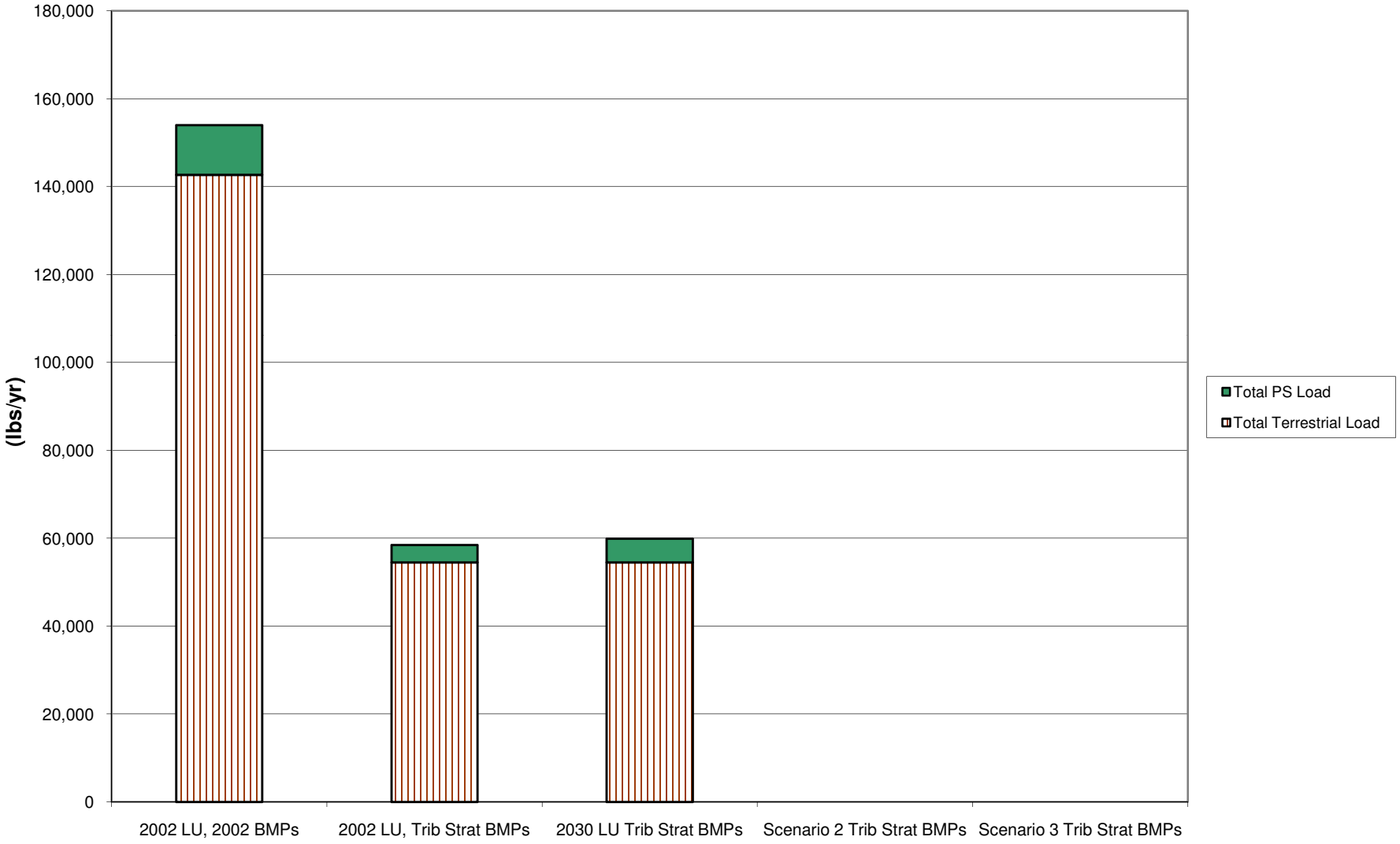


Figure 5-3 Total Phosphorus Load for Kent County (MDP, 2008)



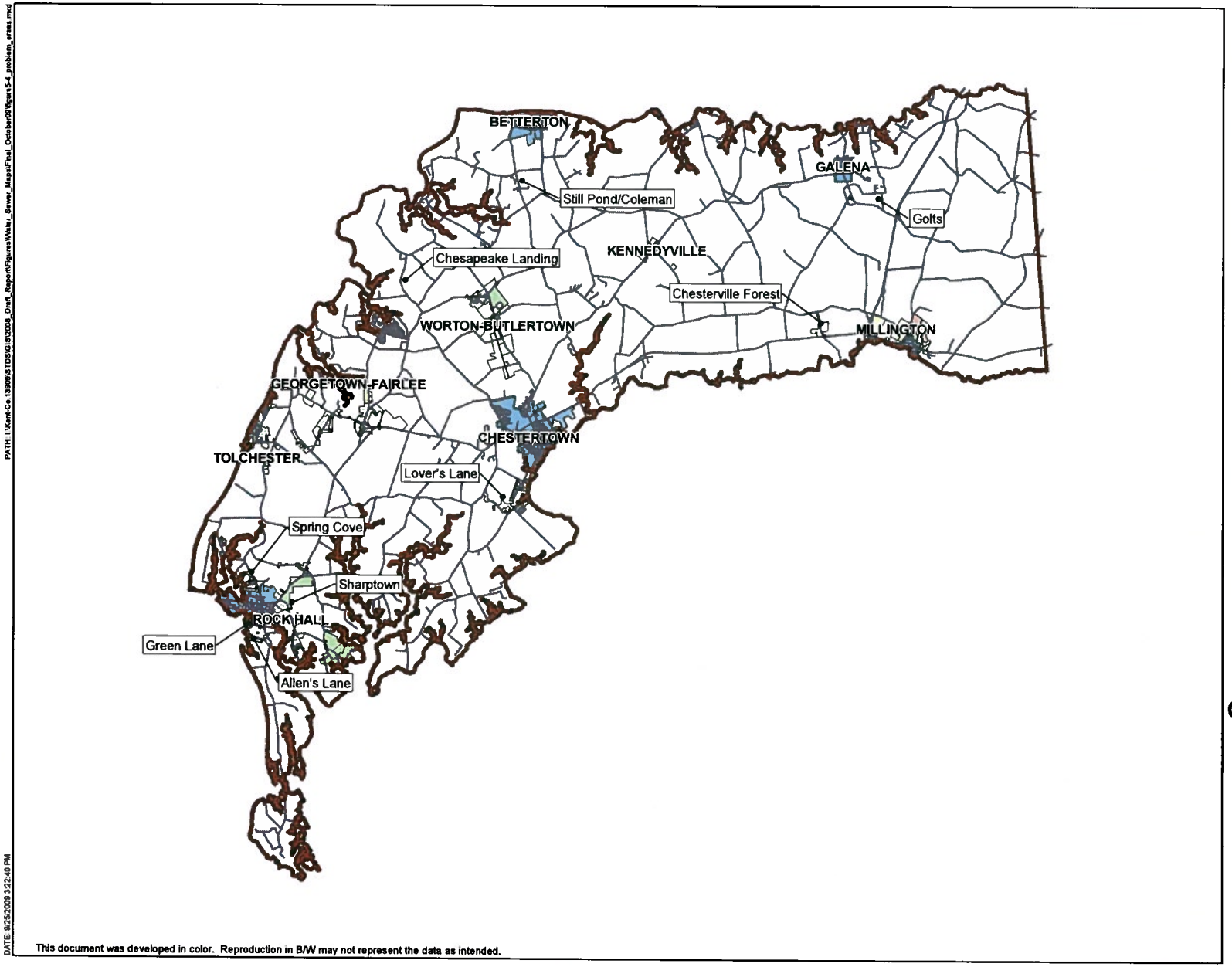


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FIGURE 5-4

N

LEGEND

- Existing Town Service
- Existing County Service
- Proposed Town Service
- Proposed County Service
- Incorporated Town
- County Boundary
- Road

Sassafras River Problem Areas will be added upon completion of future study.

KENT COUNTY
COMPREHENSIVE WATER & SEWER PLAN 2009

KENT COUNTY OSDS PROBLEM AREAS

0 1.5 3 6
Miles

OCTOBER 2009
13909/42582

O'BRIEN & GERE